TORQ-MATIC WRENCH
PRODUCT BULLETINS

CANRIG PRODUCT BULLETIN MANUAL

Printed in the United States of America.

CANRIG
DRILLING TECHNOLOGY LTD.

TABLE OF CONTENTS

PRODUCT BULLETIN NUMBER: WRENCH 001

PRODUCT: Torqu-Matic Wrench **DATE:** May 22nd, 2008

SUBJECT: **Leaking fittings within the hydraulic valve banks.**

SERIAL NUMBERS: **All TM Series Wrenches**

DISCUSSION: It has been brought to Canrig's attention that the BSPP fittings for the HAWE valves that Canrig specifies for use with our valves have been being replaced or assembled with the equivalent fittings from various vendors.

RECOMMENDATION:

The fittings recommended by Canrig in these locations can NOT be substituted with equivalent fittings, as the equivalent fittings from other suppliers do NOT come with the O-Ring and Retaining Seal. Therefore they require the use of a Douty washer, which is not withstanding the pressures seen in this valve body and they are leaking. If any of your fittings on your valves have the Douty washer installed along with it and are leaking, please contact Canrig and have these replaced with the correct fittings.

DESCRIPTION	ATTRIBUTE VALUE
PRODUCT TYPE	FITTING, INDUSTRIAL TUBE TO STRAIGHT THREAD
TUBE SIZE	18,20mm, 3/4"
TUBE CONNECTION	Male 37 deg Flare
STRAIGHT THREAD SIZE	3/4"
STRAIGHT THREAD CONNECTION	Male BSPP; NBR seal
MATERIAL	Steel, zinc plated
ADDITIONAL DETAIL	
TRADE/BRAND NAME	Triple-Lok
SYNONYM	JIC, 37 deg Flare

INFORMATION: *For a complete list of all bulletins go to* ***www.canrig.com***

For further information contact:

Field Service
Canrig Drilling Technology Ltd.

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Fax: 403.233.2667

PRODUCT BULLETIN
NUMBER: WRENCH 002

PRODUCT: WRENCH MAIN BOOM **DATE:** JULY 29, 2008

SUBJECT: **CYLINDER MOUNT GUSSET FAILURE ON MAIN BOOM**

SERIAL NUMBERS: **ALL AFFECTED WRENCHES**

DISCUSSION:

Canrig Engineering has been informed that cylinder mounts on the early production main booms are failing. This is occurring on the older arms which only have three structural gussets around the cylinder mount tubes

This issue only needs to be corrected if there is cracking in the welds or failures of any sort around the cylinder mount tubes.

RECOMMENDATION:

A document has been created with complete instructions for repair and rework. This document is 188200003.E.

Please contact Canrig Field Service for a copy of the repair document and the parts required for the repair.

INFORMATION: *For a complete list of all bulletins go to **www.canrig.com***

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PRODUCT BULLETIN NUMBER: WRENCH 003

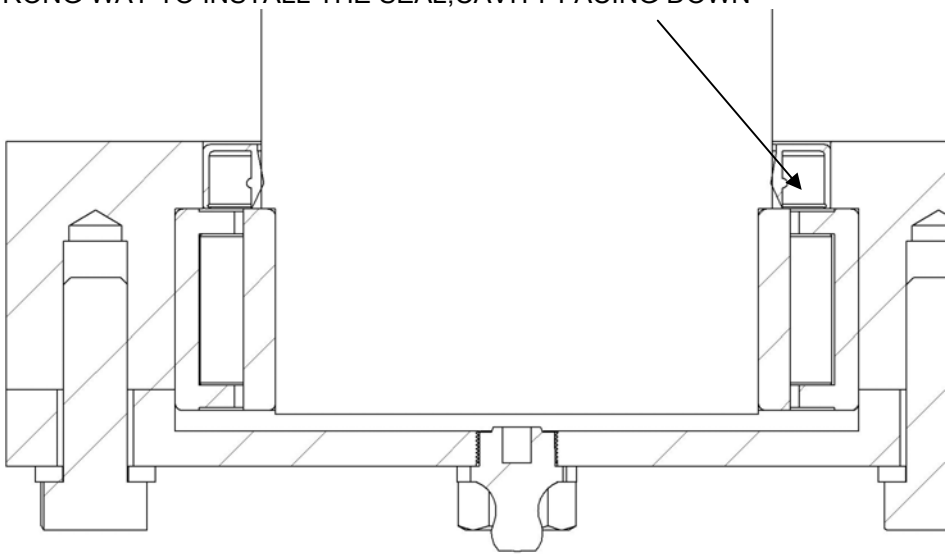
PRODUCT: TM-80 **DATE:** Apr 27/09

SUBJECT: Orientation of spinner roller seals

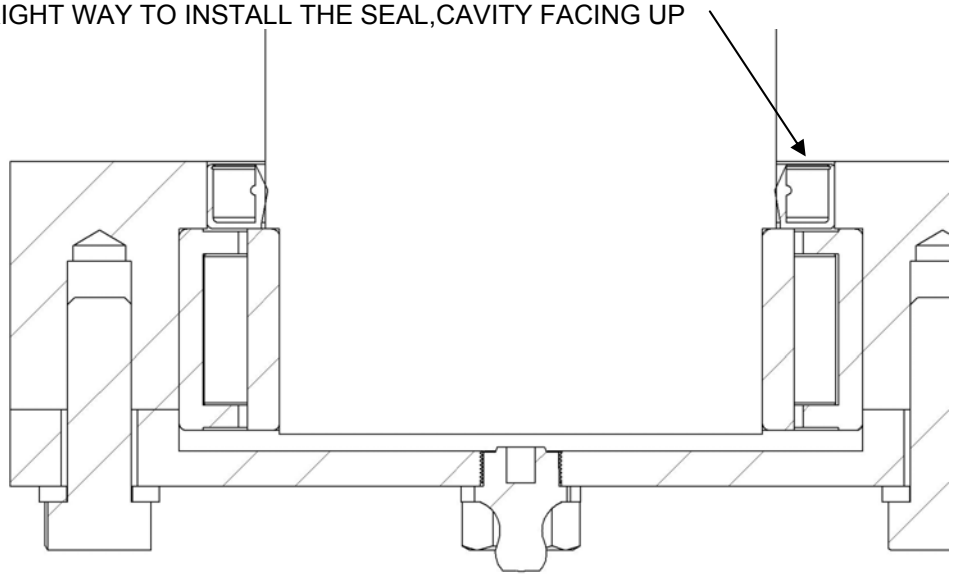
SERIAL NUMBERS: **ALL**

DISCUSSION: CANRIG has discovered that early production units of the TM-80 may have had the grease seals installed upside down. This prevent excess grease and pressure from exiting the cavity and may eject the seal or push the roller shaft up.

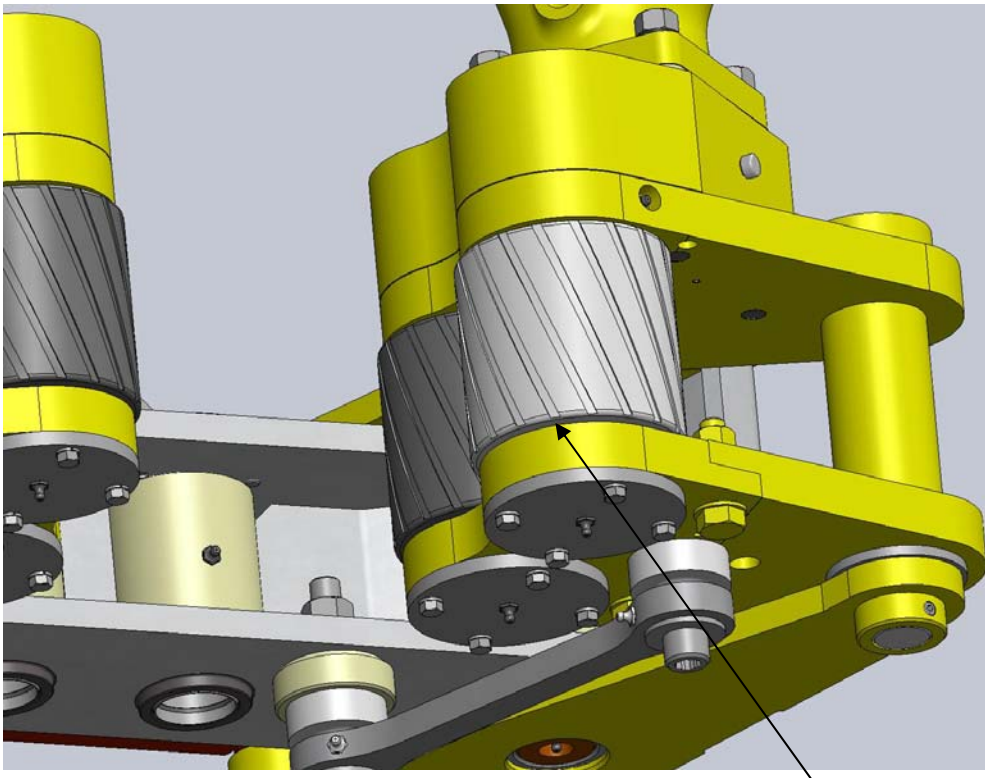
WRONG WAY TO INSTALL THE SEAL,CAVITY FACING DOWN



RIGHT WAY TO INSTALL THE SEAL,CAVITY FACING UP



RECOMMENDATION:



GREASE SHOULD BE VISIBLE UNDER ROLLER

Check seal orientation by greasing spinner roller shafts, grease should come out under rollers. If not the seal is installed upside down, unscrew grease nipple to release excess pressure.
Contact CANRIG to ship 4 of seal P/N S10104 and 4 of bearing P/N M10644
See DWG # 188200005 for installation instructions.

INFORMATION:

For a complete list of all bulletins go to ***www.canrig.com***

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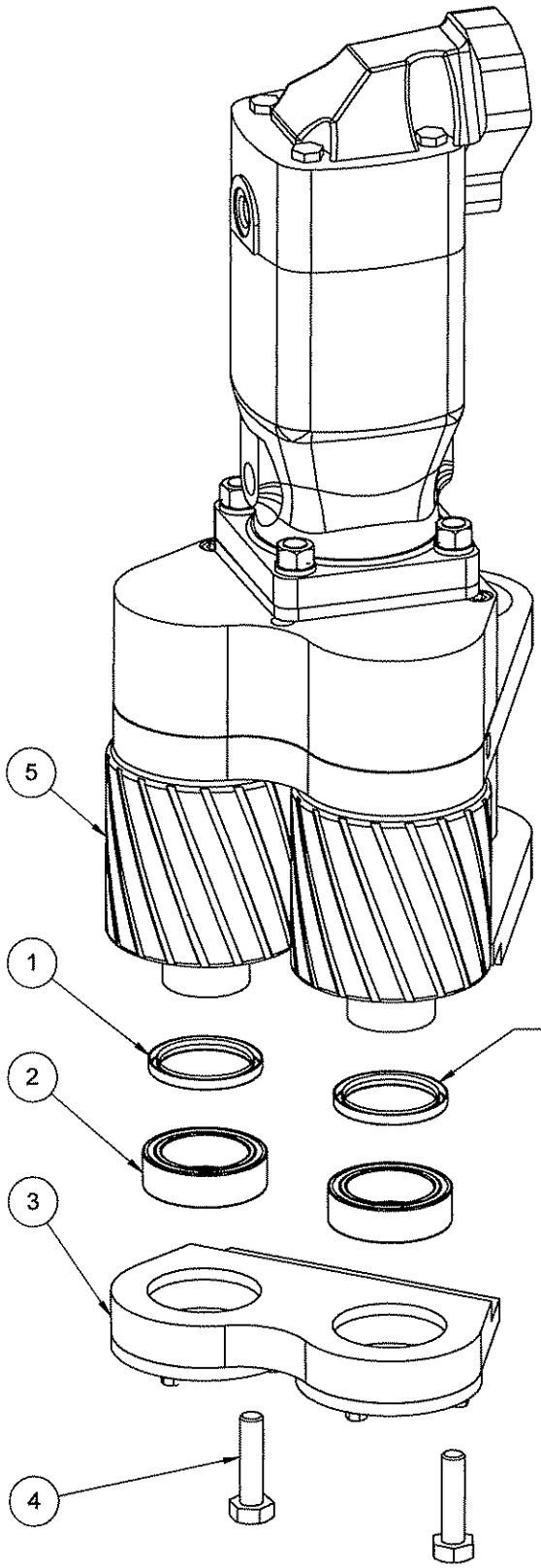

SEALS CAVITY HAS TO FACE UPWARDS

SPINNER ROLLER SEAL /BEARING REPLACE INSTRUCTION

1. REMOVE LINK ARM (NOT SHOWN - 3/4" BOLT)
2. RETAIN ITEM #5 ROLLERS FROM FALLING DOWN
3. UNSCREW ITEM #4 (2 - 5/8") BOLTS
4. REMOVE ITEM #3 SPINNER LOWER PLATE
5. REPLACE ITEM #1 WITH NEW SEALS (2)
6. REPLACE ITEM #2 WITH NEW BEARINGS (2) (MAY HAVE TO UNBOLT (8 - 5/16") AND REMOVE BOTTOM COVER PLATES (2) IN EVENT OF ANY DIFFICULTIES REMOVING BEARINGS)
7. ASSEMBLE IN REVERSE ORDER

REV.	DESCRIPTION	DATE
A	RELEASE TO PRODUCTION	4/30/2009
00		4/30/2009

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TITLE:

TM-80 SPINNER ROLLER SEAL INSTALLATION

DRAWN BY:	DATE:	DRAWING NO:	SHEET:	REV:
-	4/27/2009	188200005	1 OF 1	A

PRODUCT BULLETIN NUMBER: WRENCH 004

PRODUCT: TM-80 JEEP ASSY **DATE:** February 11, 2010

SUBJECT: **Shearing Belleville Stack Mounting Studs**

SERIAL NUMBERS: **2 - 101**

DISCUSSION: There is a potential for the mounting stud for the Belleville Washer Stack to shear at the thread where it is screwed into the Jeep Carriage Frame.

RECOMMENDATION: It has been determined that there is a possibility the Belleville Mounting Studs on the Jeep Assembly will shear. If this happens, the Spinner/Jeep Assembly will lean at an angle towards well center rather than vertical. Clamping onto drill string in this position will cause the Spinner/Jeep Assembly to violently snap into position, causing damage to the Jeep Assembly, Link Arms and Jeep Rear Mounting Plate.

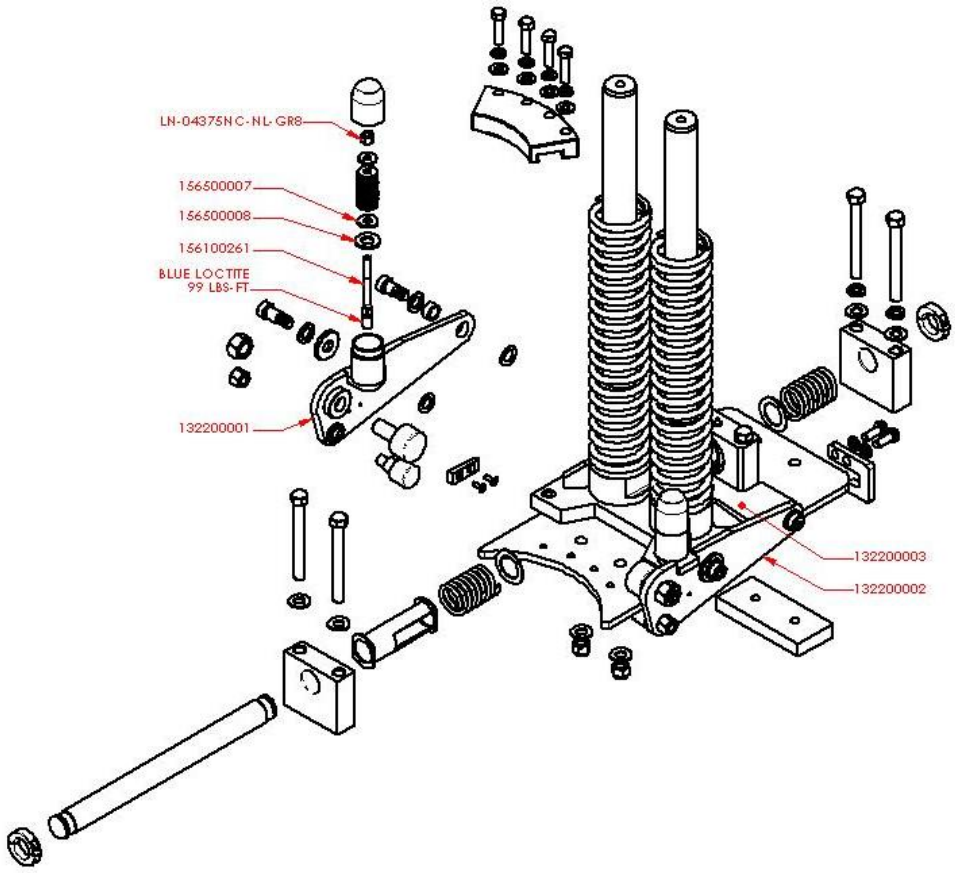
The “Frame, Jeep Carriage, TM-80”, left and right “Side Arm, Spinner Track Jeep”, “Stud, Mounting, Belleville Washer Stack” are modified designs that need to replace the old parts. Also, there are 2 washers made from UHMW that need to be installed under the Belleville Stack to allow free movement of the assembly.

In order to complete the retrofit, the kit needed is:

1 EA – 112200008 – KIT, RETROFIT, BELLEVILLE MOUNTING STUD

The retrofit kit consists of these parts:

1 EA - 132200001 - SIDE ARM, L, SPINNER TRACK JEEP, TM-80
1 EA - 132200002 - SIDE ARM, R, SPINNER TRACK JEEP, TM-80
1 EA - 132200003 - FRAME, JEEP CARRIAGE, TM-80
2 EA - 156100261 - STUD, MOUNTING, BELLEVILLE STACK, TM-80
2 EA - 156500007 - WASHER, FLAT, 1.25 OD X .50 ID X .125
2 EA - 156500008 - WASHER, FLAT, 1.50 OD X .75 ID X .125
2 EA - LN-04375NC-NL-GR8 - LOCKNUT, 7/16-14 UNC, NYLOCK, GR8
3 EA - H15-070109-08, PLUG, 1/2 JIC, HEX HEAD
3 EA - H15-070112-08, CAP, 1/2 JIC
2 EA - H15-070109-12, PLUG, 3/4 JIC, HEX HEAD
2 EA - H15-070112-12, CAP, 3/4 JIC



Spinner Track Jeep Removal Procedure:

1. (Refer to 102100002) Remove hoses from Spinner Bulkhead and terminate with the kit supplied hose end caps.

2. Remove Rod End Cap (Item 7) from the Vertical Spinner Rods (Item 3 on 122200021).

3. Lift the Spinner Assembly (Item 3) off the Jeep Assembly (Item 4).

4. Remove the Jeep Retainer (Item 14 on 112200006) and unbolt the Jeep from the Rear Mounting Plate (Item 9).

5. Remove the Spinner Track Jeep Assembly (Item 4) and set on a workbench for rebuilding.

Jeep Disassembly Procedure:

1. (Refer to 112200006) Remove the lower cam follower (Item 17) from the side plates (Items 3 & 4), spread side plates apart and remove the Jeep from the base plate (Item 2).

2. Remove Belleville Spring Stack cap (Item 12), nylock nut (Item 36), flat washer (Item 31), Belleville springs (Item 16) and all components and hardware from the side plates. Remove the Belleville studs (Item 11) and side plates (Items 3 & 4).

3. Discard the left and right side plates, Belleville studs and the nylock nuts for the stud. These parts will not be used again.

4. (Refer to 122200021) Disassemble the Jeep and discard the Jeep Carriage Frame (Item 1).

Jeep Reassembly Procedure:

1. (Refer to 122200021) Reassemble the Jeep Carriage.

2. (Refer to 112200006) Screw in new Belleville Stud ((Item 11) 156100261) into the new Jeep Frame (Item 1 on 122200021). Use blue Loctite and tighten to 99 lbs-ft.

3. Install components and hardware onto the new sideplates (132200001 (Item 4) & 132200002 (Item 3)).

4. Install the new sideplates onto the Jeep Carriage (Item 1) and assemble the rest of the components excepting the Belleville washer stack (Item 16), UHMW washers (Items 40 & 41), flat washer (Item 31) and nylock nut (Item 36).

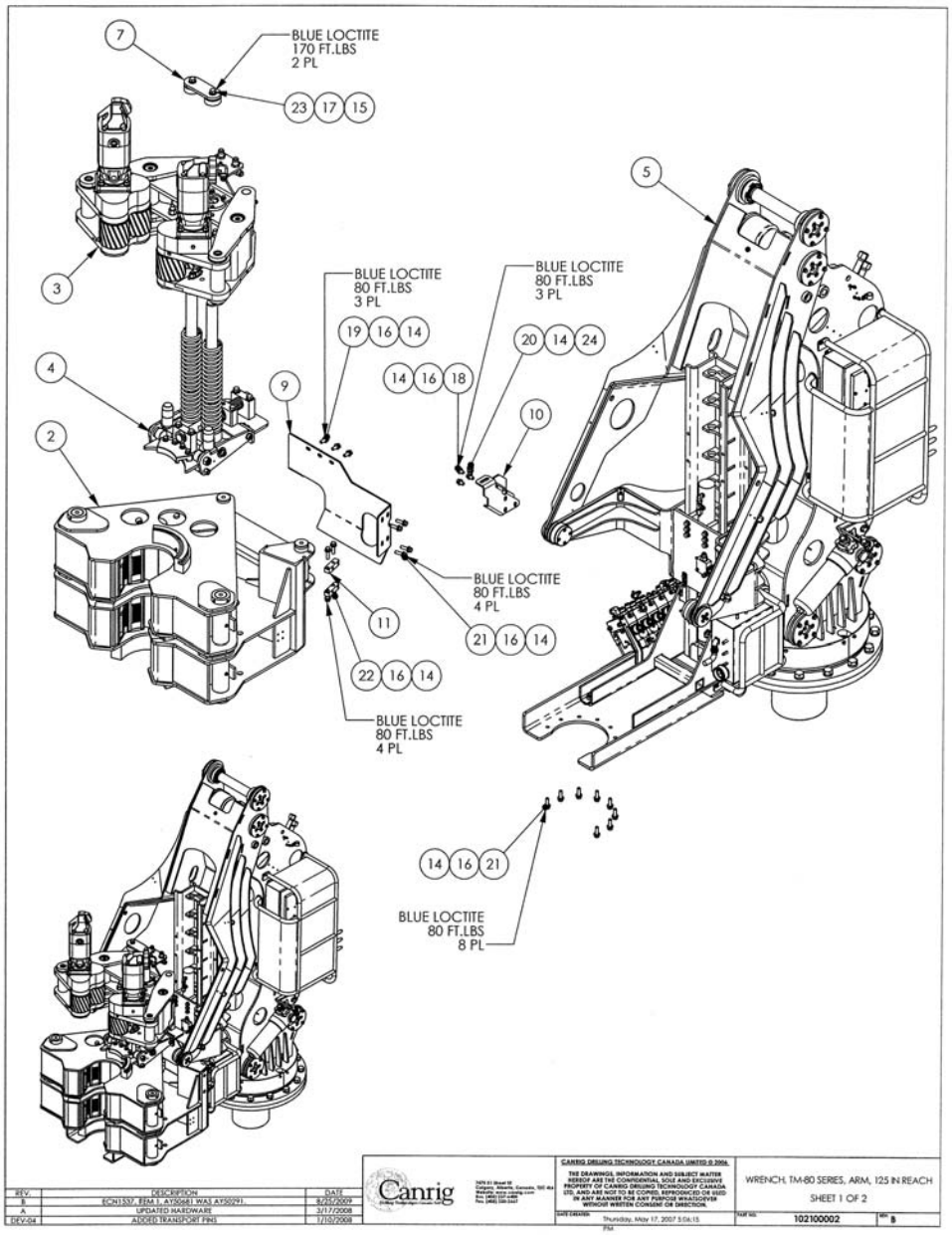
5. Install the large UHMW washer (Item 41), then the small UHMW washer (Item 40) on each of the new shafts (Item 11). Then assemble the Belleville washer stack (Item 16) with the first washer facing “cone up.” Then alternately face each Belleville washer to each other. Finally add the flat washer (Item 31) and the new nylock nuts (Item 36). Tighten the nuts until 3-4 threads are showing on each shaft.

Spinner Track Jeep Reassembly Procedure:

1. (Refer to 102100002) Install the Spinner Track Jeep assembly (Item 4) onto the upper tong assembly (Item 2) and secure with the Jeep Retainer (Item 14 on 112200006). Fasten the Spinner Track Jeep to the Rear Mount Plate (Item 9) with blue Loctite and torque to 80 lbs-ft.

2. Install the Spinner Assembly (Item 3) onto the Vertical Spinner Rods (Item 3 on 122200021). Install the Rod End Cap (Item 7) and hardware. Use blue Loctite and torque to 170 lbs-ft.

3. Remove hose end caps and reattach hoses to the Spinner Bulkhead.



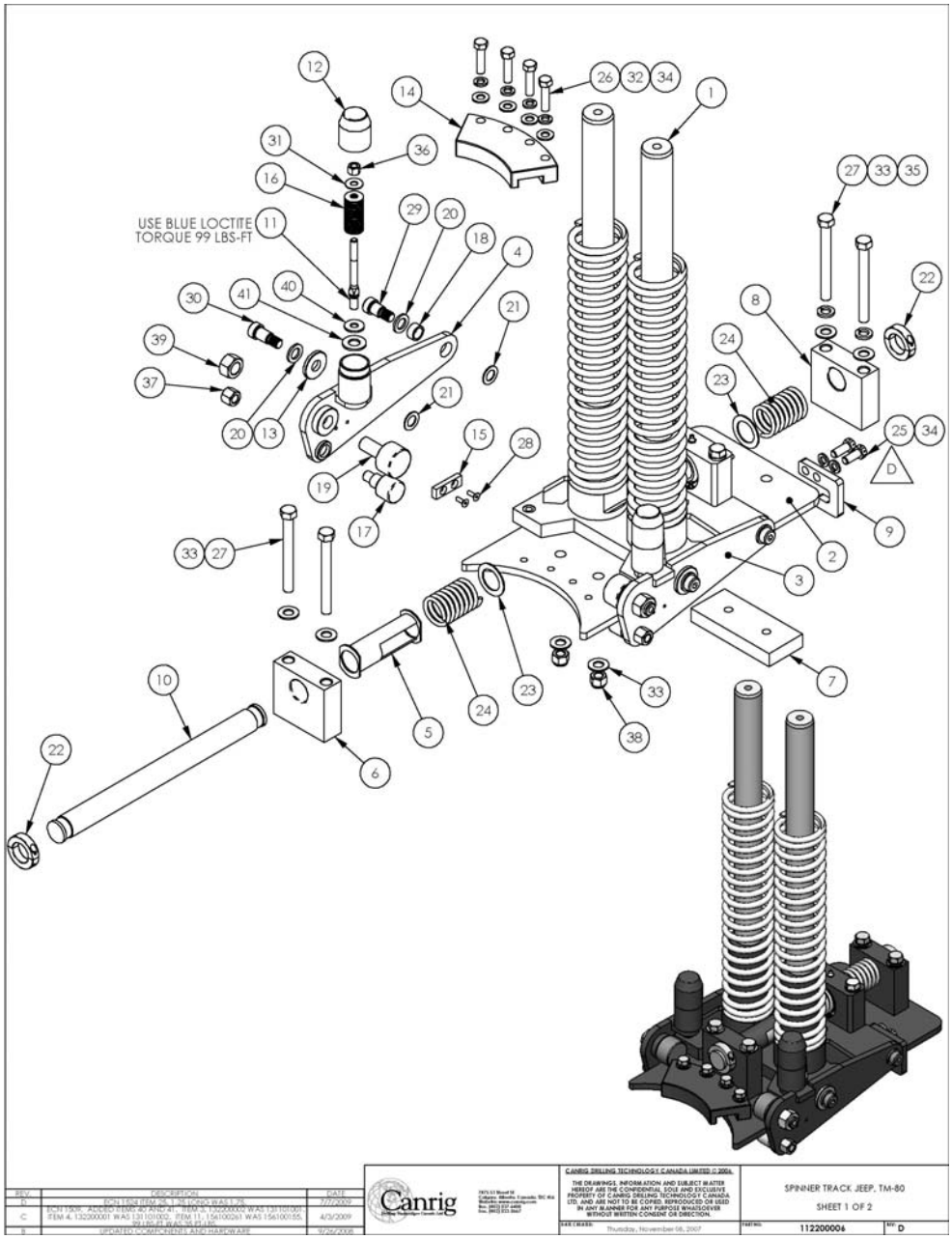
REV.	DESCRIPTION	DATE
B	ECN1537, ITEM 1, AY50681 WAS AY50291.	8/22/2009
A	UPDATED HARDWARE	3/17/2008
DEV-04	ADDED TRANSPORT PINS	1/10/2008

Canrig

DATE CREATED: Thursday, May 17, 2007 5:04:15 PM

WRENCH, TM-80 SERIES, ARM, 125 IN REACH
SHEET 1 OF 2

PART NO. 102100002 REV. B



REV.	DESCRIPTION	DATE
D	ECN 1604 ITEM 25, 1.75 LONG WAS 1.75	7/7/2009
C	ECN 1505 - ADDED ITEMS 40 AND 41 - ITEM 5 150000000 WAS 131010001 ITEM 4, 132000001 WAS 131010002, ITEM 11, 156100261 WAS 156100155, 99 LBS-FT WAS 95 FT-LBS	4/3/2009
B	UPDATED COMPONENTS AND HARDWARE	9/26/2008

Canrig

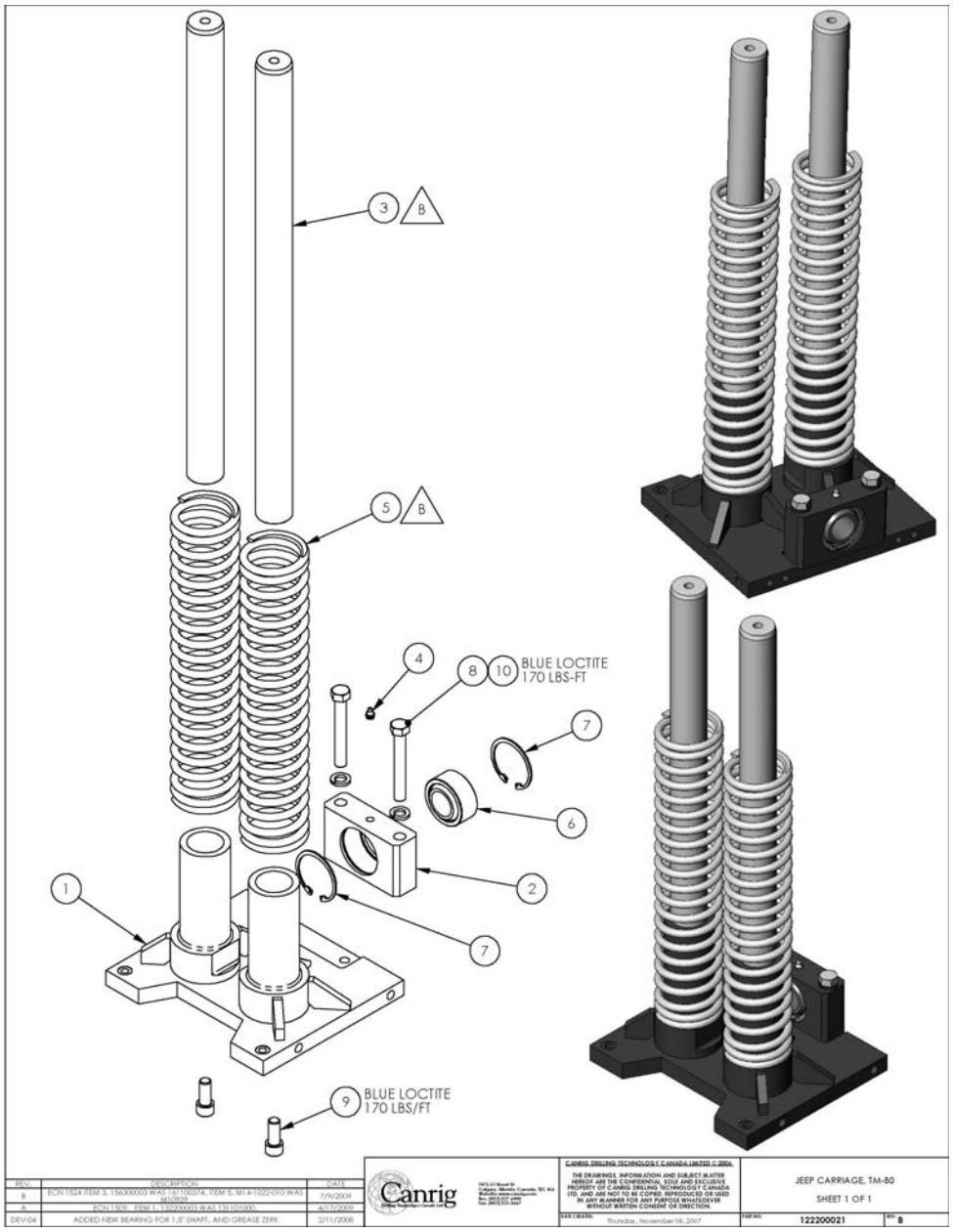
DATE CREATED: Thursday, November 08, 2007

SPINNER TRACK JEEP, TM-80

SHEET 1 OF 2

PART NO. 112200006

REV. D



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PRODUCT BULLETIN
WRENCH NUMBER: 005

CANRIG
DRILLING TECHNOLOGY LTD.

PRODUCT: TM-80, 110” **DATE: May 06, 2011**

SUBJECT: **Inspection of Main Boom Pin Tube and Support Gussets**

SERIAL NUMBERS: **All TM-80, 110” Torq-Matic Wrenches**

DISCUSSION: In two isolated instances, rig crews in the process of servicing a TM-80 (110” reach) wrench, discovered cracks along the welds connecting support gussets to the horizontal cylinder pin tubes located near the top of the main boom. Both wrenches had been in operation for over a year.

Figure 1 shows the location of the pin tube on the main boom. Two halves of the pin tube are welded to the insides of the main boom side plates. The horizontal cylinder is secured between the tubes with a 1 1/4” pin and is used to extend the wrench tong assembly over the well.

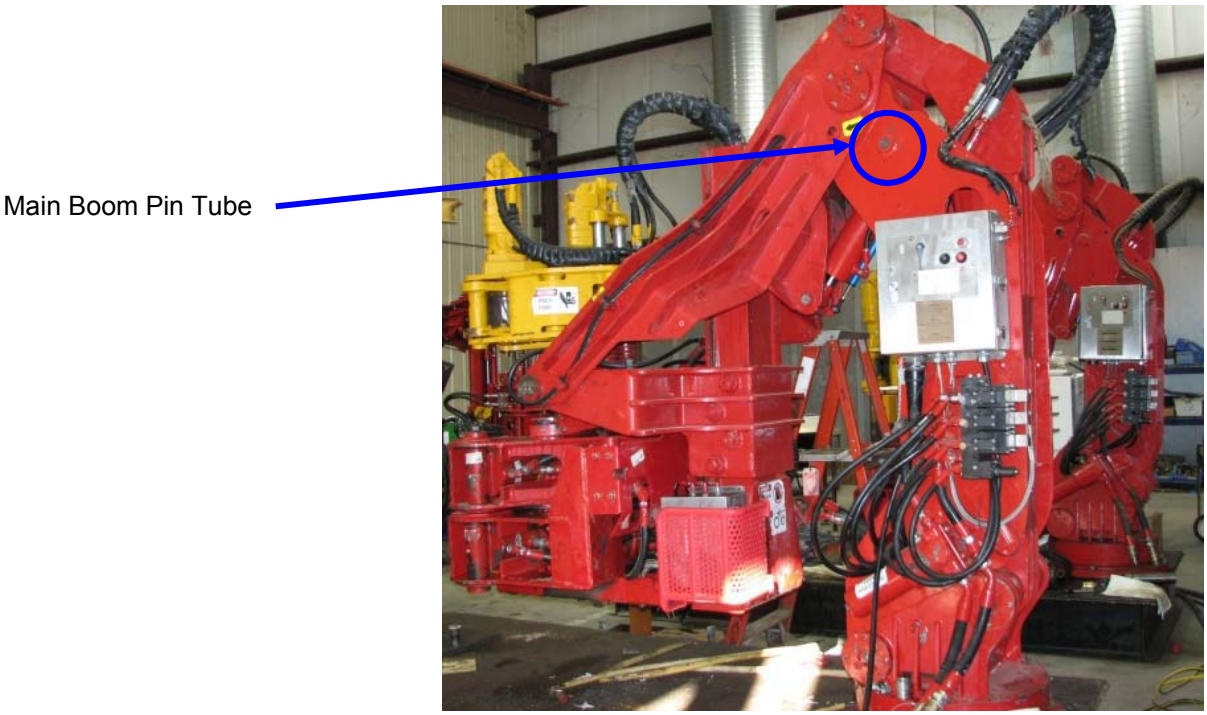

Figure 1

For precautionary and operational reasons the wrenches were removed from service and returned to Canrig. The main booms are purchased components and Canrig discovered that both of the failed booms were supplied by the same manufacturer. Canrig then conducted a detailed analysis of both of the booms in question.

Pin tubes and gussets were cut off the main boom and cross-sectioned in order to get a detailed look at the weld joints.

Examination of the weld joints revealed voids between the support gussets and pin tubes, poor penetration of the weld into the gusset material, and lack of weld fusion with the pin tubes. Canrig estimates that the inferior quality of the welds could have reduced the maximum allowable stress in that area by as much as 70%. Because the weld deficiencies were hidden underneath the weld, they

would have been nearly impossible to visually detect during receiving or final shipping inspections.

Canrig is currently working with the manufacturer to identify and repair other booms in stock which could exhibit the same deficiencies. In addition, we are in the process of evaluating the overall boom design, with specific emphasis on the pin tube design, in order to come up with a solution that will both strengthen the boom and make it less susceptible to failures due to unobservable defects in the welded areas.

RECOMMENDATION:

1. Conduct inspection of the wrench following the below steps.

   a. Extend the wrench out far enough so that the vertical can be fully lowered down and carefully set on the floor, without putting stress on the vertical cylinder.

   b. Disconnect power. Follow local tag out and lock out procedures. Remove any valve hand controls if installed.

   c. View main boom from underneath with flashlight and inspect main pin tube and supporting gussets for cracks in the welds. Clean the area around the pin tubes and support gussets if necessary for better visibility

   d. Using a step ladder and flashlight, perform similar inspection from above main boom.

   e. Inspect pin tube and weld from the outside on both sides for cracks or evidence of buckling.

   f. Figures 2 and 3 below indicate the areas of inspection.

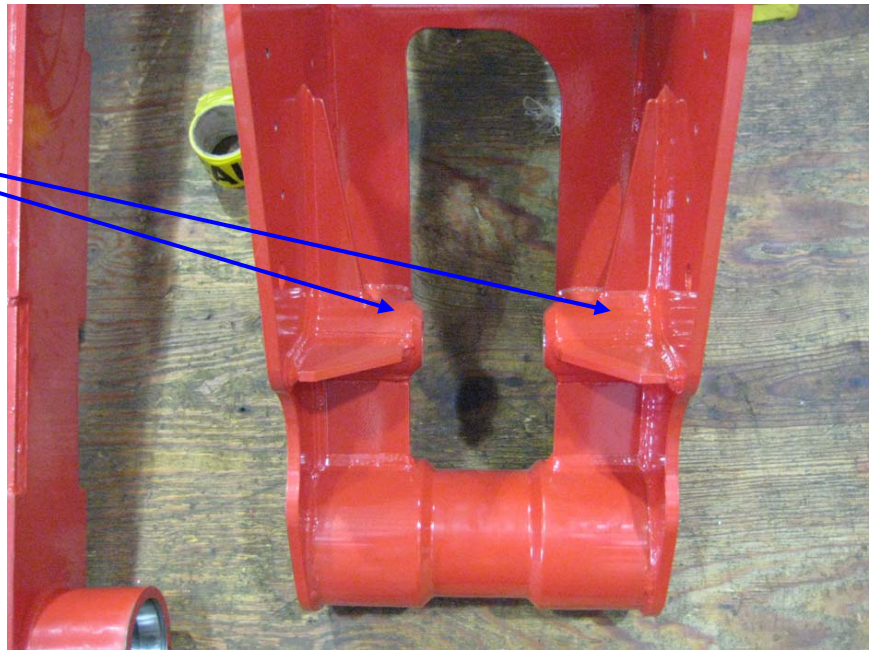

Figure 2

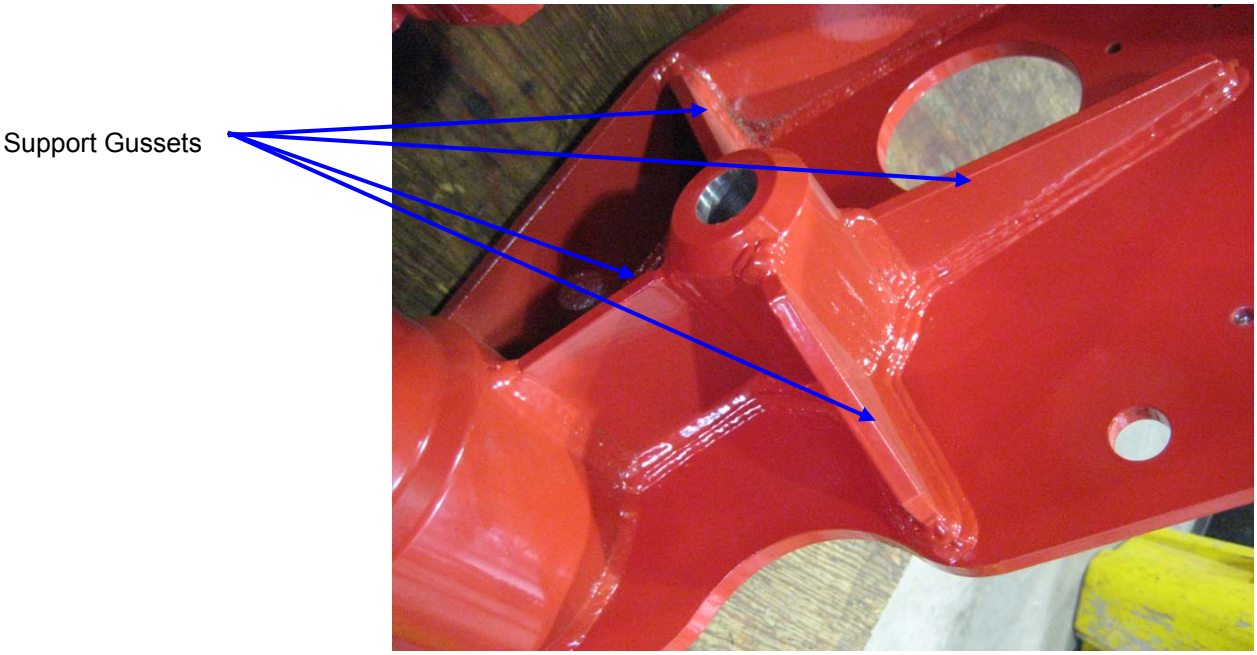

Figure 3

g. Evidence of cracking at the weld joints between the pin tube and support gussets is indicated in Figures 4 and 5 below.

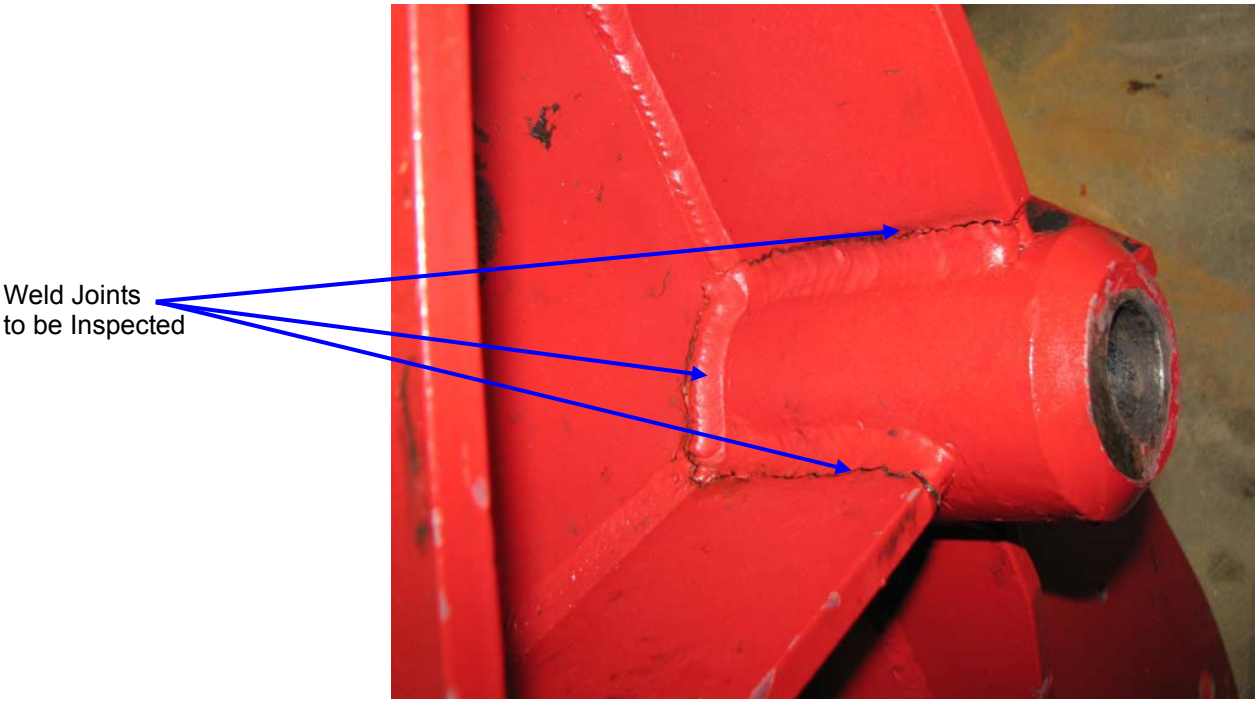

Figure 4

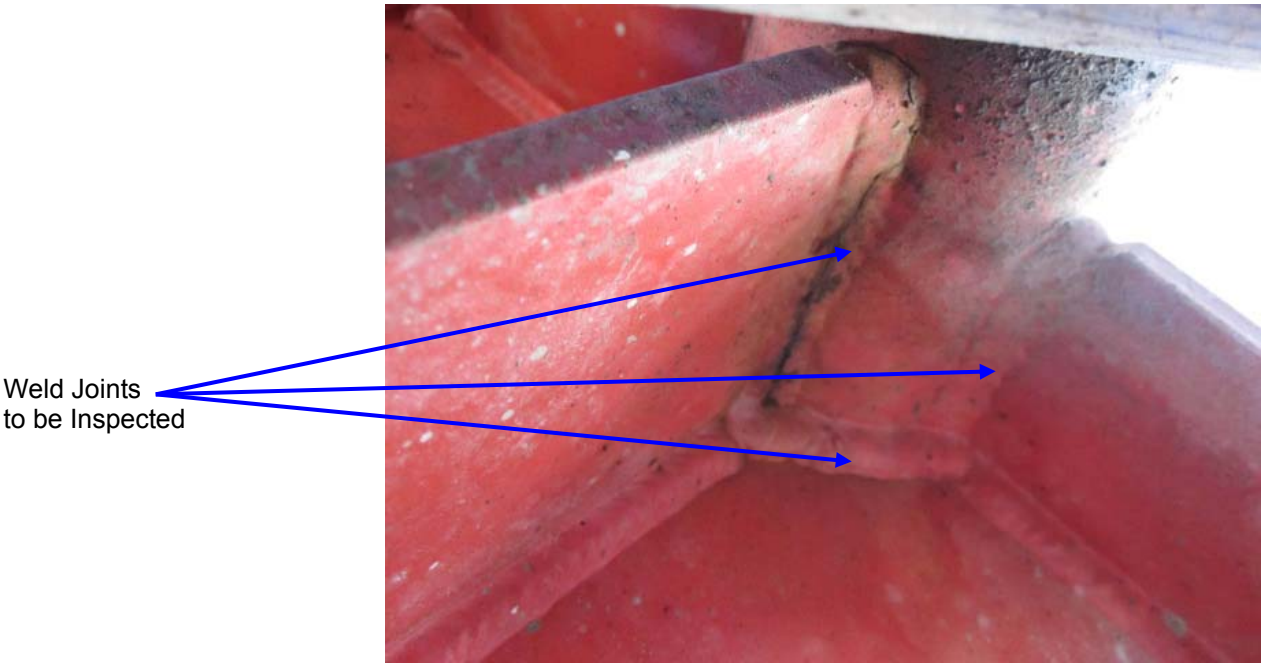

Figure 5

2. If you find evidence of cracking at the weld joints similar to that depicted in the above images, contact the Canrig Service Support Department immediately for an assessment. Contact information is provided below.

3. Failure to identify the problem and have it promptly corrected could potentially damage the equipment and, if not dealt with, could potentially become a hazard to personnel.

INFORMATION:

For a complete list of all bulletins go to ***www.canrig.com***

For further information contact:

Service Support Department
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PRODUCT BULLETIN
WRENCH NUMBER: 006

CANRIG
DRILLING TECHNOLOGY LTD.

PRODUCT: Torq-Matic Wrench **DATE: Jun 10, 2011**

SUBJECT: **HIGH PRESSURE CONTROL SEATS FOR HYDRAULIC VALVE**

SERIAL NUMBERS: **ALL TM-80 MODELS THRU # 800131, ALL TM-120 MODELS THRU # 120097**

DISCUSSION:

Hydraulic control valves for Torq-Matic wrenches have been installed by Canrig with pressure control seats on the torque cylinder valve rated for 320 bar (4641 psi). However, the wrench torque cylinder may operate at hydraulic pressures up to 355 bar (5150 psi). At higher operating pressures, the pressure control cones (darts) have a tendency to stick and cause the valve to malfunction.

RECOMMENDATION:

Replacing the pressure control seats and cones as well as associated o-ring seals with the higher pressure versions will increase the pressure rating of the valve from 320 bar to 355 bar. These components should be replaced during the next available maintenance period.

Kit part number AY50784 contains the components necessary to replace the existing components with equivalent high pressure components. The AY50784 kit can be used for both the TM-80 and TM-120 and includes the following items:

Item #	Canrig P/N	Qty	Description
1	S12888	2	O-Ring, 3 x 1.5, NBR 90 SH
2	H11293	2	Seat, Pressure Control
3	H10560	2	Valve, Cone, Press Control
4	S12889	2	O-Ring, 6.86 x 1.78 HNBR 90 SH Red Spot

The following tools are required to perform the replacement:

1 ea 4mm socket head wrench
1 ea mini-pick
1 ea small magnetized Phillips-head screwdriver
1 set small needle nose pliers

Follow the steps below.

1. Disconnect electrical power to wrench and HPU, following lock out and tag out procedures.

2. Dissipate any residual hydraulic pressure in the control lines by manually activating at least two of the valves on the tong valve bank.

3. Locate the torque cylinder valve. The torque cylinder valve is located on the tong valve bank. On the TM-80, the torque cylinder valve is located second from the right as you are looking at the tong valve bank. On the TM-120, the torque cylinder valve is located second from the left as you are looking at the tong valve bank. A solenoid is attached to the valve (see Fig 1). The parts to be replaced are located at the interface between the solenoid valve and the torque cylinder valve body.

Notice: The repair is best performed with the repairer in the supine position. Due to the small size of the replacement parts, laying out white absorbent pads

underneath the work area will make it easier to locate parts should they fall.

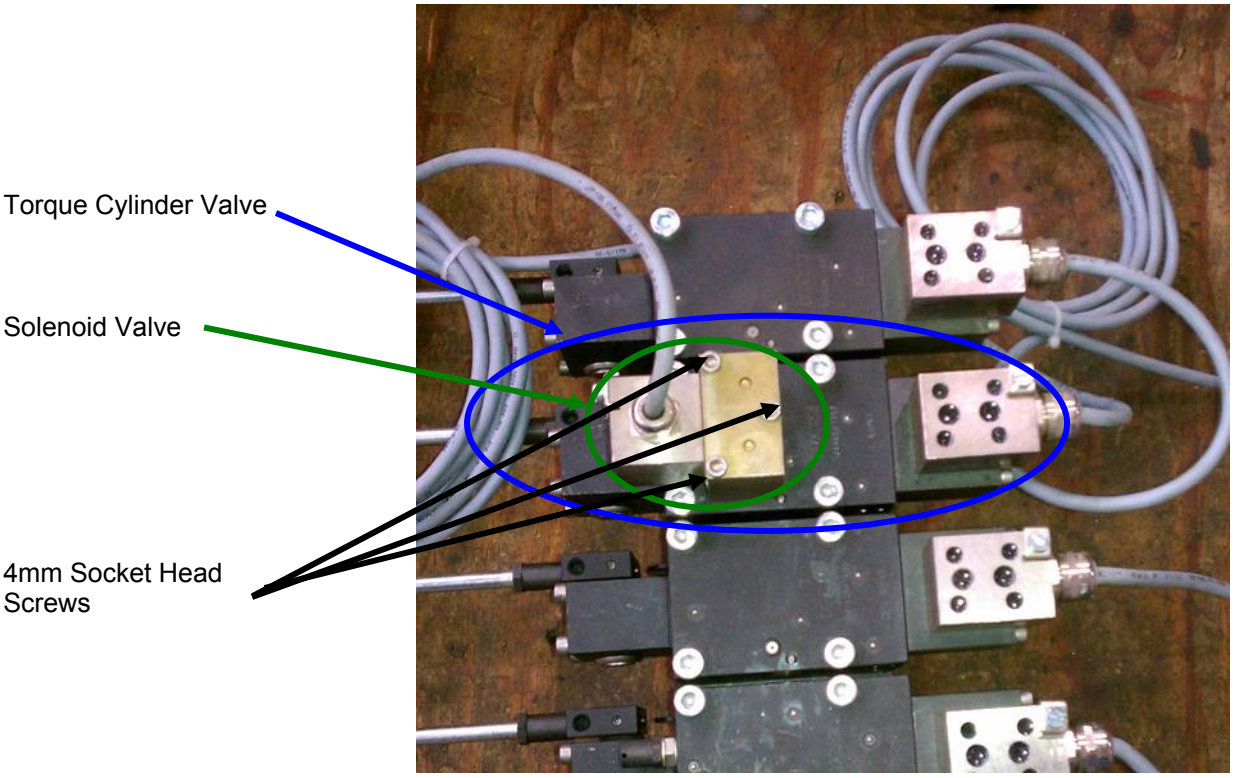

Figure 1: TM-80 Tong Valve Bank

4. Remove the solenoid valve from the tong cylinder valve by loosening the 4mm socket head screws (see Figure 1) with a socket head wrench.

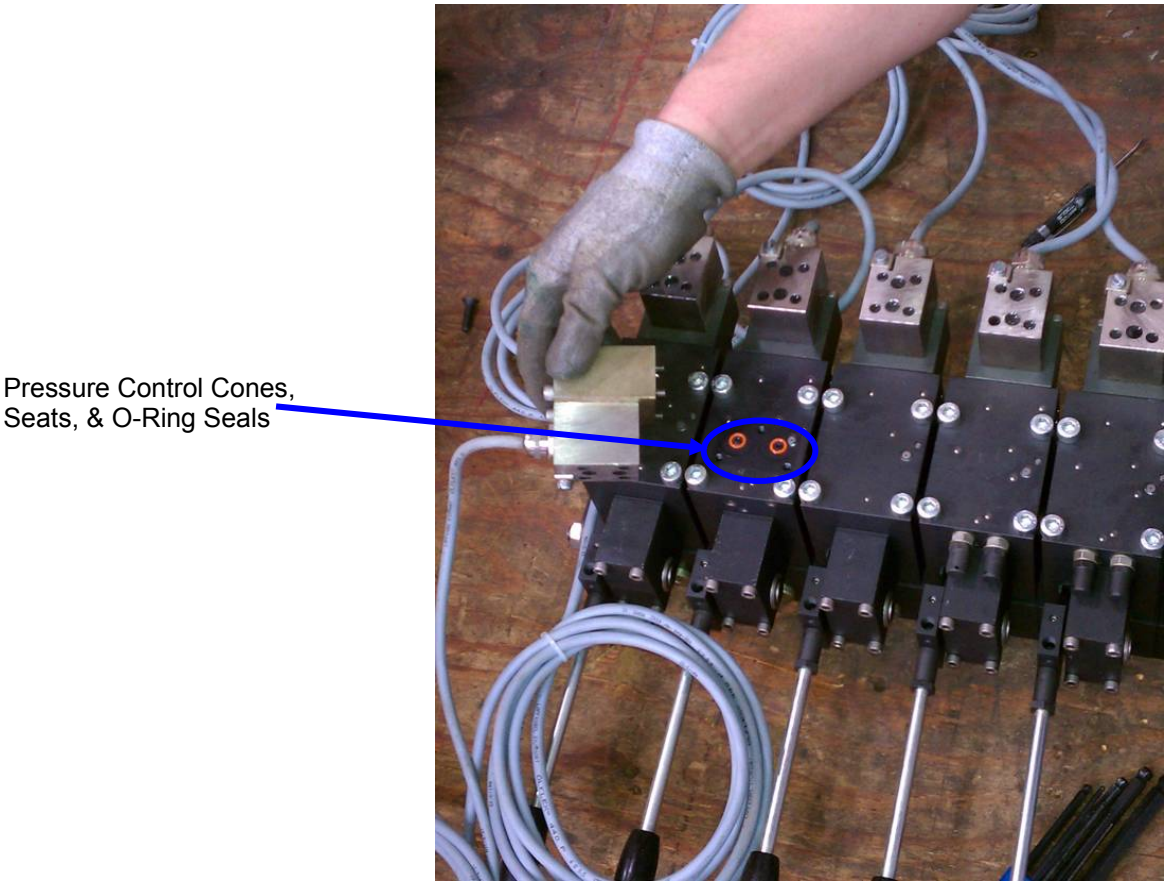

Figure 2

5. Remove pressure control cone, seat, & o-ring seals from both ports using magnetized screwdriver and pick (or needle nose pliers).

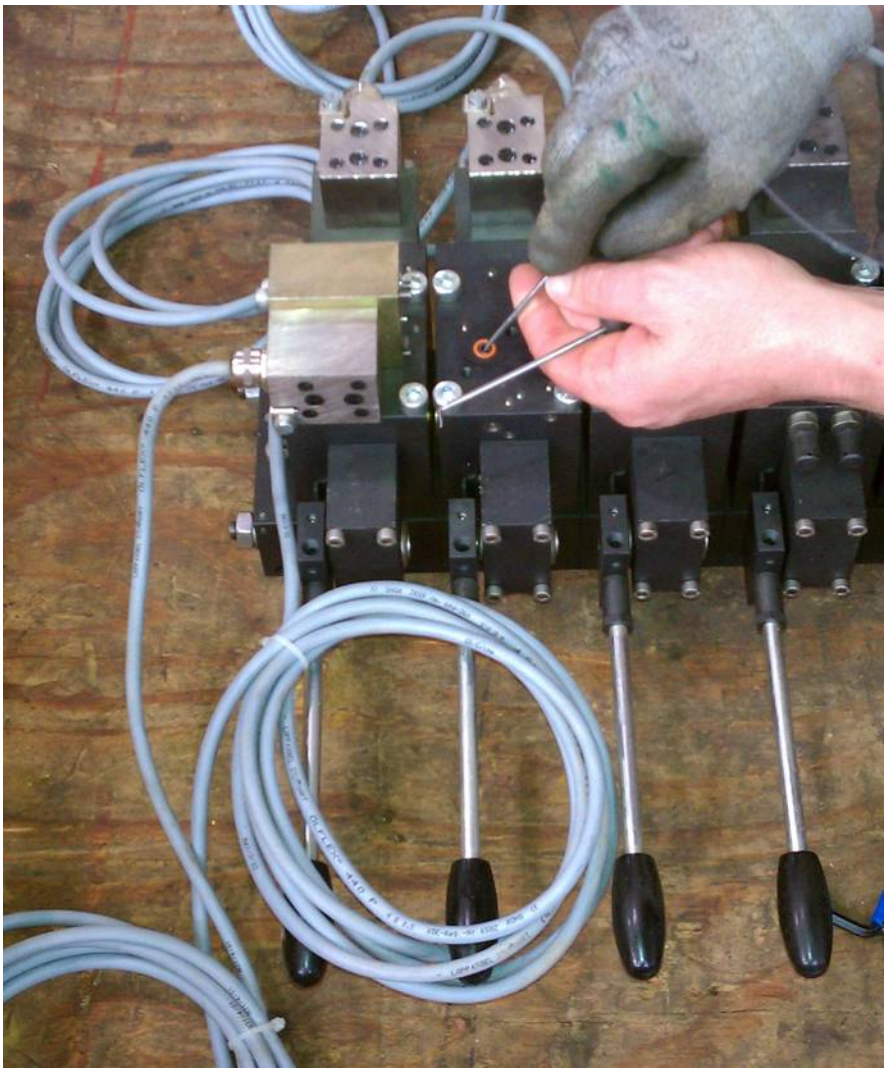

Figure 3

6. Replace removed components with items in kit in the order indicated below with the tools proscribed above.

1st – Small o-ring
2nd – Pressure control seat
3rd – Pressure control cone (dart)
4th – Large o-ring

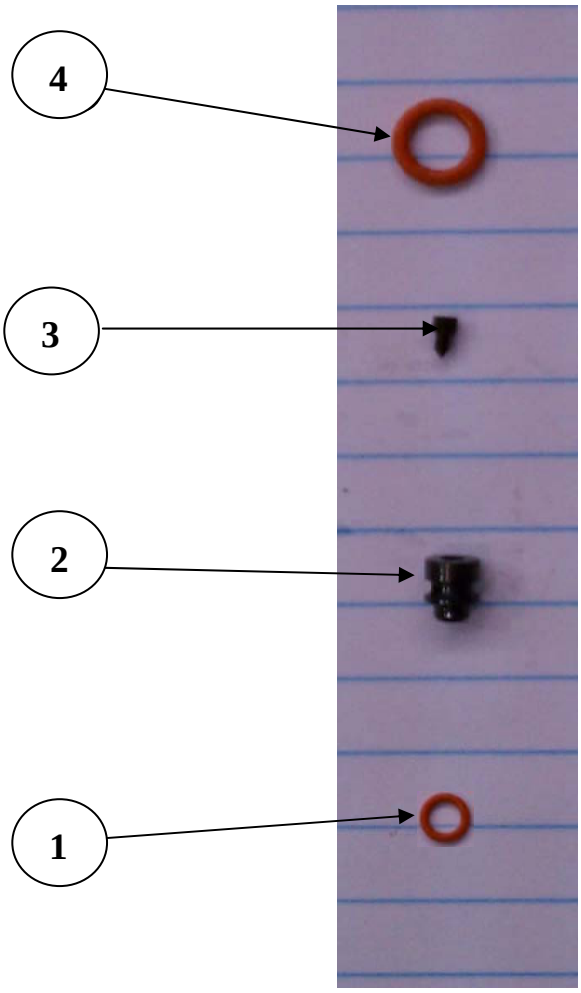

Figure 4

7. Reattach solenoid valve.

8. Reconnect electrical power to wrench and HPU. Verify wrench functionality by performing pump pressure test.

INFORMATION: *For a complete list of all bulletins go to* ***www.canrig.com***

For further information contact:

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CANRIG
DRILLING TECHNOLOGY LTD.

PRODUCT BULLETIN NUMBER: WRENCH 007

PRODUCT: TM-80 **DATE:** May 18, 2011

SUBJECT: **Inspection of Vertical Lift Channel**

SERIAL NUMBERS: **ALL**

DISCUSSION:

In a few isolated instances, rig crews have discovered cracks in the Vertical Lift Channel located approximately one third to halfway from the base of the channel. Probable cause of these cracks is most likely a result of repeated excessive loading or a singularly large impact load beyond normal operation of the wrench.

Figure 1 and Figure 2 indicate the areas of inspection for cracks on the Vertical Lift Channel.

Figure 1

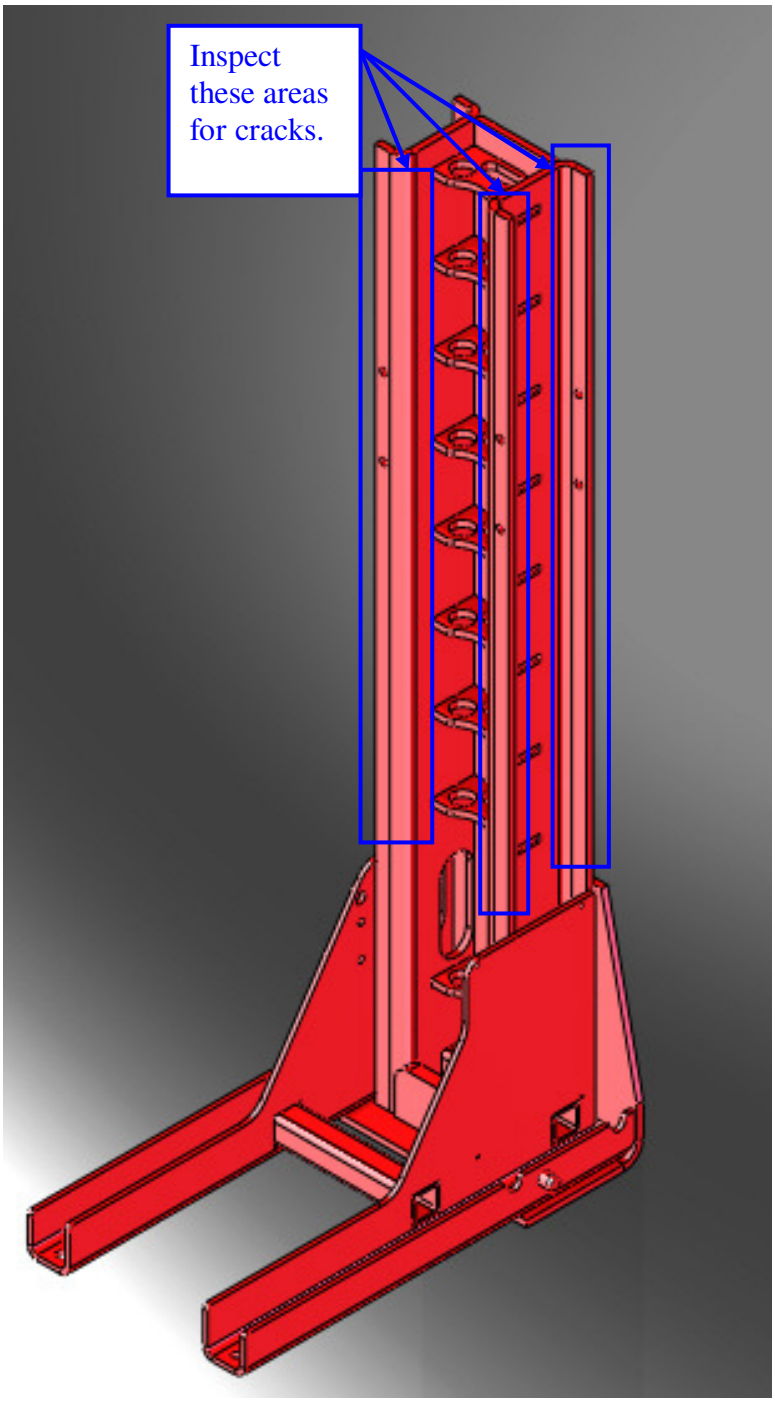

Figure 2

RECOMMENDATION:

1. Conduct inspection of the wrench following the steps outlined below.
    a. While the wrench is in or close to the park position, fully raise the Vertical Lift Assembly
    b. Disconnect power and follow local lock out and tag out procedures and remove any valve hand controls if installed.
    c. Inspect the upper half of the Vertical Lift Channel for any sign of cracks. Clean the area in the channels for greater visibility if necessary.
    d. Reconnect power to the wrench to move the assembly so that the bottom half of the Vertical Lift Channel can be inspected.
    e. Extend the wrench out far enough so that the vertical can be fully lowered down and carefully set on the floor, without putting stress on the vertical cylinder.
    f. Disconnect power. Follow local lock out and tag out procedures.

Remove any valve hand controls if installed.

g. Inspect the bottom half of the Vertical Lift Channel for any signs of cracks. Clean the area in the channels for greater visibility if necessary.

2. If you find evidence of cracking, as shown in Figure 3, contact the Canrig Service Support Department immediately for an assessment. Contact information is provided below.

Figure 3

3. Failure to identify the problem and have it promptly corrected could potentially damage the equipment and, if not dealt with, could potentially become a hazard to personnel.

INFORMATION: *For a complete list of all bulletins go to* ***www.canrig.com***

For further information contact:

Service Support Department
Canrig Drilling Technology Ltd.

Houston Office:

8223 Willow Place Drive South
Houston, Texas 77070
Phone: 866.433.4345
Fax: 281.774.5650

Calgary Office:

7475 51 Street SE
Calgary, AB T2C 4L6
Phone: 403.237.6400
Fax: 403.536.4605

PRODUCT BULLETIN NUMBER: WRENCH 008

PRODUCT: TM-80 TM-120 Tong Cylinder **DATE:** 7/27/2011

SUBJECT: **Tong Cylinder Orifice**

SERIAL NUMBERS: **ALL TM Series Wrenches**

DISCUSSION:

The rod end of the Clamp Cylinder has an orifice inserted in the hydraulic hose connector fitting (45 Deg or straight fitting). It is imperative to have this orifice in place; this allows a smoother and more accurate operation of the tong clamps. There is potential for the orifice in the fitting to not be installed when fitting is replaced.

RECOMMENDATION:

Ensure that the 3/16" orifice is being replaced when a replacement fitting is installed on the rod-side. The orifice is essential for reducing flow so that the cylinder retracts smoothly.

Part Numbers for these items are as follows:

45-degree angle fitting: 1581000028 – ADPT 45, ¾ JIC X ¾ ORB, 3/8 NPT BORE
Straight Fitting: 1581000029 – ADPT, ¾ JIC X ¾ ORB, 3/8 NPT BORE
Orifice: 158100030 – PLUG, 3/8 NPT, ORIFICE, 3/16

Note: The straight fitting is used on the rod-side of the lower right cylinder

Replacement fittings from Canrig will include necessary orifice fitting. However, if orifice is missing, the technician can reuse the original orifice if it is not visibly damaged (orifice can be removed with hex wrench).

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PRODUCT BULLETIN NUMBER: WRENCH 009

PRODUCT: TM-80 / TM-120 **DATE:** 7/27/2011

SUBJECT: **37-Pin Cable and Receptacle Cap Plugs Getting Pinched**

SERIAL NUMBERS: **ALL TM Series Wrenches**

DISCUSSION:

Both the receptacle for the wrench arm junction box and the 37-pin conductor cable which connects the PLC control panel to the wrench arm junction box are supplied with protective cap plugs. Once the cable is connected to the receptacle, these cap plugs (hereafter referred to as the receptacle cap and cable cap) will hang loose and have the potential to become pinched between the wrench main boom and base during operation. See Figure 1.

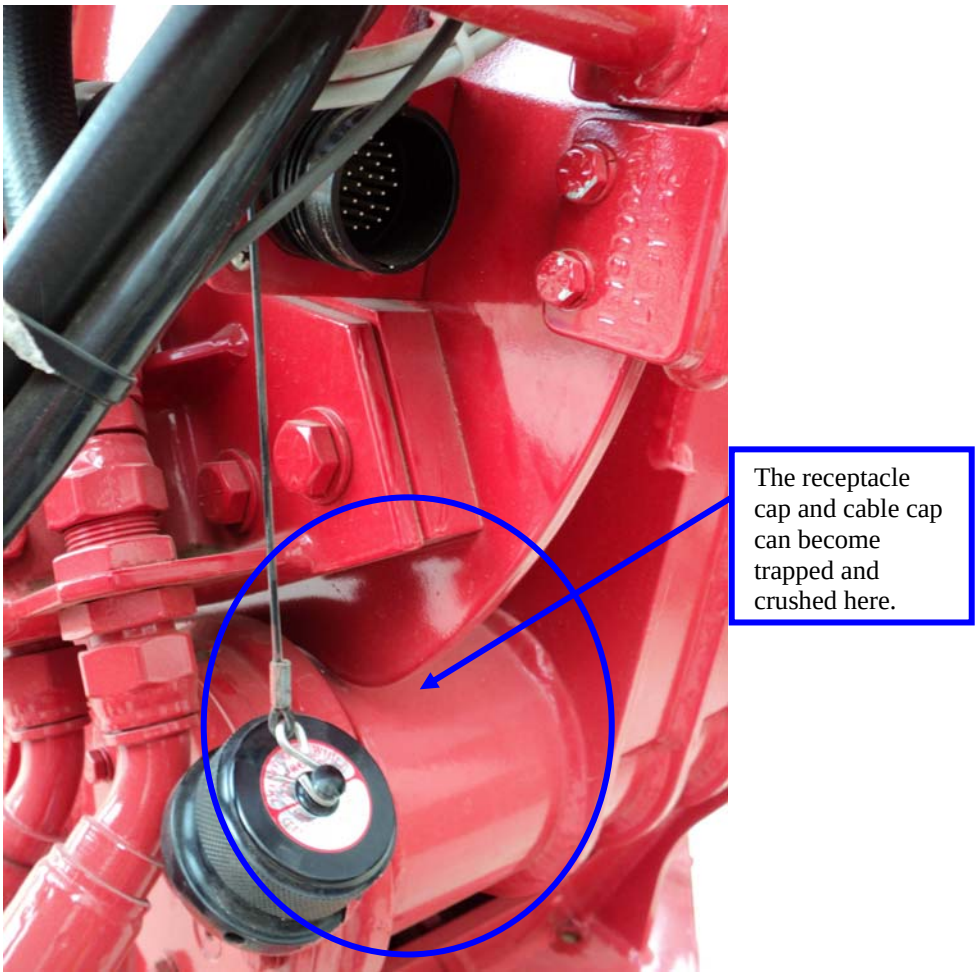


Figure 1

RECOMMENDATION:

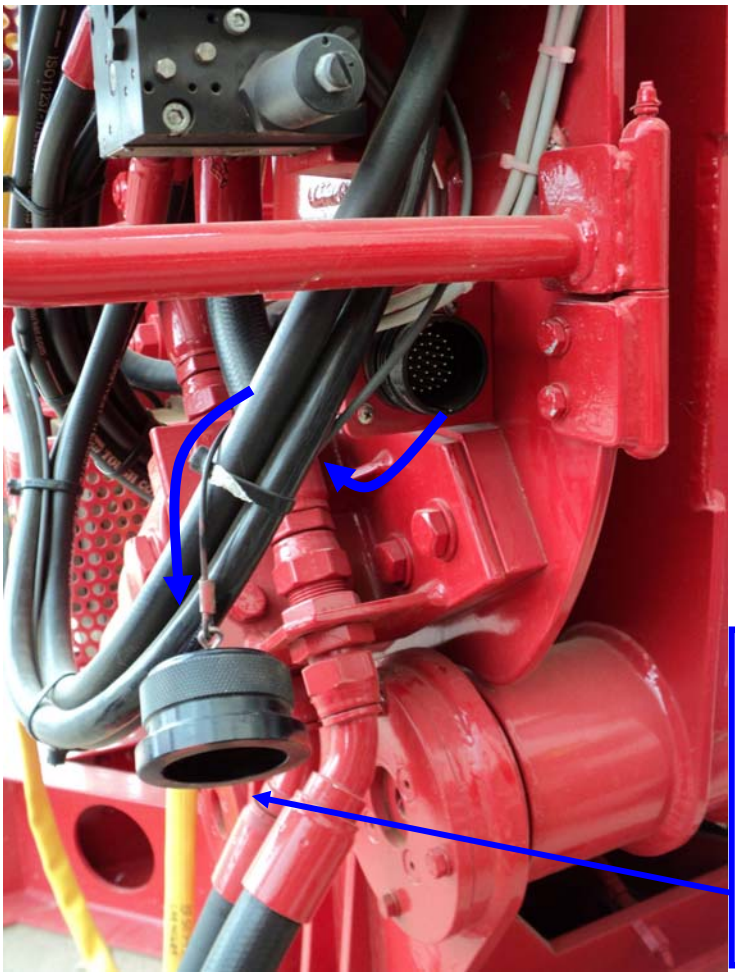
For wrenches that have the 37-pin cable receptacle mounted under the Arm Valve Bank:

- Connect the 37-pin cable and then feed the receptacle cap around the hydraulic hoses to the left of the connection and screw the receptacle cap onto the cable cap.

For wrenches that have the 37-pin cable receptacle mounted on the other side of the wrench:

- Connect the 37-pin cable and then screw the receptacle cap onto the cable cap.

See Figures 2 & 3 for clarification.



For wrenches with 37-pin receptacle mounted beneath the Arm Valve Bank - Feed the receptacle cap around the hydraulic hoses and couple it with the cable.

Figure 2

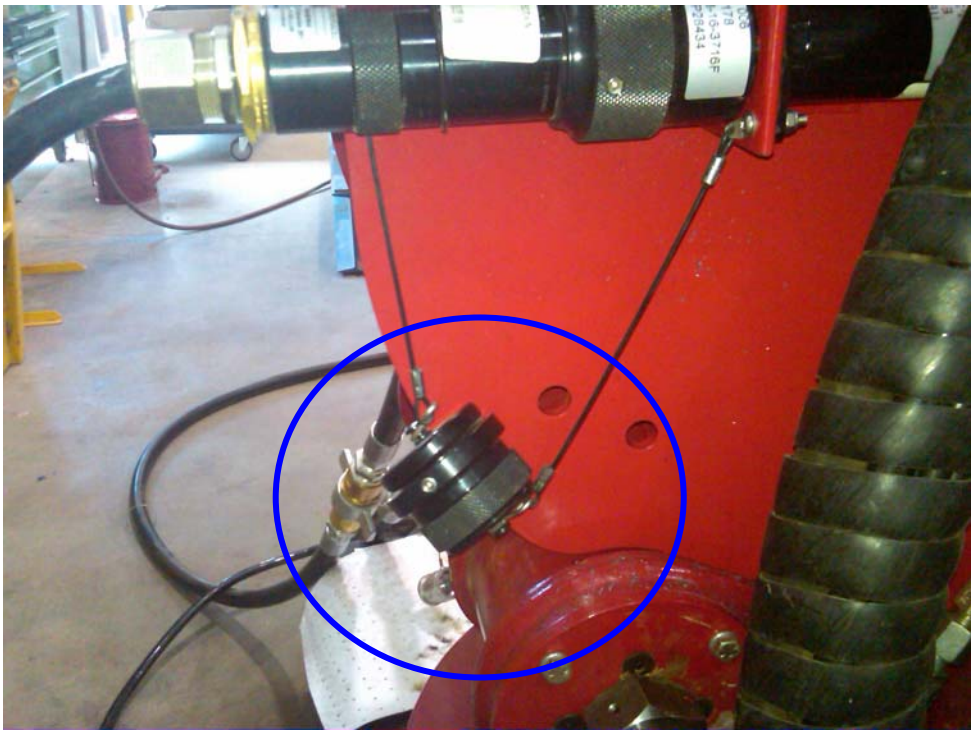


Figure 3

For wrenches that have the 37-pin receptacle connected to the non-valve-bank side of the arm, simply screw the receptacle cap onto the cable cap. DO NOT attempt to route the caps around any hoses.

INFORMATION:

For further information contact:

*For a complete list of all bulletins go to **www.canrig.com***

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Canrig Drilling Technology, Ltd.

Houston Office:

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PRODUCT BULLETIN NUMBER: WRENCH 010

PRODUCT: TM-80 TM-120 Encoder/Rotate Motor Guard/Cable Guide

DATE: August 15, 2011

SUBJECT: **Cable Guide / Encoder Guard**

SERIAL NUMBERS: **ALL TM Series Wrenches**

DISCUSSION: There is potential for the hydraulic hoses and cables to become trapped behind the rotate motor and encoder (if present) during wrench operation. See Figure 1.

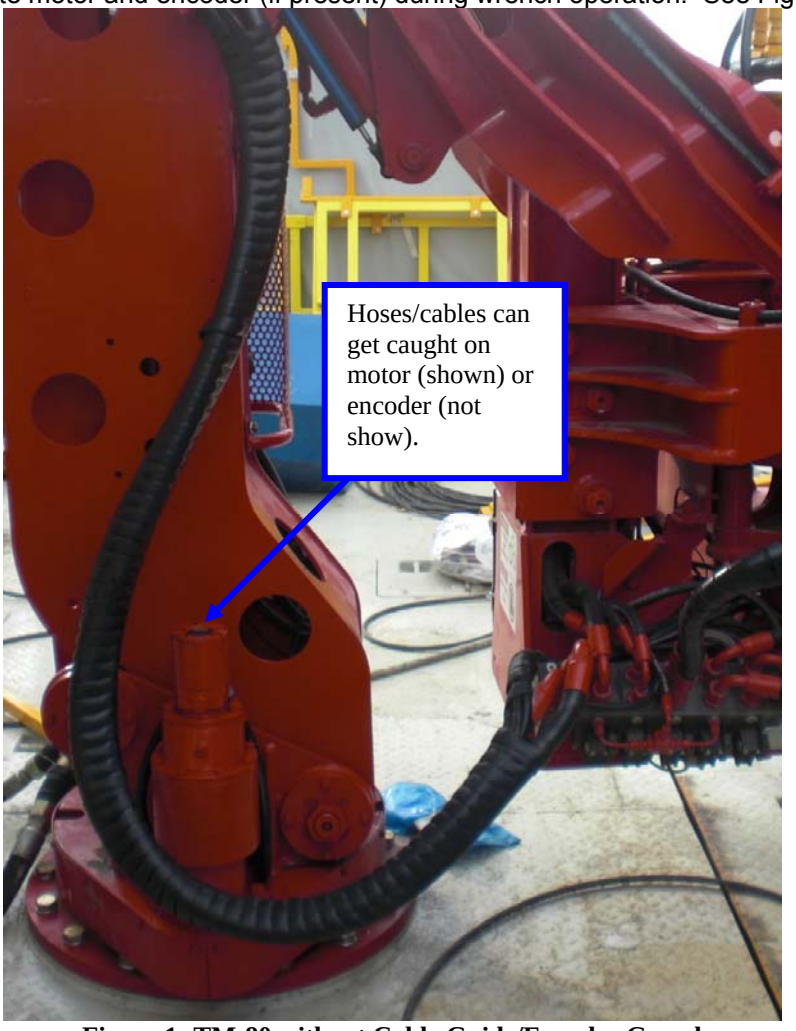

Figure 1: TM-80 without Cable Guide/Encoder Guard

Figure 2: TM-80 Wrench with Cable Guide/Encoder Guard Installed

RECOMMENDATION:

Installing the Encoder Guard will help prevent cables and hoses from catching on the motor or encoder as well as providing added protection during standard rig operations. See Figure 2.

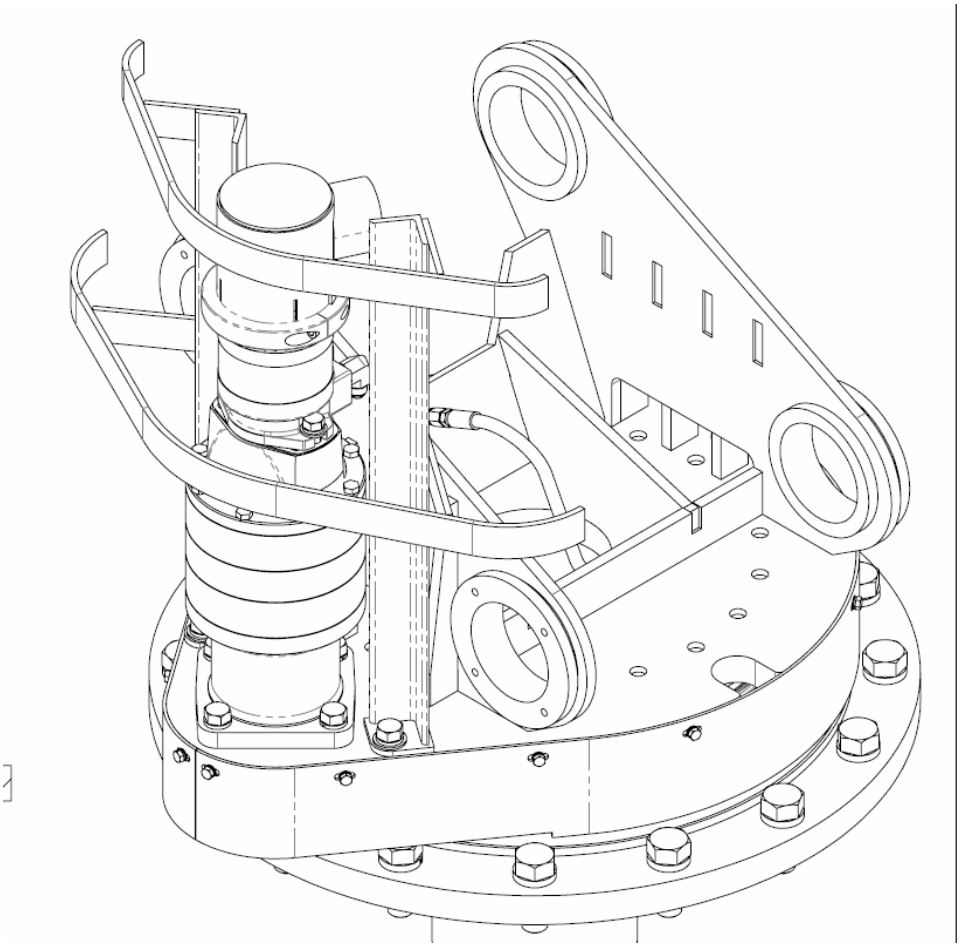

Figure 3

In order to complete the retrofit, the following parts are needed:

1 EA – AY50832 – KIT, GUIDE, CABLE BUNDLE, TM-80/120

The retrofit kit consists of these parts [reference Figure 4]:

1 EA (Item 01) – M13618 – DRILL BIT, 17/32, JOBBER
1 EA (Item 02) – M13619 – TAP, 5/8-11 UNC, RH, SPIRAL POINT
1 EA (Item 10) – DT50452 – GUIDE, CABLE BUNDLE, TM-80/120
2 EA (Item 13) – FW-0625-A – WASHER, F, 5/8, PLAIN, TYPE A
2 EA (Item 29) – HH-0625NC-0175-GR8-W – CAPSCR, HEX HD, 5/8-11UNC x 1.75, GR8, W
2 EA (Item 19) – LW-0625-HS – LOCKWASHER, 5/8 HELICAL SPRING

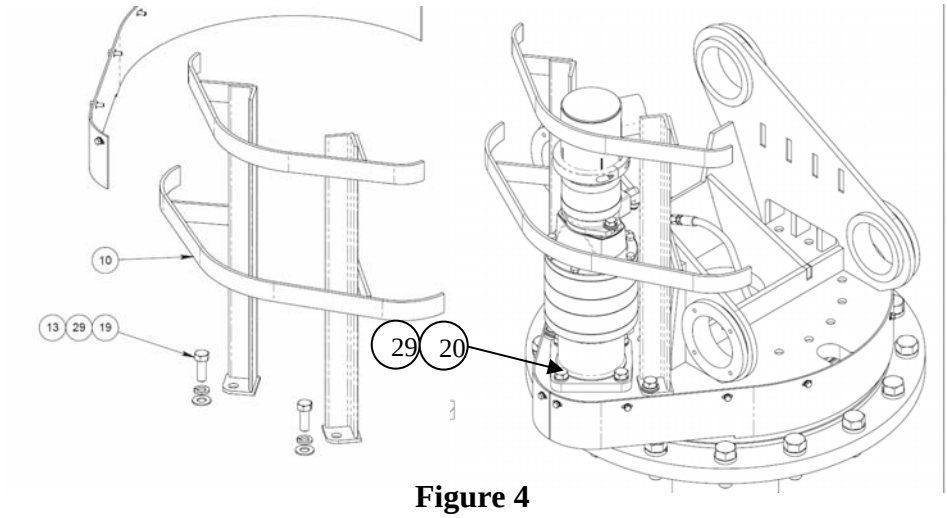

Figure 4

Installation Instructions:

1. Mark location for drilling bolt holes on Upper Plate Weldment [Figure 5].
2. Remove Rotate Motor Assembly if required for drilling:
    a. Unbolt four (4) 5/8-11UNC x 2.25 hex head bolts (Item 20) attaching motor to Upper Plate Weldment
    b. Carefully store assembly and hardware while commencing work on Upper Plate Weldment
3. Drill and tap bolt holes for Cable Bundle Guide. Deburr as needed. Paint with appropriate color rust prevention paint (i.e. Rustoleum).
4. Apply Blue Locktite and bolt motor assembly back into place with four (4) 5/8-11UNC x 2.25 hex head bolts (Item 20).
5. Bolt on Cable Bundle Guide with two (2) 5/8-11UNC x 1.75 (Item 19), two (2) 5/8 helical spring lock washers (Item 29), and two (2) 5/8 plain type A flat washers (Item 13). Use Blue Locktite.

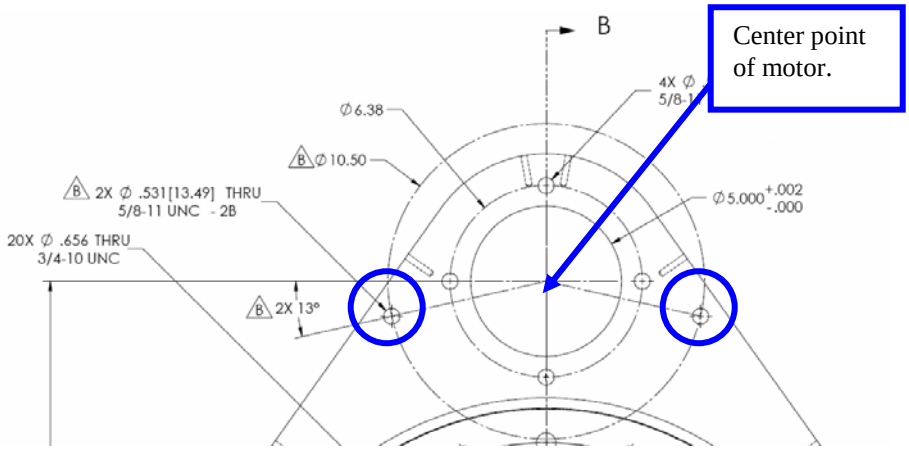

Figure 5

INFORMATION:

For further information contact:

Service Support Department
Canrig Drilling Technology Ltd.

Houston Office:

8223 Willow Place Drive South
Houston, Texas 77070
Phone: 866.433.4345
Fax: 281.774.5650

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CANRIG
DRILLING TECHNOLOGY LTD.

PRODUCT BULLETIN NUMBER: WRENCH 11

PRODUCT: TM-80, TM-120 **DATE:** September 14, 2011

SUBJECT: **Locking Joystick on Driller's Console**

SERIAL NUMBERS: **All TM-80 & TM-120 Torq-Matic Wrenches**

DISCUSSION:

There is a potential for the wrench to be accidently moved if the Driller's Console Joystick is bumped by personnel. A locking joystick is now available as a replacement that would mitigate this potential problem. The new joystick requires that the user pull-up on a sliding mechanism to engage joystick operations.

RECOMMENDATION:

Replace existing joystick (Figure 1) on the Driller's Console with the new locking joystick (Figure 2).

Figure 1: Existing joystick

Figure 2: New locking joystick

Materials Needed:

Part: AY15373 KIT, JOYSTICK, LOCKING, CONSOLE, TM

Consists of:

1.00 EA	E13916	JOYSTICK, 4POS, LOCKING, SPRING RETURN
2.00 EA	E12771	SAFETY BARRIER, ZENER
1.00 EA	DT18286	MOUNTING BRACKET, L-SHAPE, DIN RAIL
2.00 EA	E10955	END BRACKET, TS 35 RAIL, 9.5MM
30.00 EA	E16-2018-010	FERRULE, #16 AWG, 14mm, INS, RED
4.00 FT	E11209	CABLE, 5 C OVERALL SHIELD, 20AWG
2.00 FT	E11847	HEAT SHRINK, 1 IN. BLUE
5.00 EA	C10048	MOUNT, CABLE TIE, 4 WAY, 0.50X0.50
10.00 EA	E10498	CABLE TIE, 5.6 IN LG, 18 LB

Procedure:

1. Perform Job safety analysis before commencing work. Ensure that proper PPE is worn. Adhere to local lockout/tagout procedures.
2. Remove existing joystick and wiring.
3. Orient joystick according to Figure 3 and install into console panel.

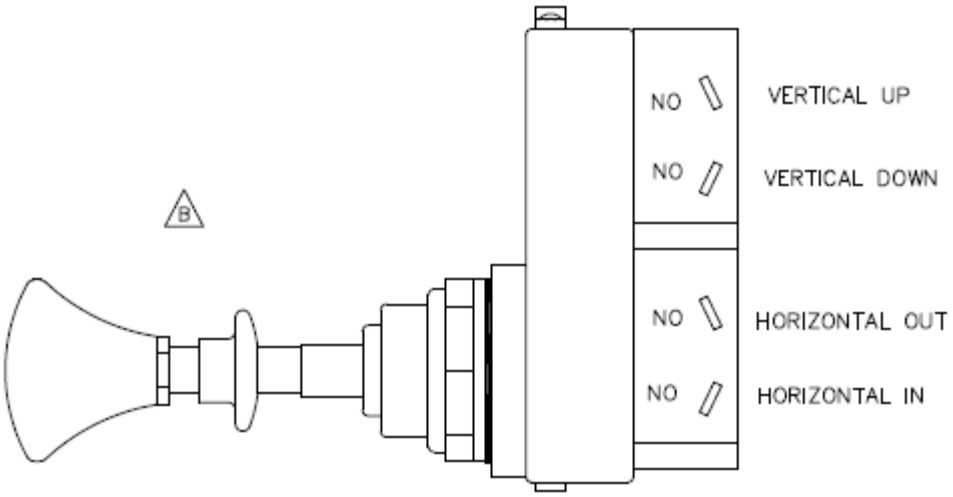


Figure 3: Joystick orientation and configurations

4. Wire joystick according to Figure 4.

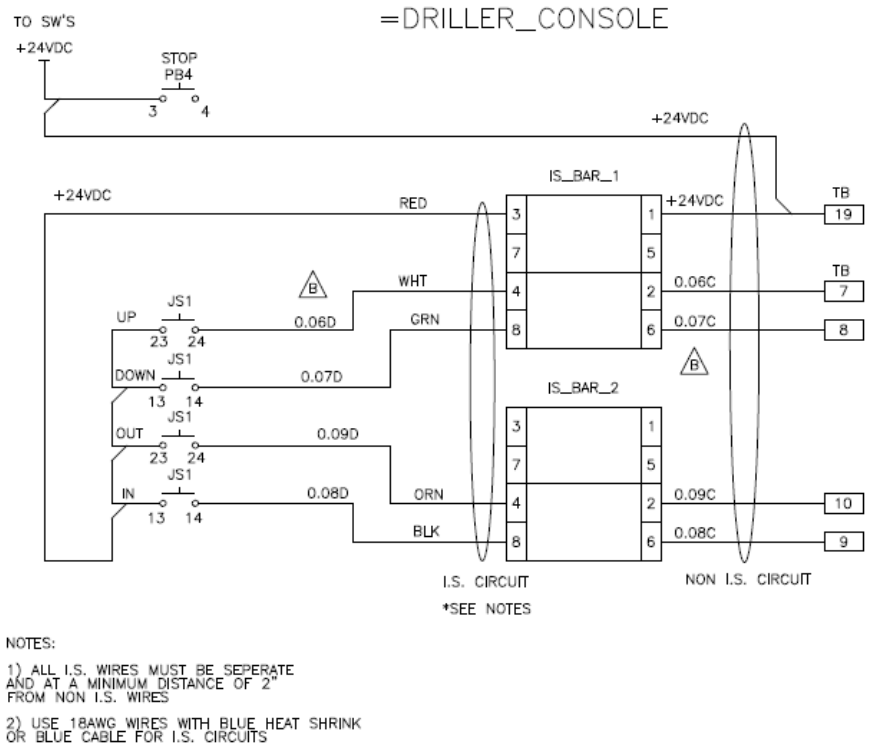
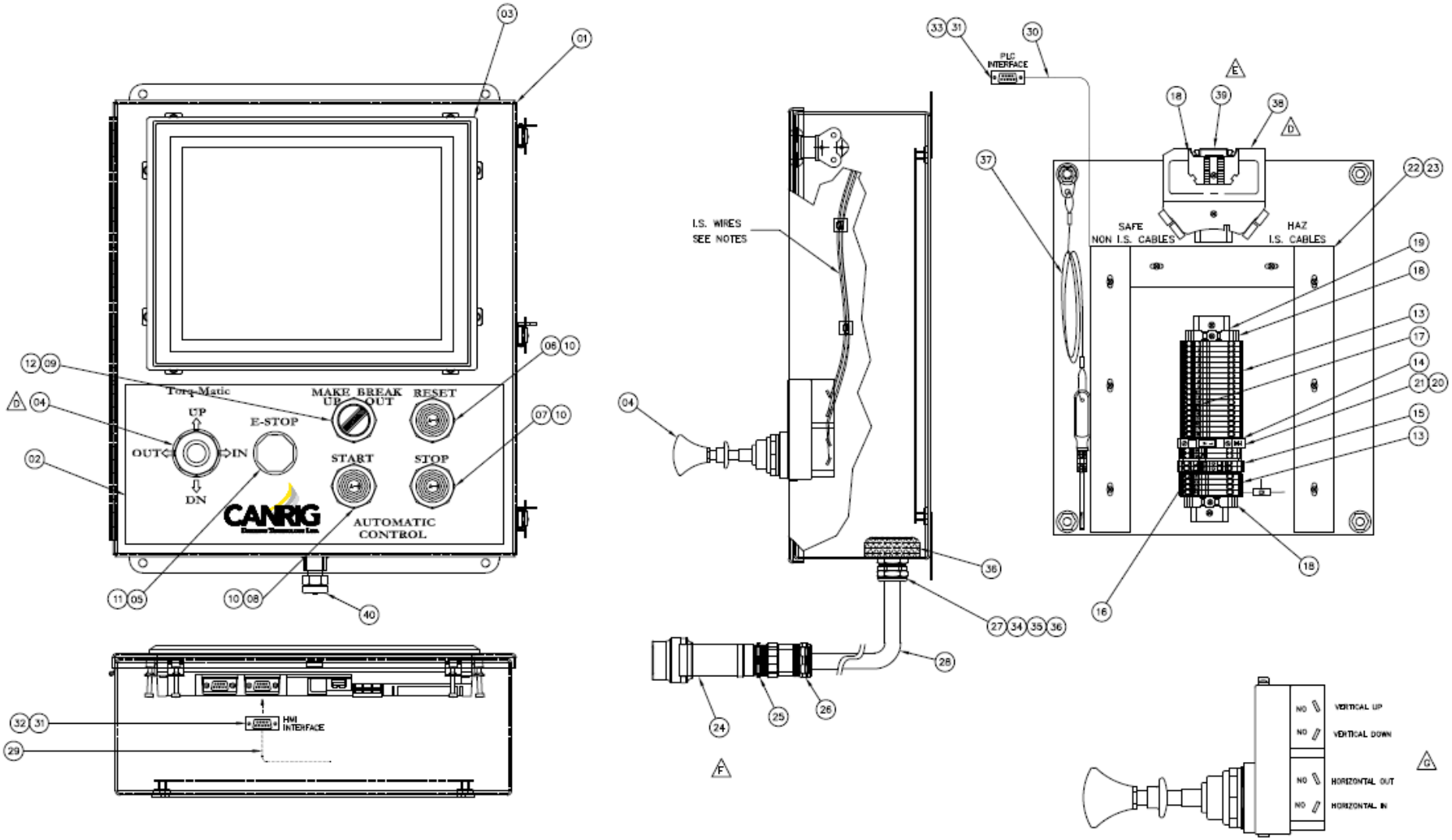


Figure 4: Electrical wiring schematic for locking joystick

5. Secure all Intrinsically Safe (IS) wires with 4-way adhesive backed cable tie mounts (C10048) according to notes in Figures 4 & 5.



JOYSTICK ASSEMBLY
SIDE VIEW
ATTACH CONTACT BLOCKS AS SHOWN

NOTES:
1. REFER TO GEL10023 FOR WIRING DIAGRAMS OF JS.
2. ATTACH I.S. WIRES TO SIDEWALL AND MUST BE MINIMUM OF 2" AWAY FROM NON I.S. WIRES.
3. IDENTIFY I.S. WIRES WITH BLUE HEAT SHRINK OR USE BLUE CABLE.
4. ITEM 45 NOT SHOWN.

No.	Y/M/D	BY	REVISION DESCRIPTION	CHKD.	APVD.
E	09/06/19	DHT	ADDED MTG BRACKET ITEM 39 AND BLUE CABLE	GRY	BGT
D	09/02/24	MJS	ECN# CN1245, CHANGED ITEM 4, ADDED ITEM 38	GRY	DHT
C	09/01/19	MJS	CHANGED TITLE BLOCK AND ENCLOURE DESIGN	GRY	MXD
G	11/04/05	DHT	CORRECTED JS CONFIGURATIONS		
F	10/11/03	MJS	CHANGED ITEM# 24	GRY	BGT

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WELDING PROCEDURE UNLESS NOTED OTHERWISE AS PER CANRIG SPECIFICATION – ENG 704

TOLERANCE – UNLESS OTHERWISE SPECIFIED
REMOVE SHARP CORNERS AND BURRS
CASTING ± 1/16
⌖ CONCENTRICITY .005 TIR
— STRAIGHTNESS ± .005 IN 5 INCHES
⊥ SQUARENESS ± .010 IN 5 INCHES
// PARALLELISM ± .010 IN 5 INCHES
⌖ TRUE POSITION .005
MACHINED SURFACES 125
RADIUS UNLESS SHOWN – 0.03 MAX.

FABRICATING IMPERIAL (in)		FABRICATING METRIC (mm)	
0 TO 24	± 1/16	0 TO 610	± 1 mm
24 TO 60	± 1/8"	610 TO 1525	± 3 mm
60 TO 120	± 3/16"	1525 TO 3048	± 5 mm
120 TO 280	± 1/4"	3048 TO 7112	± 7 mm
280 & OVER	± 1/2"	7112 & OVER	± 13 mm

MACHINING IMPERIAL		MACHINING METRIC	
DECIMAL .x	± .030"	DECIMAL	± .8 mm
.xx	± .015"		± .40 mm
.xxx	± .005"	.xxx	± .13 mm

ANGULAR MACHINING ± 1° FABRICATION ± 2°

DRAWN	LAQ	08/05/13
CHECKED	LAM	08/05/21
APPRV'D	MJS	08/05/21
MATERIAL		
EST. WEIGHT	SCALE	1:2

THIRD ANGLE PROJECTION | SHEET SIZE D

J–BOX, DRILLERS, CONSOLE WRENCH

PROJECT TM80/120 | AY50146 REV G

Figure 5

5. Complete lockout/tagout procedures and ensure that personnel are clear from the wrench.

6. Start the wrench and check joystick operation.

INFORMATION:

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For further information contact:

Canrig Drilling Technology Ltd.

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Calgary, AB T2C 2R4
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Fax: 403.279.6888

PRODUCT BULLETIN NUMBER: WRENCH 012

PRODUCT: TM-80 & TM-120, All Models **DATE: December 13, 2011**

SUBJECT: **Sealed Electric Operator for Horizontal Extend/Retract Valve**

SERIAL NUMBERS: **All**

DISCUSSION:

The hydraulic valves supplied with the wrench are equipped with manual handle lever boxes for manual actuation. With the manual actuators, there is a small gap in the wrist pin area between the lever box and valve body which can be infiltrated by contaminants. When this happens, contaminants or corrosion may cause the valve spool to stick, causing the wrench movement to be less than fluid and may result in a disparity between the actual wrench position and the wrench position perceived by the PLC based on feedback from the linear transducer. This is important in the horizontal positioning of the wrench, where spool sticking may cause the tong assembly to overshoot or undershoot its pre-programmed location when operating in Automatic mode. Removing the manual actuator and installing a sealed electric operator on the horizontal extend/retract valve will result in a consistently smooth motion regardless of the surface corrosion that may arise during service.

RECOMMENDATION:

Follow the below procedures to remove the manual actuator and install a sealed electric operator. This procedure should only be performed by a trained technician as it requires recalibration of the PR card and service level access to the HMI.

Parts Required:
Electric Operator Kit: Canrig P/N AY50806

Tools Required:
4mm hex key wrench
Channel lock pliers
Flat-head screwdriver

1. Fully retract the wrench to the park position.

2. Disconnect power. Follow local tag out and lock out procedures.

3. Open the arm junction box (Figure 1) and locate the horizontal extend/retract valve coil wires.

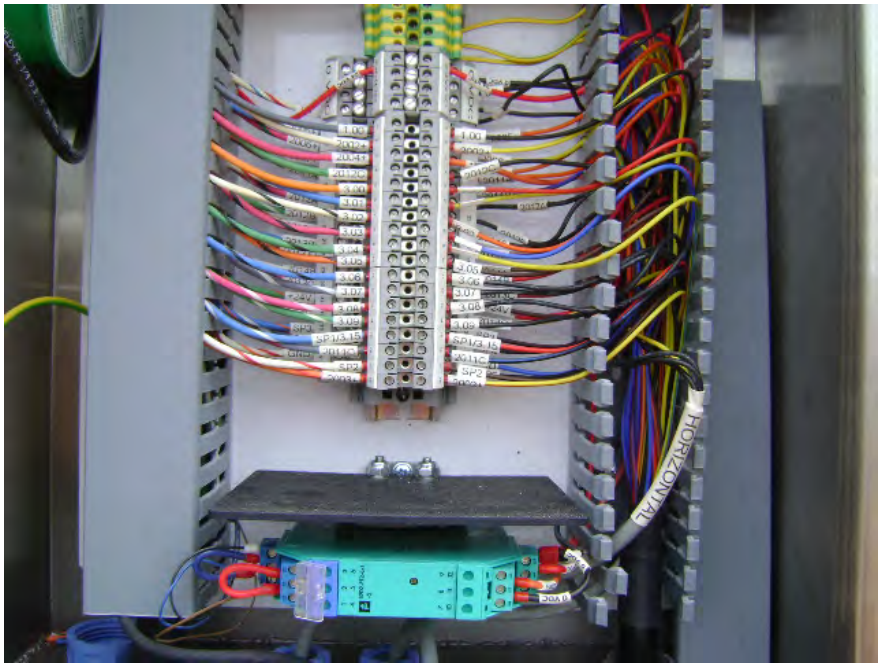

Figure 1

4. Disconnect the coil wires from the terminal block (Figure 2). Disconnect 2012A_3 from TB1-24, 2012C_1 (or 0V) from TB1-4, and 2012B_2 from TB1-25. Note: Wire numbers and terminal block assignments on other revisions of electrical schematic may vary. Some versions may require disconnect of ground (green/yellow) wires.

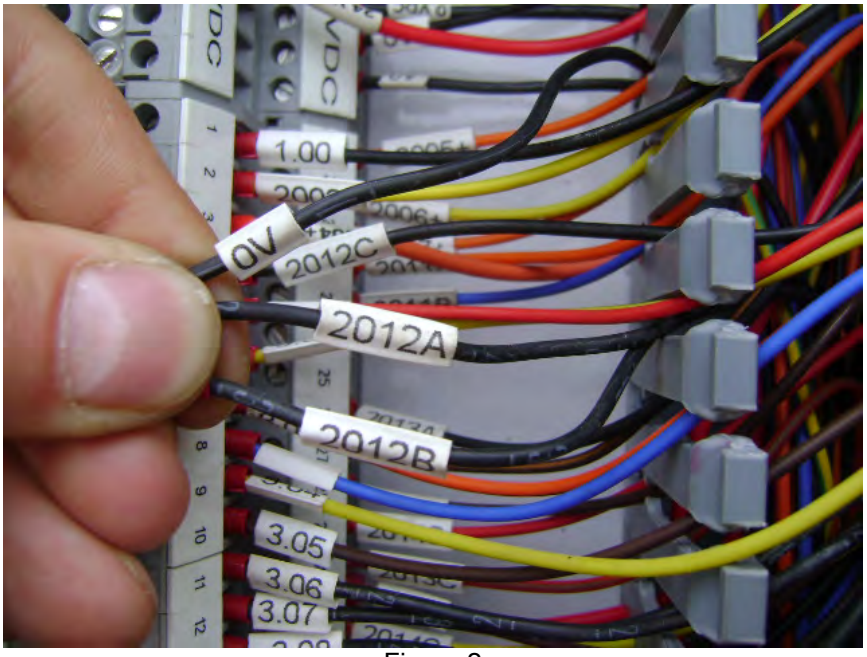

Figure 2

5. Take note of terminal locations for re-installation.

6. Remove the strain relief using channel lock pliers and remove the cable from the arm junction box. (Figure 3). Pull the cable back to the coil on the horizontal extend/retract valve.

Figure 3

7. Locate the horizontal extend/retract valve section on the arm valve bank (Figure 4). This will be the valve section on top for all models.

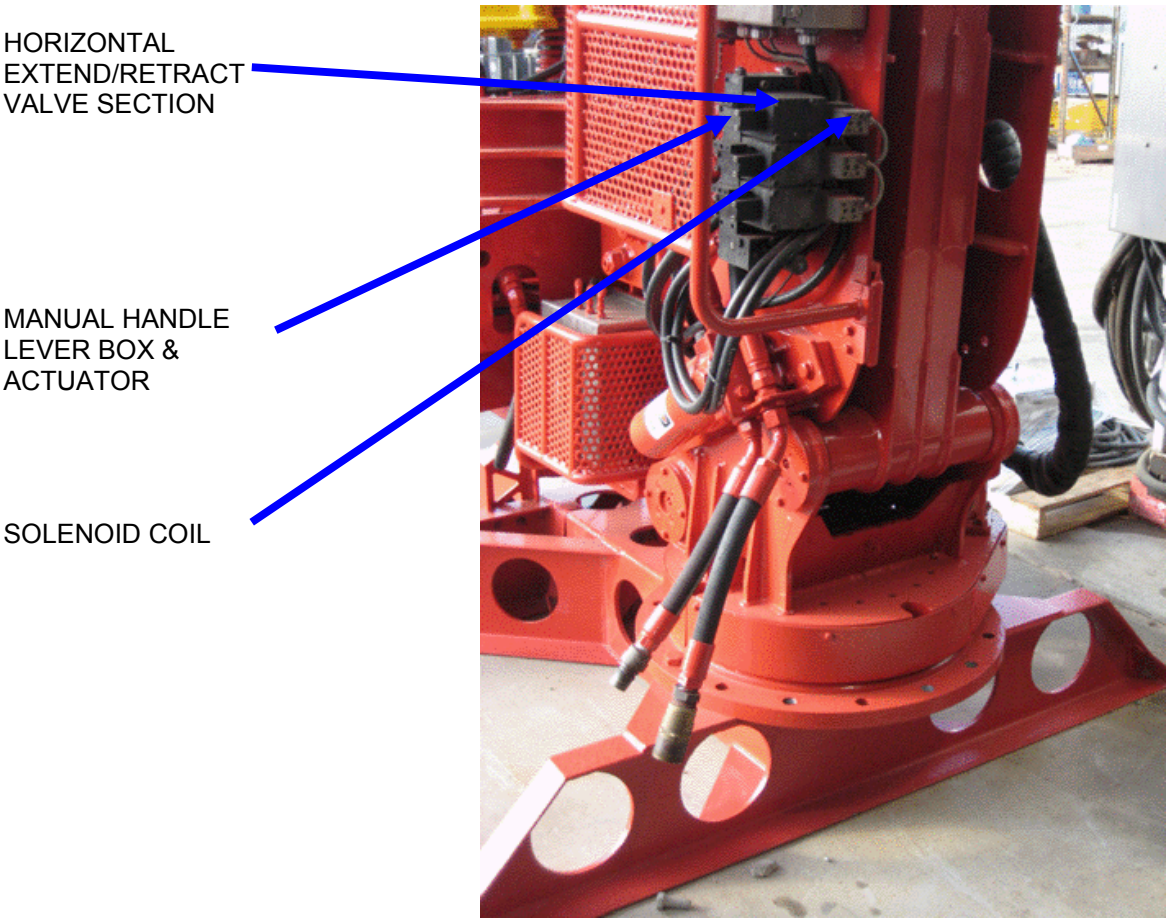

Figure 4

7. Remove the four 4mm x 40mm socket head screws securing the manual actuator to the valve body (Figure 5).

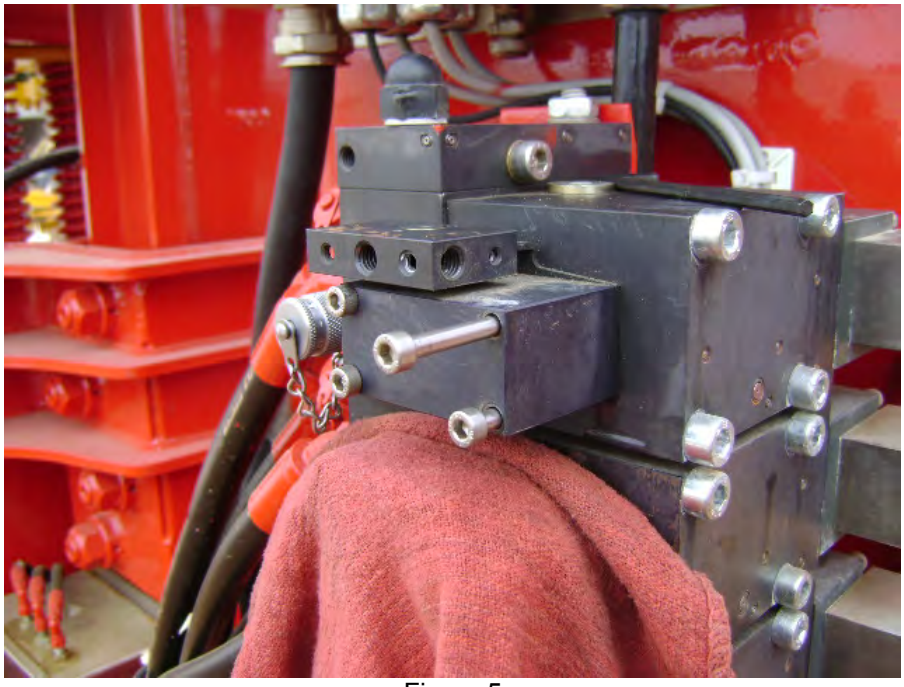

Figure 5

8. Pull the actuator away from the valve body until the e-clip and pin that are attached to the valve spool are exposed (Figure 6).

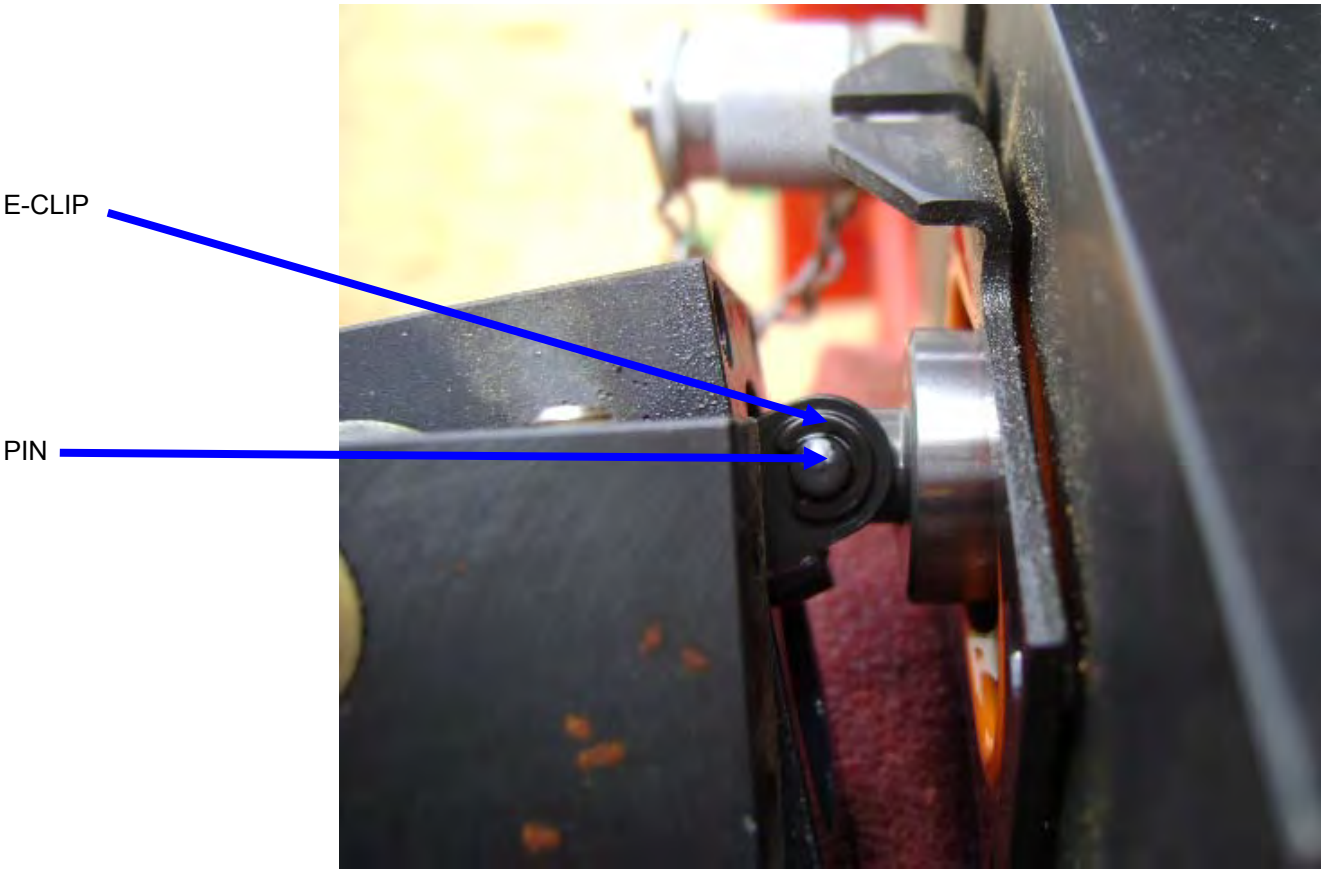

Figure 6

9. Remove the e-clip and pin to release the actuator from the spool (Figures 7 and 8).

Figure 7

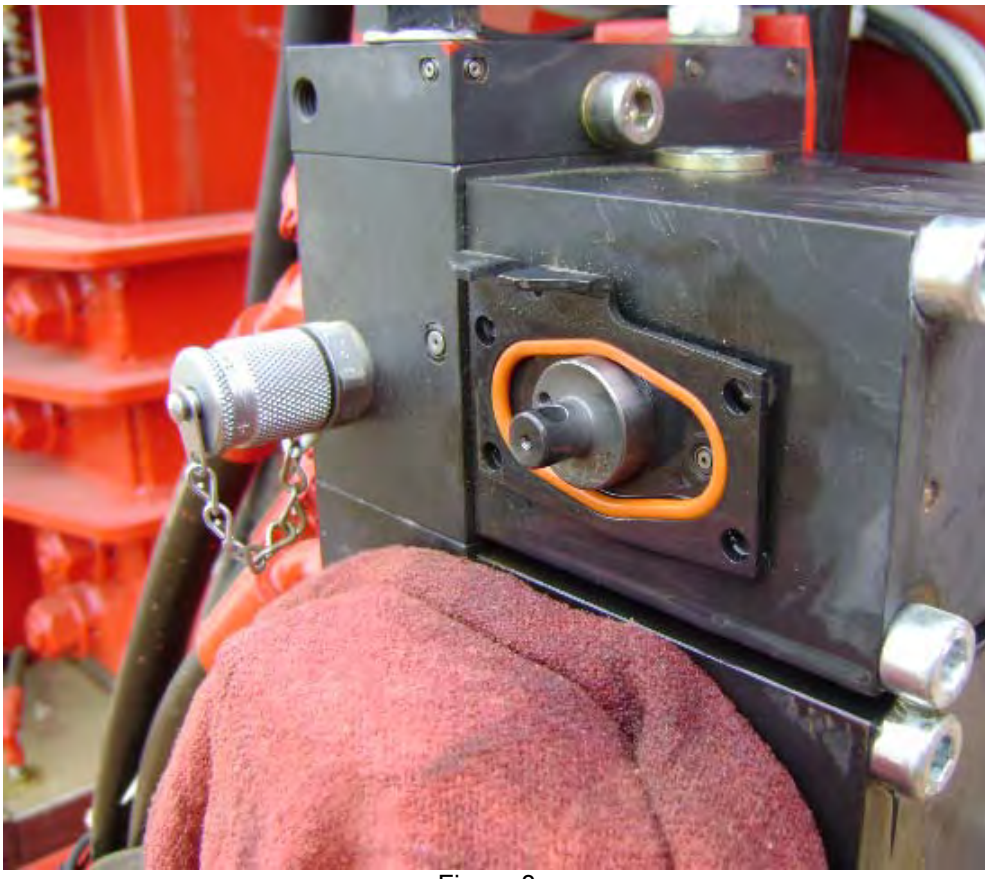

Figure 8

10. Remove the three 4mm x 60mm socket head screws securing the coil to the valve body (Figure 9).

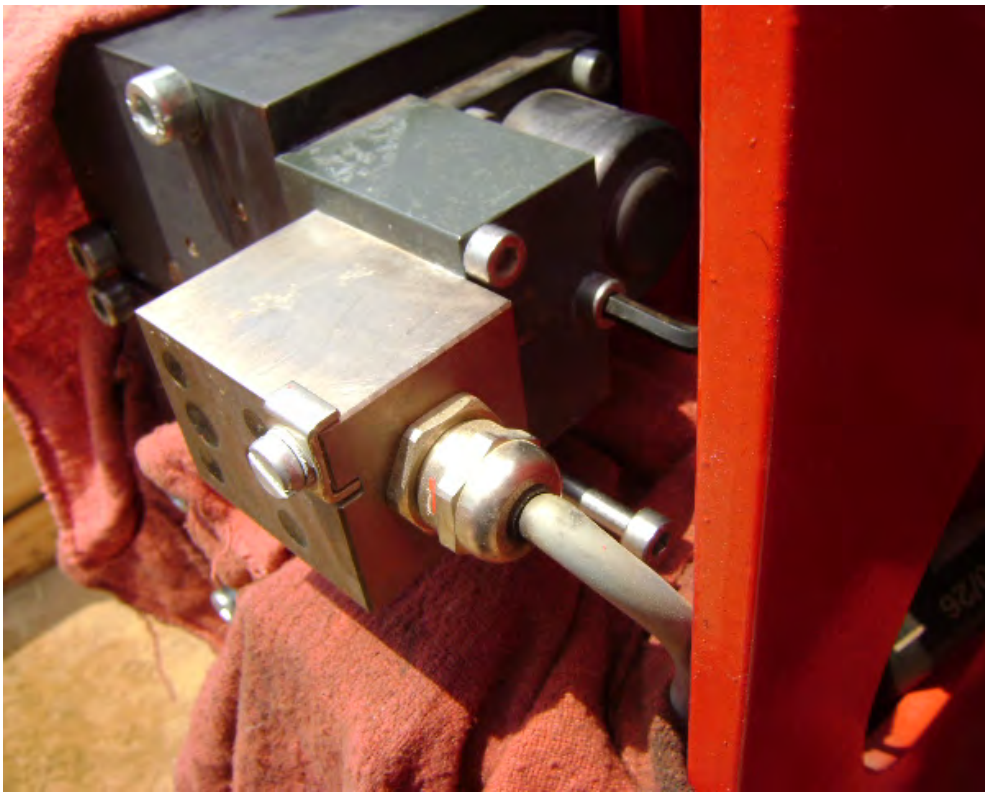

Figure 9

11. Remove the coil and cable. Make sure the o-rings and actuating spools remain inside the valve body (Figure 10).

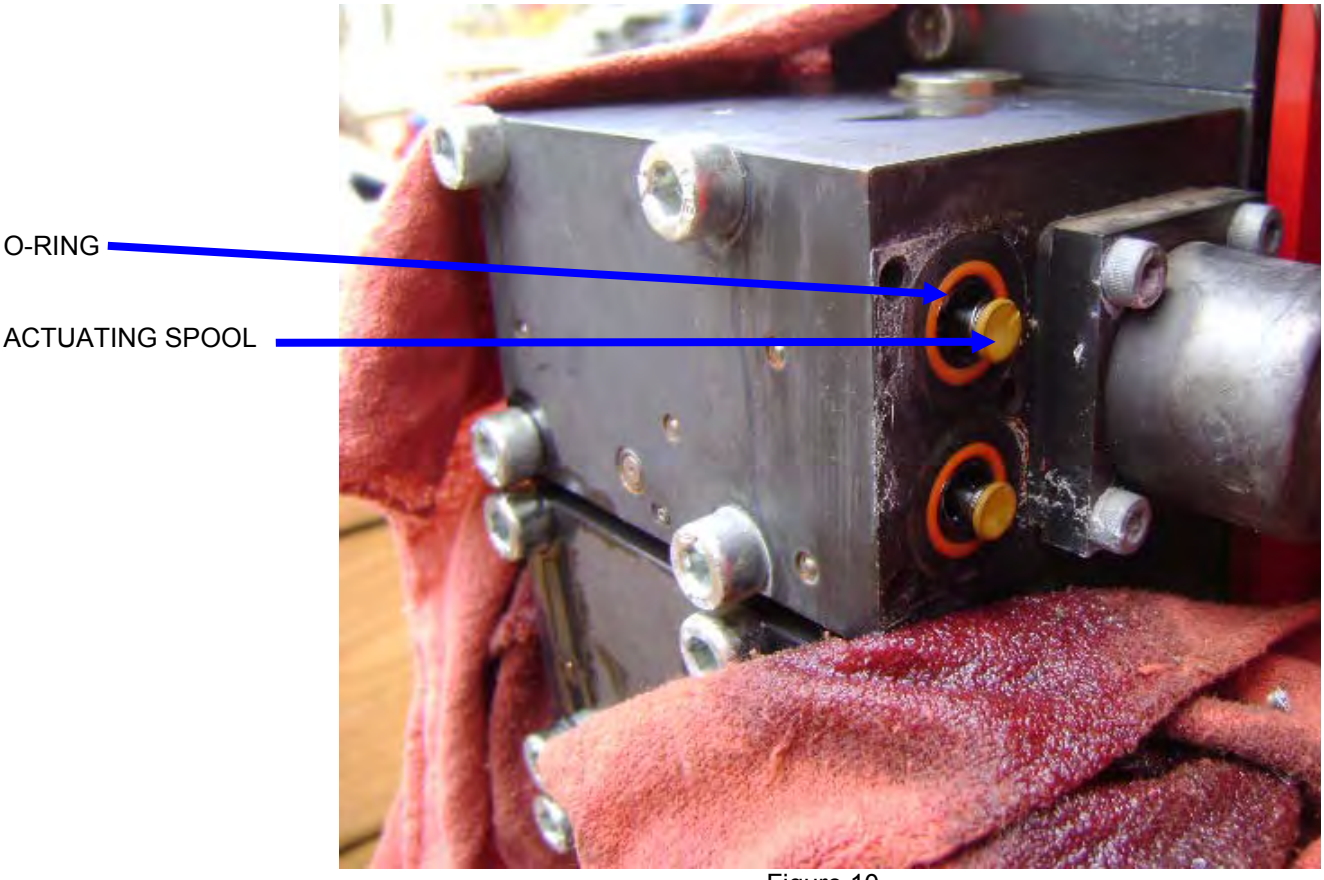

Figure 10

12. Locate the new electric operator and insert four 4mm x 60mm socket head screws through the coil body (Figures 11 and 12).

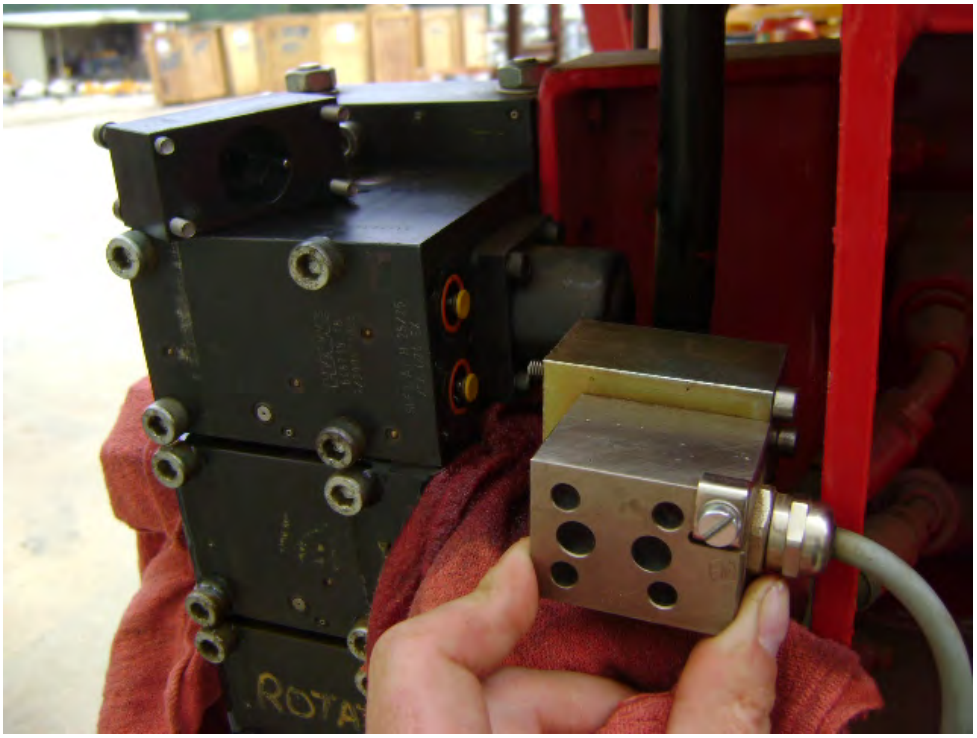

Figure 11

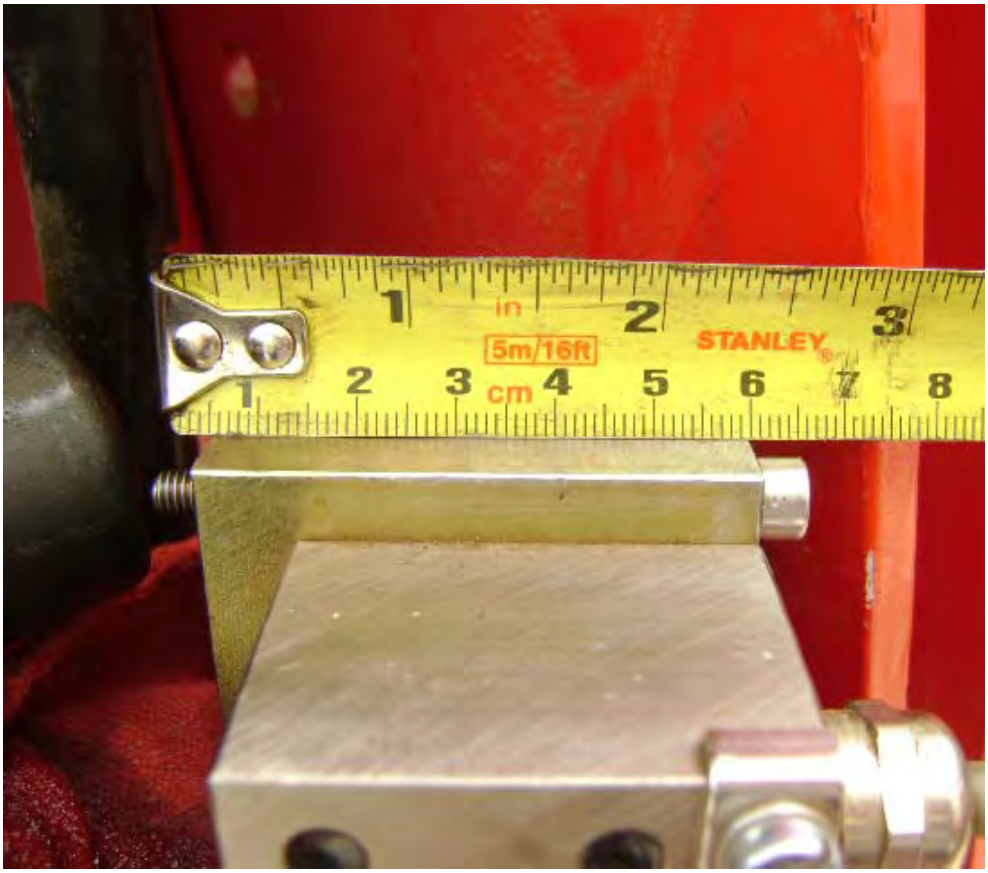

Figure 12

13. Install the new electric operator onto the valve body (Figure 13).

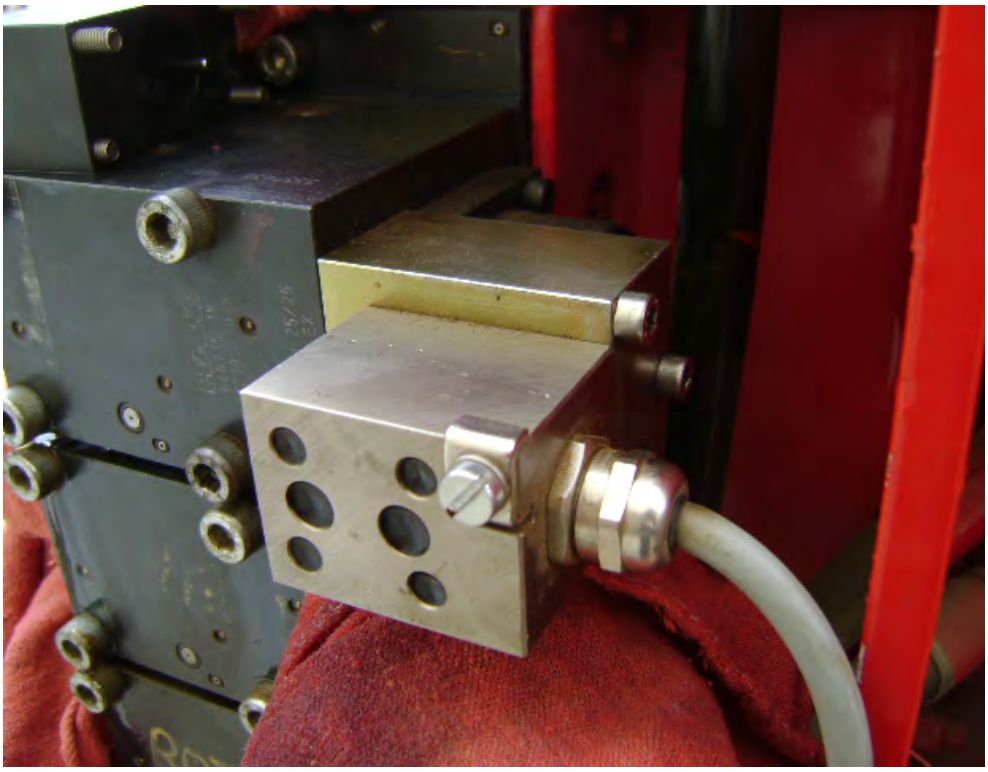

Figure 13

14. Place the 4mm x 40mm socket head screws in the spool cover (Figure 14).

Figure 14

15. Orient the spool to line up the pin hole with the pin inside the spool cover that is replacing the manual actuator (Figures 15 and 16).

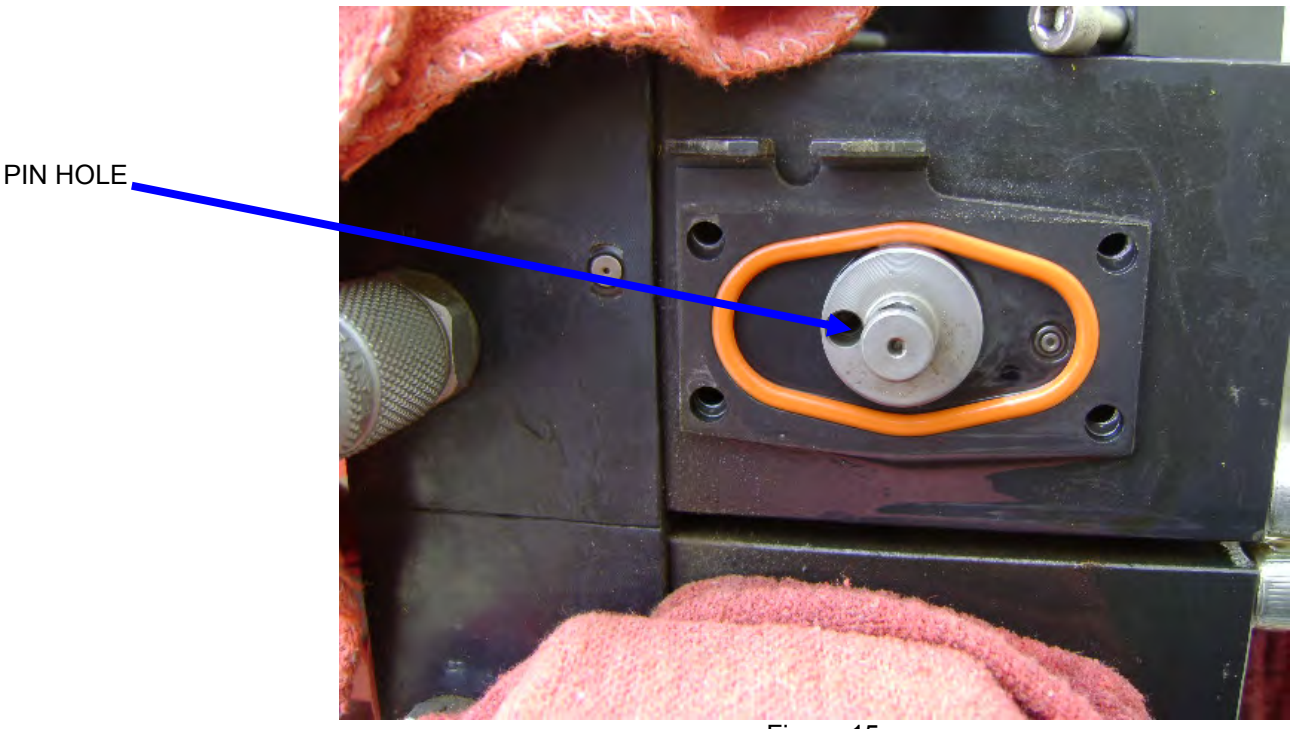

Figure 15

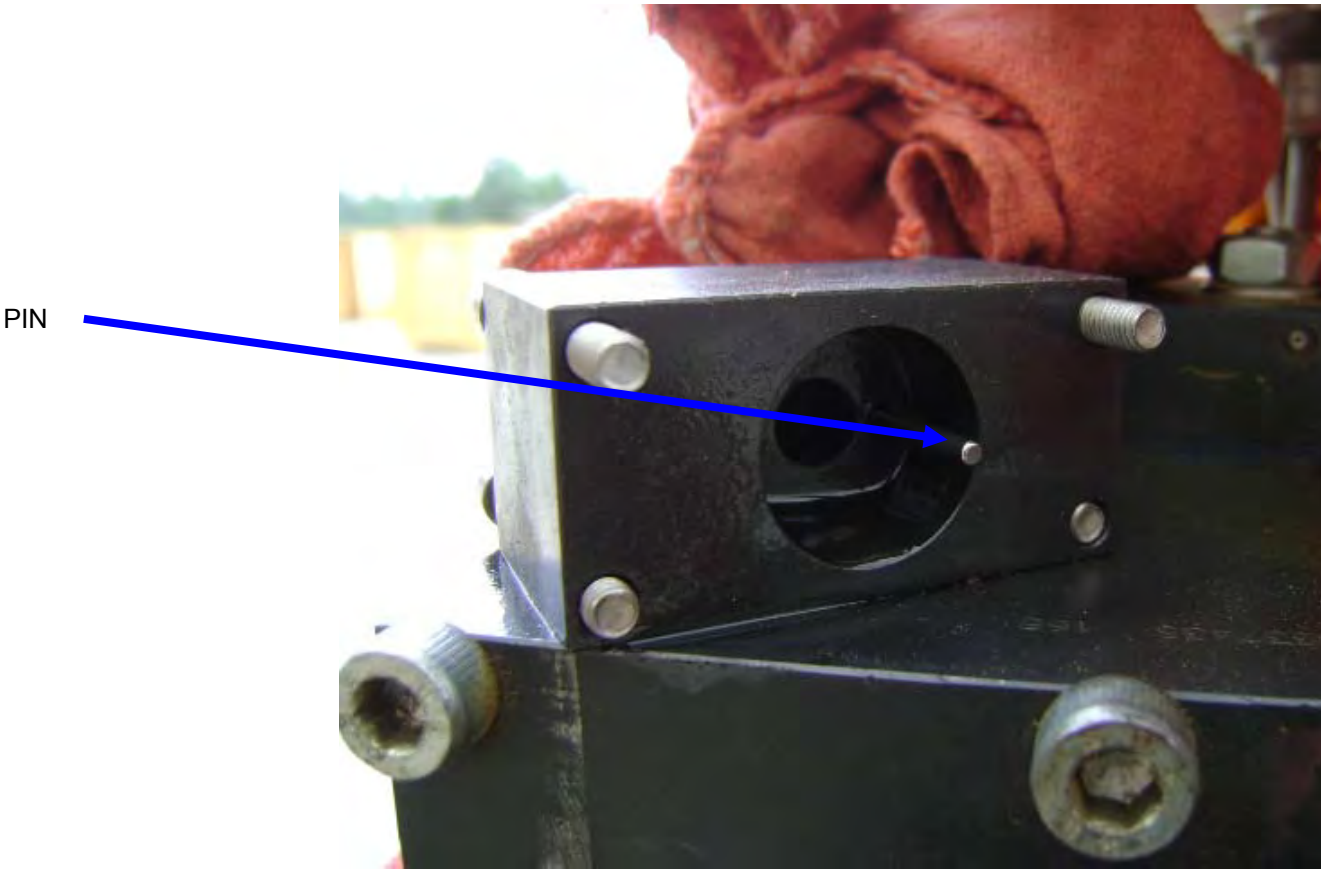

Figure 16

16. Install the spool cover onto the valve (Figure 17). Ensure the o-ring stays in place while installing the cover so that it does not get pinched during tightening.

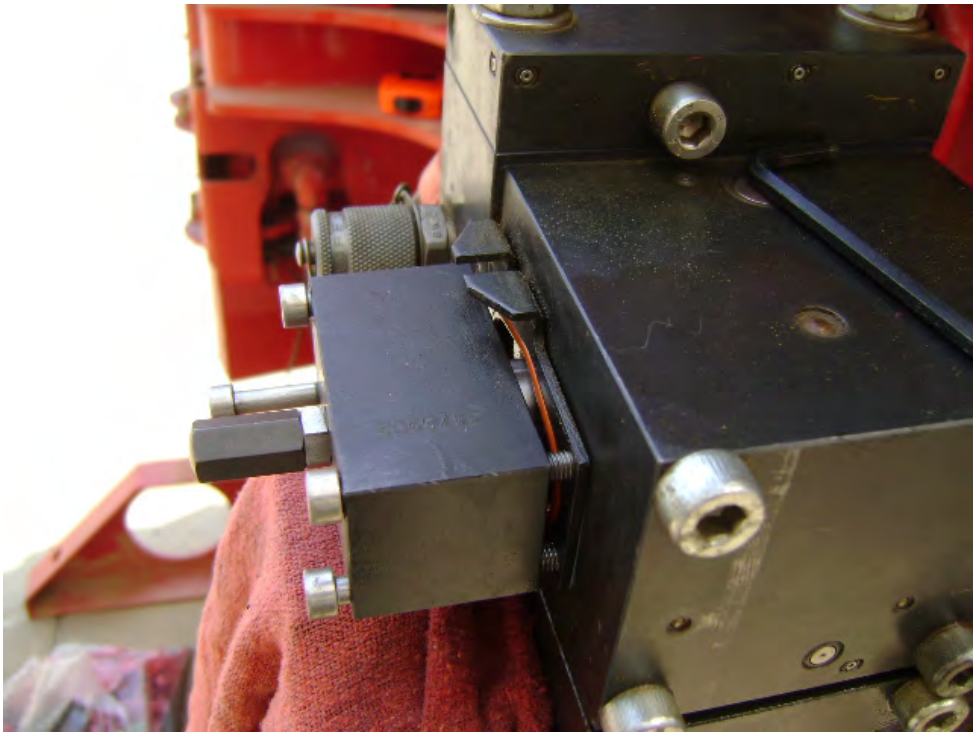

Figure 17

17. Once the spool cover has been installed, verify that it is sitting flush and that the o-ring is not sticking out.

18. Remove the adjustment screw cover and verify the adjustment screw is all of the way out. If not, unscrew it CCW until it is all of the way out (Figure 18).

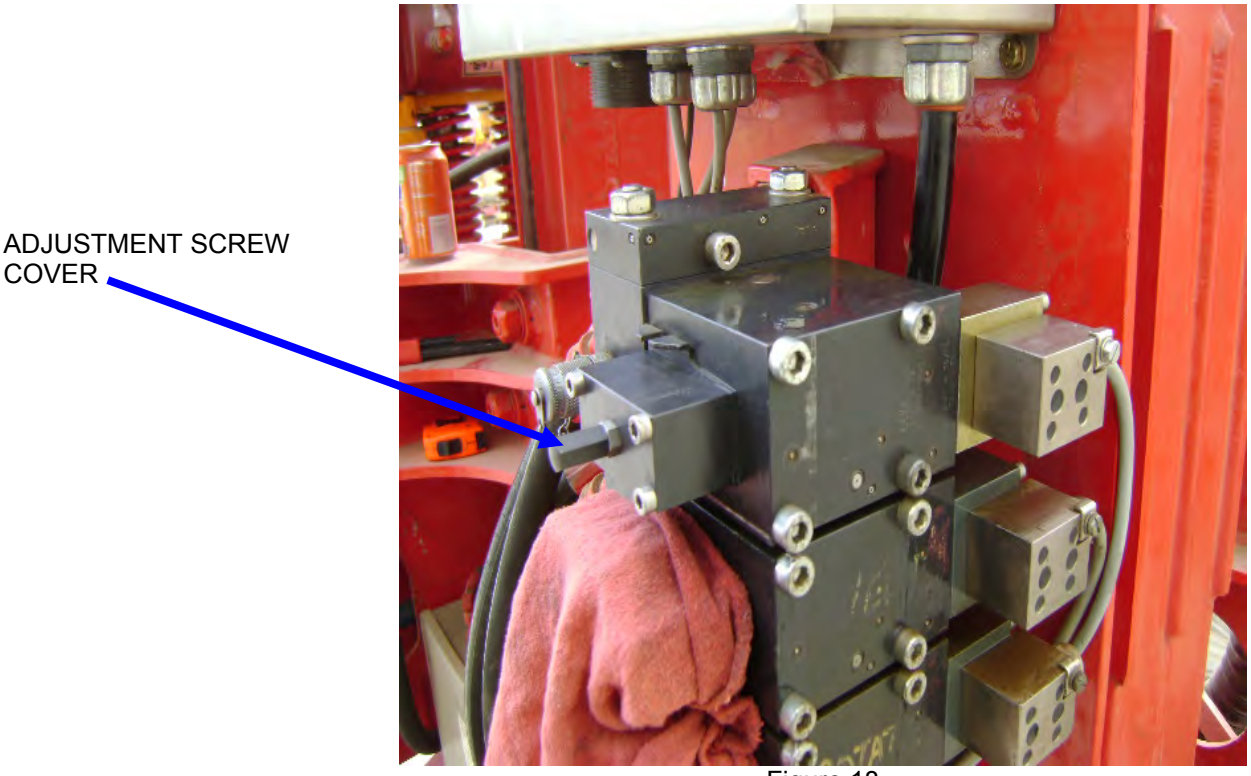

Figure 18

19. Route the new coil cable back through the strain relief and into the arm junction box. Tighten the strain relief once the cable has been passed through, leaving some slack behind to avoid having the cable stretched out from the coil to the junction box (Figure 19).

Figure 19

20. Terminate the coil wires back to their proper locations (as removed) (Figure 20).

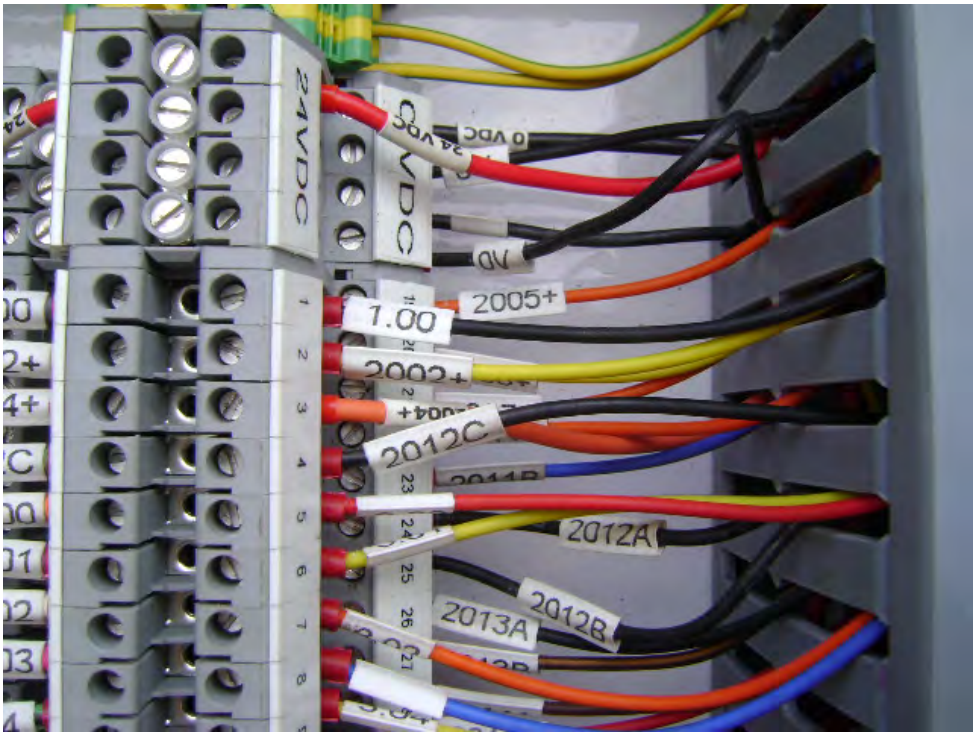

Figure 20

21. Reinstall the wire cover and close the arm junction box (Figure 21).

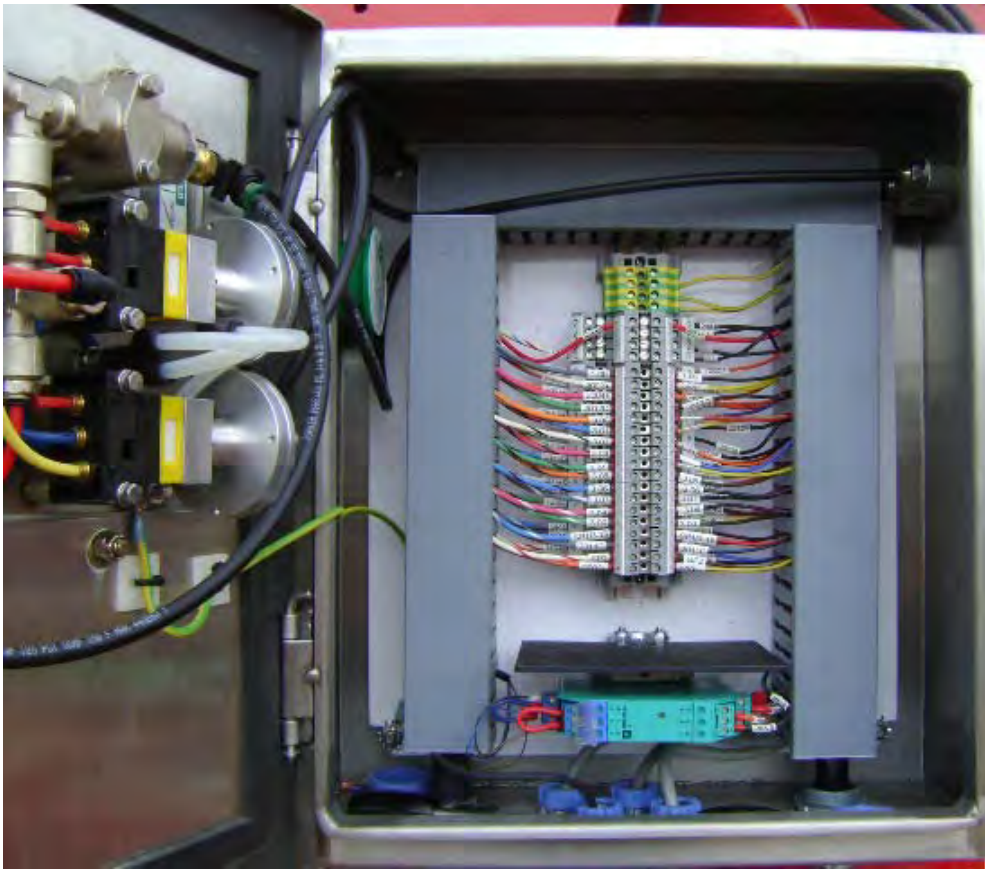

Figure 21

22. Reconnect power.

The remaining procedures can only be performed by trained service technicians.

23. Recalibrate the 2012 PR card
    a. Change LOA setting from 20 to 25.
    b. Change IA2 setting from 57 down to 52.
    c. Change LOB setting from 20 to 25.
    d. Change IB2 setting from 57 down to 52.

24. Test the functionality of the new horizontal valve operator and adjust the speed set points, as necessary, located in the Advance Settings under the Arm/Carriage page on the HMI (Figure 22). Perform this operation for both the Extend and Retract function until the proper speed has been accomplished.

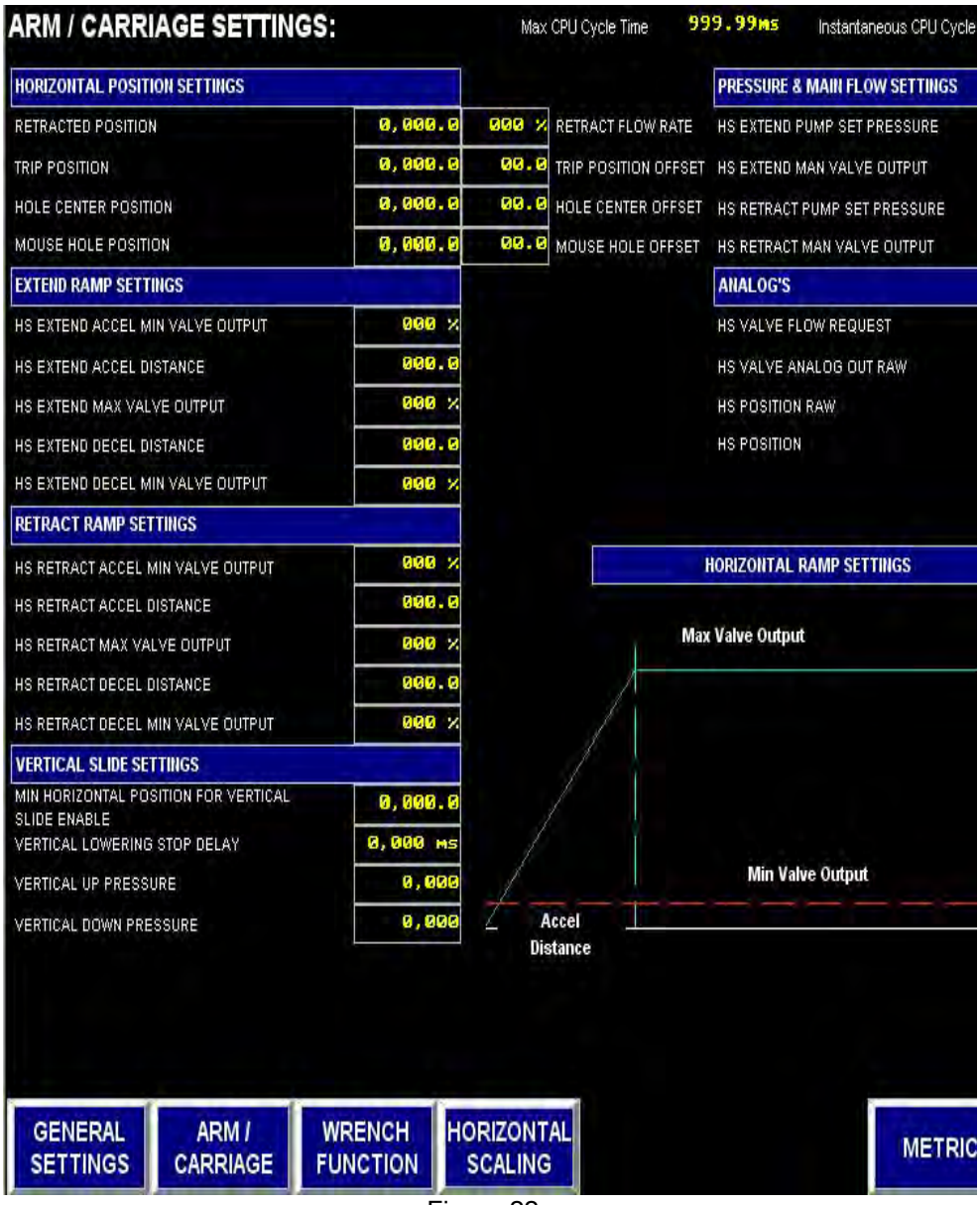

Figure 22

25. Once the automatic speed settings have been properly adjusted, manually extend and retract the tong assembly in the horizontal direction by pushing the top button on the electric operator to extend and the bottom button to retract (Figures 23 and 24).

PRESS TO EXTEND MANUALLY

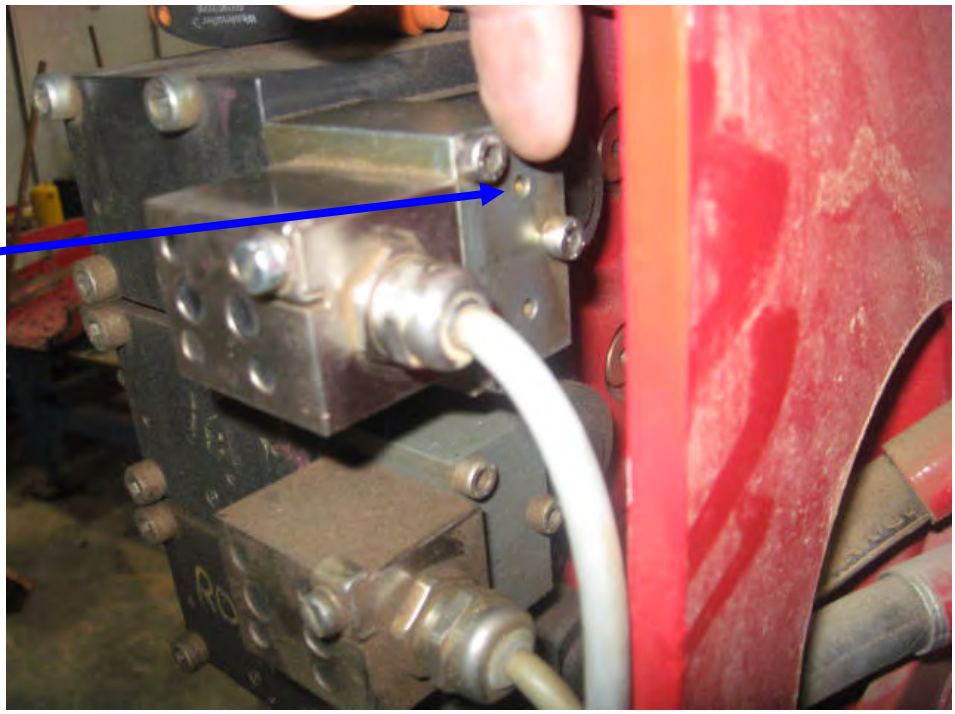

Figure 23

PRESS TO RETRACT MANUALLY

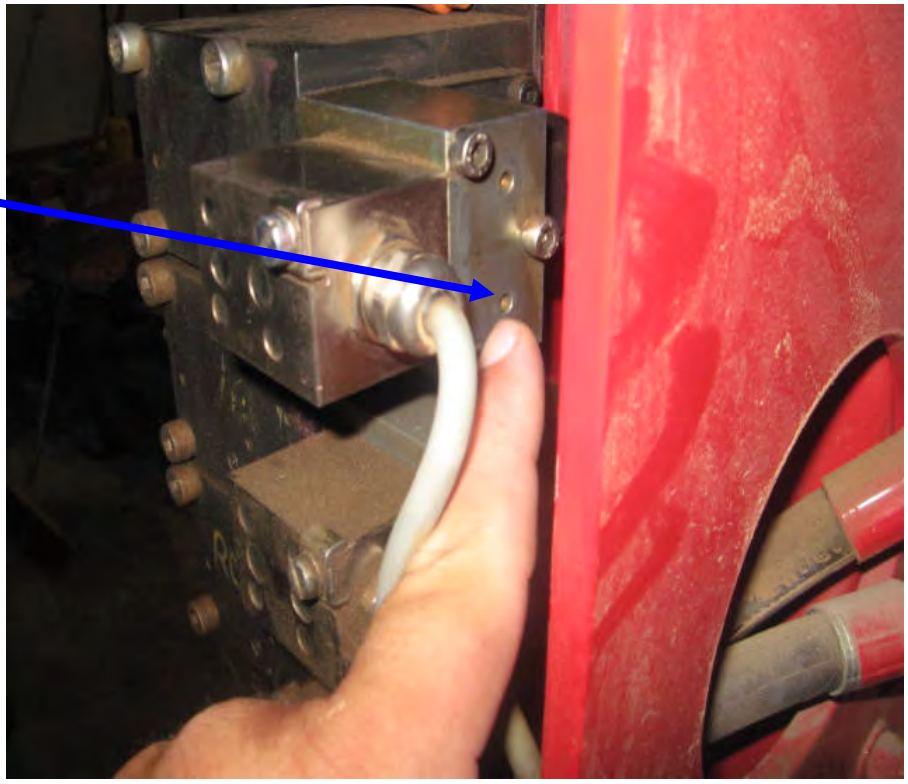

Figure 24

INFORMATION:

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For further information contact:

Canrig Drilling Technology Ltd.

8223 Willow Place South
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CANRIG
DRILLING TECHNOLOGY LTD.

PRODUCT BULLETIN
WRENCH NUMBER: WRENCH 013

PRODUCT: Torq-Matic Wrench **DATE: MAY 16, 2012**

SUBJECT: **Tong Cylinder Upgrade**

SERIAL NUMBERS: **All TM-80 Series Wrenches**

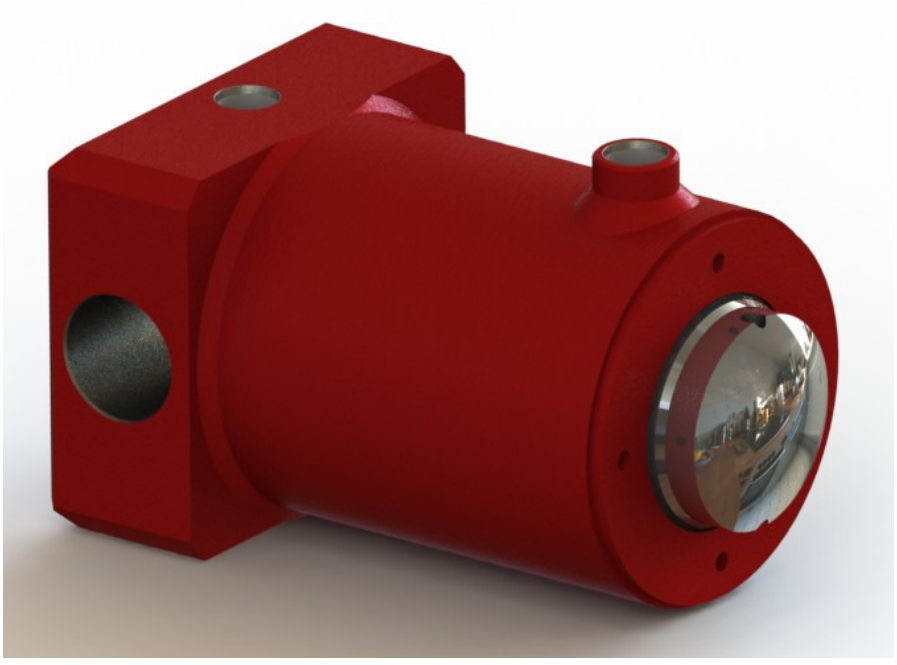
DISCUSSION:

Heavier duty tong cylinders are now available as an upgrade to the existing upper & lower, left & right tong cylinders used on the TM-80.

Upgrades to the cylinder include:

1. Increased piston thickness and increased diameter of threaded portion of rod - increases threaded surface contact area between rod and piston and prevents rod from backing out.
2. Addition of piston wear ring - reduces frictional resistance and provides better seal between piston and barrel wall.
3. Relocated o-ring on cylinder head – protects o-ring from damage and offers better leak prevention.
4. Internal orifice on rod end – reduces part count and eliminates need for externally installed orifice.

The new cylinder results in a near doubling of the Factor of Safety relative to system hydraulic design pressure over the current cylinder.



RECOMMENDATION:

The current cylinder (H10552) will be obsoleted once inventory is depleted.

The new cylinders are currently available for aftermarket sale and will be installed on all new TM-80 wrenches beginning July 2012.

The part number for the new cylinder is H11416.

H11416 Specifications:
Size:
- Barrel OD: 7”
- Bore ID: 6”
- Rod OD: 4”
- Stroke: 4.625”

Materials of Construction:
- Rod: 17-4 SS CPO
- Tube: 1026 DOM HT

Max Operating Pressure:
- Extend: 5300 psi (FoS = 2.4)
- Retract: 5300 psi (FoS = 2.4)

Connections:
- Extend: #12 SAE ORB
- Retract: #12 SAE ORB

H11416 should only be ordered independently if replacing an existing H11416 cylinder. Due to the relocation of the extend port, a fitting kit is required with the H11416 cylinder when replacing the current H10552 cylinder to effectively extend the length of the hose.

When ordering a complete set of four replacement cylinders, use part number AY50927 (drawing attached). This kit includes the cylinders and a complete set of adapter fittings.

AY50927

ID	P/N	Description	Qty
1	H11416	CYL, BORE 6, ROD 4, STRK 4.625, 5300 PSI	4
2	H15-070320-12-12	ELL 45°, MALE 3/4 JIC, MALE 3/4 ORB	5
3	H15-070220-12	ELL 90°, MALE 3/4 JIC, MALE 3/4 ORB	2
4	H15-070432-12	TEE, SWV NUT RUN, 3/4 JIC	4
5	H15-070112-12	CAP, 3/4 JIC	4
6	H15-070120-12-12	ADPT, MALE 3/4 JIC, MALE 3/4 ORB	1

When ordering individual cylinders, a fitting kit (AY50930) must be ordered with each cylinder (H11416). The AY50930 fitting kit contains enough fittings to install the cylinder in any location.

AY50930

ID	P/N	Description	Qty
2	H15-070320-12-12	ELL 45°, MALE 3/4 JIC, MALE 3/4 ORB	2
3	H15-070220-12	ELL 90°, MALE 3/4 JIC, MALE 3/4 ORB	1
4	H15-070432-12	TEE, SWV NUT RUN, 3/4 JIC	1
5	H15-070112-12	CAP, 3/4 JIC	1
6	H15-070120-12-12	ADPT, MALE 3/4 JIC, MALE 3/4 ORB	1

Note: The orifice installed in the adapter fitting on the rod end port is no longer required.

The replacement seal kit is S12899.

To replace the installed cylinders, the follow the steps below.

Tools Required:

1-1/4” open end wrench
3/8” Allen wrench
1/4” Allen wrench
Hammer
Brass drift or wooden rod
Blue Loctite
Oil absorbent pads

Procedure:

1. Start the HPU.
2. From the DEVICE TEST screen of the HMI:
    a. Extend wrench to hole center using the Horizontal IN and Vertical Lift DN buttons.
    b. Adjust tong assembly height using the Vertical Lift DN or UP buttons to locate the cylinders at a comfortable working height (approximately waist high).
    c. Use the Torque Cylinder EX button to rotate the upper tong and expose all four cylinder pins.
3. Turn off the HPU.
4. From the DEVICE TEST screen, cycle the Lower Clamp and Upper Clamp OP and CL buttons a few times to bleed pressure from the cylinders. Refer to the Actual Hyd Pressure readout as an indicator as to whether the pressure has been bled off.
5. Disconnect power. Follow local tag out and lock out procedures.
6. Place a bucket(s) and/or oil-absorbent pads under the work area to capture leaking hydraulic oil.
7. With extreme caution, use a 1-1/4" open end wrench to slightly crack open one of the fittings on each of the cylinders to ensure all hydraulic pressure has been bled off. If high pressure appears to still exist, retighten cracked fittings, place valve handles on the clamping cylinder valve sections, and actuate valve handles in and out until all of the residual pressure has been bled out.
8. Loosen the set screws on the cylinder pins using the 1/4" Allen wrench.
9. Use a hammer and a brass drift or sturdy wooden rod to drive out cylinder pins. Avoid using hard metal tools such as steel punches, as this may damage the pin. A second person may be needed for this step in order to catch the pins as they are driven out.
10. Use a 1-1/4" open end wrench to disconnect hydraulic hoses from cylinder ports. Mark each hose section with chalk or marking paint so they can be reconnected correctly.
11. Use a crane or lifting device to help slowly remove the cylinder and jaw weldment as one piece. If no lifting device is available, use two persons to remove the assembly.
12. Use a 3/8" Allen wrench to remove the ram connection bolt.
13. Remove cylinder from the jaw weldment.
14. Install adapter fittings on replacement cylinders. Tighten loosely.
15. Install replacement cylinder in jaw weldment and re-install the ram connection bolt using a small amount of Loctite.
16. Re-insert new assembly into the tong assembly, ensuring cylinder, fittings, and clamp dies are correctly oriented.
17. Reconnect hydraulic hoses.
18. Tighten port fittings on cylinder.
19. Align cylinder pin hole in the cylinder with its corresponding bracket in the tong assembly and re-insert cylinder pin.
20. Tighten set screws.
21. Remove lockout and tagout devices and reconnect power.
22. Start the HPU.
23. Cycle through the make-up / break-out sequence several times to verify functionality.
24. Fully retract the wrench to the park position and turn off the HPU.

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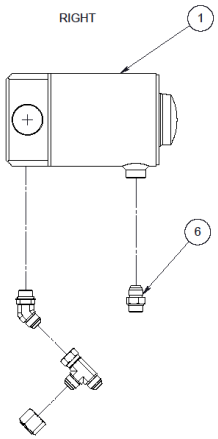
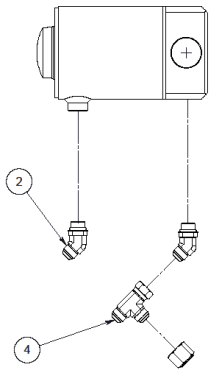
IF IN DOUBT.....PLEASE ASK!

BOTTOM

RIGHT

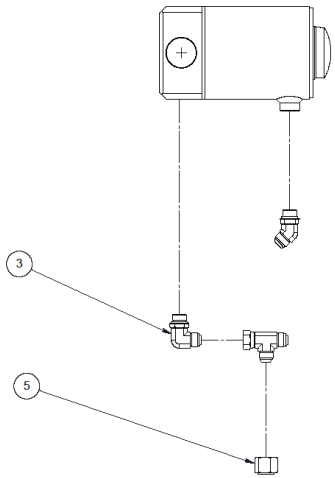


LEFT

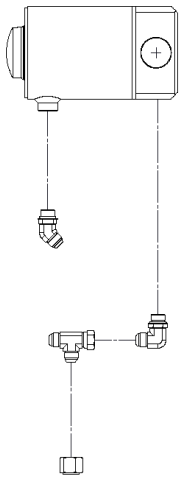


TOP

RIGHT



LEFT



WELDING PROCEDURE AS PER CANRIG SPECIFICATION - ENG 704, UNLESS NOTED OTHERWISE

REMOVE SHARP CORNERS AND BURRS
CASTING ± 1/16

◎	CONCENTRICITY	.005 TIR
—	STRAIGHTNESS	± .005 IN 6 INCHES
⊥	SQUARENESS	± .010 IN 6 INCHES
∥	PARALLELISM	± .010 IN 6 INCHES
▱	FLATNESS	± .010 or as Shown
⌖	TRUE POSITION	.005

MACHINED SURFACES 125

MIN. RADIUS UNLESS SHOWN = 0.03 MAX.

TOLERANCE - UNLESS OTHERWISE SPECIFIED

FABRICATING IMPERIAL		FABRICATING [METRIC]	
0 TO 24"	± 1/16"	0 TO 610 mm	± 1 mm
24" to 60"	± 1/8"	610 TO 1525	± 3 mm
60" to 120"	± 3/16"	1525 TO 3048	± 5 mm
120" to 280"	± 1/4"	3048 TO 7112	± 7 mm
280" & OVER	± 1/2"	7112 & OVER	± 13 mm

MACHINING IMPERIAL		MACHINING METRIC	
DECIMAL .x	± .030"	DECIMAL x.	± .8 mm
.xx	± .015"	x.x	± .40 mm
.xxx	± .005"	x.xx	± .13 mm
ANGULAR MACHINING	± 1°	FABRICATION	± 2°

REV	DATE	BY	REVISION DESCRIPTION	ECN	CHKD	APVD

	INIT.	YY/MM/DD
MODELED	JRO	12/03/02
DRAWN	JRO	12/03/02
CHECKED	GRY	12/03/28
APPRV'D	ATB	12/03/28

MATERIAL

EST. WEIGHT 444.1 lbs | SCALE 1:4 | SHEET SIZE D

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

CANRIG Drilling Technology Ltd.

KIT, HVY DUTY TONG CYL, ALL

SHEET 1 OF 1 | AY50927 | REV A

IF IN DOUBT.....PLEASE ASK!

CANRIG
DRILLING TECHNOLOGY LTD.

PRODUCT BULLETIN
WRENCH NUMBER: WRENCH 014

PRODUCT: Torq-Matic Wrench **DATE:** 05/18/12

SUBJECT: **Wrench Lifting Procedure**

SERIAL NUMBERS: **All TM Wrenches with Pedestal Mount Arm Delivery Systems**

DISCUSSION: This document lists the sequential steps and instructions required for setting up the wrench in the shipping configuration and lifting the wrench. This bulletin is intended for use as a transport and shipping document only. Detailed instructions for rigging up and rigging down the wrench are included in the Installation section of the Instruction and Operations Manual. Any individuals performing this task must comply with all local codes and safety regulations.

RECOMMENDATION: Follow the procedures below to prepare and lift the wrench in a manner which will prevent injuries to personnel and damage to the wrench.

Note: Total WLL (Working Load Limit) = 10,000 lbs for TM-80 & TM-120

1. Perform a Job Safety Analysis.
2. At a minimum, visually inspect the equipment for the following prior to beginning any lifting operation.
    a. Ensure the wrench is in the stationary and upright position, with the torque assembly fully retracted.
    b. Verify bolt hole alignment in base (Figure 1). Rotate wrench to correct alignment prior to disconnecting hydraulic and electric power.
    c. Ensure the wrench has been thoroughly cleaned.
    d. Ensure all electrical and hydraulic power lines are disconnected and that connectors have been are plugged or capped.
    e. Look for signs of wear or damage that may constitute a hazard during lifting (use the JSA to determine corrective action).
    f. Replace missing fasteners and spot check installed fasteners for tightness.
    g. Look for signs of leaks and make the necessary corrections to prevent further leakage.
3. Follow steps 4 through 16 if the wrench is not configured for transport. If the wrench is already in the transport configuration (Figure 2), proceed to step 17.
4. Inventory the transport items and make up any shortages (Figures 4). Transport items include:
    a. Shipping Pins (DT50531 x 2).
    b. Linch Pins (M24-5003-010 x 2).
    c. Lifting Sling Set.

Wrench Model	Lifting Sling Set
TM-80, 110”	AY50680
TM-80 , 125”	AY50681
TM-120, 110”	AY50735
TM-120, 125”	AY50735

Lifting sling set includes: shackles (x4), hammer locks (x8), wire sling (x2 long, x2 short), chain link (x1), safety pins (x4), wire rope (x4 ft) & ferrules (x8) (Figure 3).

d. Shipping Skid.

Wrench Model	Shipping Skid
TM-80, 110”	112300010
TM-80 , 125”	112300009
TM-120, 110”	112300003
TM-120, 125”	112300003

e. 2” x 15’ Double J-Hook Ratchet Strap (M11179 x 1).
f. 1-8UNC x 2.75” Hex Head Capscrew (HH-0500NC-0200-GR8 x 1).
g. 1-8UNC Hex Nut (HN-0500NC-GR8 x 1)
h. Wooden blocks (as required).

IMPORTANT: Observe the inspection and rejection criteria for rigging hardware as per ASME B30.26 and ASME B30.9

5. Insert the shipping pins on both sides of the wrench through the shipping pin holes in the main boom and jib boom (Figures 5 & 6).
6. Secure the shipping pin with the linch pins.
7. Match the appropriate sling length to the correct location (shorter slings to rear on main boom and longer slings to front on jib boom).
8. Install the four shackles through the lift holes identified by the lift point labels (Figure 5).
9. If the lifting sling set is pre-assembled, skip steps 10, 12, and 13.
10. Loop one end of the wire rope around the shackle prior to inserting the screw pin. Loop the other end of the wire rope around the coiled loop of the safety pin.
11. Install the safety pin through the hole in the screw pin (Figure 7).
12. Connect the shackles to the hammer locks attached to the sling.
13. Connect the hammer locks at the top ends of the two short slings to a common chain link. Connect the hammer locks at the top ends of two long slings to a common chain link. Connect the common chain links to the main chain link (Figure 3).
14. Using a crane or equivalent lifting apparatus rated for 10,000 lb minimum load, attach the main hook of the crane to the main chain link of the wrench sling set and hoist the wrench.
15. Orient the wrench with the shipping skid and carefully lower the wrench onto the skid.
16. Fasten the base of the wrench to the shipping skid with the caps crew and nut (Figure 8). Torque to 250 ft-lbs.
17. Insert the J-Hook of one end of the ratchet strap through the hole in the skid indicated in Figure 9. Loop the ratchet strap over the upper tong, travelling jeep frame, and opposite side of the upper tong (Figure 2). Insert the opposite end J-Hook into the opposite end skid hole and ratchet down the ratchet strap.
18. Brace the jeep assembly area with wooden blocks to prevent movement during shipping.
19. Using a crane or equivalent lifting apparatus rated for 10,000 lb minimum load, attach the main hook of the crane to the main chain link of the wrench sling set and hoist the wrench.
20. Carefully lower the wrench onto the shipping platform in the upright position.
21. Shipping company will secure wrench shipping skid to shipping platform.

IMPORTANT: Transport components should be stored in a secure location for future use after each installation.

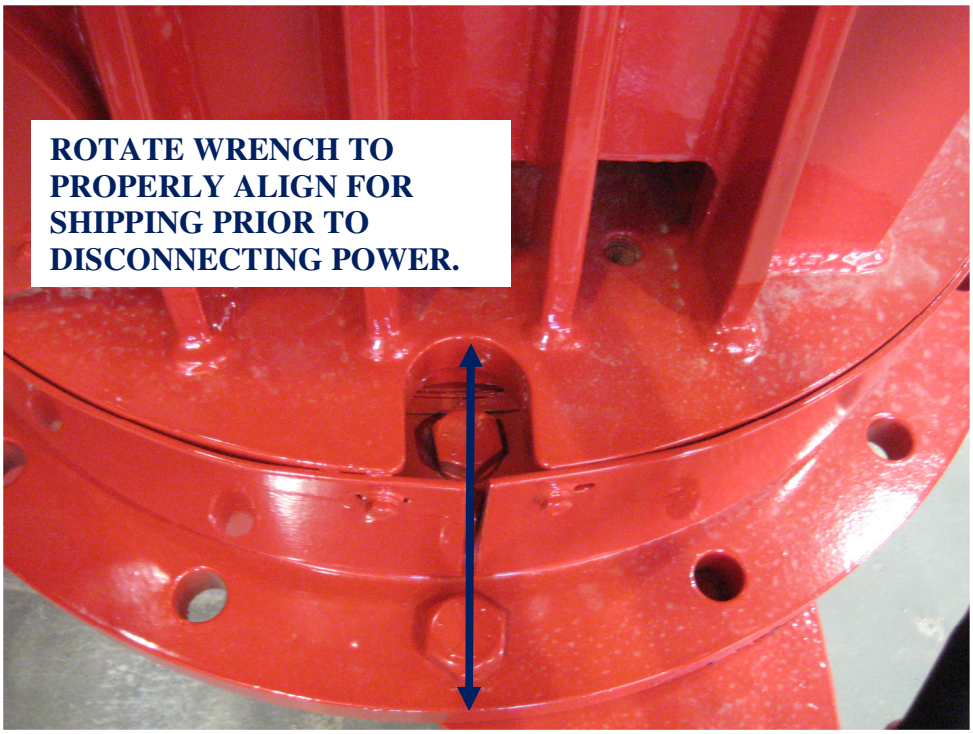


Figure 1

Figure 2

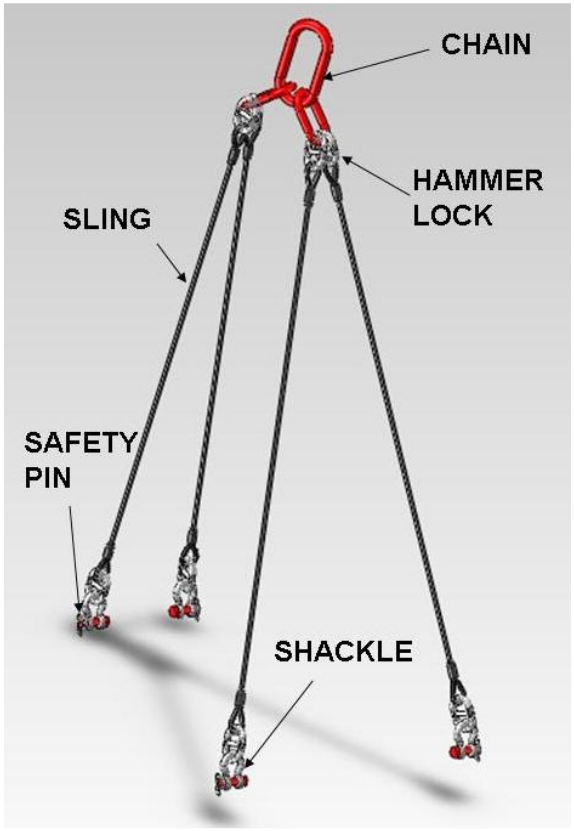


Figure 3

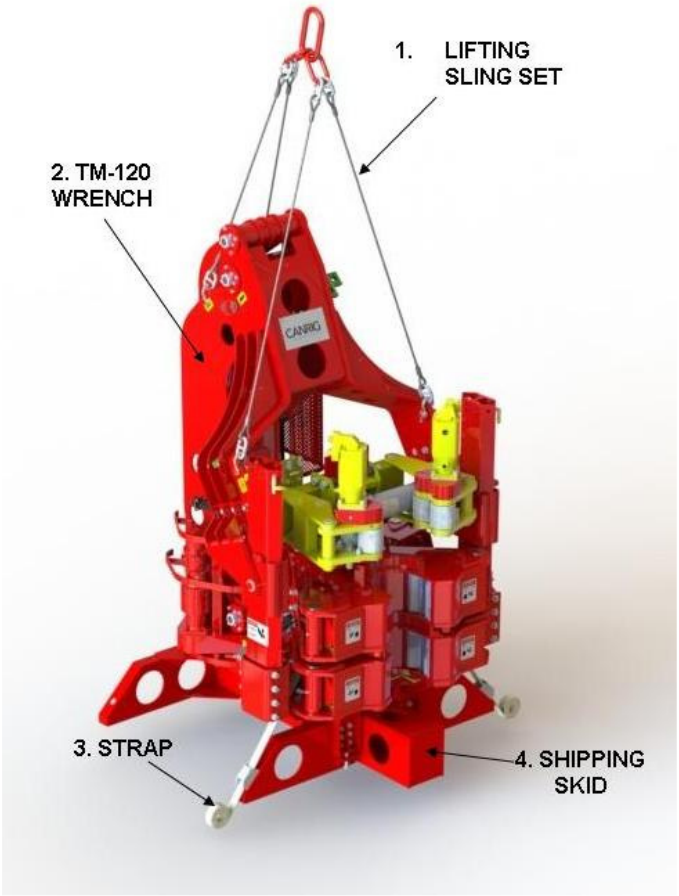


Figure 4

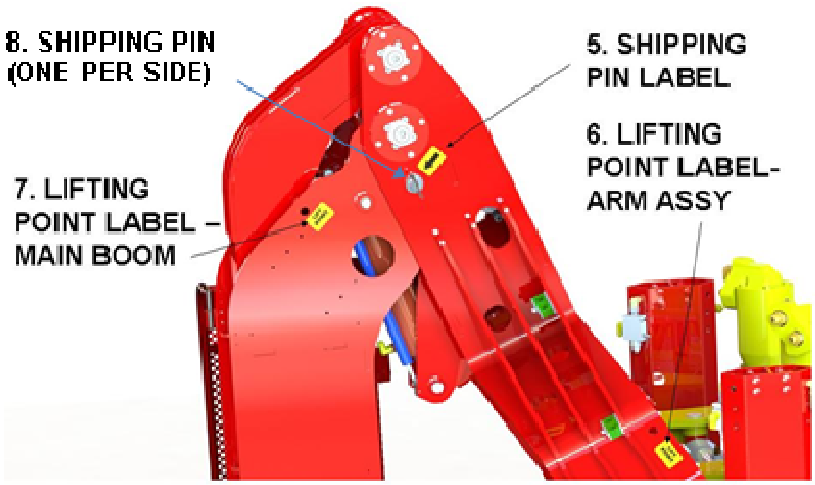


Figure 5

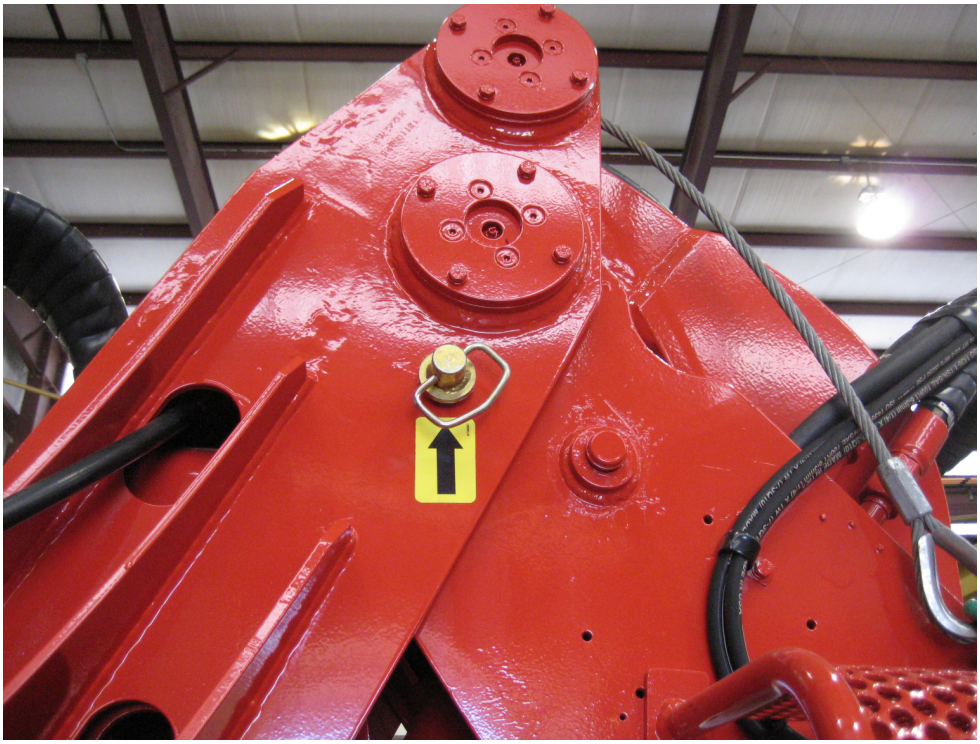
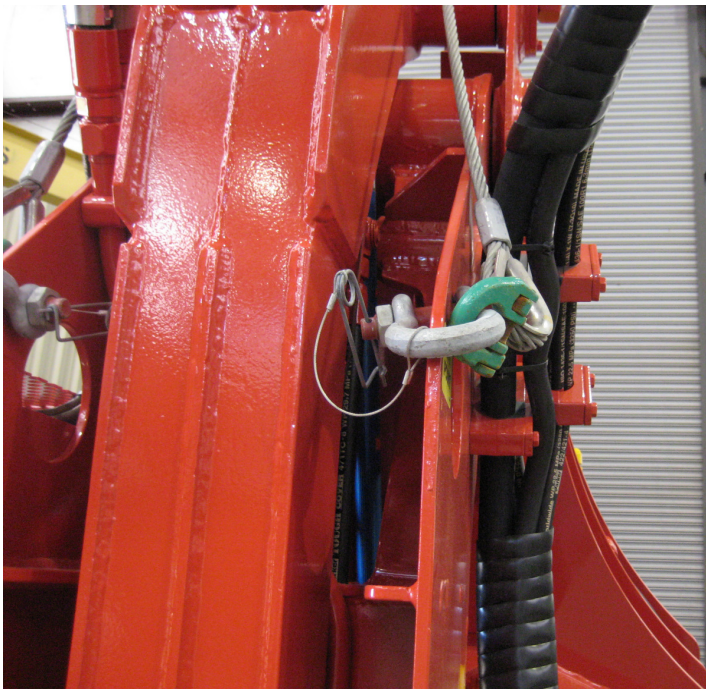


Figure 6



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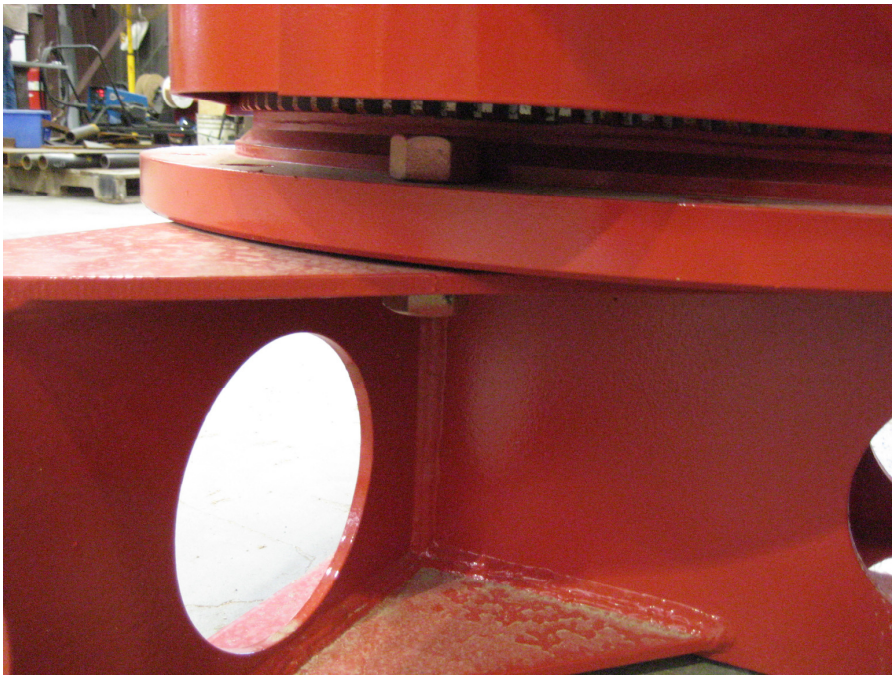

Figure 8

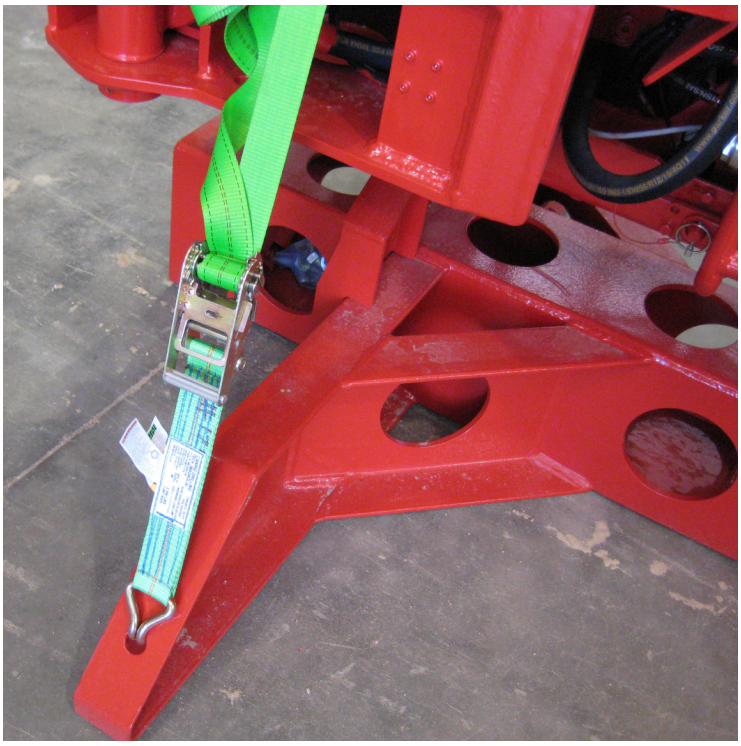

Figure 9

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