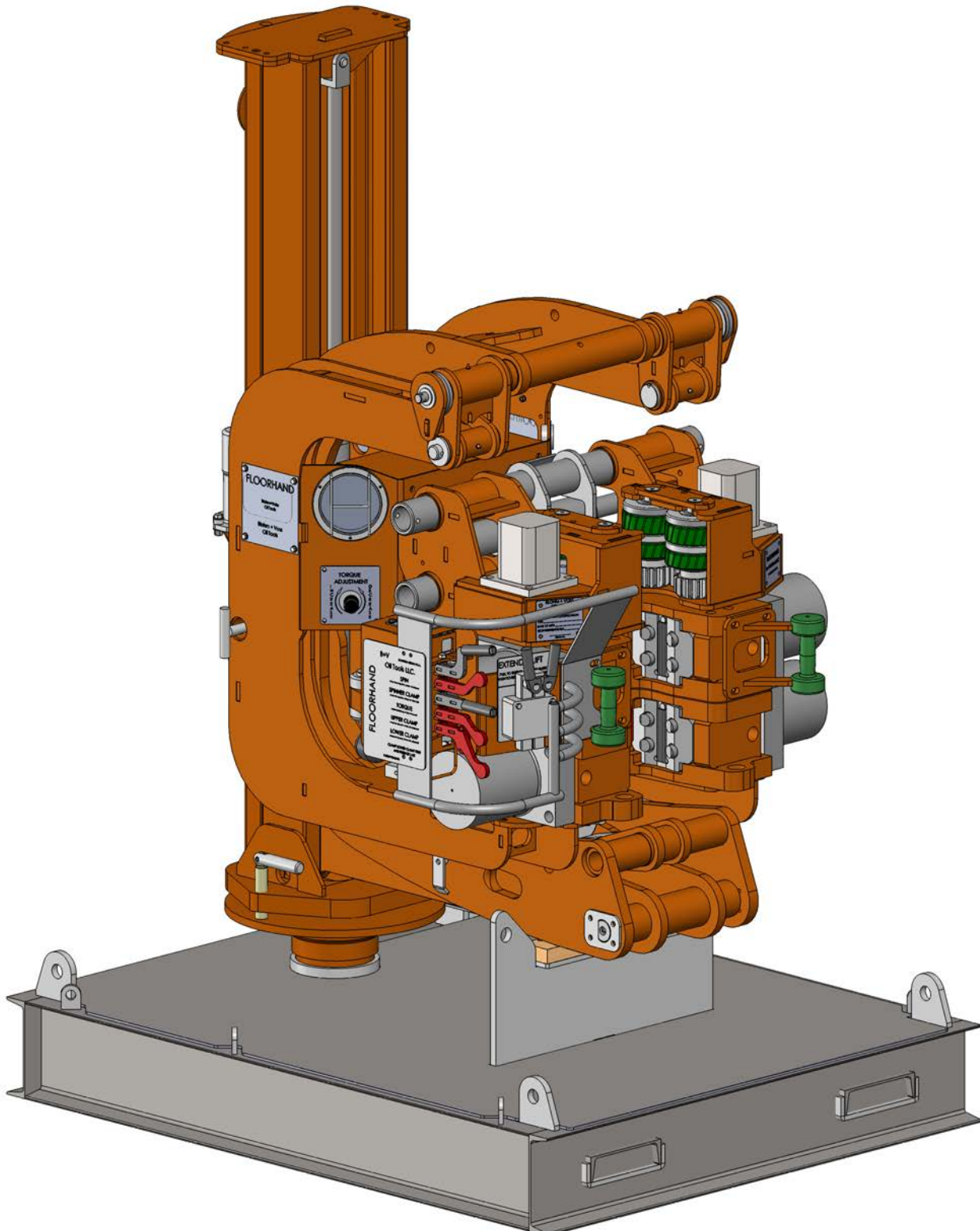


# Blohm + Voss Oil Tools, LLC

9GF-1100 Cantilever Style FloorHand with  
9FM-2500 Hydraulic Manipulator

Technical Documentation



To be used with Serial Numbers 200+

# GENERAL INFORMATION

## Warnings and Notes

**WARNING: A "WARNING" INDICATES A DEFINITE RISK OF EQUIPMENT DAMAGE OR DANGER TO PERSONNEL. FAILURE TO OBSERVE AND FOLLOW PROPER PROCEDURES COULD RESULT IN SERIOUS OR FATAL INJURY TO PERSONNEL, SIGNIFICANT PROPERTY LOSS, OR SIGNIFICANT EQUIPMENT DAMAGE.**

**NOTE:** A "NOTE" indicates that additional information is provided about the current topics.

### Intended use of this manual

**WARNING: THIS TECHNICAL DOCUMENTATION CONTAINS INSTRUCTIONS ON SAFETY, INSTALLATION, OPERATION AND MAINTENANCE. IT MUST BE STUDIED BEFORE WORKING WITH THE TOOL.**

This manual is intended for use by field service, engineering, installation, operation, and repair personnel. Every effort has been made to ensure the accuracy of the

information contained herein. Blohm + Voss Oil Tools, LLC, will not be held liable for errors in this material, or for consequences arising from misuse of this material. Anyone using service procedures or tools, whether or not recommended by Blohm + Voss Oil Tools, LLC, must be satisfied that neither personal safety nor equipment safety will be jeopardized.

### Intellectual property

All rights retained. No part of this document may be reproduced in any form (print, photocopy, microfilm or any other procedure) or be processed using an electronic system without written approval of Blohm + Voss Oil Tools, LLC

All information contained in this manual is based upon the latest product information available at the time of printing. Dependent on ongoing technical improvements (ISO 9001) "Blohm + Voss Oil Tools, LLC" reserves the right to change the design

and specifications without announcement.

The values specified in this manual represent the nominal values of a unit produced in series. Slight deviations in the case of the individual devices are possible.

**NOTE: In the event of problems that cannot be solved with the aid of this manual, please contact one of the addresses listed below.**

### General remarks

As with all rig equipment, the FloorHand Cantilever must be operated in accordance with accepted rig safety practices and procedures. All operators should be familiar with all safety precautions and recommended installation and operating procedures, including the information provided in this manual and any other safety publications by Blohm + Voss Oil Tools, LLC Listed on the next page are safety considerations and warnings found throughout this manual:

### CE Marking

The tool complies with the Machinery Directive 2006/42/EC and the Directive 2014/34/EU "Equipment and protective systems in potentially explosive atmospheres" The marking is as follows: CE Ex II 2G T5

### Patents

The following patent numbers apply:  
U.S. 11/404,317  
U.S. 11/890,582  
U.S. 11/732,813

### Limited Warranty

The warranty provided will be void if the FloorHand or cantilever is either:

1. Repaired or serviced by a service facility which was not authorized by Blohm + Voss Oil Tools, LLC.
2. Replacement parts not manufactured by Blohm + Voss Oil Tools, LLC are used.
3. Modifications were made to the FloorHand which were not approved by Blohm + Voss Oil Tools, LLC.

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## Safety issues

**WARNING: ONE SHOULD AVOID CREATING IGNITION SOURCES, LIKE HEAT, AS A RESULT OF THE USE OF THE TOOL WITH OTHER TOOLS OR EQUIPMENT.**

**WARNING: THE WARNING PLATES, SIGNS AND LABELS MUST BE PRESENT ON THE TOOL. DO NOT REMOVE THE LABELS. IF THEY ARE MISSING, REPLACING IS MANDATORY.**

**WARNING: ALL WARNING PLATES, SIGNS AND LABELS ATTACHED TO THE EQUIPMENT MUST BE OBSERVED.**

**WARNING: DO NOT USE THE TOOL FOR ANY OTHER PURPOSE THAN MAKING UP AND BRAKING OUT WITHIN ITS SPECIFICATION.**

**WARNING: FAILURE TO CONDUCT ROUTINE MAINTENANCE COULD RESULT IN EQUIPMENT DAMAGE OR INJURY TO PERSONNEL.**

**WARNING: THE TOOL MUST ONLY BE SERVICED BY TRAINED B+V PERSONNEL OR BY AUTHORIZED PERSONNEL.**

**WARNING: WHILE WORKING WITH THE EQUIPMENT, WEAR PERSONAL PROTECTION EQUIPMENT.**

**WARNING: IF ANY SAFETY ELEMENTS (LIKE SAFETY ROPES, WIRE, SAFETY SHEETS, PLATES OR WASHERS) WERE DISASSEMBLED DUE TO MAINTENANCE WORK, DO**

**NOT RE-USE THEM. ALWAYS REPLACE THEM WITH NEW SAFETY ELEMENTS.**

**WARNING: KEEP HANDS AND ARMS CLEAR OF ALL MOVING PARTS WHEN CONNECTING, DISCONNECTING OR OPERATING THE UNIT.**

**WARNING: ALWAYS WEAR PROTECTIVE GEAR FOR EYES, HEAD, HANDS AND FEET.**

**WARNING: WHEN SERVICING UNIT, BE SURE ALL POWER IS OFF AND SUPPLY LINES ARE DISCONNECTED AND INTERNAL PRESSURE IS BLED FROM THE TOOL.**

**WARNING: LUBRICATE UNIT ONLY WHEN SUPPLY LINES ARE DISCONNECTED AND H.P.U IS OFF AND TAGGED OUT. VERIFY THAT SYSTEM PRESSURE IS -0- PSI.**

**WARNING: ALWAYS USE LIFTING APPARATUS (SLINGS, CABLES, SHACKLES AND THE LIKE) THAT HAVE BEEN INSPECTED AND ARE IN GOOD CONDITION AND ARE PROPERLY SIZED. ENSURE THAT ALL RIGGING AND LIFTING PROCEDURES ARE IN ACCORDANCE WITH ACCEPTED OILFIELD PRACTICES AND STANDARDS.**

**WARNING: ALWAYS CHECK THE UNIT FOR LOOSE FASTENERS AND HYDRAULIC CONNECTIONS AS WELL AS ANY OTHER DAMAGE PRIOR TO TURNING ON THE POWER UNIT.**

## Revision History Table

REV.	SECTION	SUB-SEC.	PARA.	CHANGE REQUEST #	DATE	AUTHORIZED BY
Draft	All	All	All	N/A	10/01/10	KJ
0	All	All	All	N/A	03/19/12	KJ

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DESCRIPTION	DESCRIPTION
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## General Components

The Blohm + Voss Oil Tools, LLC FloorHand is a combination torque and spinning tool designed for quick installation on a variety of drilling rigs by the use of various manipulators. This manual covers the basic FloorHand 9GF-1100 including the 9FM-2500 Cantilever Mount Manipulator.

The FloorHand “can” make and break all tool joint connections from 4 ¼” to 8 ½” outside diameter, and “can” handle nominal drill pipe from 3 ½” up to 6 ⅝” without any modification. (To handle 2 ⅞” drill pipe, Blohm + Voss is able to provide an optional adapter kit assembly. Please contact Blohm + Voss Oil Tools, LLC for prices on the 9FH-10703 adapter kit. The FloorHand can also make and brake stabilizers, spiral collars and other bottom hole assembly (BHA) components with sufficient connection length.

## Wrenches

The FloorHand utilizes an upper and a lower wrench designed to apply torque when making up or breaking out tool joint connections. Each wrench contains an opposing set of clamp cylinders and Die Block assemblies that self adjust to varying pipe sizes. The FloorHand is capable of 65,000 ft-lbs (88,128.16 Nm) make up torque and 80,000 ft-lbs (108,465.40 Nm) break out torque.

## Spinner

The FloorHand is equipped with a spinner that consists of two halves, a right and a left hand assembly each containing a set of urethane drive rollers. The spinner uses direct drive gears, eliminating the need for expensive transmissions. The FloorHand spinner is designed to be field serviceable and easily maintained by rig personnel.

## Frame

The cantilever frame is designed to support and house the wrench and spinner assemblies.

## Controls

The all-hydraulic controls for the FloorHand and manipulator are mounted conveniently on the front of the unit for easy access as well as maximum visibility for the operator.

## Transport Skid

The transport skid is designed to aid in shipping of the FloorHand 9GF-1100 and cantilever mount manipulator 9FM-2500 from location to location.

## Manipulator

The Blohm + Voss Oil Tools, LLC Cantilever Manipulator 9FM-2500 is a moderate reach manipulator that eliminates the need for hanging cables. The center line of the manipulator mounting socket may be located up to 99.5" (2,527.3 mm) from well center or mousehole position. The manipulator allows the FloorHand to be manually rotated in either direction.

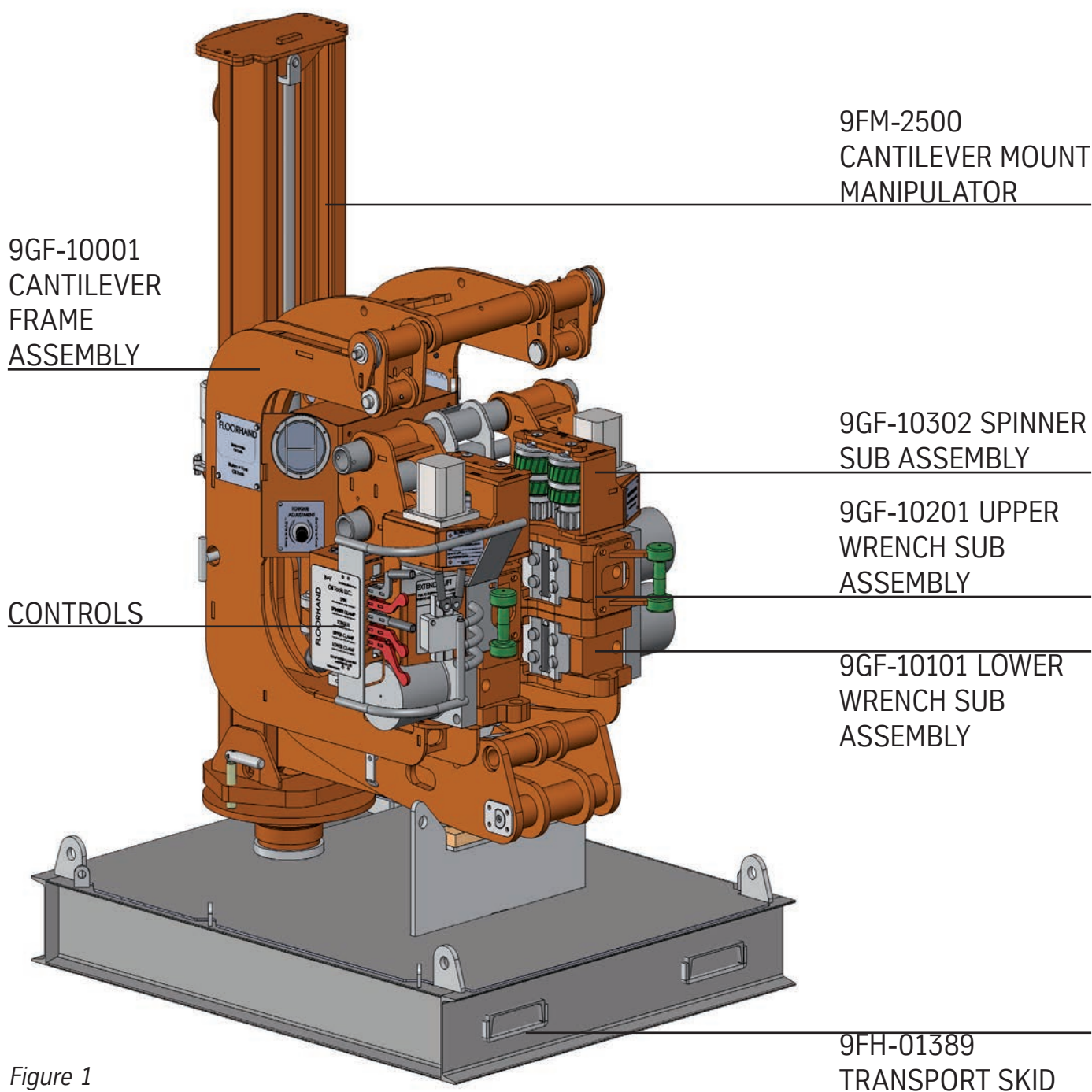


Figure 1

# Specifications

## Hydraulic Requirements

Hydraulic supply pressure (max.)	2,800 psi (19.30 mPa) - 193 bar
Hydraulic supply pressure (min.)	2,500 psi (17.23 mPa) - 172 bar
Hydraulic flow rate required	23 - 28 gpm (87 - 106 lpm)
Supply connection (min.)	1" hose with ¾" MNPT at FloorHand end
Return connection (min.)	1 ¼" hose with 1" MNPT at FloorHand end

The FloorHand is equipped with a Closed Center Hydraulic System. The unit should only be operated in coordination with a pressure compensated variable displacement Hydraulic Power Source.

**WARNING: USE OF A CONSTANT DISPLACEMENT PUMP WILL RESULT IN DAMAGE AND/OR FAILURE THUS VOIDING WARRANTY.**

## Wrench Assembly:

Motor spinning roller ratio	1: 1.25
Spin speed ( <i>rollers</i> )	105 - 110 rpm
Spin speed (8 ½" O.D.)	80 - 100 rpm
Make up torque	11,000 ft/lb. min. (w/o optional low torque system) (14,913 Nm)
	65,000 ft/lb. max. (88,128.16 Nm)
Break out torque	80,000 ft/lb. max. (108,465.40 Nm)

## Shipping Data:

Without Shipping Skid	
Height ( <i>without flanges</i> )	86 inches (2,184 mm)
Width	60 inches (1,524 mm)
Depth	65 inches (1,651 mm)
Weight	7,220 lbs (3,281.82 kg)

## With Shipping Skid:

Height ( <i>without flanges</i> )	100 inches (2,540 mm)
Width	62 inches (1,575 mm)
Depth	77 inches (1,956 mm)
Weight	9,500 lbs (4,318.2 kg)

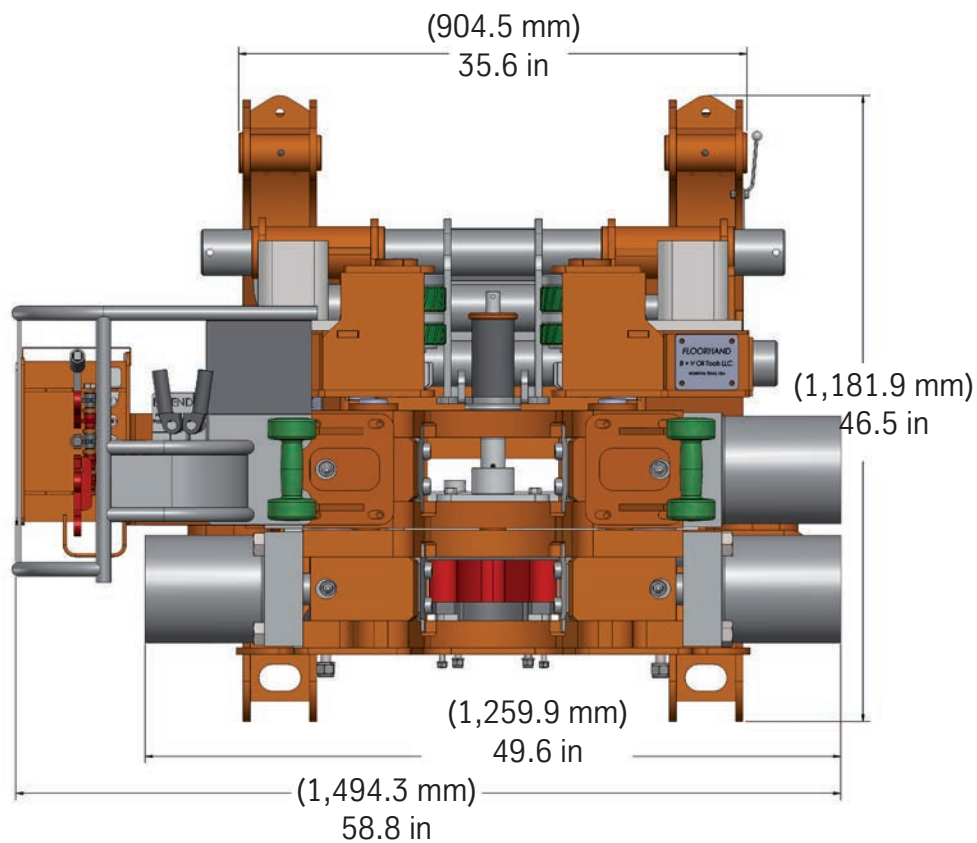


Figure 2

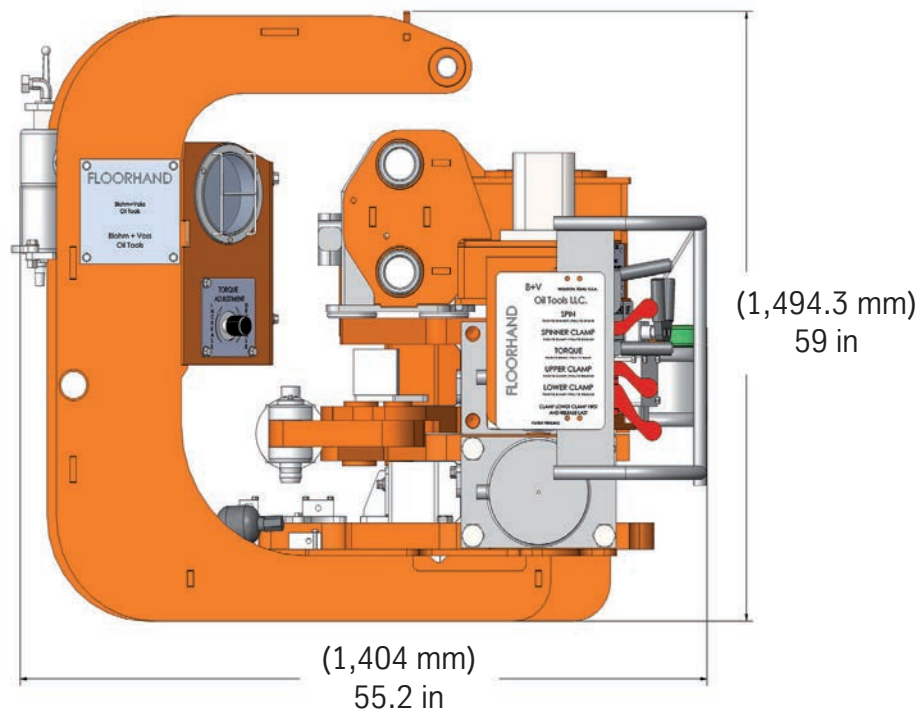


Figure 3



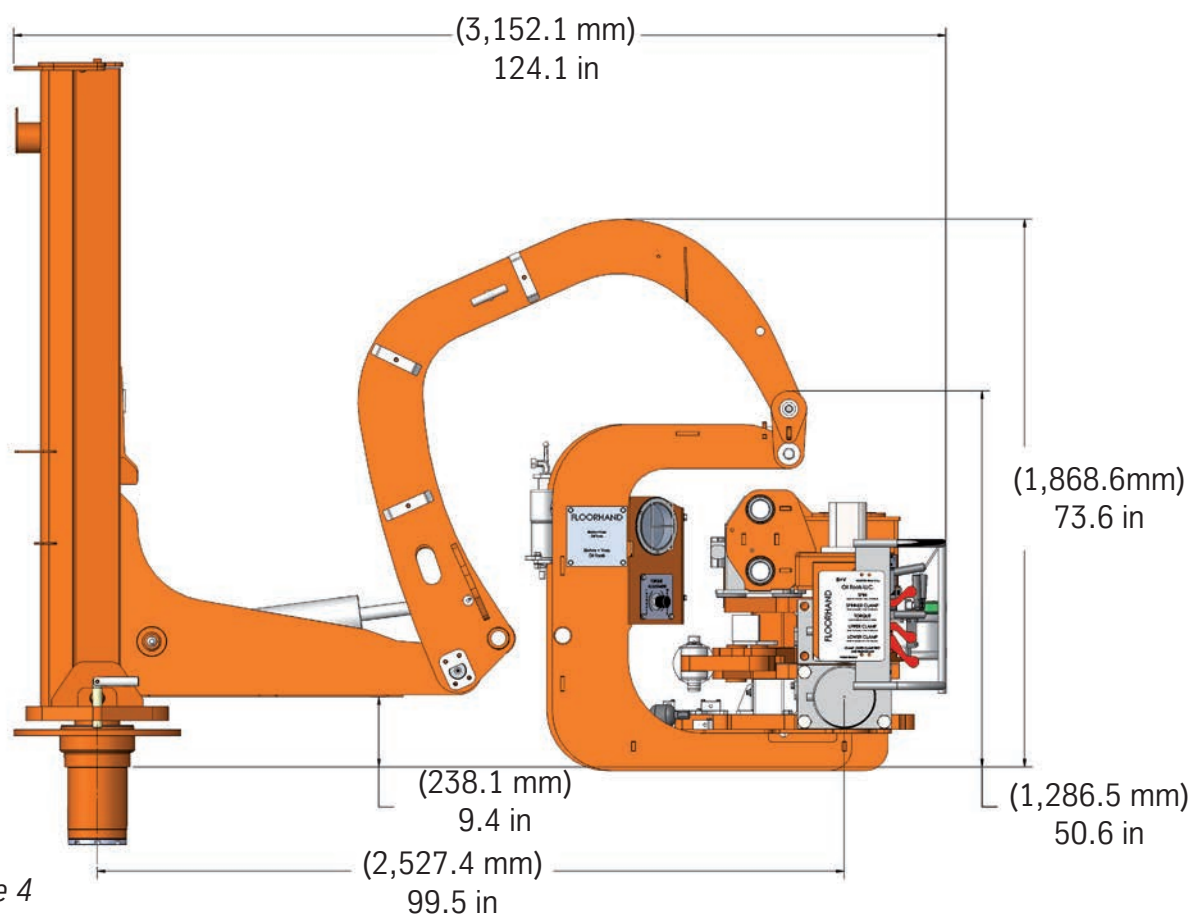


Figure 4

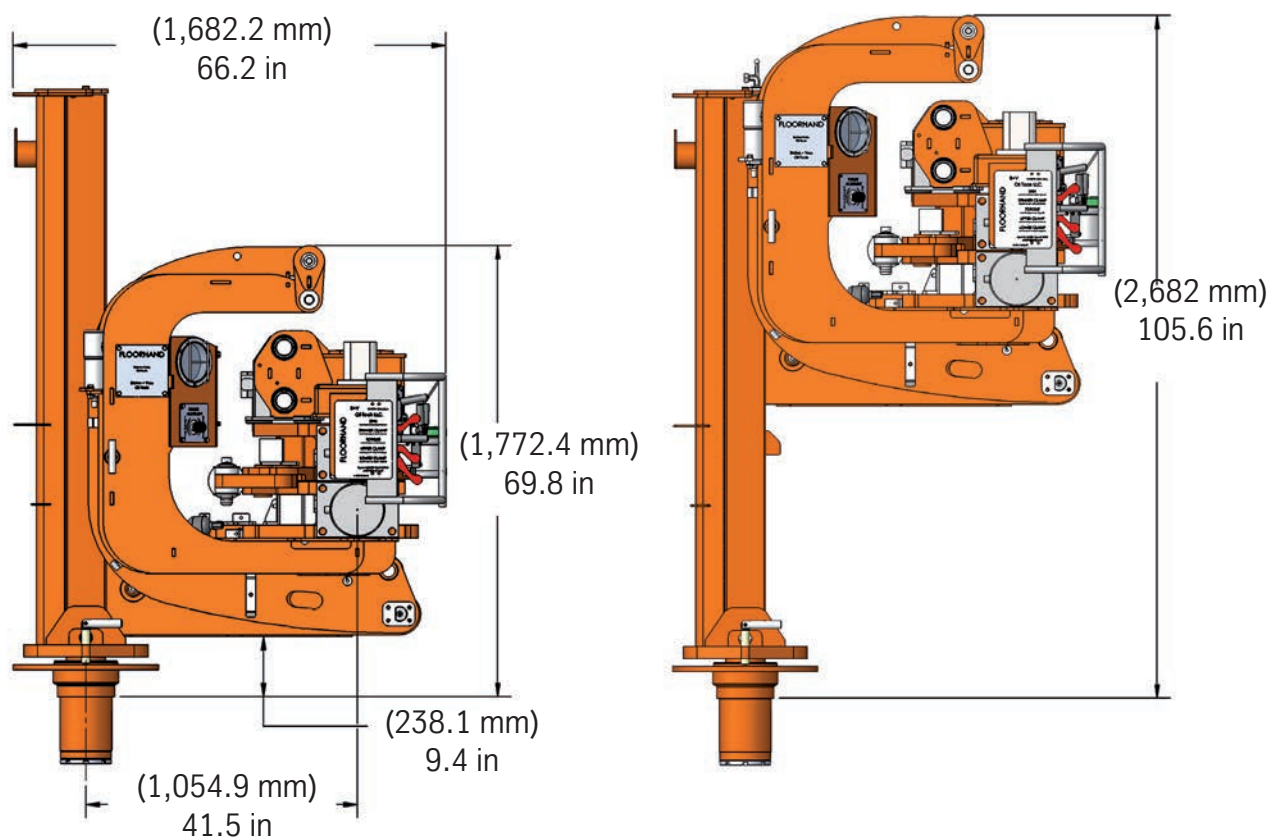


Figure 5

## EG-Konformitätserklärung EC-Declaration of Conformity

Wir (we)

Blohm + Voss Oil Tools, LLC  
11355 FM 830  
Willis, TEXAS 77318  
USA

erklären in alleiniger Verantwortung, dass das Produkt  
hereby declare in our sole responsibility, that the product

### BVOT hydraulic make-up/break-out wrench and spinner combination

2-7/8" DP (min. 4" TJ) - 8-1/2" DC Make-up Torque: 65,000 Ft Lbs

auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder  
normitativten Dokumenten übereinstimmt

which is the subject of this declaration, is in conformity with the following standard(s) or  
normative documents

#### Bestimmungen der Richtlinie:

terms of the directive:	Title and/or No. and date of issue of the standard
Richtlinie 2006/42/EG des Europäischen Parlaments und des Rates vom 17 Mai 2006 über die Angleichung der Rechtsvorschriften von 2006 der Mitgliedstaaten für Maschinen.	Maschinenrichtlinie 2006/42/EG 17 Mai 2006
Directive 2006/42/EG of the European Parliament and of the Council of 17 May 2006 on the approximation of the laws of 2006. The Member States relating to machinery.	Machinery Directive 2006/42/EG 17 May 2006
Sicherheit von Maschinen. - Teil 1 und 2 Safety of machinery, part 1 and 2	DIN EN ISO 12100:2009.10 DS EN ISO 12100:2009.07
Sicherheit von Maschinen - Leitsätze zur Safety of machinery, Risk assessment	DIN EN ISO 14121-1:2007.12 DS EN ISO 14121-1:2007.12
Ausrüstung für Bohr- und Bohrlocharbeiten Petroleum and natural gas industries-Drilling and well-servicing equipment	DIN EN ISO 14693:2005.07 ISO 14693 / API 7K 5th Edition:2010.06
Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen	EG Richtlinie 94/9/EG (ATEX 95)
Devices and protection systems fot intended use in explosive	EG Richtlinie 94/9/EG (ATEX 95)
Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen	DIN EN 13463-1:2009-07
Non-electrical equipment for use in potentially explosive atmospheres	DIN EN 13463-1:2009-07

Das Gerät „FLOORHAND hydraulisch betrieben“ erfüllt die Maschinenrichtlinie 2006/42/EC und erfüllt die EG Richtlinie 94/9/EG.

The product „FLOORHAND hydraulic operated“ complies with the Machinery Directive 2006/42/EC and complies with the EC Guideline 94/9/EG.

Kennzeichnung:

Mark:

Location and Date

Blohm+Voss Oil Tools, LLC  
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CE Ex II 2G T5

*David R. Voss*

**Blohm + Voss Oil Tools, LLC**  
11355 FM 830  
Willis, Texas 77318

# COMMISSIONING

## Document Front Page

0	11/04/2010	FloorHand Shop Test/ Commissioning Procedure	DT	CT	MT	
Draft	10/28/1020	Issued	DT	CH	MT	
Rev./Status	Date	Description	Made by	Checked By:	Approved:	
			Supplier References:			
			Procurement References:			
			TAG No:			
Date:	Signature:	SDRL Code:	Area:	System:	Pages:	Encl:
Company:			Document Title/ Equipment:			
			Commissioning Check Sheet for FloorHand (Iron Roughneck)			
Rig/Vessle/Customer Order:			Equipment Serial No:			
Supplier:			Document No:			
Blohm + Voss Oil Tools, LLC						

# FloorHand Commissioning Procedure

This test procedure is to be performed by authorized B+V personnel only!

*Note: When performing the following steps, appropriate PPE will be used and standard safety practices must be followed at all times.*

*Note: When commissioning, H.P.U Commissioning must be completed prior to FloorHand commissioning. If installing FloorHand to customer supplied hydraulics, hoses must be flushed completely before connecting to FloorHand.*

1. \_\_\_\_ Connect FloorHand (using flow meter) to Hydraulic power source of 2,500-2,800 psi and 25-28 gpm. If pressure is above 2,800 psi, a Pressure Release Valve (PRV) should be used. \_\_\_\_ If flow rate is above 28 gpm, a pressure compensated flow control should be used. \_\_\_\_

2. \_\_\_\_ H.P.U should be powered up a minimum of 20 minutes before moving to next step, to bring all oil to required operating oil temperature, record oil temp. \_\_\_\_

*Note: Throughout entire test, observe FloorHand for leaks, and or malfunctions, repair as necessary.*

3. \_\_\_\_ Run spinner motors in make direction for 20 seconds, check that rotation of all four rollers are correct, check for leaks. Monitor flow meter, record max flow. \_\_\_\_  
See step 1.

4. \_\_\_\_ Run spinner motors in break direction for 20 seconds, check for leaks.

*Note: After making fresh hydraulic connections, or a rig move, it is best to always run the spinner before anything else. The spinner is the only system that is close to a direct system. For example, there are no PRV's, check valves, shuttle valves, diverter valves, pilot operated check valves, etc. in the spinner motor system, only a flow divider. This means, by running the spinner first, any small trash or contaminants that may be in the lines, will be flushed through with minimal to no damage. If there were trash in the lines, and the torque, or clamp system were operated first, there is a chance of contaminants getting lodged in a small orifice, in one or more of the many valves in the other systems.*

5. \_\_\_\_ Without pipe, clamp and unclamp lower wrench 10 times, check that die blocks extend and retract evenly, check for leaks.

*Note: This helps to remove air from the lower clamp system so that the flow divider may work correctly.*

6. \_\_\_\_ Without pipe, clamp lower wrench.

7. \_\_\_\_ Clamp and unclamp upper wrench 10 times, check that die blocks extend and retract evenly, check for leaks.

8. \_\_\_\_ Unclamp lower wrench.

9. \_\_\_\_ Without pipe, clamp and unclamp spinner 10 times, check for leaks.

*Note: spinner may, or may not close evenly, this is normal.*

10. \_\_\_\_ Back torque adjustment knob out completely, then turn in (clockwise) 4 turns, Blohm + Voss Oil Tools, LLC.

11. \_\_\_\_ Actuate torque cylinder 10 complete strokes in each direction and check for leaks.

12. \_\_\_\_ Adjust make up speed flow control for a 5 second stroke. Verify during commissioning.

13. \_\_\_\_ Install test gauge on lower clamp cylinder outboard test port.

14. \_\_\_\_ Clamp lower wrench.

15. \_\_\_\_ Observe the test gauge on lower wrench clamp cylinder, and Pressure Release

Valve (PRV) if applicable.

16. \_\_\_\_ Set Pressure Release Valve (PRV) output to obtain 600 psi at lower clamp cylinder. Verify during commissioning.
17. \_\_\_\_ Clamp upper wrench, ensure that system pressure is now present on lower clamp cylinders also (PRV reading should not change), unclamp upper wrench, unclamp lower wrench.
18. \_\_\_\_ Mock up test pipe, with torque, at end of stroke, check that gauge dump valve functions correctly.
19. \_\_\_\_ Stall spinner in make direction and hold for 5 seconds and check for leaks.
20. \_\_\_\_ Stall spinner in break direction and hold for 5 seconds and check for leaks.
21. \_\_\_\_ Operate manipulator / lift cylinder full up & down 10 times to remove all air from cylinder and counterbalance valve, check for leaks. If commissioning, inform rig crew that this should be done after every rig-up.
22. \_\_\_\_ Raise manipulator / lift cylinder to mid stroke, check that counterbalance valve holds.
23. \_\_\_\_ If applicable, extend and retract manipulator full out and in 5 times, check for proper function, check for leaks.
24. \_\_\_\_ WARNING: Clamp lower wrench, verify that manipulator functions do not operate.
25. \_\_\_\_ Unclamp lower wrench.
26. \_\_\_\_ Connect test gauge to return system test port, run spinner motors and hold while checking pressure filter bypass indicator (if applicable), and monitoring system back pressure, not to exceed 250 psi. Record back pressure \_\_\_\_\_
27. \_\_\_\_ If applicable, check shutoff valve for proper function.
28. \_\_\_\_ Remove test gauges, and reattach the cap ports.
29. \_\_\_\_ Install any panels / covers removed for test.
30. \_\_\_\_ Ensure rig personnel fully understand all functions and basic maintenance of the FloorHand, including but not limited to: Importance of keeping fresh dies installed, proper make up torque adjustment, proper breakout procedure. Demonstrate how to remove and install the following: Dies, die blocks, and drive rollers.

Tech: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_



Technician:

Signature:

Date:

### Record of Training

Name:	Areas of Training: (Lubrication/Frequency/PM, etc.)	Signature:	Date:
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	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
My signature above indicates that I have read and understand the opening instructions and have been trained to use the above machine by Blohm + Voss Oil Tools, LLC Technicians.			

Acknowledgement of Rig Superintendant / Tool Pusher

Date

Name

Signature

--	--	--

My signature above indicates acceptance of commissioning and the above personnel training.

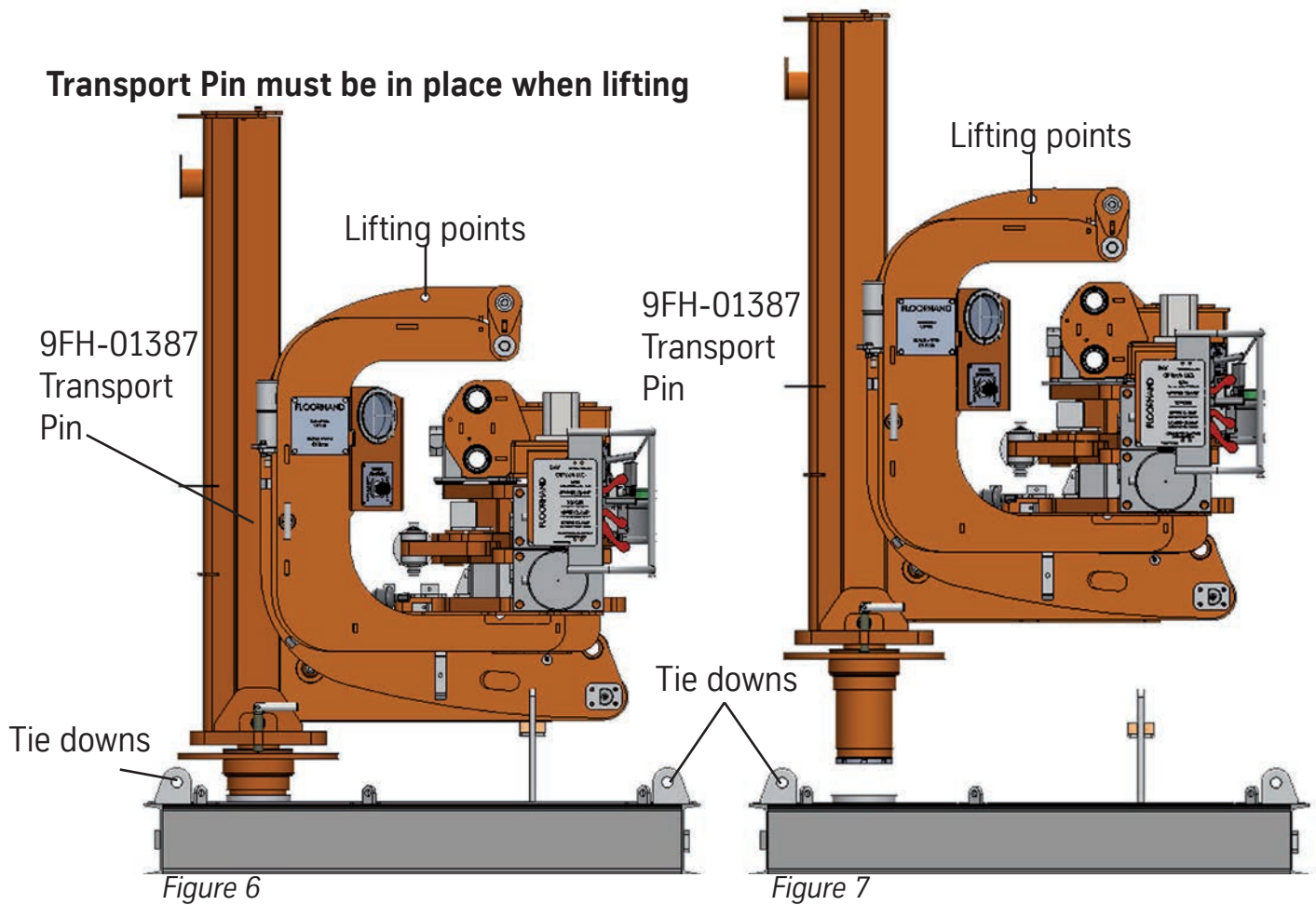
# INSTALLATION

# Normal Rig Move Removal and Installation

## Lifting

The FloorHand 9GF-1100 and 9FM-2500 combination incorporates two lifting points on the uppermost area of the torque arm. The unit should always be lifted using a two part bridle, one leg of each bridle attached to one of the lifting points. Never lift the unit by a single leg.

**Transport Pin must be in place when lifting**



**WARNING: ALWAYS USE LIFTING APPARATUS (SLINGS, CABLES, SHACKLES AND THE LIKE) THAT HAVE BEEN INSPECTED AND ARE IN GOOD CONDITION AND ARE PROPERLY SIZED. ENSURE THAT ALL RIGGING AND LIFTING PROCEDURES ARE IN ACCORDANCE WITH ACCEPTED INDUSTRY PRACTICES AND STANDARDS.**

**WARNING: NEVER STAND UNDER A LOAD BEING LIFTED.**

**WARNING: NEVER ALLOW PERSONNEL TO BE IN THE DIRECTION THAT THE EQUIPMENT MAY SWING WHEN BEING INSTALLED OR REMOVED.**

## Locating the Manipulator

The FloorHand 9GF-1100 and the Cantilever Manipulator are to be installed directly into the rig floor. The Manipulator may be located at any location on the rig floor that will:

- Support the deck loads from the FloorHand and Manipulator at full extension. An Engineering Review with the rig manufacturer must be performed to ensure that the rig structure and attachment to the manipulator socket are within industry standards. The "Design Weight Equivalent" is shown on figure 10 reflects the overhung loads imposed on the socket with the FloorHand installed and the manipulator at full extension.
- Provide the operator with a safe environment for all rig floor operations.
- Provide the best accessibility for maintenance and the minimum interference with other rig activities when the FloorHand is not in use.

Figure 6 and 7 shows the relative positions of the FloorHand and the Manipulator when in both the retracted and fully extended positions.

## Installing the Socket

The socket should be welded down on the perimeter of the upper plate as shown per the requirements from the rig manufacturer subsequent to the Engineering Review. The lower portion of the socket must be supported per the Engineering Review to provide a secure installation and to support the significant overhung loads imposed during operation. (See Figures 8 and 9)

Normally, a portion of the floor plate is removed so that the socket may be welded directly to the supporting structure. The socket is symmetrical about the vertical axis and may be oriented in any position. The socket must be level within  $\pm 2^\circ$  in all directions, assuming the rig floor is level.

## Locating the H.P.U and attaching the Hydraulic Lines

The Hydraulic Power Unit may be located some distance away from the rig floor and away from the danger zone. The electric components on the H.P.U are explosion proof. This includes the remote start/stop switch that is provided with the HPU. The supply and return hoses from the H.P.U are normally run up through the rig floor near the socket. The optional supply and return hoses are equipped with self-closing quick disconnect fittings. They attach to the mating quick disconnect fittings mounted on the back of the manipulator. Care must be taken during installation to minimize chafing of the hoses during rig up/rig down as

well as during operation of the FloorHand. If the hoses chafe against the rig structure when the manipulator is moved, particularly when being slewed, chafe protection should be used.

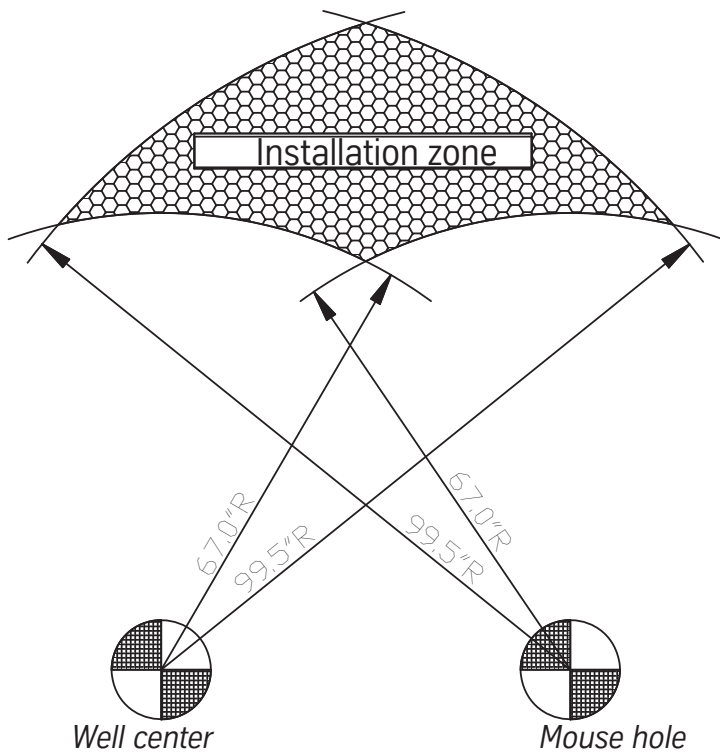


Figure 8

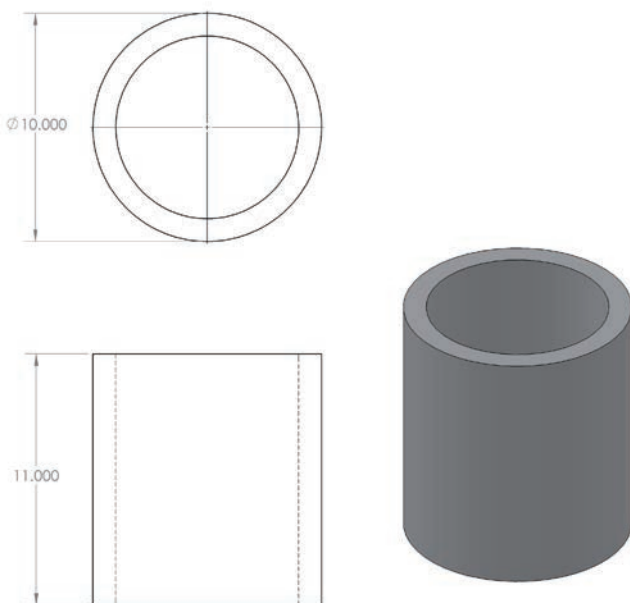


Figure 9

Structure must be designed to support a minimum overhung load of 33,333 ft-lbs (451.94 kNm) any direction.

Socket must be level within  $\pm 2^\circ$  in all directions for proper operation assuming rig floor is level

Socket material:  
Group 1 steel use approved procedures per AWS D11

Typical installation, using installation socket 9FH-01386

## Attaching the Hydraulic Lines

When replacing these fittings, it is imperative to use exactly the same fitting in exactly the same orientation consistent with the factory installation. Always ensure that the quick disconnect fittings are fully engaged and locked (if appropriate to the type of fitting used).

1. Attach the pressure line quick disconnect fitting from the manipulator to the pressure line fitting that is connected to the Shutoff Valve at the top of the unit.
2. Attach the return line from the manipulator to the fitting (the lower fitting) at the top of the unit.

3. Attach the four smaller lines from the manipulator to the appropriate lines on the unit.

4. Bleeding the system prior to use.

**WARNING: THE QUICK DISCONNECT FITTINGS ARE CONFIGURED FROM THE FACTORY BY THE SIZE, AND ORIENTATION OF THE FITTING SO THERE IS LITTLE POSSIBILITY OF ATTACHING THE LINES INCORRECTLY.**

Procedure:

1. Operate all handles for a number of times; allow the tool to move completely to its hard stops.
2. Spin and torque a piece of pipe.

**WARNING: ALWAYS MAKE SURE THAT ALL OF THE CONTROL VALVE HANDLES FOR CLAMP (LOWER WRENCH, UPPER WRENCH AND SPINNER CLAMP) FUNCTIONS ARE IN THE FULLY RETRACTED ("PULLED BACK") POSITION PRIOR TO TURNING ON THE POWER UNIT. STAND CLEAR OF THE UNITS WHEN POWER IS APPLIED.**

**WARNING: PRIOR TO USE OF CANTILEVER ALWAYS ENSURE NO AIR EXIST IN THE HYDRAULIC CIRCUITS OF NEITHER THE FLOORHAND NOR THE CANTILEVER MANIPULATOR. AIR IN THE HYDRAULIC CIRCUIT CAN CAUSE UNEXPECTED MOVEMENT OF FLOORHAND AND CANTILEVER.**

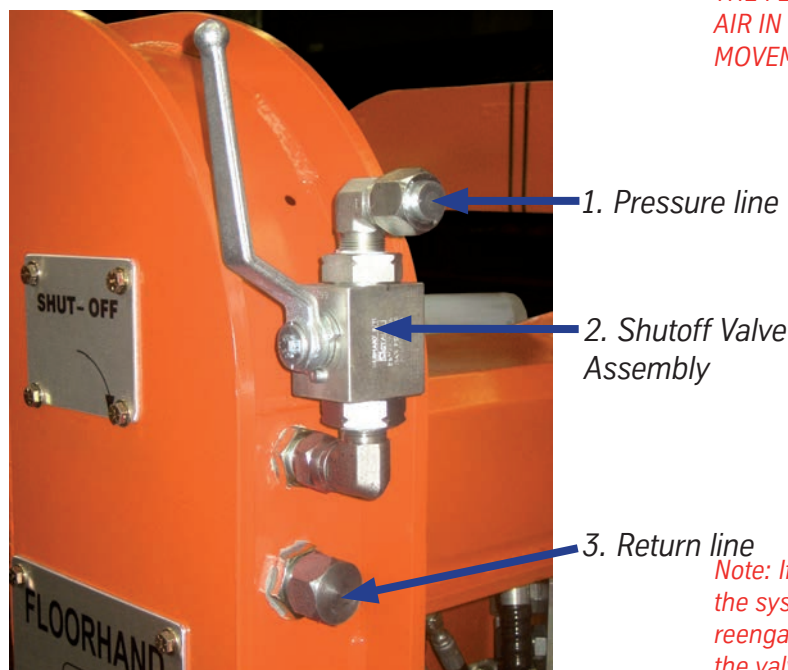


Figure 10



Figure 11

**Note: If the Shutoff Valve is activated, no harm will come to the system. However, when the Emergency Shutoff Valve is reengaged; open the valve slowly and incrementally. Opening the valve suddenly could cause damage to the hydraulic lines and system.**



## Make Up Torque Adjustment

To make up a connection for the first time, it is necessary to set the make up torque to the proper setting for the given tool joint, as per appropriate specifications from either the well plan or from the drill pipe manufacturer. Referring to normal make up procedures, it is assumed that the unit is engaged with the lower wrench clamped on the box and the pin has been spun up and shouldered. The make up torque adjustment is as follows:

1. Locate the "Torque Adjustment" control knob on the control panel below the torque gauge and break free the lock knob. Then rotate the adjustment knob counter clockwise until it stops. This decreases the available pressure in the torque circuit to a minimum.
2. With the upper wrench unclamped, move the "torque" handle on the main control valve to rotate the upper wrench fully to the break out position (that is, where the torque cylinder is fully extended).
3. Push the "upper clamp" handle on the main control valve to clamp the upper wrench on the pin end of the tool joint.
4. Pull and hold the "torque" handle on the main control valve. The upper wrench may or may not begin to move in the direction of make up. While holding the "torque" handle, rotate the "Torque Adjustment" control knob on the control panel clockwise to increase the torque until the reading on the torque gauge reaches the desired setting and stops moving. Hold for 3 seconds. Do not over torque the joint.
5. Lock in torque adjustment by gently tightening the locking knob. Do not over tighten. Once the unit has been properly adjusted, it is usually not necessary to re-adjust under normal conditions. At each connection, the operator should verify that the torque gauge stops at the proper setting for the particular tool joint. If it does not, the unit must be re-adjusted.

**NOTE: IF, AT ANY TIME, THE TORQUE PRESSURE DROPS DURING THE MAKE UP PROCEDURE, THIS MEANS THAT THE CYLINDER IS OUT OF STROKE. THE UPPER WRENCH SHOULD BE UNCLAMPED AND ANOTHER BITE SHOULD BE TAKEN.**

**NOTE: MAKE SURE TO ALLOW THE UPPER WRENCH SUFFICIENT TIME TO FULLY CLOSE AND GRIP THE TOOL JOINT. THIS CAN BE VERIFIED BY WATCHING THE "SYSTEM PRESSURE" GAUGE ON THE CONTROL PANEL. WHEN FULLY CLAMPED, THE SYSTEM PRESSURE SHOULD BE STEADY AT 2,500 psi.**



Figure 12



Figure 13

# FloorHand Wrench Torque Chart

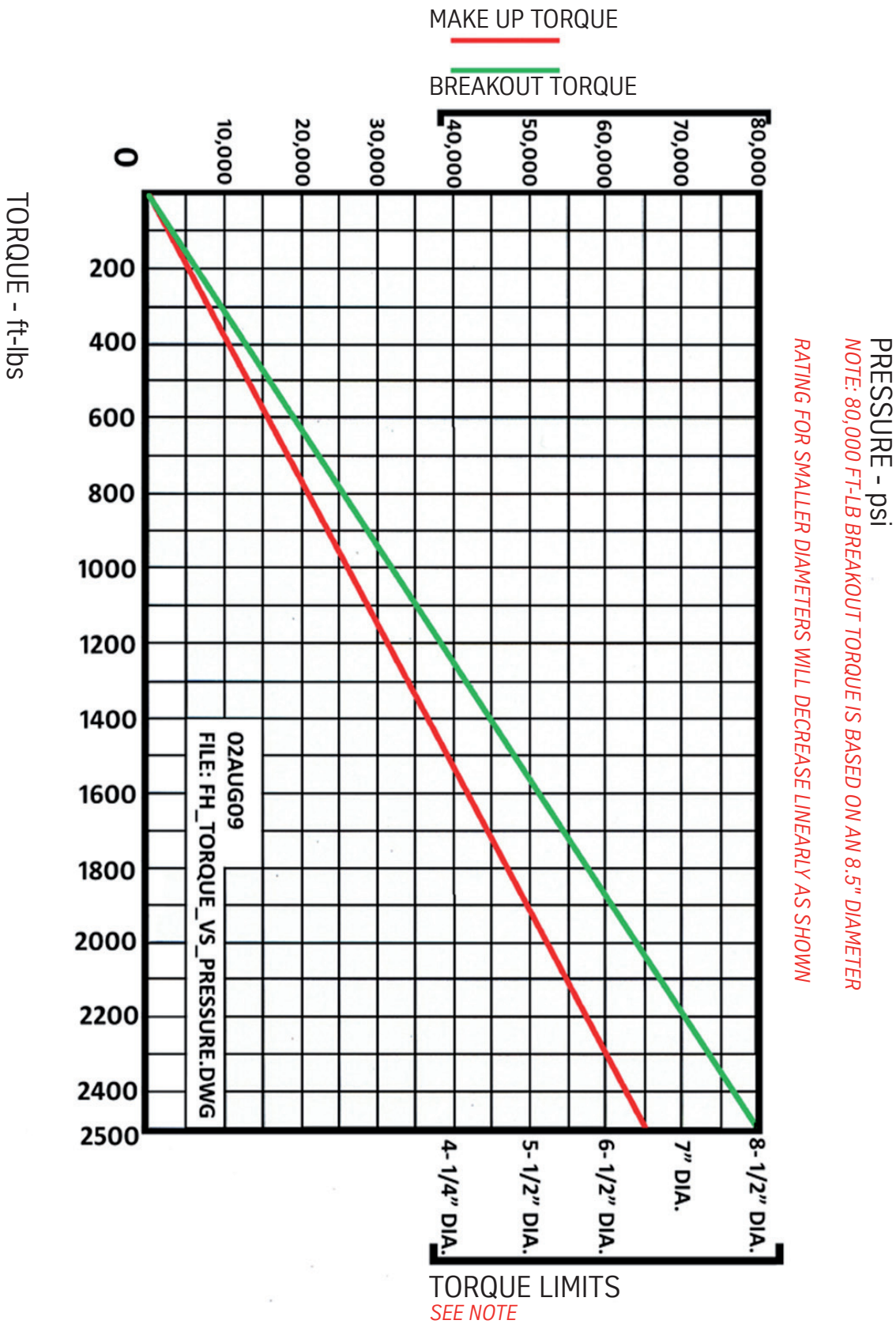


Figure 14

## Installing the Manipulator FloorHand Assembly

- Brush grease on the inside of the socket bore to minimize corrosion.
- Verify that the Transport Pin is installed to prevent movement of the Lift Arm or Torque Arm during hoisting operations.
- Attach the shackles of a two-part lifting bridle to the lift eyes of the Torque Arm.
- Remove tie downs from each arm securing the FloorHand and manipulator to the Transport Skid.
- Lift the FloorHand and align the bottom of the Bearing Housing with the socket.
- Lower the FloorHand into the socket until the shoulder of the Bearing Housing rests on the top of the socket.
- Remove lifting bridle.
- Remove Transport Pin and place in storage position vertically on the back of the manipulator.

## OPERATIONS

## Controls

The controls for the manipulator and wrench are situated on the front left corner of the upper wrench.



Figure 15



These two images show where the pipe needs to be positioned within the FloorHand.

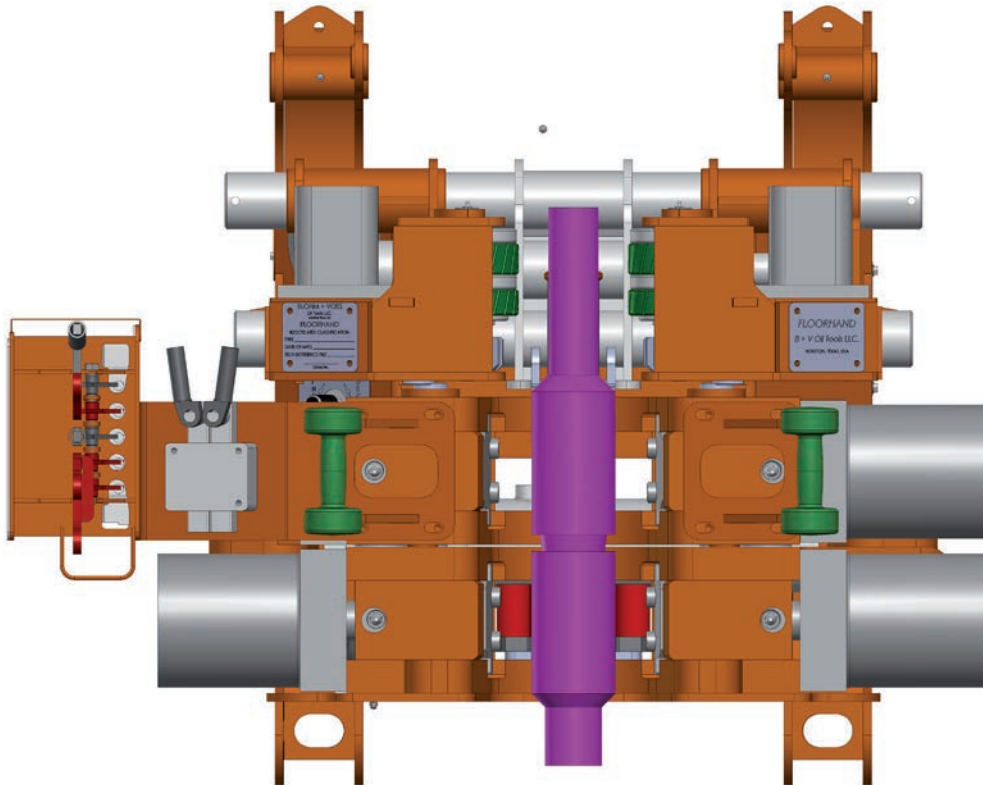


Figure 16

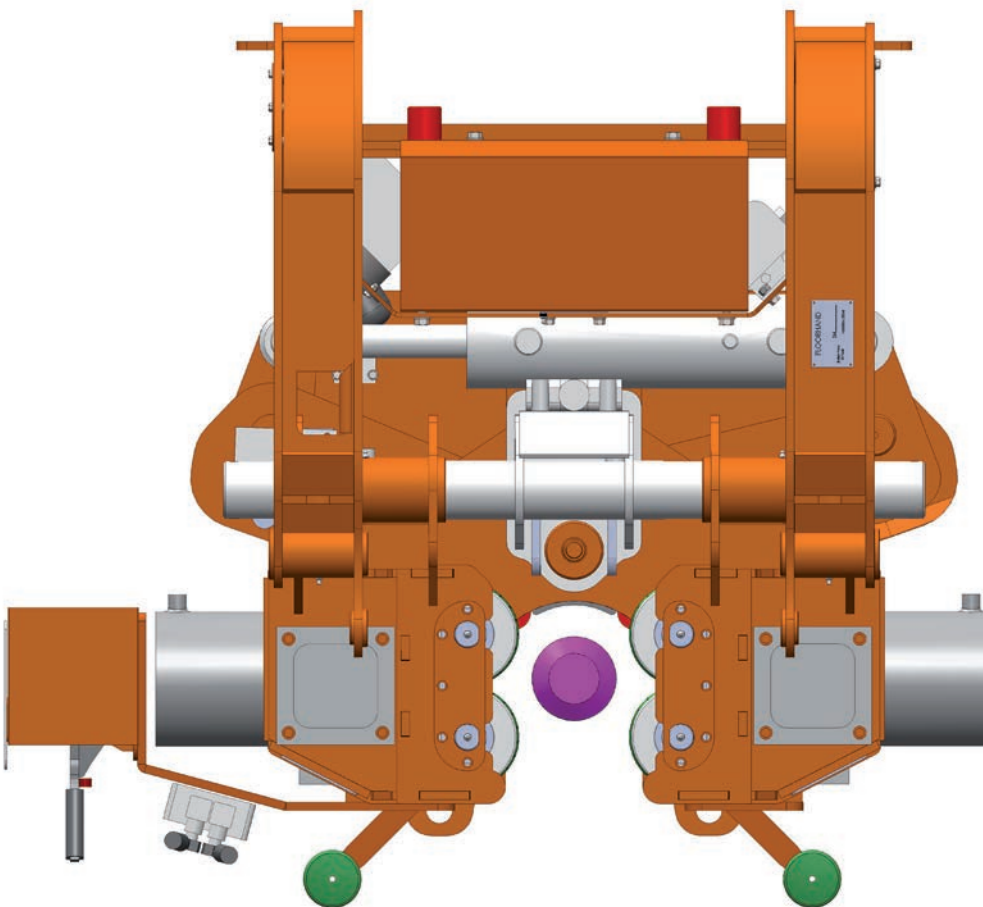


Figure 17



## Making a Connection

**WARNING:** BEFORE OPERATING THE UNIT, MAKE SURE THAT YOU HAVE READ AND UNDERSTAND THIS ENTIRE MANUAL AND HAVE BEEN PROPERLY TRAINED IN THE OPERATION OF THE UNIT. ALSO VERIFY THAT THE UNIT HAS BEEN PROPERLY INSPECTED, ADJUSTED AND LUBRICATED BEFORE EACH USE.

**WARNING:** ALWAYS CLAMP THE LOWER WRENCH BEFORE CLAMPING THE UPPER WRENCH OR SPINNER.

**WARNING:** DO NOT CLAMP THE FLOORHAND ONTO THE PIPE BEFORE THE PIN HAS BEEN STABBED.

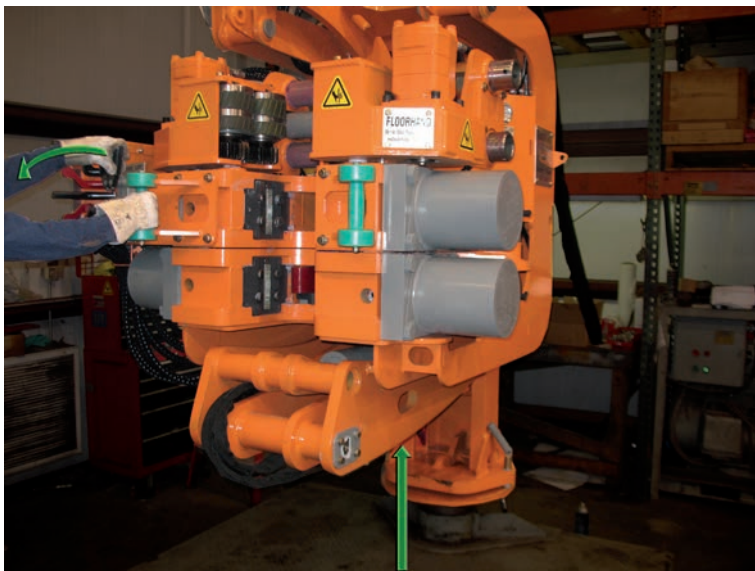


Figure 18

1. Slowly pull the "Lift" handle to raise the FloorHand approximately 2 to 3 feet from the rig floor.

**WARNING:**  
NEVER ALLOW YOURSELF OR SOMEONE ELSE TO BE BETWEEN THE FLOORHAND AND THE PIPE, OR ANY FIXED OBJECT.

**NOTE:**  
REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.



Figure 19

2. Once you have ensured that the operating area is clear, pull the "Extend" handle to move the FloorHand out to the pipe. Release the "Extend" handle when the tool approaches the pipe center.



Figure 20

3. Release the "Extend" handle when the tool approaches the pipe center.

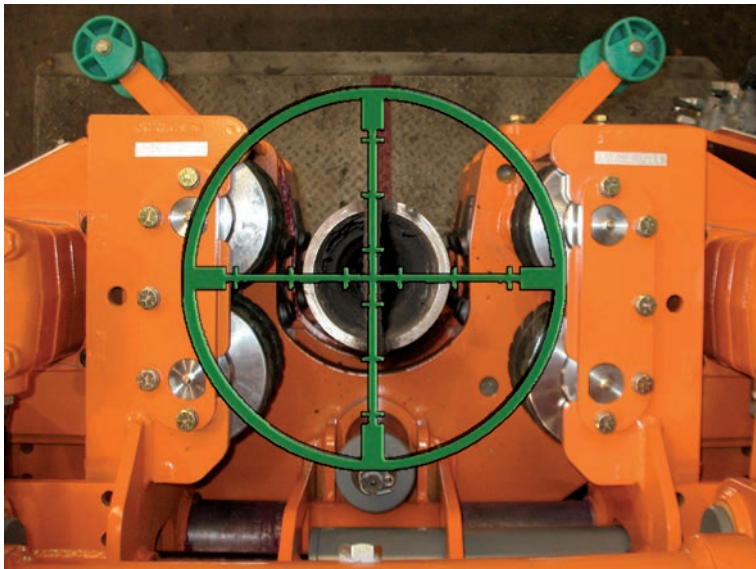


Figure 21

4. Use the "Extend" handle to center the tool in and out first.

**NOTE:**  
ALWAYS CENTER BY EXTENDING FIRST AND THEN CENTER BY MOVING UP AND DOWN!



Figure 22

5. Use the lift handle to center the top of the box with the pivot center of the tool (see photo).



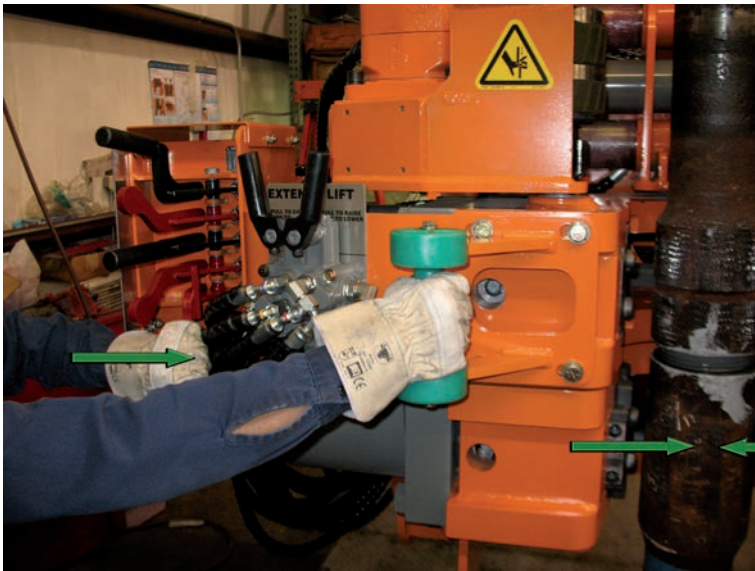


Figure 23

6. Once the FloorHand is centered on the Tool joint, clamp the lower wrench onto the box.

**NOTE:**  
REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.

**NOTE:**  
STAY CLEAR OF HARBAND!



Figure 24

7. **TECHNICAL NOTE:** When clamped alone, the lower wrench clamps at approximately 600 psi. This prevents the box from becoming deformed before the pin is spun in.

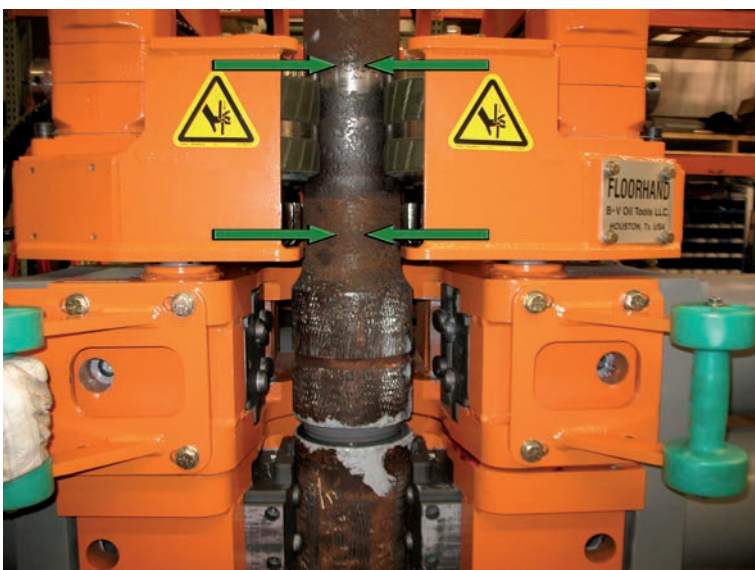


Figure 25

8. Make sure not to clamp on the upset or tool joint taper.



Figure 26

9. Clamp the spinner on the pipe by pushing the spin clamp handle.

**NOTE:**  
REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.



Figure 27

10. Pull the spinner handle to "Spin In".



Figure 28

11. Shoulder up pin with spinner.





Figure 29

12. Pull the spinner clamp handle to unclamp the spinner.

**NOTE:**  
REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.

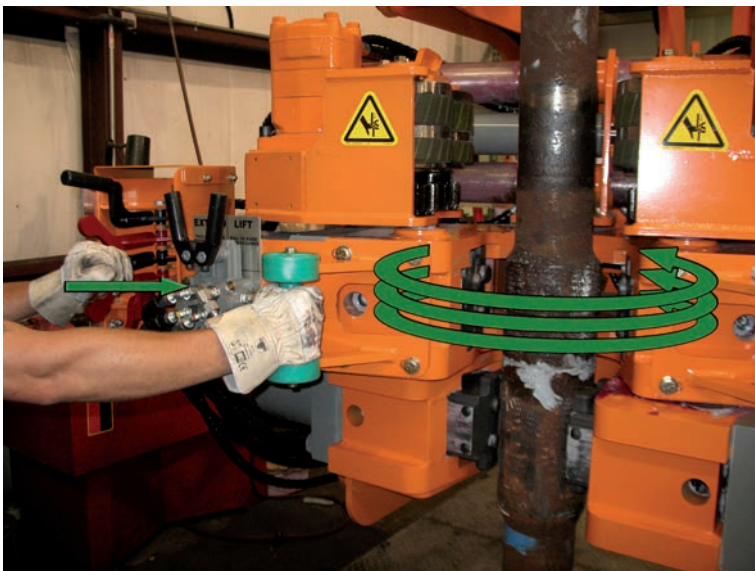


Figure 30

13. Push the torque handle to clock the upper wrench to the full break out position (counter clockwise) to ready the wrench for a full make up stroke.



Figure 31

14. Clamp the upper wrench on the tool joint by pushing the upper wrench clamp handle.

**NOTE:**  
REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.

**NOTE:**  
STAY CLEAR OF HARBAND!



Figure 32

15. Unlock the torque adjustment locking knob.

**NOTE:**  
NO OTHER ADJUSTMENT SHOULD BE NECESSARY UNLESS THE PIPE SIZE OR SPECIFIED TORQUE CHANGES. HOWEVER, TORQUE SHOULD BE MONITORED ON EVERY CONNECTION.



Figure 33

16. Rotate the torque adjustment knob full counter clockwise.

**NOTE:**  
THIS IS THE ABSOLUTE MINIMUM SETTING, AND SHOULD ALWAYS BE USED AS THE STARTING POINT WHEN ADJUSTING THE TORQUE.



Figure 34

17. Pull and hold the torque in the makeup direction.

**NOTE:**  
TOOL WILL NOT MOVE MUCH IF ANY, AS MINIMUM PRESSURE IS BEING SENT TO TORQUE CYLINDER.





Figure 35

18. While holding the torque handle fully in the makeup direction, slowly turn the torque adjustment knob clockwise until the desired torque (marked in black on the gauge) is reached. When torque is reached, hold for 3 seconds; tighten the torque adjustment lock knob to hold the torque setting. (DO NOT OVER TIGHTEN)

*NOTE: THERE IS APPROXIMATELY TWO TURNS OF DEAD SPACE IN THE TORQUE ADJUSTMENT KNOB.*

*NOTE: IF THE TORQUE NEEDLE FALLS OFF, THE CYLINDER IS AT THE END OF ITS STROKE. IT IS NOW NECESSARY TO UNCLAMP THE UPPER WRENCH AND PERFORM ANOTHER MAKE UP CYCLE. (REPEAT TORQUE CYCLE)*

*NOTE: TORQUE ON ALL CONNECTIONS SHOULD BE HELD AND VERIFIED FOR A MINIMUM OF 3 SECONDS.*



Figure 36

19. Unclamp the upper wrench by pulling the upper wrench unclamp handle.

*NOTE: REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.*





Figure 37

20. Unclamp the lower wrench by pulling the lower wrench unclamp handle.



Figure 38

21. Ensure all is clear and move the tool away from the pipe to the full retracted position.

**NOTE:**  
REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.

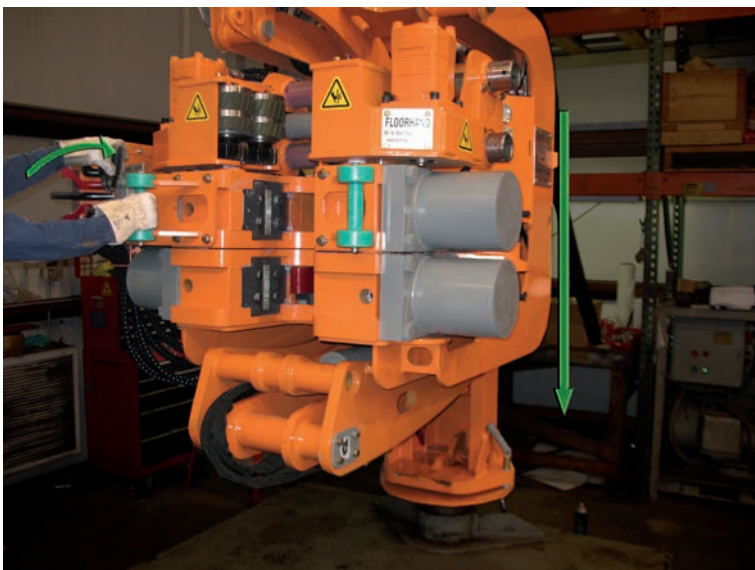


Figure 39

22. Lower the FloorHand to its full seated position.

**NOTE:**  
IT IS GOOD PRACTICE TO LOWER THE TOOL COMPLETELY AFTER EVERY CYCLE TO REDUCE INTERFERENCE WITH TOP DRIVE SERVICE LOOP OR KELLY HOSE.

## Breaking a Connection



Figure 40

1. Slowly pull the "Lift" handle to raise the FloorHand approximately 2 to 3 feet from the rig floor.

**WARNING:**  
NEVER ALLOW YOURSELF OR SOMEONE ELSE TO BE BETWEEN THE FLOORHAND AND THE PIPE, OR ANY FIXED OBJECT.

**NOTE:**  
REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.



Figure 41

2. Ensure the operating area is clear, then pull the "Extend" handle to move the FloorHand out to the pipe. Release the "Extend" handle when the tool approaches the pipe center.

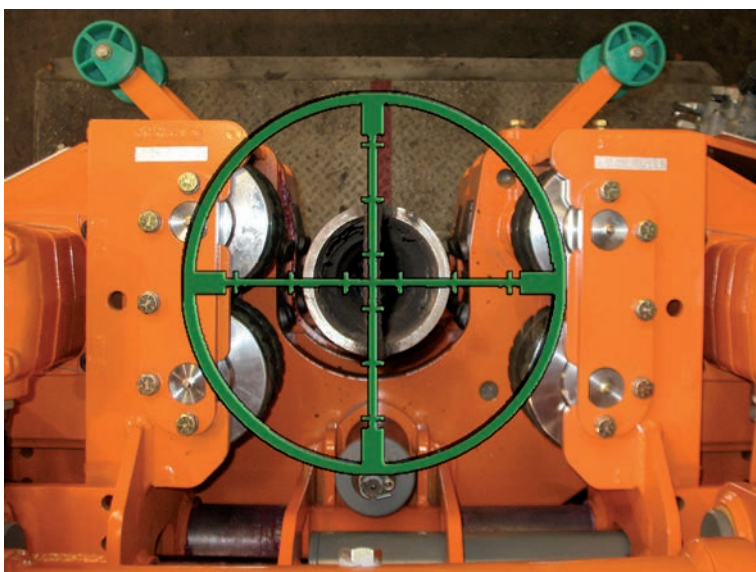


Figure 42

3. Use the "Extend" handle to center the tool in and out first.

**NOTE:**  
ALWAYS CENTER BY EXTENDING FIRST AND THEN CENTER BY MOVING UP AND DOWN!





Figure 43

4. Use the "Lift" handle to center the tool VERTICALLY on the tool joint.



Figure 44

5. Once the FloorHand is centered on the tool joint, clamp the lower wrench onto the box by pushing the lower wrench clamp handle.

**NOTE:**  
**STAY CLEAR OF HARBAND!**

**NOTE:**  
**REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.**

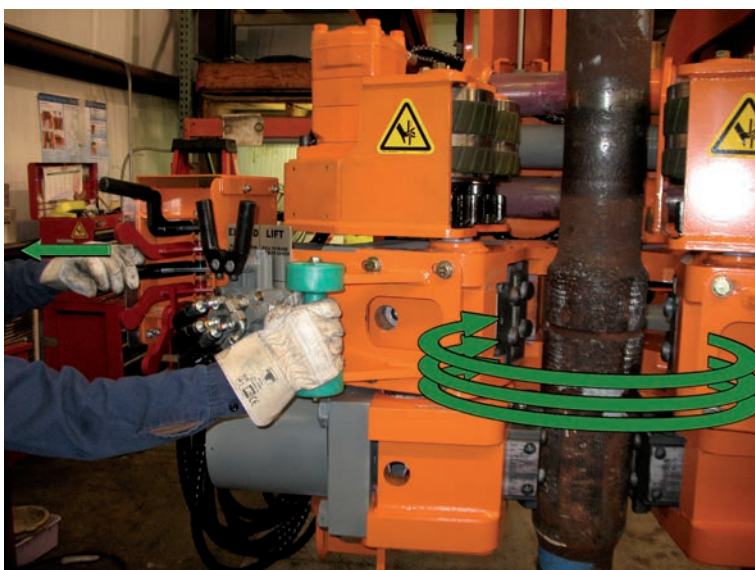


Figure 45

6. Pull the torque handle to place the wrench in a position that will allow for a full breakout stroke.

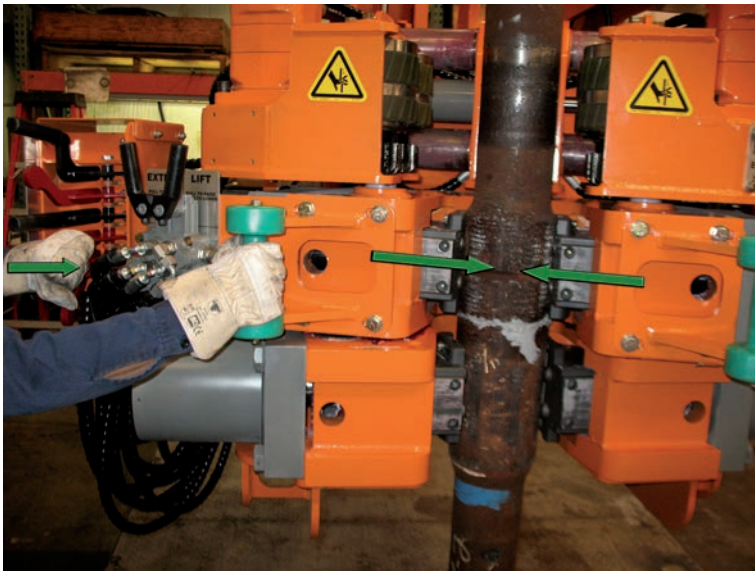


Figure 46

7. Clamp the upper wrench by pushing the upper wrench clamp handle.

**NOTE:**  
**STAY CLEAR OF HARBAND!**

**NOTE:**  
**REMEMBER TO ALWAYS KEEP YOUR FREE HAND ON THE GREEN SAFETY HANDLE.**

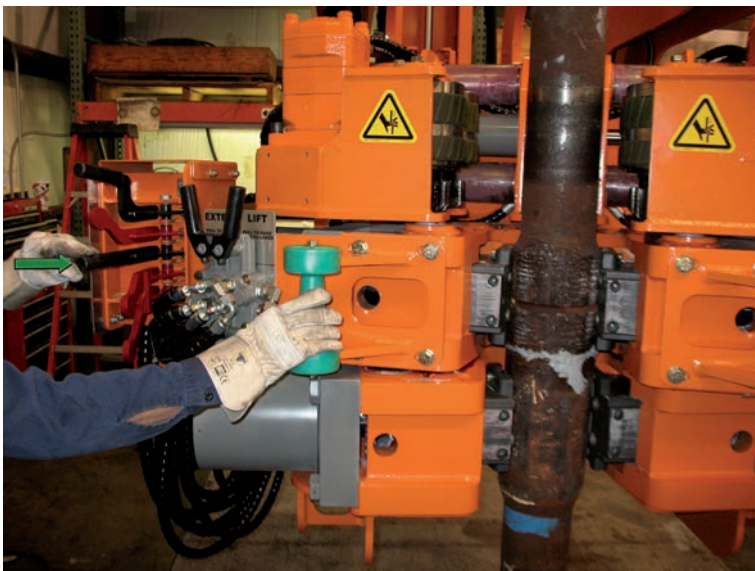


Figure 47

8. Gently move the torque handle to the right to slowly break the connection.

**NOTE:**  
**THERE IS NO ADJUSTMENT FOR BREAK OUT TORQUE PRESSURE. THEREFORE, THE BREAKOUT CYLINDER GETS FULL PRESSURE AND FLOW.**

**NOTE:**  
**IN HIGH TORQUE SITUATIONS, IF THE BREAKOUT HANDLE IS SHIFTED FULLY, THE DIES MAY BREAK OR THE UPPER WRENCH COULD SLIP, THUS DAMAGING THE TOOL JOINT.**

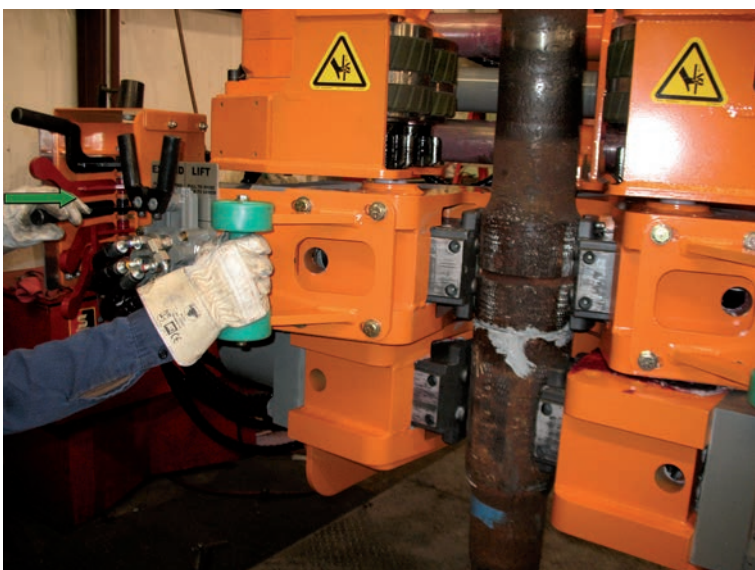


Figure 48

9. Once the connection breaks, the handle may be shifted fully to the right to finish the breakout stroke at full speed.

**NOTE:**  
**IT WILL SOMETIMES BE NECESSARY TO BREAKOUT TWICE BEFORE THE SPINNER CAN TAKE OVER.**





Figure 49

10. After the breakout is complete, unclamp the upper wrench.

**NOTE:**  
YOU MAY NOW CENTER THE UPPER WRENCH  
HOWEVER THIS IS NOT NECESSARY.

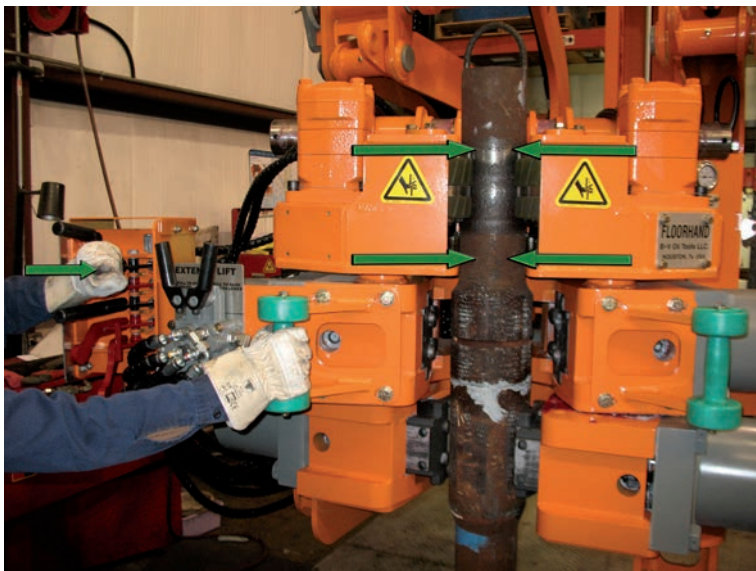


Figure 50

11. Clamp the spinner by pushing the spin clamp handle. Stay clear of the upset and tool joint taper.



Figure 51

12. Push the spin motor handle to the right, fully, to spin out the pin.



Figure 52

13. Pull the spin clamp handle to unclamp the spinner.



Figure 53

14. Unclamp the lower wrench.



Figure 54

15. Ensure all is clear and move the tool away from the pipe to the full retracted position.



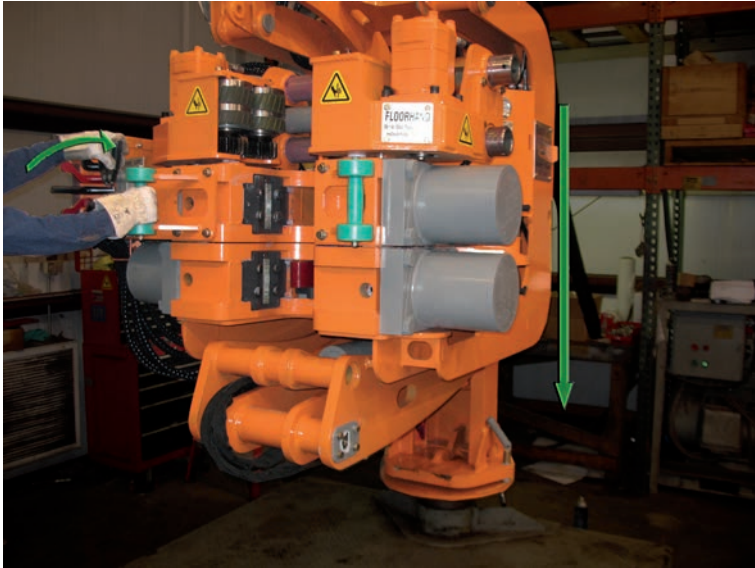


Figure 55

16. Lower the FloorHand to its full seated position.

**NOTE:**  
IT IS GOOD PRACTICE TO LOWER THE TOOL COMPLETELY AFTER EVERY CYCLE TO REDUCE INTERFERENCE WITH TOP DRIVE SERVICE LOOP AND OR KELLY HOSE.

## Pinch Point Hazards

Safety should be the first and last thought to consider while working with the FloorHand. Illustrated in yellow below are points on the FloorHand where caution should be exercised. Also, if the pinch point hazard warning labels fall off, please refer to this guide in order to replace them in the proper locations. The warning label points are listed 1 through 6. Spots 4 and 6 are on the opposite side of the tool, at a similar location to parts 3 and 5.

Please use the part number 9BV671640 (WARNING SIGN "HANDS" STICKER ) when ordering replacement labels.

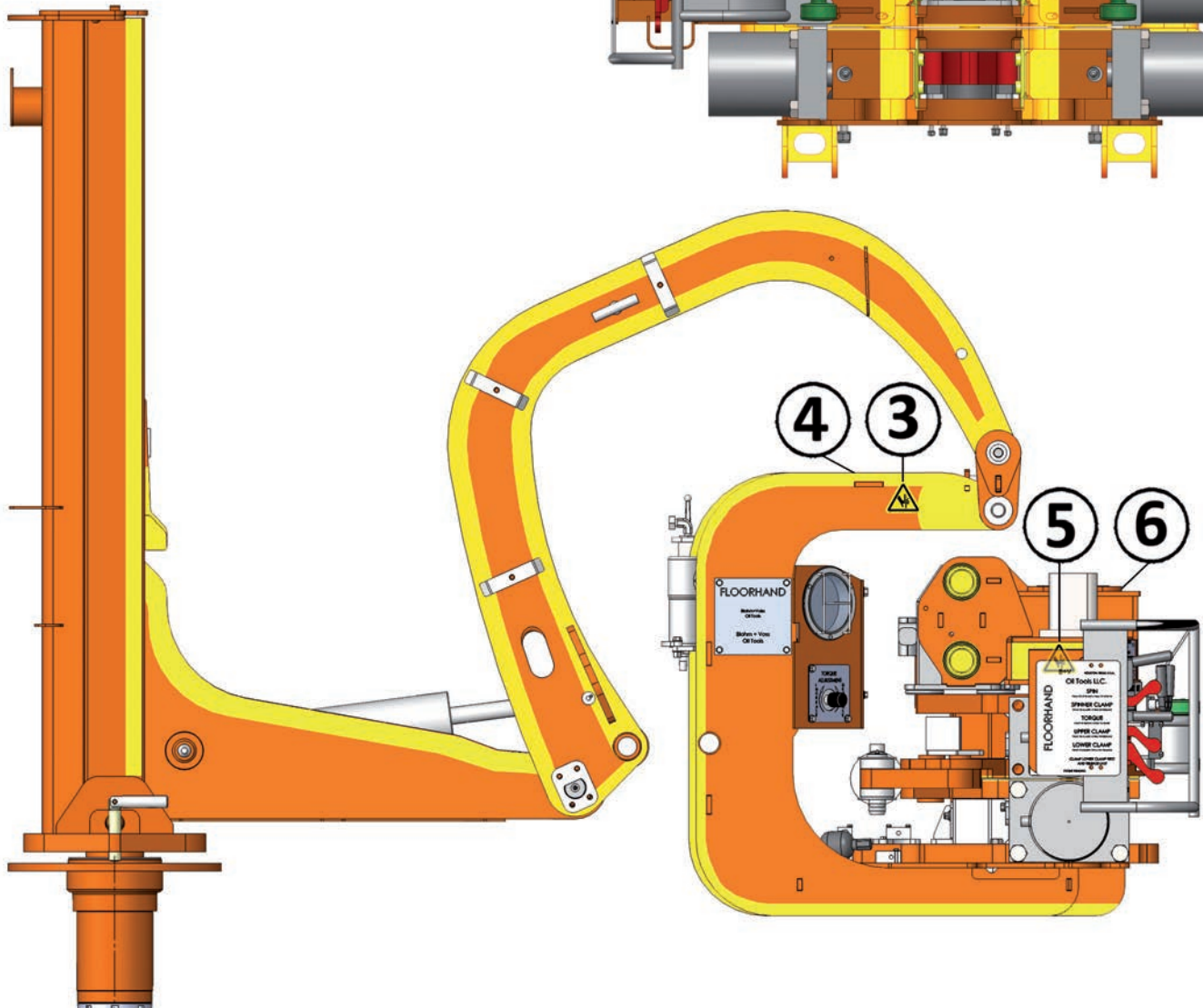
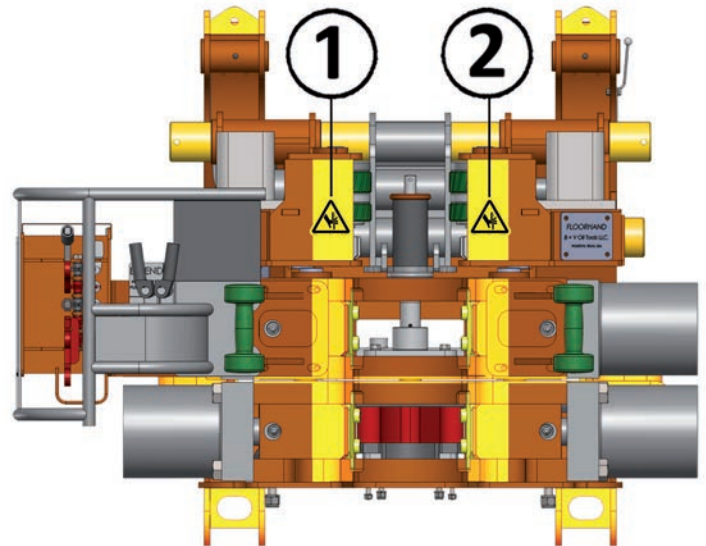
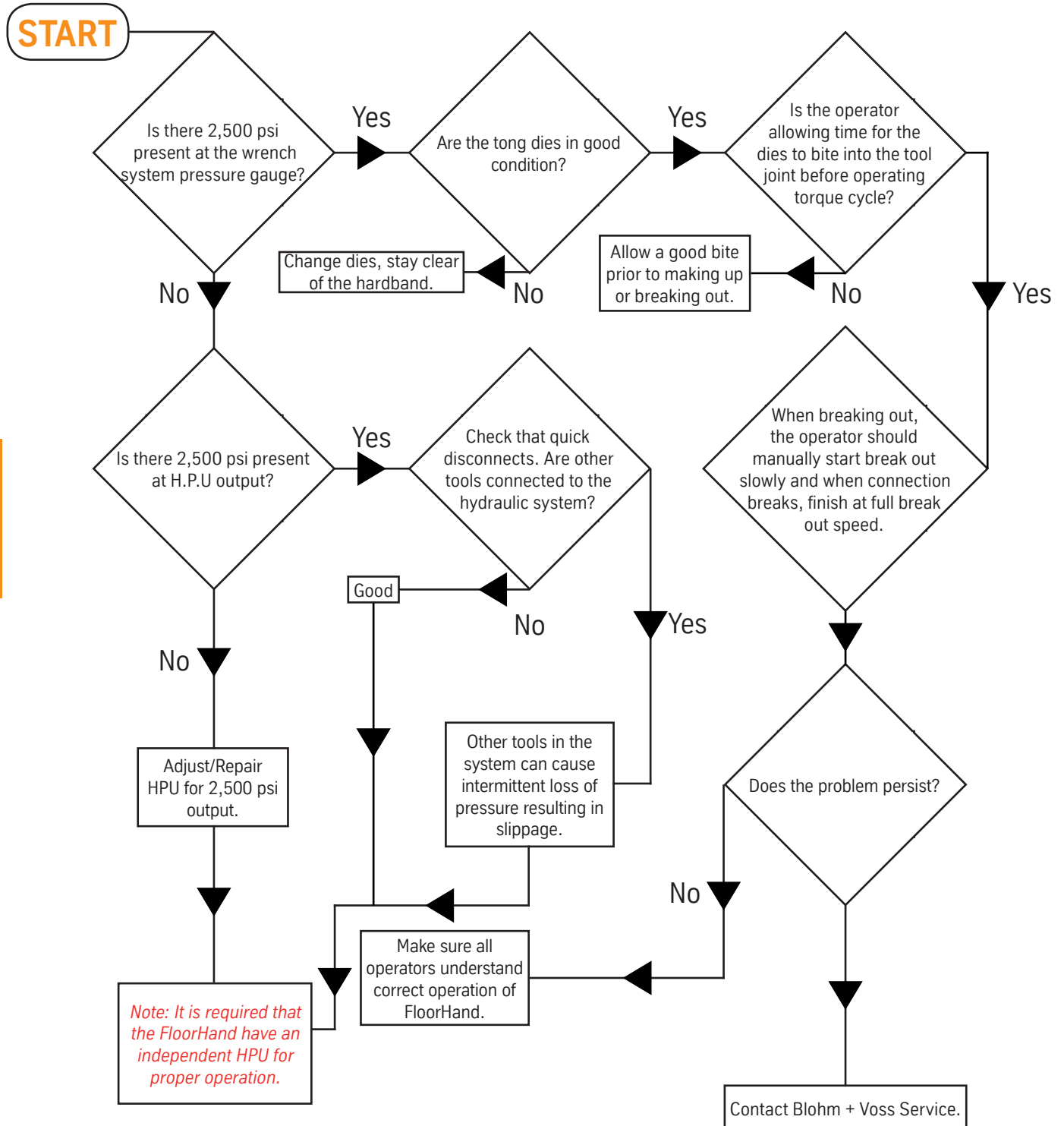


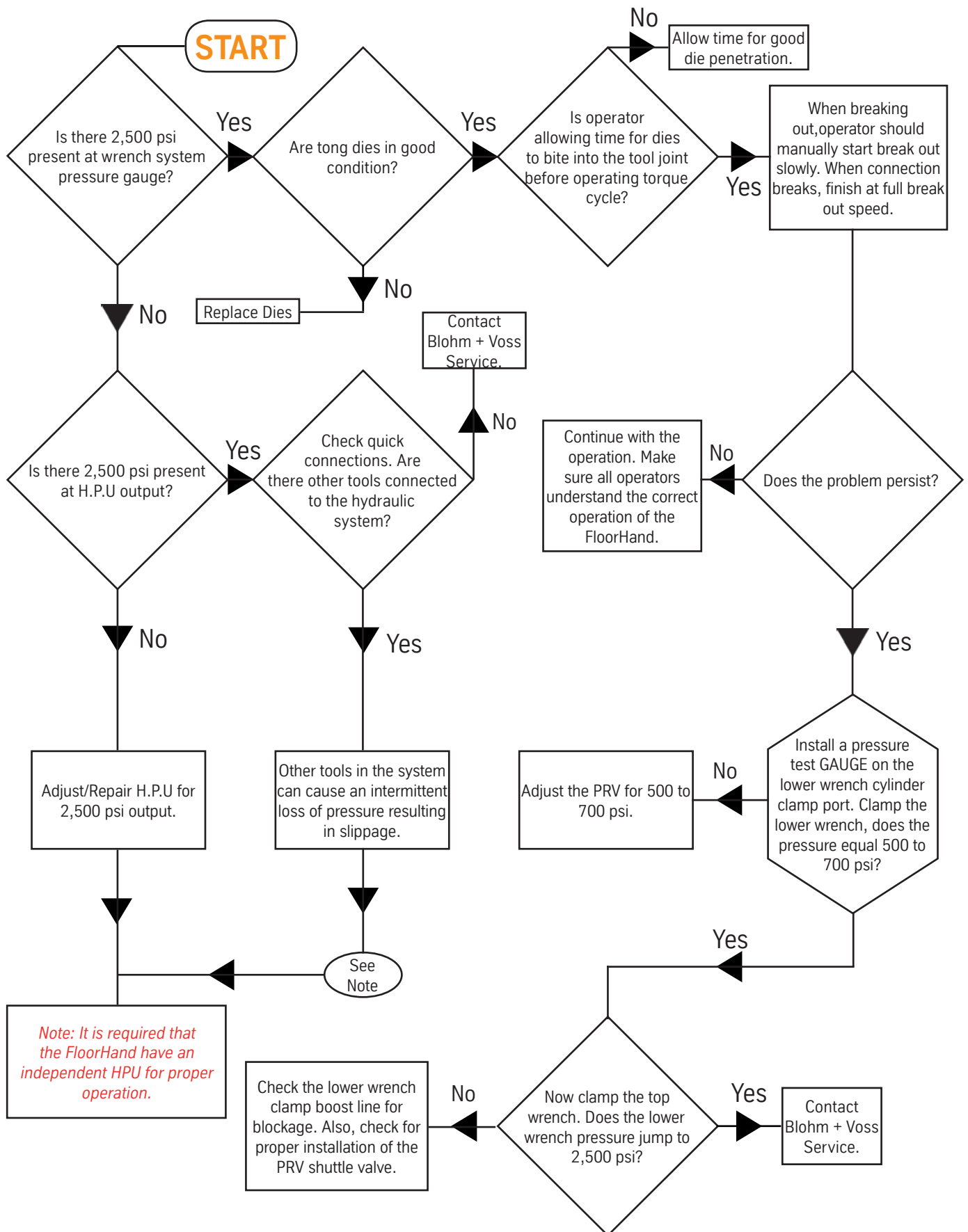
Figure 56

## Troubleshooting

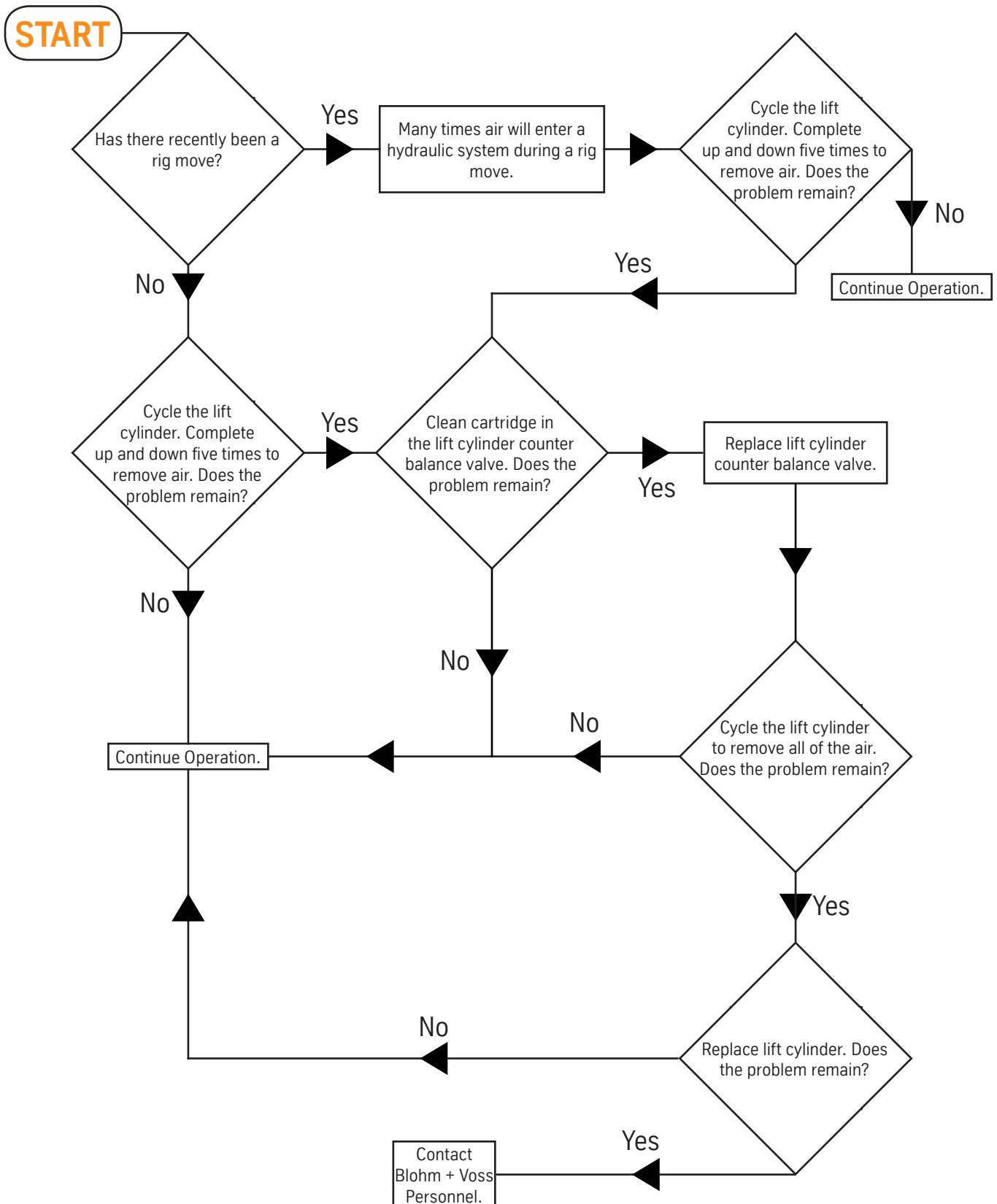
### Problem: Upper wrench slips when making or breaking a connection.



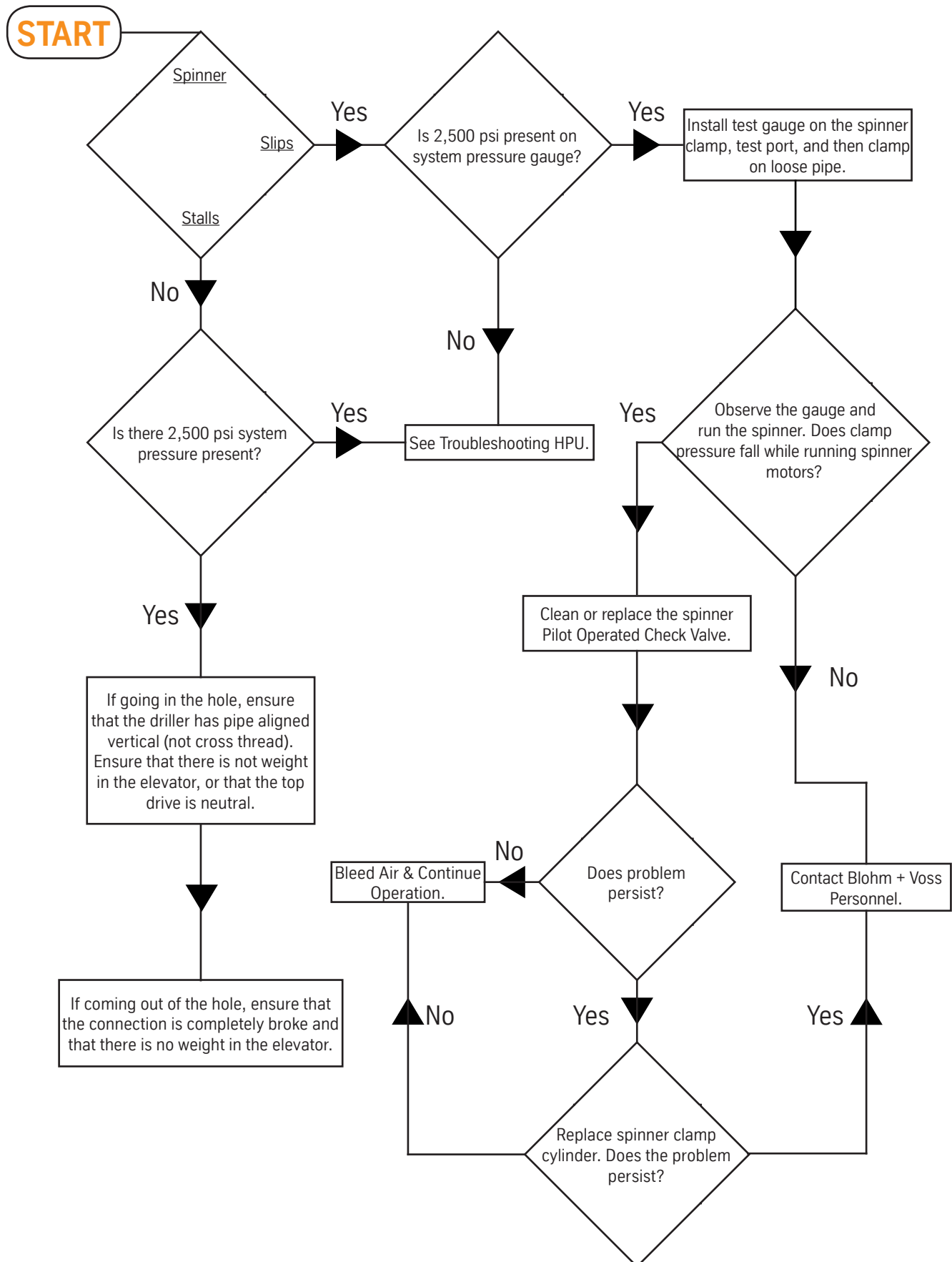
## Problem: Lower wrench slips when making or breaking connections.



## Problem: After Manipulator / Lift Cylinder is raised, FloorHand slowly drifts down.

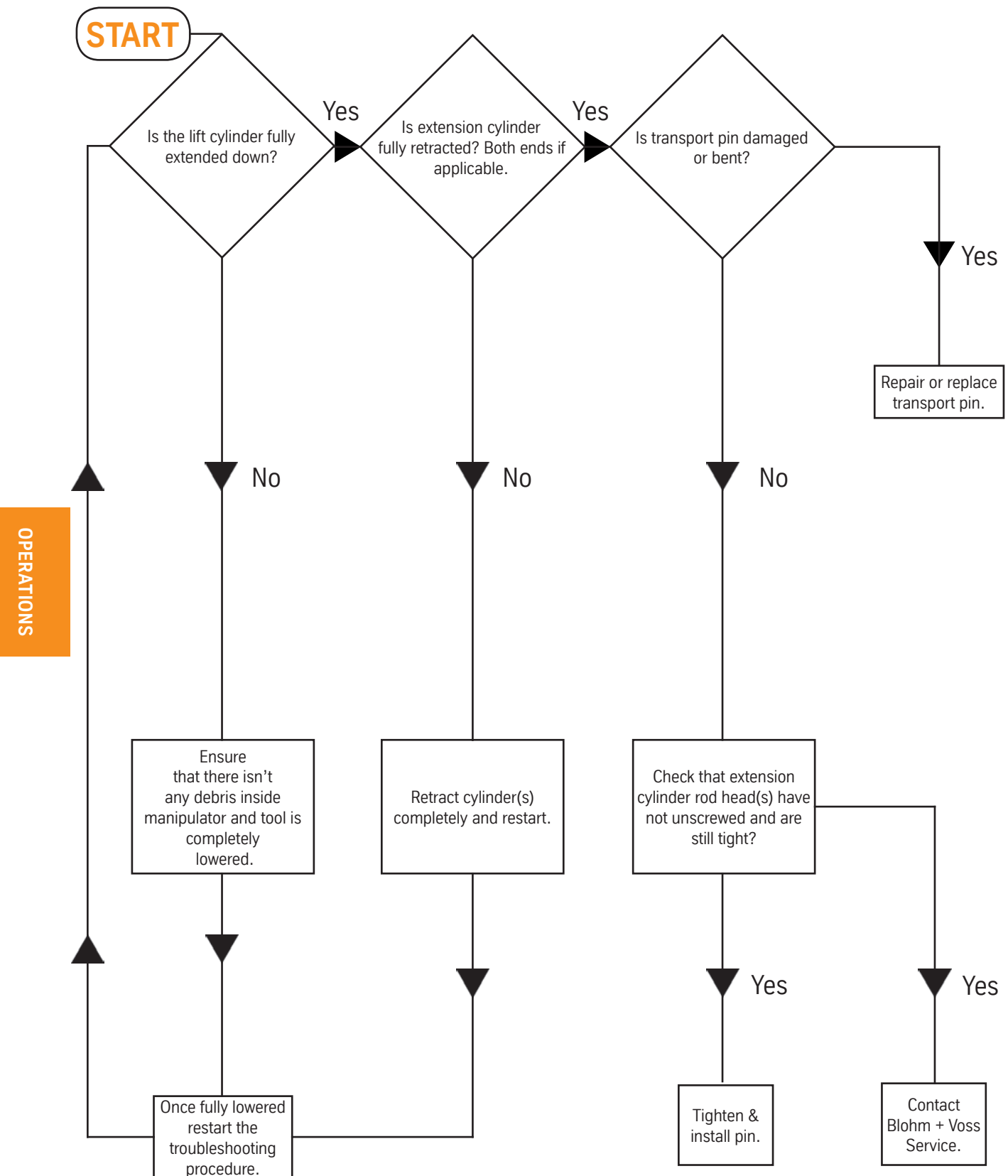


## Problem: Upper wrench slips when making or breaking connection.

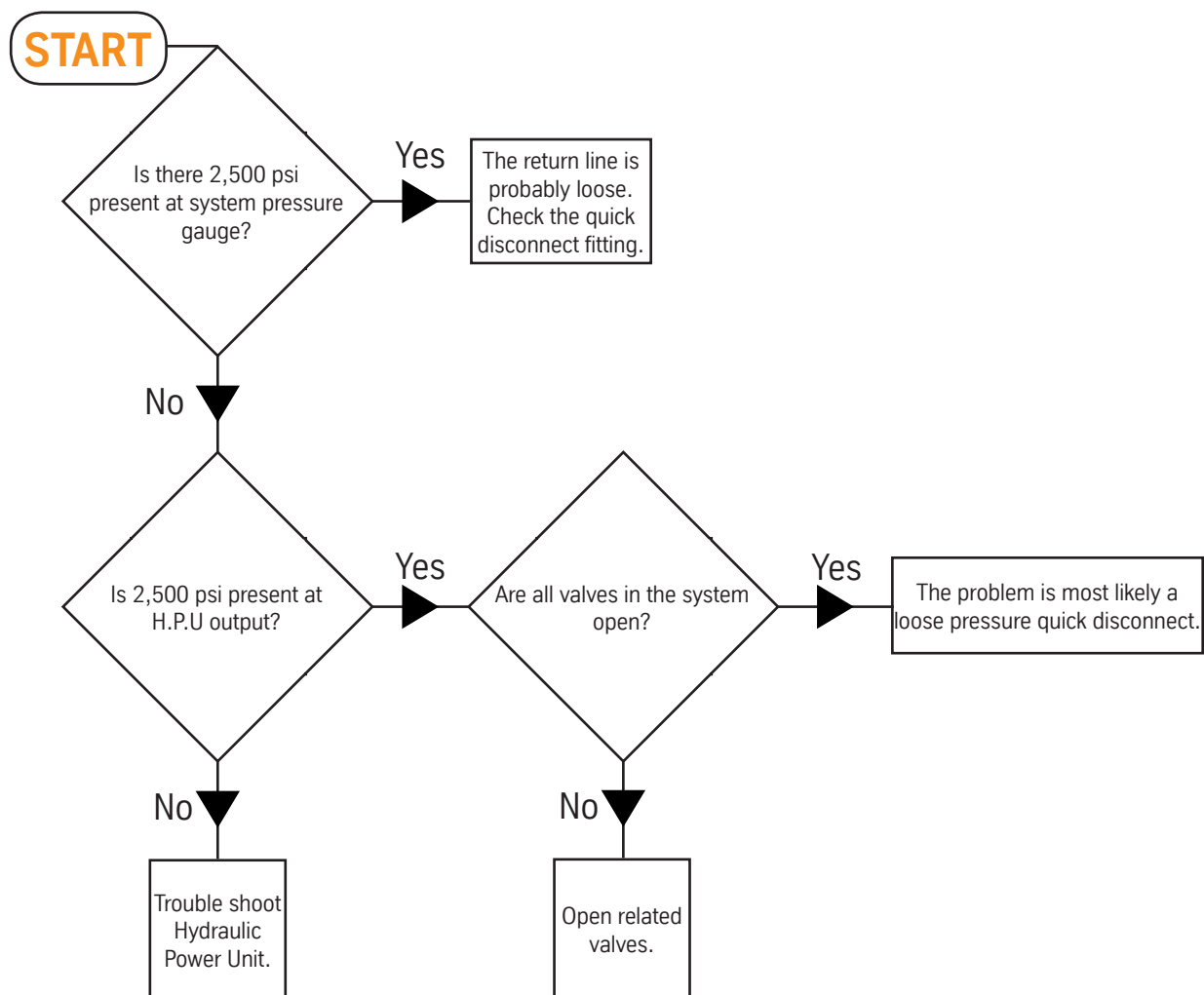




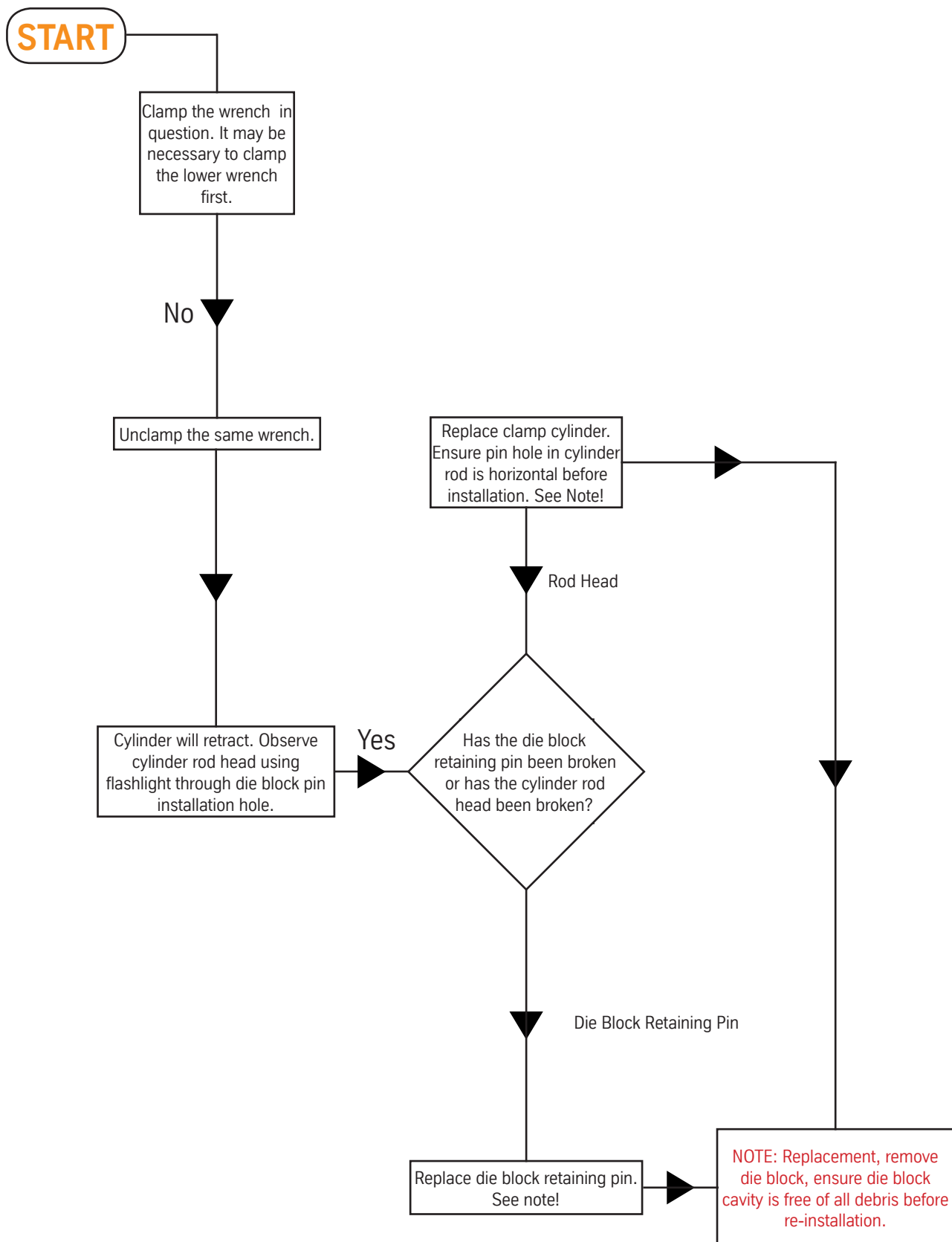
## Problem: Transport pin cannot be installed, holes do not line up.



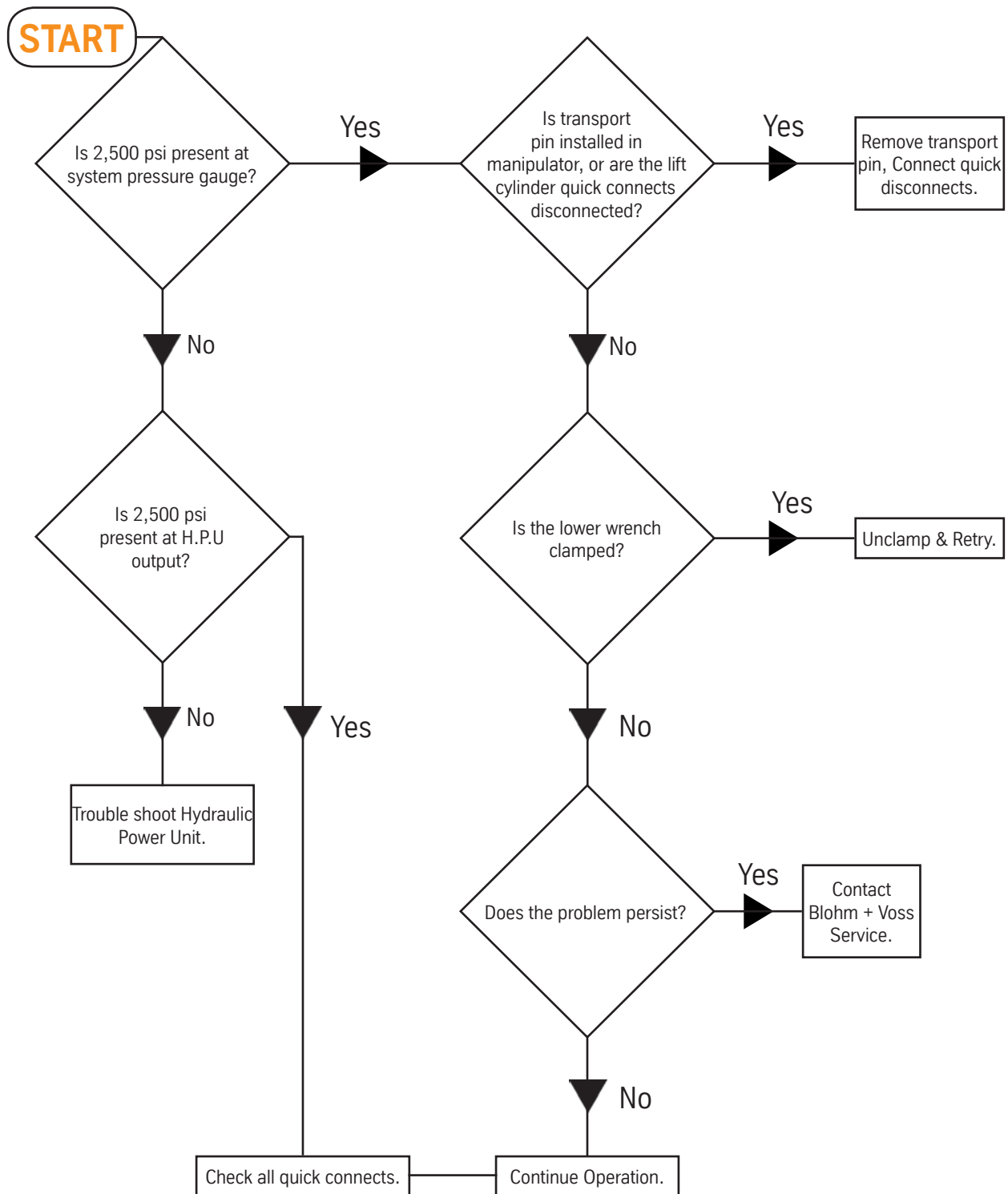
## Problem: All wrench & manipulator functions are inoperative.



## Problem: Die block extends, but will not retract on its own.



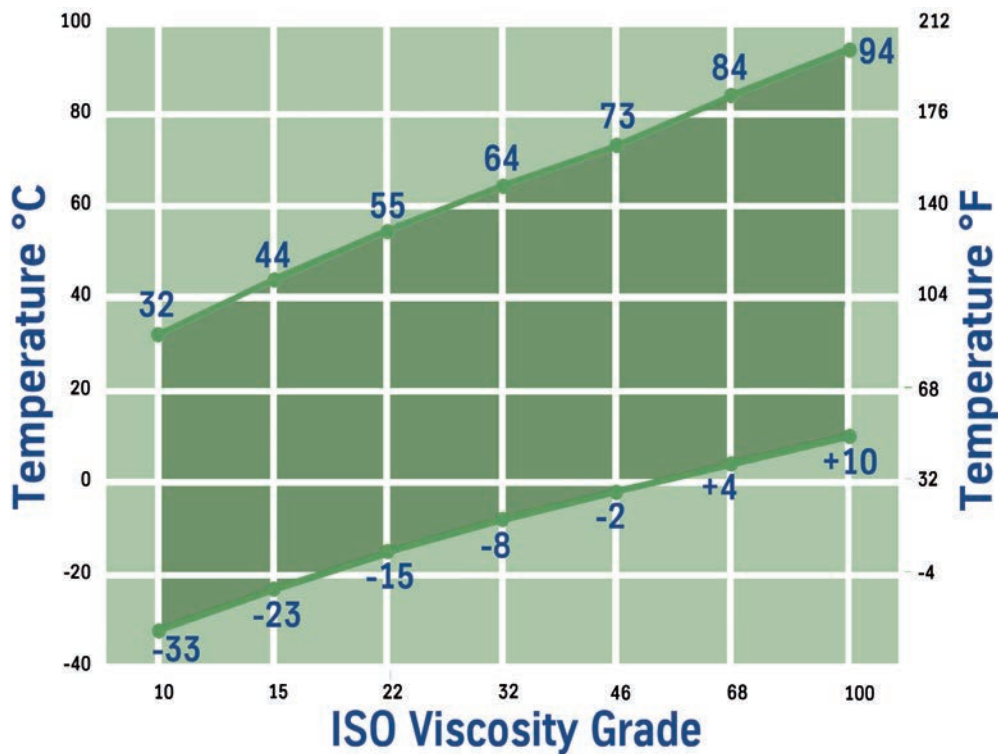
## Problem: Manipulator / Lift Cylinder does not function.



## MAINTENANCE & INSPECTION

## Hydraulic Oil Quality

BVOT recommends a mineral based hydraulic oil, ISO 68 or equivalent for primary use in temperature ranges between 65° - 95° F (18° - 35° C). For environments above or below this range, consult the chart below to select an appropriate substitute.



## Primary Hydraulic Oil

Chevron Regal® R&o ISO 220-ISO 680

Shell Tellus® Oil Premium 68

Multipurpose grease, e.g.:

Retinax Grease LX2

Shell Alvania RL 3

Aviaticon XRF NLGI 0

Alternatively; use EP gear lubricating grease for greasing "non-oil tight gear trains"

NESSOS SF0

NLGI 0

DIN 51 826 GPOF-25

DIN 51 502 GPOF-25

**WARNING: ALWAYS TURN OFF THE HYDRAULIC POWER UNIT; DISCONNECT THE HYDRAULIC LINES AND TAG OUT THE H.P.U CONTROL BEFORE LUBRICATING THE FLOORHAND. FAILURE TO DO SO MAY CAUSE INJURY TO PERSONNEL OR DAMAGE TO THE EQUIPMENT.**



## Lubrication

The FloorHand should be inspected and greased each week. For higher ambient temperature up to 86° Fahrenheit (30° Celsius) we recommend to use NLGI grade 2. (See Figure 57).

## The Manipulator

- **TOGGLE BEARINGS** - Use a grease gun on the grease fittings on the cross tubes of each Frame Toggle. 4 grease points. (See Figure 57)
- **ROD KNUCKLE** - Use a grease gun on the grease fitting on the head of each Cylinder Rod Pin (2 grease points). One fitting is accessed through the hole in the side of the Torque Arm the other from the column end of the Lift Arm.
- **TORQUE ARM PIN** - Use a grease gun on the grease fitting on each end of the Torque Arm Pin (2 grease points) (See Figure 57).

## The FloorHand

- **DIE BLOCKS** - Actuate both lower wrench clamp and upper wrench clamp to expose the grease fittings before turning off the hydraulic power unit. Use a grease gun on each of the four fittings (front and back) on each die block to lubricate the centering buttons. It may be necessary to use spray lubricant on the back side of the lower wrench die blocks due to pipe stop interference.
- **DIE BLOCKS** - With the die blocks extended, brush grease on the top, bottom, and sides of each die block.
- **SPINNER GEARS** - Brush grease onto the drive gear teeth. Take care to keep grease off of the drive rollers. Do this daily.
- **TORQUE CYLINDER PINS** - Use a grease gun on the fitting on the top of each torque cylinder pin.
- **SPINNER CLAMP CYLINDER PINS** - Use a grease gun on the grease fitting on each end of the spinner clamp cylinder.
- **SPINNER GUIDE TUBES EXTERIOR** - Brush grease on the spinner guide tubes.

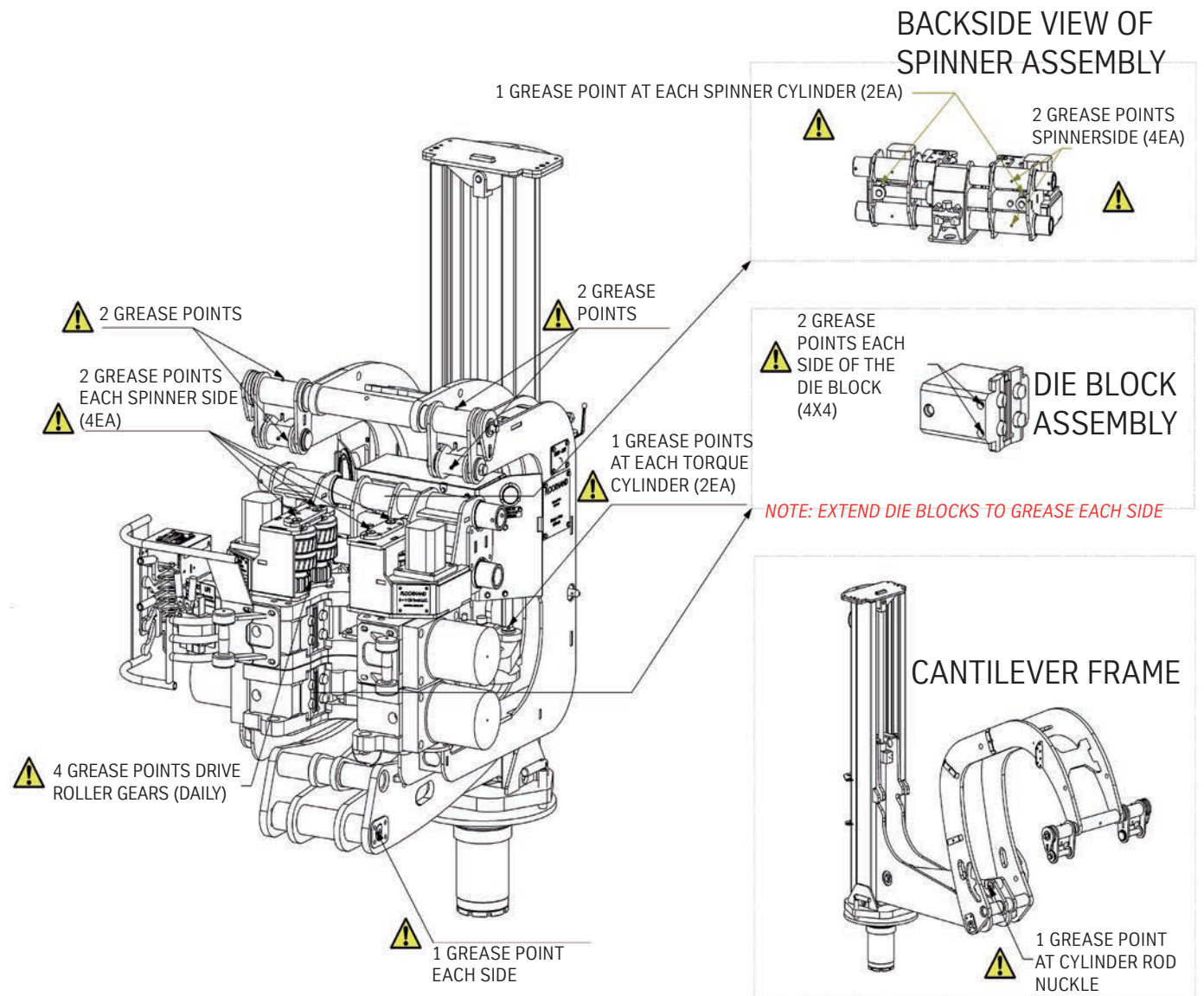


Figure 57

- SPINNER GUIDE TUBES - Use a grease gun on the grease fittings
- DIE DOVE TAIL GROOVE - Brush grease in the die slots when replacing the dies.

## Removal of DIE BLOCK

Procedure:

1. Remove the bolt. Number 1
2. Remove retainer. Number 2
3. Remove the retainer pin. Use the opening on the front on the wrench to push the pin through the opening on the back of the wrench. (Not shown)
4. Remove pipe stop. (Lower wrench only) Number 4
5. Remove pipe stop base. (Lower wrench only) Number 5
6. Slide out the DIE BLOCK. Number 6



Figure 58

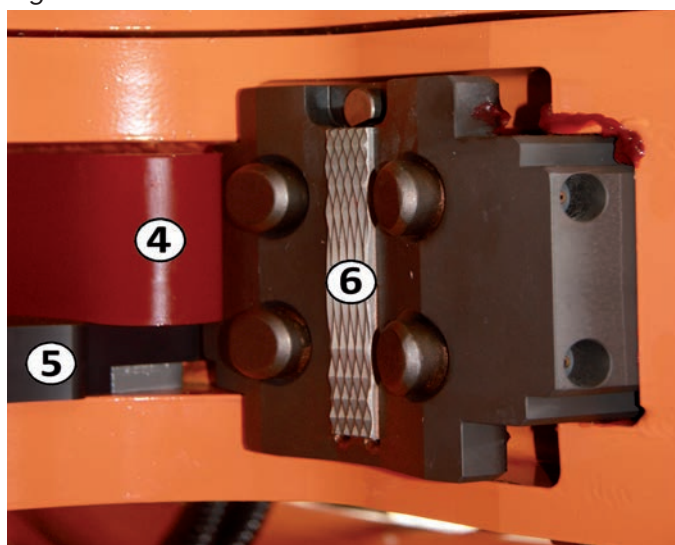


Figure 59

## Replacement of TONG DIES

The TONG DIES should be inspected on a daily basis and replaced if damaged. Actuate both lower wrench clamp and upper wrench clamp to expose the tong die retainer cotter pins before turning off the hydraulic power unit. Once the lower wrench clamp is fully extended and the upper wrench clamp is partially extended, all four tong dies may be replaced at the same time

1. Remove the cotter pin securing the tong die retainer.
2. Remove the tong die retainer.
3. Slide the tong die upwards to disengage from the slot in the jaw. If the die is difficult to

remove, use a brass drift to tap it out from the bottom.

4. Discard old tong dies and cotter pins.
5. Clean and grease the die slot.
6. Slide in new tong dies.
7. Replace tong die retainers.
8. Insert new cotter pins and bend legs to secure.

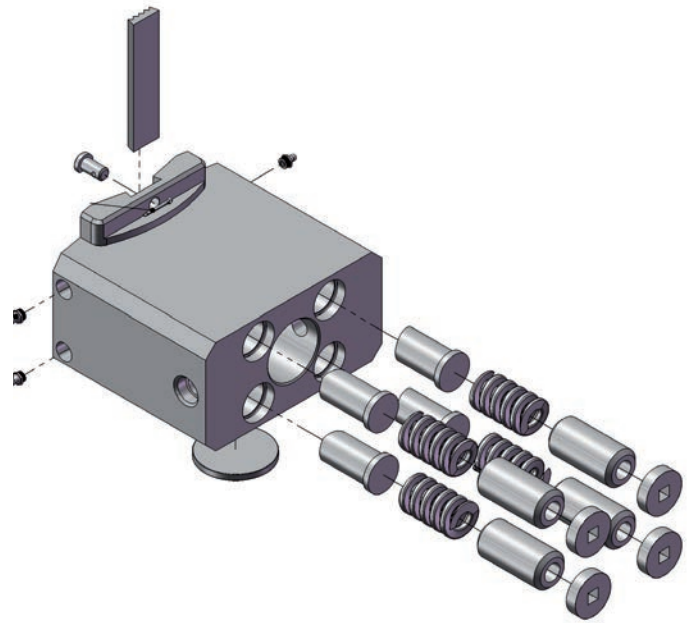


Figure 60

## Replacement of Centering Buttons

Procedure: Figure 60

1. Remove the DIE BLOCK as described on page 56.
2. Use a ½" drive ratchet to remove the spring retainer plug, the spring spacer and the spring.
3. Now use a mallet to drive the button back through and out of the housing.
4. Remove all debris.

**WARNING: ALWAYS TURN OFF THE HYDRAULIC POWER UNIT, DISCONNECT THE HYDRAULIC LINES AND TAG OUT THE H.P.U CONTROL BEFORE REPLACING TONG DIES ON THE FLOORHAND.**

**WARNING: NEVER STRIKE THE TONG DIES WITH A HAMMER OR ANY OTHER STEEL TOOL WHEN REPLACING THE TONG DIES ON THE FLOORHAND. TONG DIES ARE HIGHLY HEAT TREATED AND BRITTLE AND MAY SHATTER. ALWAYS WEAR PROTECTIVE EYEWEAR WHEN CHANGING TONG DIES.**

**WARNING: BE AWARE OF THE FACT THERE IS A SLIGHTLY PRELOADED SPRING BEHIND THE PLUG WHICH COULD CAUSE INJURY.**

**WARNING: ALWAYS TURN OFF THE HYDRAULIC POWER UNIT, DISCONNECT THE HYDRAULIC LINES AND TAG OUT THE H.P.U CONTROL BEFORE REPLACING TONG DIES ON THE FLOORHAND.**

**WARNING: THE BLOCK IS HEAVY, TAKE CARE WHILE LIFTING.**

*WARNING: ALWAYS TURN OFF THE HYDRAULIC POWER UNIT AND DISCONNECT THE HYDRAULIC LINES BEFORE REPLACING SPINNER DRIVE ROLLERS ON THE FLOORHAND.*

5. Apply lubricant and reinstall components.
6. Replace the button and assemble in reverse order.

## Replacing Spinner Drive Rollers

The spinner drive rollers should be inspected after each trip and replaced if they show signs of deterioration or cracking. To replace the spinner drive rollers refer to Figure 61 on page 60 and follow the procedure. For additional help refer to the full size image and explanation of parts on page 83:

1. Remove the five bolts securing the drive roller shaft retainer plate. (Items 40 and 41)
2. Remove the drive roller shaft retainer plate. (Item 17)
3. Pull the drive roller shaft (Item 16) upwards approximately  $\frac{3}{4}$ " so that the bottom end of the drive roller shaft clears the bottom plate of the spinner frame.
4. Withdraw the entire assembly from the spinner frame. Hold together the gear, roller and shaft as to not drop the parts. (Items 14, 15 and 16 respectively)
5. Remove and set aside the upper spacer for reuse. (Item 13)
6. Withdraw the drive roller shaft fully from the top of the drive roller and set aside for reuse.
7. Separate the drive roller away from the drive roller gear and set aside. (Items 15 and 14)
8. Clean the top of the drive roller gear to remove caked drilling mud and other debris that might keep the drive roller from fully seating in the case. (Refer to page 84, item 2)
9. Inspect the drive roller gear bearings and replace if they appear damaged or do not rotate smoothly.
10. Lubricate the top hex of the spinner drive gear.
11. Slide the new drive roller onto the hex portion until it seats fully.

12. Clean and lubricate the drive roller shaft. Slide it through the drive roller bearings and then through the drive roller gear bearings. Do not use force. If the drive roller shaft does not slide easily through the bearings with, **at most**, a light tap with a hammer handle, inspect the shaft for damage and, if necessary, replace the drive roller shaft.
13. Reposition the upper spacer (Item 13) on the assembly and position the lower end of the drive roller shaft flush with (or slightly inside) the face of the lower spacer.
14. Slide the entire assembly back into the spinner frame until the drive roller shaft contacts the back of the slot in the top plate of the spinner frame.
15. Align holes, then lightly tap the drive roller shaft (Item 16) down to engage the lower end of the drive roller shaft with the bottom plate of the spinner frame. (Items 1 or 2)
16. Orient the flat on the top of the drive roller shaft (Item 16) to properly mate with the drive roller shaft retainer. (Item 17)
17. Replace the drive roller shaft retainer (Item 17) and, INSTALL the bolts holding it to the spinner frame and tighten.



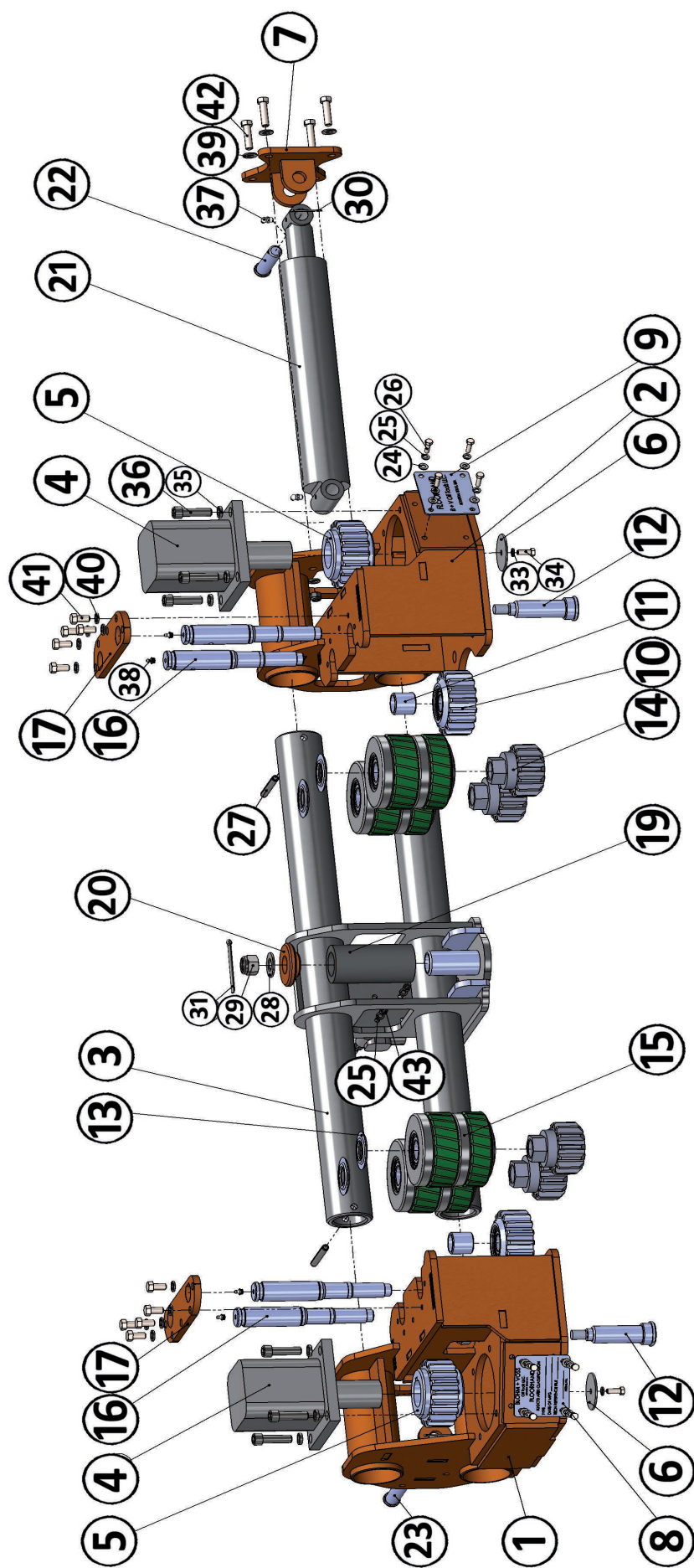


Figure 61

# Frequency

## Inspection

A thorough inspection should be carried out periodically (every 3 months) or as special circumstances may require. Before starting an inspection disconnect hydraulic system and remove all foreign materials (dirt, paint, grease, oil, scale, etc) from surface by a suitable method. After a field inspection, it is advisable to record the extent of testing and testing results. A periodic load inspection may be conducted in the field. If cracks, excessive wear etc are recognized, contact Blohm + Voss Oil Tools, LLC or an authorized service company.

## Hydraulic System Inspection

Check for leakage every day. If an internal or external leakage reaches an unacceptable level, contact Blohm + Voss Oil Tools, LLC or an authorized service company.

## Dismantling Inspection

Generally, when the equipment returns to base, warehouse, etc carry out the tool inspection, immediately. Furthermore, repair it if necessary prior to it being sent on the next job. The tool should be dismantled and inspected in a suitably equipped facility for excessive wear, cracks, flaws or deformations. Corrections should be made in accordance with recommendations which can be obtained from Blohm + Voss Oil Tools, LLC.

## Check Category I (ONGOING OBSERVATION)

Observe during operation for inadequate performance

## Check List Category II (DAILY)

CHECK FOR THE FOLLOWING GENERAL ISSUES (but not limited to):

DESCRIPTION	CHECKED	SIGNATURE
1. Complete front page of check list for the records		
2. Check state of lubrication		
3. Check functioning of FloorHand as a whole remarks		
4. Check for leakage		
5. Check completeness and condition of warning plates and labels		

Remarks

CHECK FOR LOOSE ITEMS, ESPECIALLY FOR (but not limited to):

1. Shafts, bolts and retainers		
2. Assemblies		
3. Screws, bolts, nuts, washers, retainers, springs and lock wire		
4. Check for presence of centering buttons and dies		

Remarks

CHECK FOR CRACKS, ELONGATION, DAMAGE AND CORROSION, ESPECIALLY FOR (but not limited to):

1. Dies		
2. Shafts, nuts, bolts		
3. Drive rollers		
4. Centring buttons		

Remarks

SUPERVISOR

DATE

## Check List Category III (EVERY 3 MONTHS)

GENERAL		
DESCRIPTION	CHECKED	SIGNATURE
1 Carry out a Category II inspection		
Remarks		

## Check List Category IV (EVERY YEAR)

GENERAL		
DESCRIPTION	CHECKED	SIGNATURE
1 Carry out inspection II & III		
Remarks		

\_\_\_\_\_  
SUPERVISOR

\_\_\_\_\_  
DATE

## Periodic Inspection

The recommended schedule for inspection of the FloorHand are as follows:

- Ongoing: Inspection category I
- Daily: Inspection category II
- Every 3 months: Inspection category III
- Every 1 year: Inspection category IV

The recommended frequencies apply for equipment in use during the specified period.

## Inspection Categories

This is Category III inspection plus further inspection for which the equipment is disassembled to the extent necessary to conduct NDT of all primary-load-carrying components.

Equipment shall be:

- Disassembled in a suitable-equipped facility to the extent necessary to permit full inspection of all primary-load-carrying components and other components that are critical to the equipment.
- Inspected for excessive wear, cracks, flaws and deformation.

Procedure:

- Corrections shall be made in accordance with the manufacturer's recommendations.
- Prior to inspection, all foreign material such as dirt, paint, grease, oil, scale, etc. shall be removed from the concerned parts by a suitable method (e.g. paint-stripping, steam-cleaning, grit-blasting)

# Inspection Check Lists

CHECK LIST FRONT PAGE

---

TYPE OF EQUIPMENT

---

SERIAL NUMBER

---

PART NUMBER

---

SUPERVISOR

---

DATE OF INSPECTION

---

INSPECTION CATEGORY

---

PLACE OF INSPECTION

---

## SPARE PARTS



## Recommended Spare Parts for One Year Operation

Part number	Description	Qty.
9FH-01407	DOUBLE DRIVE ROLLER ASSEMBLY	8
9FH-01408	DRIVE ROLLER GEAR ASSEMBLY	4
9FH-01315	UPPER SPACER (DR)	4
9FH-01287	IDLER GEAR ASSEMBLY	2
9FH-01384	DRIVE ROLLER SHAFT	4
9FH-01391	SPINNER IDLER SHAFT	2
9FH-01290	IDLER SHAFT SPACER	2
9FH-01216	DIE RETAINER WITH COTTER PIN	24
9FH-01055	DIE BLOCK RETAINING PINS	8
9FH-70622-1	BLUE DIAMOND TONG DIE	108
9FH-01023	SPINNER SLIDE BEARING	2
9FH-01050-1	DIE BLOCK / WRENCH SUPPORT BEARING	8
9FH-01149-29	TORQUE CONTROL CARTRIDGE	1
9G6005-3	HYDRAULIC VALVE LINKAGE KIT	5
9FH-01152-2	TORQUE GAUGE W/ MOUNTING RING	1
9FH-HCPASSM	STANDARD LEVER BOX	2
9FH-10505	MANIPULATOR HOSE KIT	1
9FH-10504	CONTROL VALVE HOSE KIT	1
9FH-10500	FRAME HOSE KIT	1
9FH-10501	LOWER WRENCH HOSE KIT	1
9FH-10502	UPPER WRENCH HOSE KIT	1
9FH-10503	SPINNER HOSE KIT	1

## Recommended Spare Parts for One Year of Operation for the FloorHand Manipulator

Part number	Description	Qty.
9FH-CJS3636	FIBERGLIDE TOGGLE BEARING	4
9FM-CJS2224	RBC FIBERGLIDE BEARINGS	2
9FM-CJS2212	RBC FIBERGLIDE BEARINGS	2
9HCMVEP17	1 FLAT FACE QDC NIPPLE	1
9HCFVEP17	1 FLAT FACE QDC COUPLER	1
9HCFVEP15	3/4 FLAT FACE QDC COUPLER	1
9HCMVEP15	3/4 FLAT FACE QDC NIPPLE	1
9FH-01371	LOCK SCREW ASSEMBLY	2
9FH-01149-4	LIFT CYL COUNTER BALANCE VALVE	1
9FH-01355	PIN, LIFT CYLINDER BODY (FM-2500)	1
9FH-01185	PIN, LIFT CYLINDER ROD	1
9FH-01074-3	LIFT CYLINDER (FM-2050, 2500,2150)	1
9FH-01356	TORQUE ARM CYLINDER BODY PIN (FM-2500)	1
9FH-01362	PIN, CYLINDER ROD (FM-2500)	1
9FH-01361	TORQUE ARM PIN (FM-2500)	1
9FH-01363	TORQUE ARM PIN RETAINER (FM-2500)	2
9FM-HVBEA461	COMBO BEARING	4
9FH-01152-14	ELEMENT	1

# DRAWINGS

## FLOORHAND & CANTILEVER MOUNT MANIPULATOR 9GF-1100 & 9FM-2500

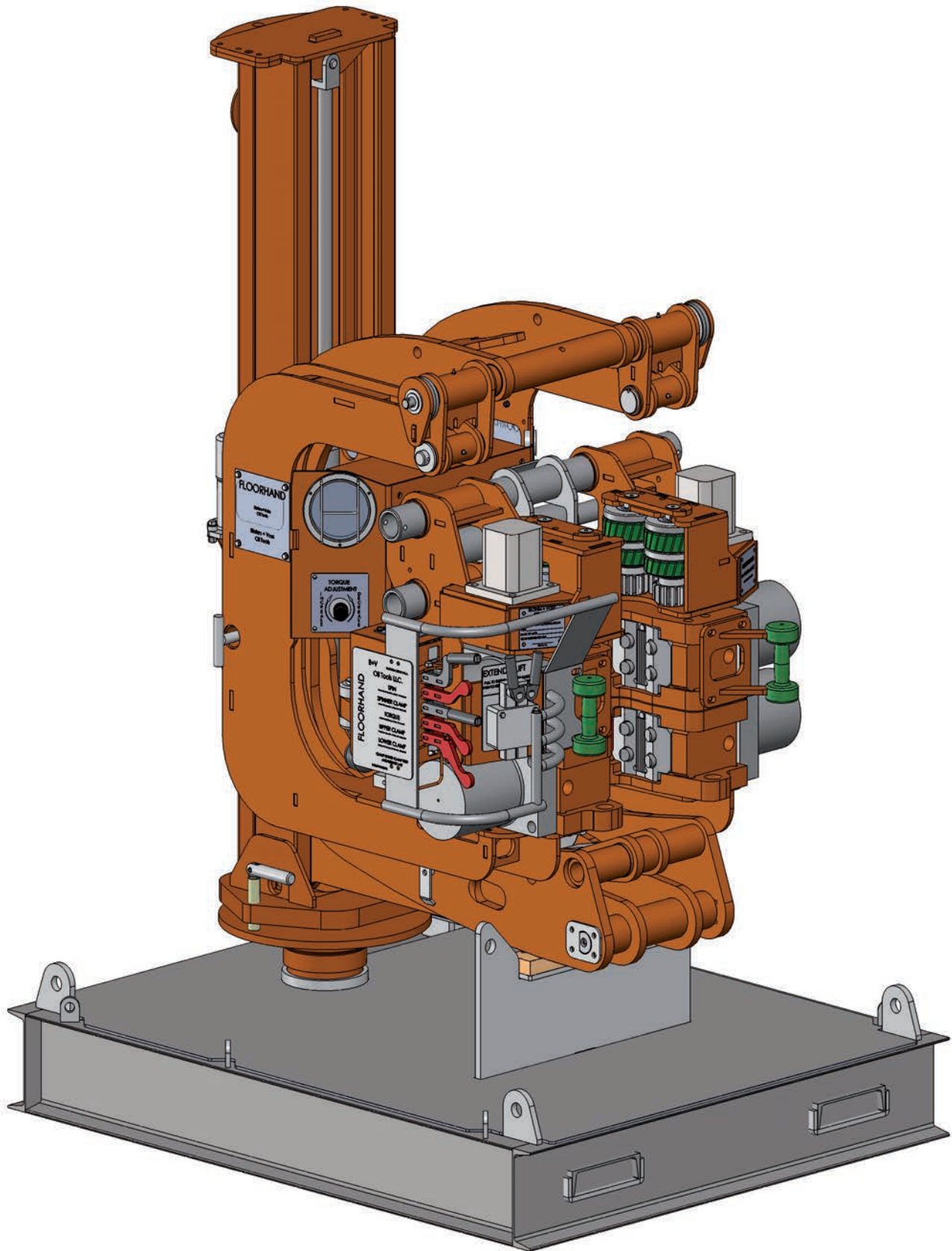


Figure 62



# FLOORHAND & CANTILEVER MOUNT MANIPULATOR

## 9GF-1100 & 9FM-2500

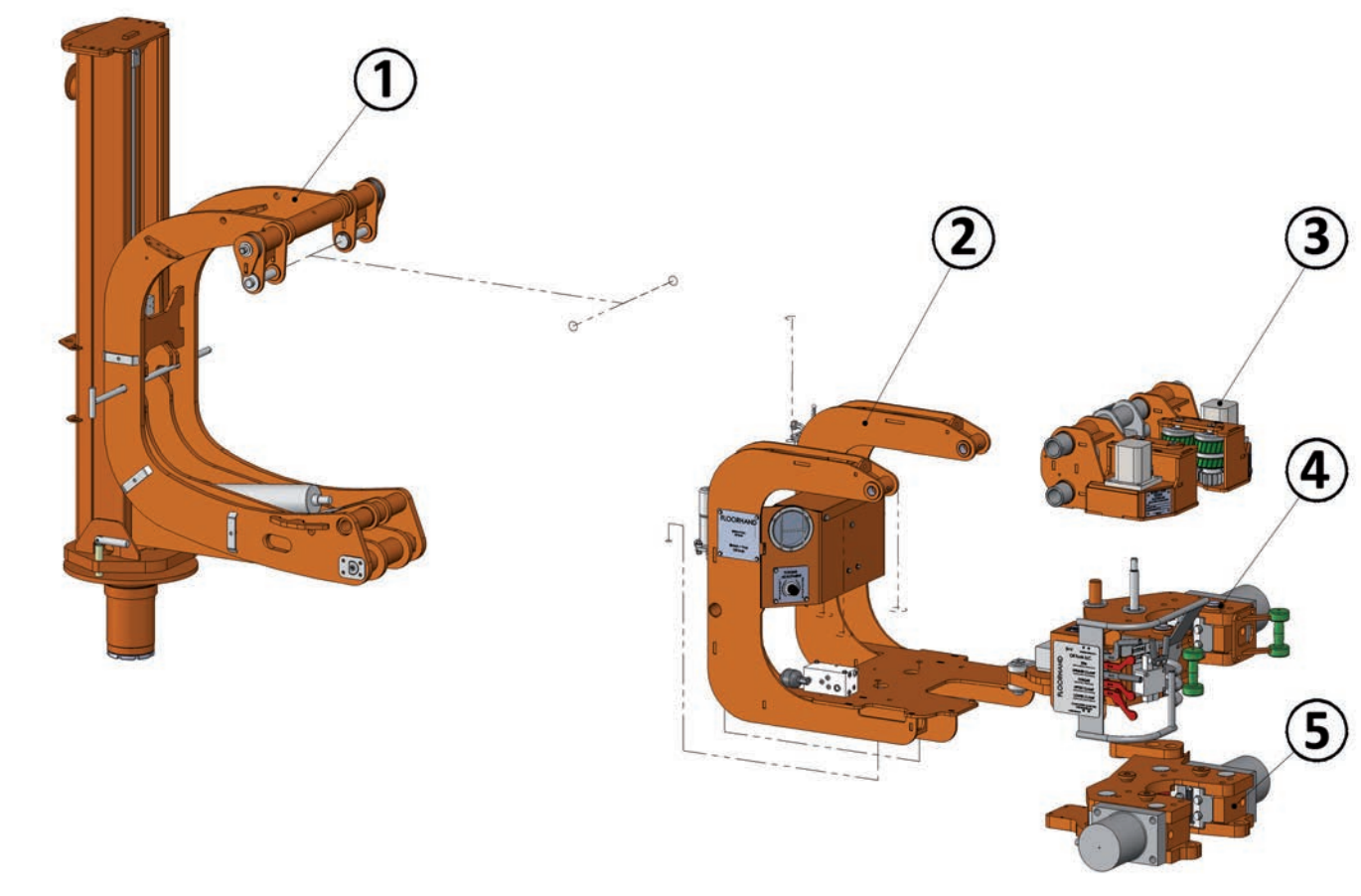


Figure 63

Item	Part number	Description	Qty.
1	9FM-2500	CANTILEVER MOUNT MANIPULATOR	1
2	9FH-10001	CANTILEVER FRAME ASSEMBLY	1
3	9FM-10302	SPINNER SUB ASSEMBLY	1
4	9FH-10201	UPPER WRENCH SUB ASSEMBLY ORFS	1
5	9FH-10101	LOWER WRENCH SUB ASSEMBLY ORFS	1

# CANTILEVER MOUNT MANIPULATOR 9FM-2500

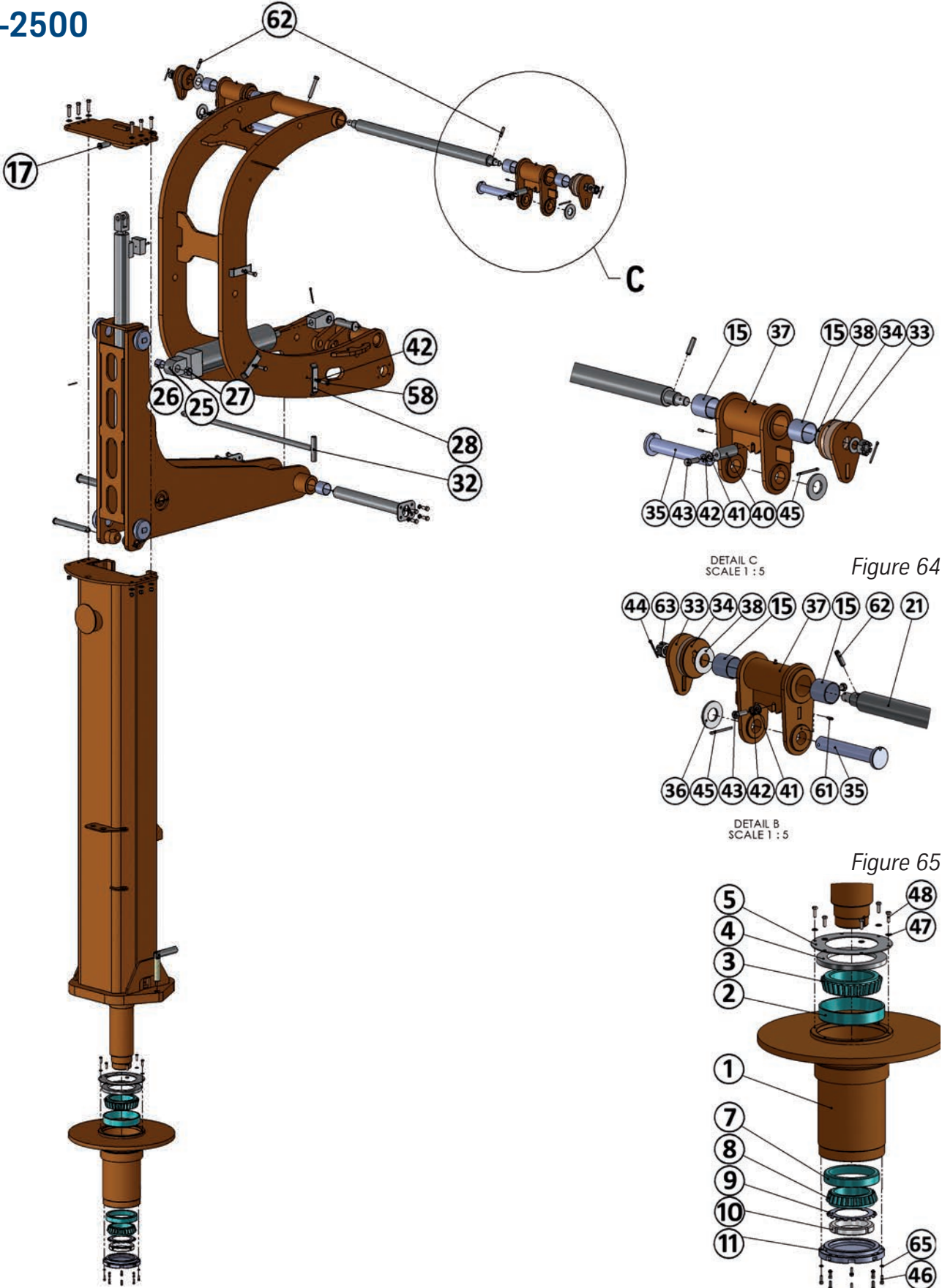


Figure 64

Figure 66

# CANTILEVER MOUNT MANIPULATOR 9FM-2500

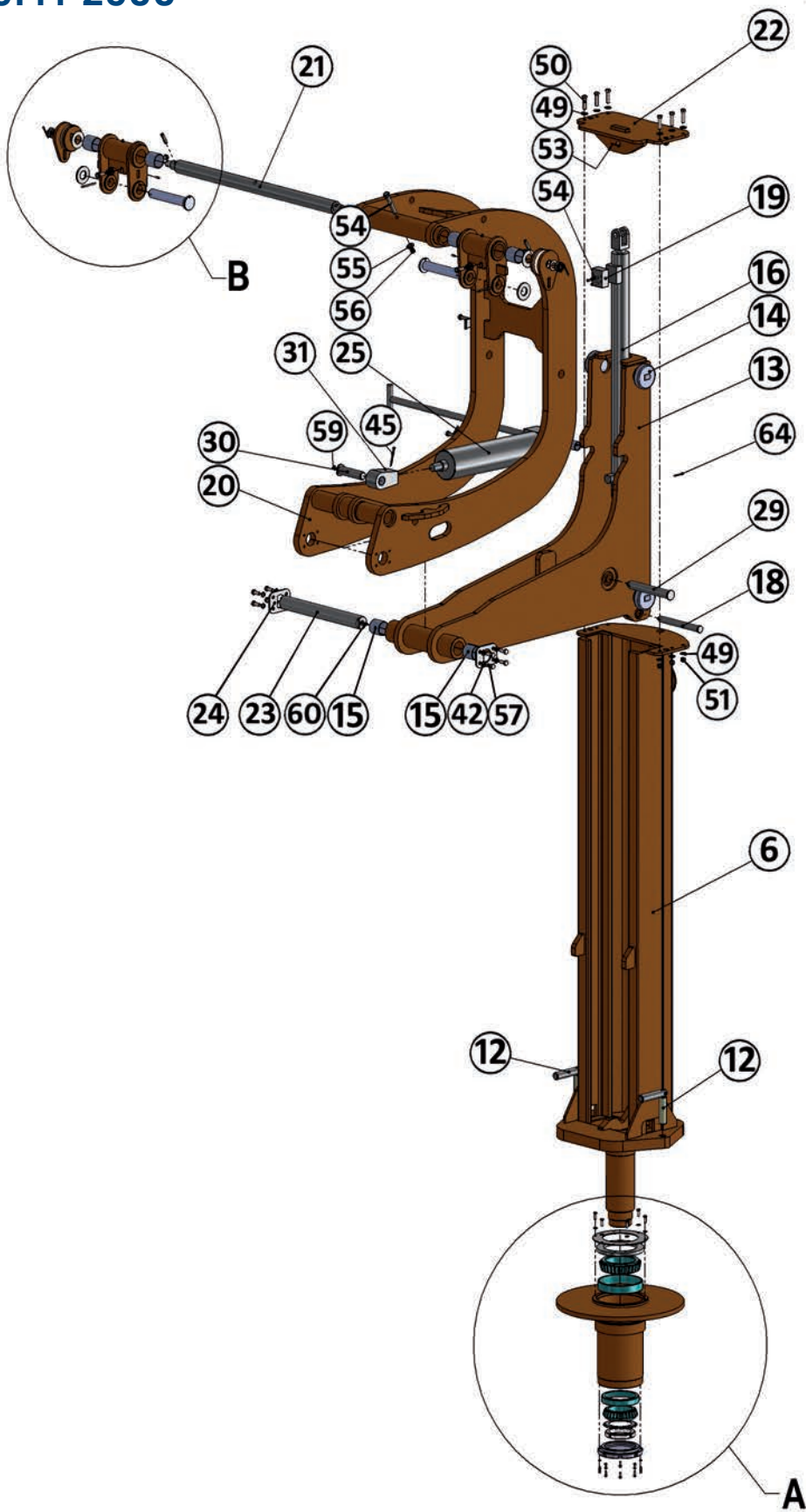


Figure 65

Item	Part number	Description	Qty.
1	9FH-01367	SHAFT HOUSING WELDMENT	1
2	9FM-T67324	BEARING	1
3	9FM-T67389	BEARING	1
4	9FM-150X210X15	OIL SEAL	1
5	9FH-01370	SEAL RETAINER	1
6	9FH-01346	CANTILEVER MANIPULATOR POST ASSEMBLY	1
7	9FM-T56650	BEARING	1
8	9FM-T56418	BEARING	1
9	9FM-W20	LOCKWASHER	1
10	9FM-AN20	LOCK NUT	1
11	9FH-01369	SHAFT HOUSING COVER	1
12	9FH-01371	LOCK SCREW ASSEMBLY	2
13	9FH-01351	CANTILEVER MANIPULATOR LIFT ARM	1
14	9FM-HVBEA461	COMBO BEARING	4
15	9FH-CJS3636	RBC FIBERGLIDE TOGGLE BEARING	6
16	9FH-01074-3	LIFT CYLINDER	1
17	9FH-01185	PIN, LIFT CYLINDER ROD (TOP)	1
18	9FH-01355	PIN, LIFT CYLINDER BODY 9FM-2500	1
19	9FH-01149-4	LIFT CYLINDER COUNTER BALANCE VALVE	1
20	9FH-01357	CANTILEVER TORQUE ARM	1
21	9FH-01360	SUSPENSION SHAFT	1
22	9FH-01349	CANTILEVER POST CAP ASSEMBLY	1
23	9FH-01361	TORQUE ARM PIN	1
24	9FH-01363	TORQUE ARM PIN RETAINER	2
25	9FH-01074-11	COUNTERBALANCE CYLINDER	1
26	9FM-CJS2224	RBC FIBERGLIDE BEARING	1
27	9FM-CJS2212	RBC FIBERGLIDE BEARING	1
28	9FH-01364	HOSE RETAINER	3
29	9FH-01356	TORQUE ARM CYLINDER BODY PIN (FM-2500)	1
30	9FH-01362	PIN, CYLINDER ROD 9FM-2500	1
31	9FH-01365	CYLINDER ROD KNUCKLE ASSEMBLY	1
32	9FH-01387	TRANSPORT PIN	1
33	9FH-01300	BRAKE BRACKET	2
34	9FH-01301	BRAKE PAD	2



Item	Part number	Description	Qty.
35	9FH-01302	TOGGLE PIN	2
36	9FH-01439	FLAT WASHER	2
37	9FH-01297	TOGGLE	2
38	9FH-K30000093S	TOGGLE BELLVILLE WASHER	2
39	9FH-FTP1628	TOGGLE FTP1628 THRUST WASHER	2
40	9FH-01500	TOGGLE STOP (BUMPER)	2
41	9BN1133817	1/2 SAE WASHER	4
42	9BN1133895	1/2 SPLIT LOCKWASHER	15
43	9BN0115209	1/2-13 X 1-1/2 HHCS	4
44	9BN65127	3/16 X 2 COTTER PIN	2
45	9BN65151	1/4 X 3 COTTER PIN	5
46	9BN1123804	1/4-28 X 3/4 SHCS	8
47	9BN1133814	5/16 SAE FLAT WASHER	6
48	9BN0115055	5/16-18 X HHCS	6
49	9BN1133861	1/2 FLAT WASHER	12
50	9BN0115211	1/2-13 X 2 HHCS	6
51	9BN1137187	1/2-13 NYLON LOCK NUT	6
52	9BN65040	3/32 X 2 COTTER PIN	1
53	9BN1123808	1/4-28 X 1-1/2 SHCS	3
54	9BN0115319	5/8-11 X 4 HHCS	1
55	9BN1133819	5/8 SAE FLAT WASHER	1
56	9BN1137188	5/8-11 NYLON LOCK NUT	1
57	9BN0115207	1/2-13 X 1-1/4 HHCS	8
58	9BN0115210	1/2-13 X 1-3/4 HHCS	3
59	9BN60104	1/8 NPT 90 DEG ZERK	1
60	9BN60102	1/8 STRAIGHT GREASE ZERK	2
61	9BN64243	1/4 X 3/4 ROLL PIN	2
62	9BN64355	1/2 X 2 ROLL PIN	2
63	9BN36819	1-8 UNF CASTLE NUT	2
64	9BN65107	5/32 X 2 COTTER PIN	1
65	9BN1133687	5/16 HI COLLAR LOCKWASHER	8
66	9FM-2500KSC	HOSE AND FITTING KIT (NOT SHOWN)	1

CYLINDER ROD KNUCKLE  
9FH-01365

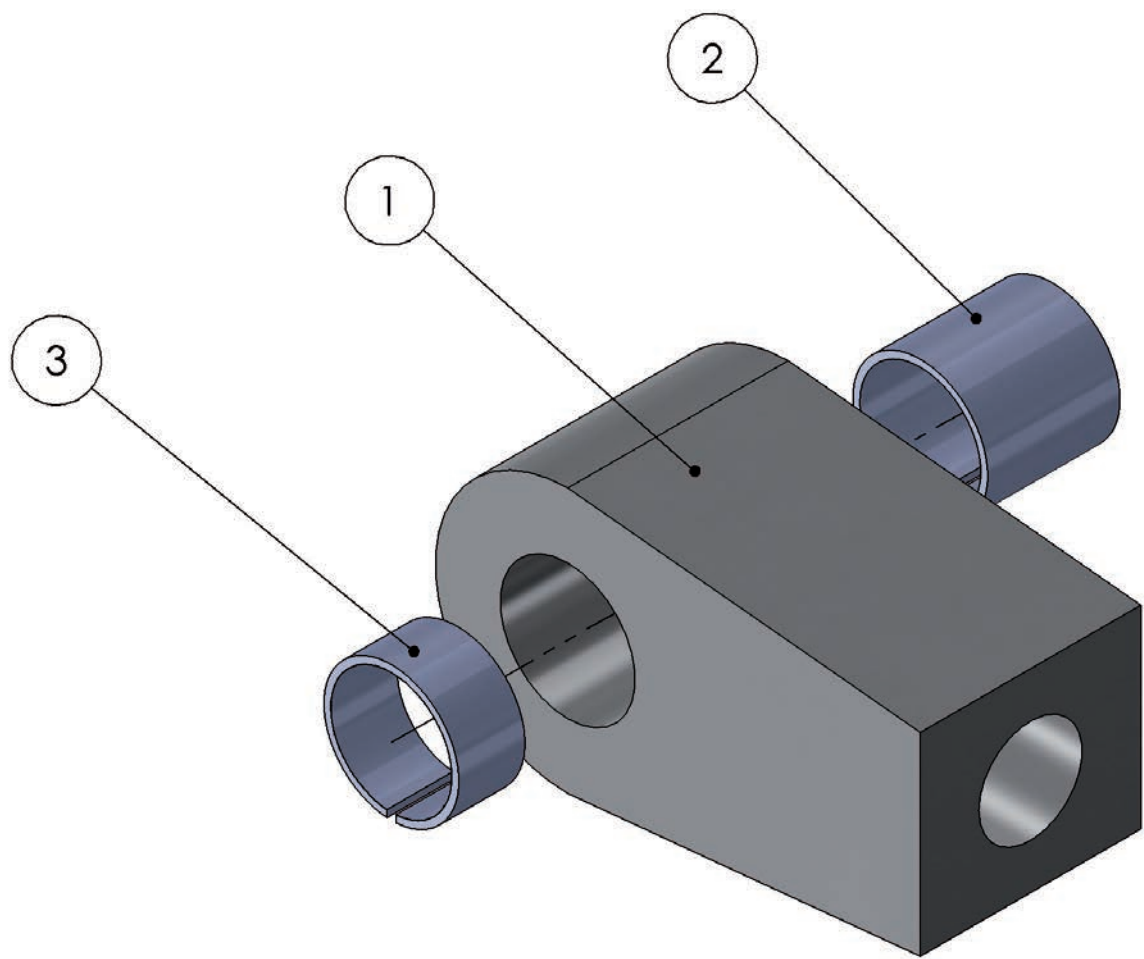


Figure 66

Item	Part number	Description	Qty.
1	9FH-01365-1	CYLINDER ROD KNUCKLE	1
2	9FM-CJS2224	RBC FIBERGLIDE BEARING	1
3	9FM-CJS2212	RBC FIBERGLIDE BEARING	1

## CANTILEVER FRAME ASSEMBLY 9FH-10001

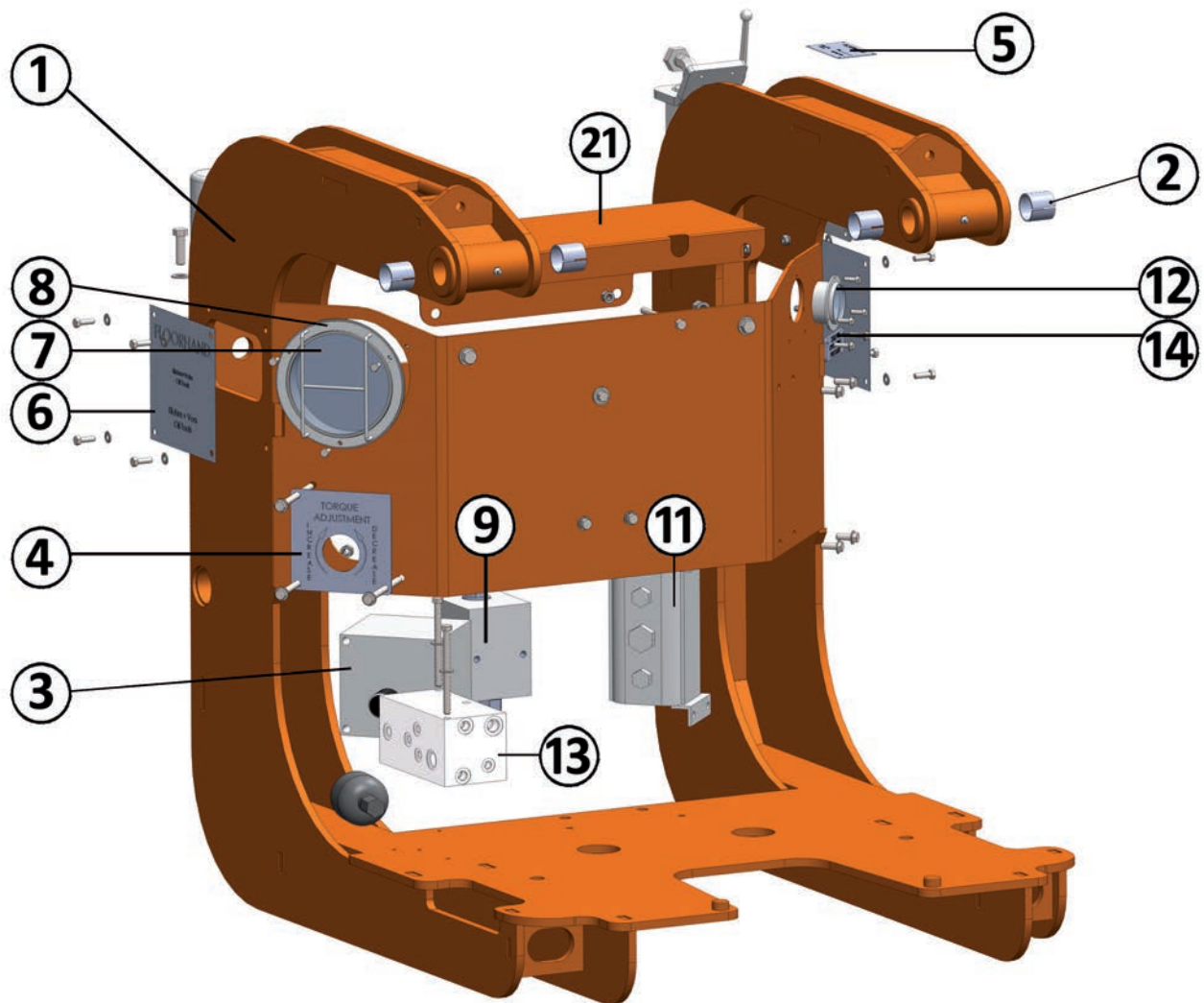


Figure 67

Item	Part number	Description	Qty.
1	9FH-01291	FRAME	1
2	9CJS2424	RBC FIBERGLIDE BEARING	4
3	9FH-01151	TORQUE CYLINDER MANIFOLD ASSY	1
4	9FH-01307-5	TORQUE MANIFOLD TAG	1
5	9FH-01018-11	FLOORHAND SN TAG	1
6	9FH-01018-12	LARGE 8X8 "FLOORHAND" TAG	2
7	9FH-01152-2	TORQUE GAUGE W/ MOUNTING RING	1
8	9FH-01533	TORQUE GAUGE GUARD	1
9	9FH-01149-8	PRESSURE REDUCING VALVE ASSY	1
10	9FH-01149-9	PRV SHUTTLE VALVE	1

## CANTILEVER FRAME ASSEMBLY 9FH-10001

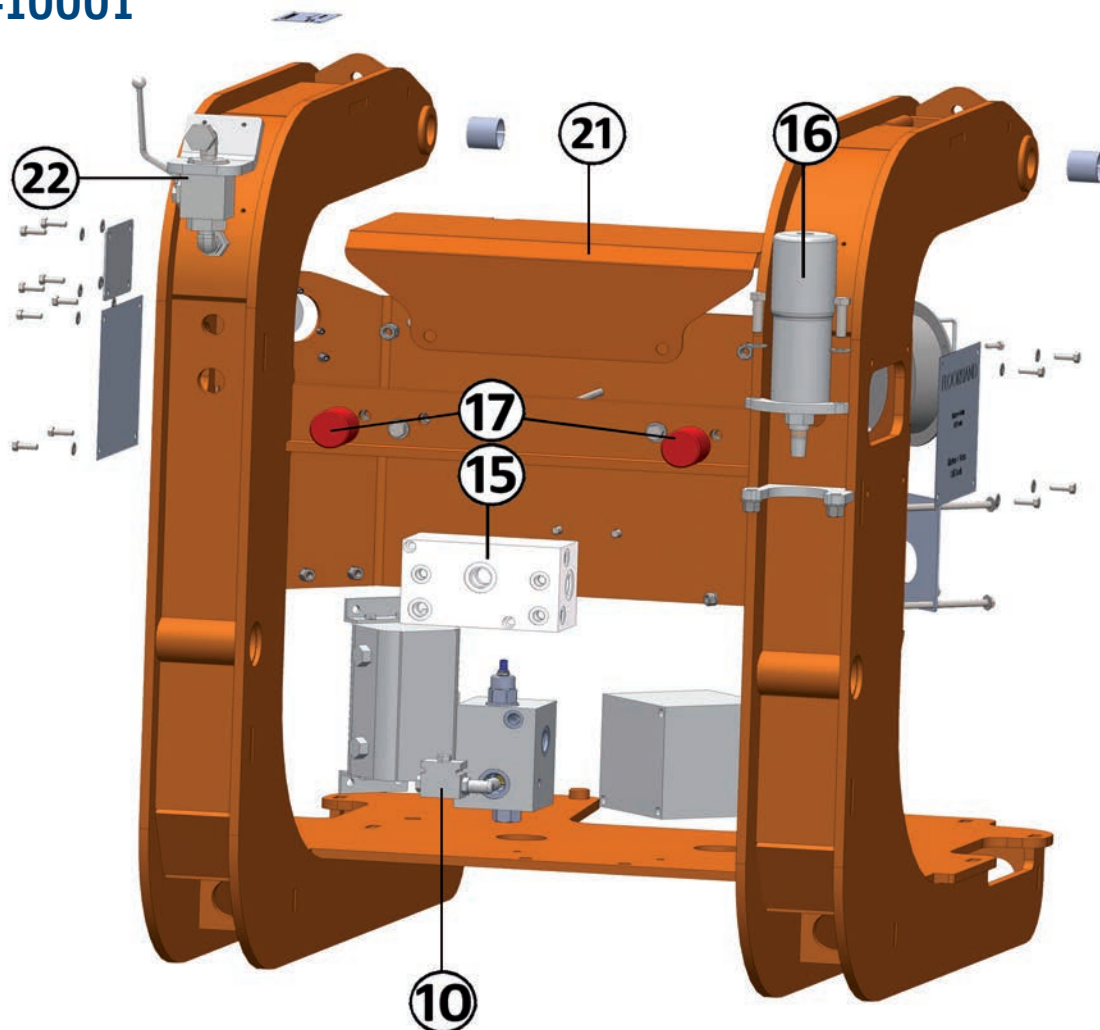


Figure 68

11	9FH-01152-1	LOWER WRENCH FLOW DIVIDER	1
12	9FH-01152-10	PRESSURE GAUGE	1
13	9FH-01539	FLOORHAND COMBINATION MANIFOLD	1
14	9FH-01018-6	SYSTEM PRESSURE TAG	1
15	9FH-01540	FLOORHAND RETURN MANIFOLD	1
16	9FH-01152-13	IN LINE PRESSURE FILTER ASSEMBLY	1
17	9FH-01344	FRAME BUMPER	2
18*	9FH-10010	FRAME ASSEMBLY BOLT KIT (NOT SHOWN)	1
19	9FH-10500	FRAME HOSE KIT (NOT SHOWN)	1
20	9FH-10510	FRAME FITING KIT (NOT SHOWN)	1
21	9FH-01310	TOP COVER	1
22	9FH-01426	SHUTOFF VALVE BRACKET	1

# PRESSURE REDUCING VALVE FH-01149-8

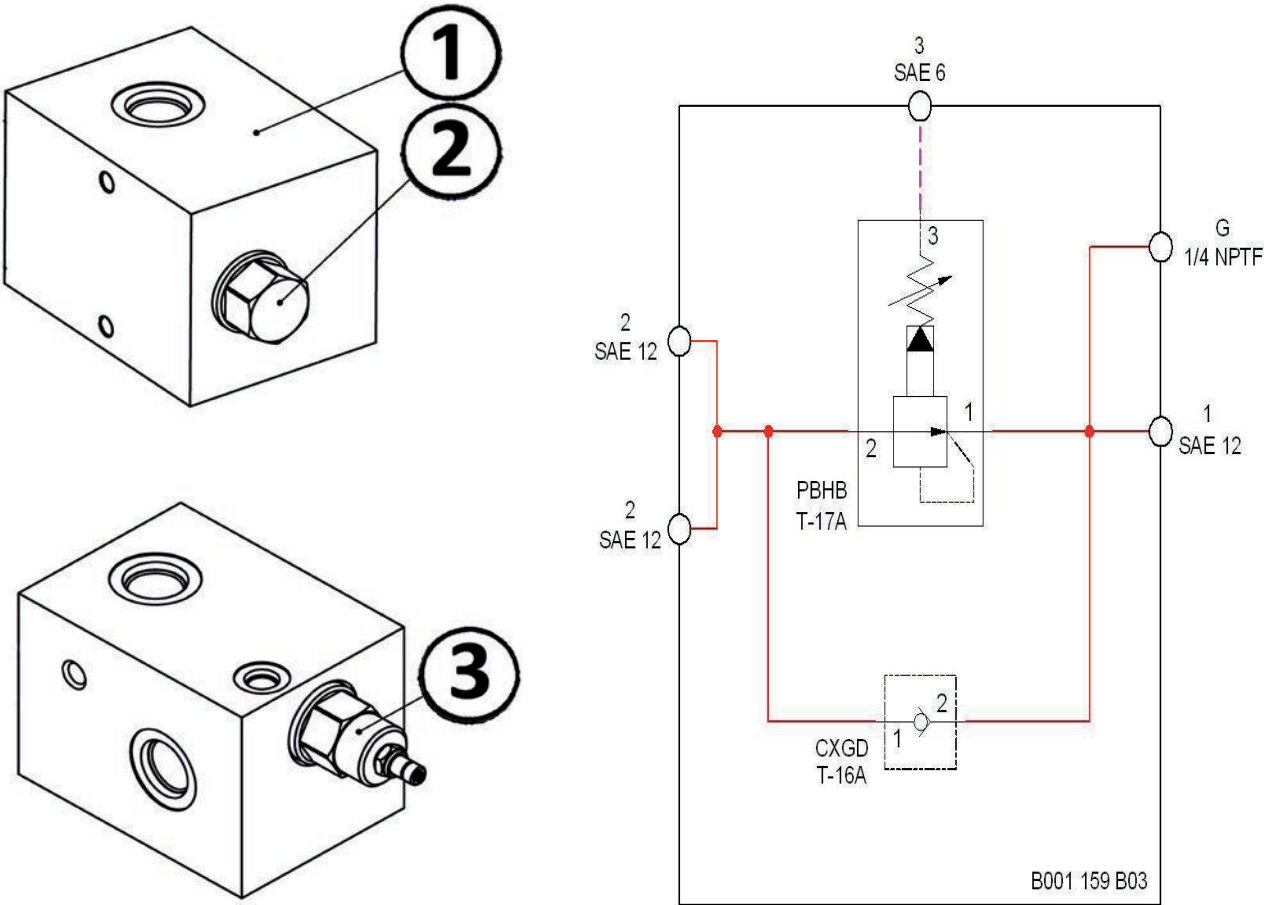
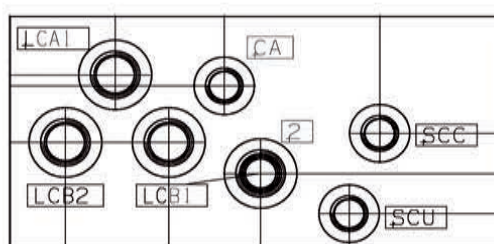
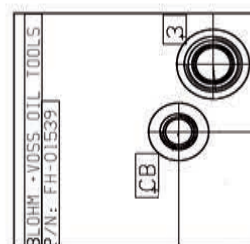
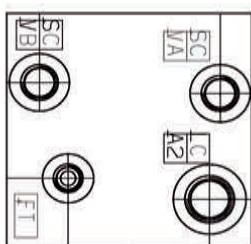
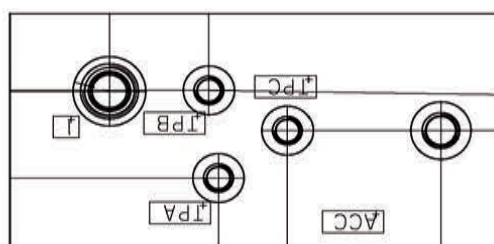


Figure 69

Item	Part number	Description	Qty.
1	9FH-01149-8M	PRV MANIFOLD	1
2	9FH-01149-32	REDUCING VALVE CARTRIDGE	1
3	9FH-01149-45	RELIEF VALVE	1



[illegible]

## DRAWINGS

Technical drawing of 12 different types of oil tools (P/N: FH-01540) used for oil analysis. The tools are numbered 1 through 12. Tools 1, 2, 3, 4, 5, and 6 are shown in two views: a top view and a side view. Tools 7, 8, 9, 10, 11, and 12 are shown in a top view. The tools are made of metal and have various shapes and sizes. Some have a central hole, some have a central hole with a smaller hole inside, and some have a central hole with a larger hole inside. The tools are labeled with their respective numbers and the part number P/N: FH-01540.

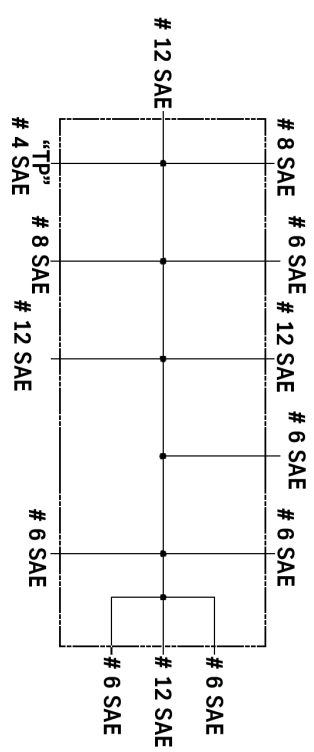
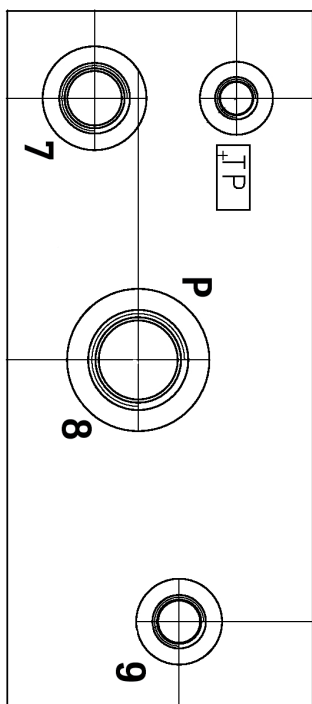
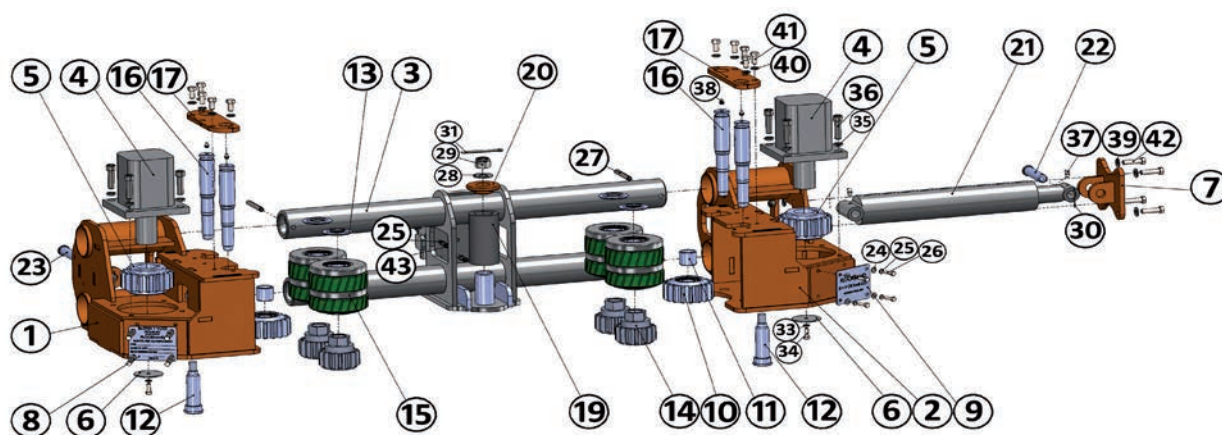


Figure 71

## SPINNER SUB ASSEMBLY 9FH-10302

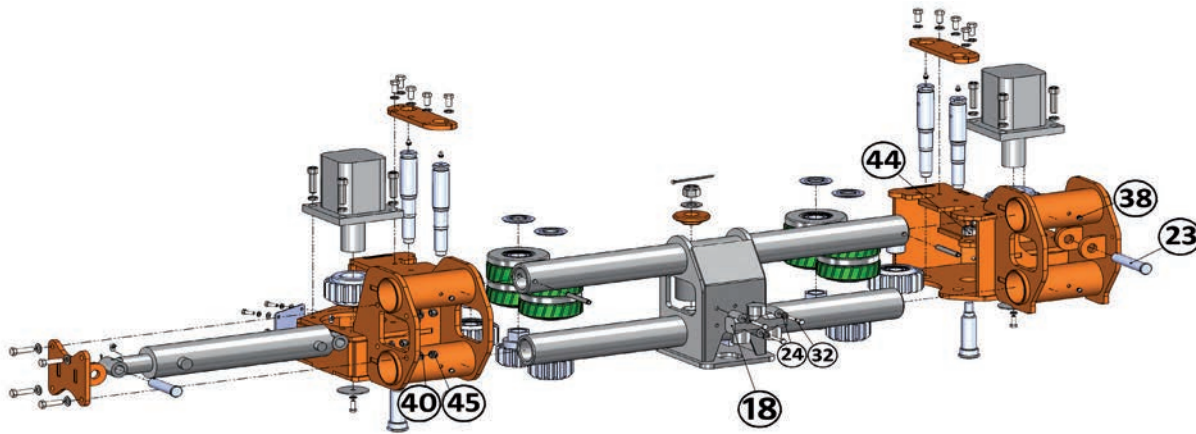
Figure 72



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	9FH-01321	DR SPINNER RIGHT HALF	1
2	9FH-01320	DR SPINNER LEFT HALF	1
3	9FH-01323	SPINNER PEDESTAL CENTER SECTION	1
4	9FH-01142-1	HYDRAULIC SPINNER MOTOR	2
5	9FH-01015	DRIVE MOTOR GEAR	2
6	9FH-01399	DRIVE MOTOR GEAR CAP	2
7	9FH-01016	SPINNER CYLINDER ROD MOUNT	1
8	9FH-01018-9	ATEX TAG	1
9	9FH-01018-8	FLOORHAND TAG	1
10	9FH-01287	IDLER GEAR ASSEMBLY	2
11	9FH-01290	IDLER SHAFT SPACER	2
12	9FH-01391	SPINNER IDLER SHAFT	2
13	9FH-01315	UPPER SPACER (DRIVE ROLLER)	4
14	9FH-01408	DRIVE ROLLER GEAR ASSEMBLY	4
15	9FH-01407	DRIVE ROLLER ASSEMBLY	4
16	9FH-01384	DRIVE ROLLER SHAFT	4
17	9FH-01017	DRIVE ROLLER SHAFT RETAINER	2
18	9FH-01149-46	SPINNER MOTOR FLOW DIVIDER	1
19	9FH-01045-5	URETHANE SPRING	1
20	9FH-01027	SPRING CAP	1
21	9FH-01074-1	SPIN CLAMP CYLINDER	1
22	9FH-01025	SHORT SPINNER CLEVIS PIN	1
23	9FH-01026	LONG SPINNER CLEVIS PIN	1
24	9BN1133814	5/16 SAE FLAT WASHER	11

## SPINNER SUB ASSEMBLY 9FH-10302

Figure 73



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
25	9BN133892	5/16 SPLIT LOCKWASHER	11
26	9BN0115055	5/16-18 X HHCS	8
27	9BN64363	1/2 X 4 SPRING ROLL PIN	2
28	9BN33822	1 SAE FLAT WASHER	1
29	9BN37192	1-8 NYLON LOCK NUT	1
30	9BN65080	1/8 X 2 COTTER PIN	2
31	9BN65153	1/4 X 4 COTTER PIN	1
32	9BN0115062	5/16-18 X 2-1/4HHCS	3
33	9BN1133893	3/8 SPLIT LOCKWASHER	2
34	9BN0115105	3/8-16 X 1 HHCS	2
35	9BN1133692	5/8 HI COLLAR LOCKWASHER	8
36	9BN1123512	5/8-11 X 2-1/4 SHCS (DRILLED)	8
37	9BN60104	1/8 NPT 90 DEG GREASE ZERK	2
38	9BN60102	1/8 STRAIGHT GREASE ZERK	8
39	9BN1133817	1/2 SAE WASHER	4
40	9BN1133895	1/2 SPLIT LOCKWASHER	14
41	9BN0115205	1/2-13 X 1 HHCS	10
42	9BN0115211	1/2-13 X 2 HHCS	4
43	9BN1137262	5/16-8 TYPE-C LOCKNUT	3
44	9BN1137190	3/4-10 NYLON INSERTED LOCKNUT	2
45	9BN1137187	1/2-13 NYLON LOCK NUT	4
46	9FH-10503	SPINNER HOSE KIT (NOT SHOWN)	1
47	9FH-10513	SPINNER FITTING KIT NOT SHOWN)	1

# DOUBLE DRIVE ROLLER ASSEMBLY 9FH-01407

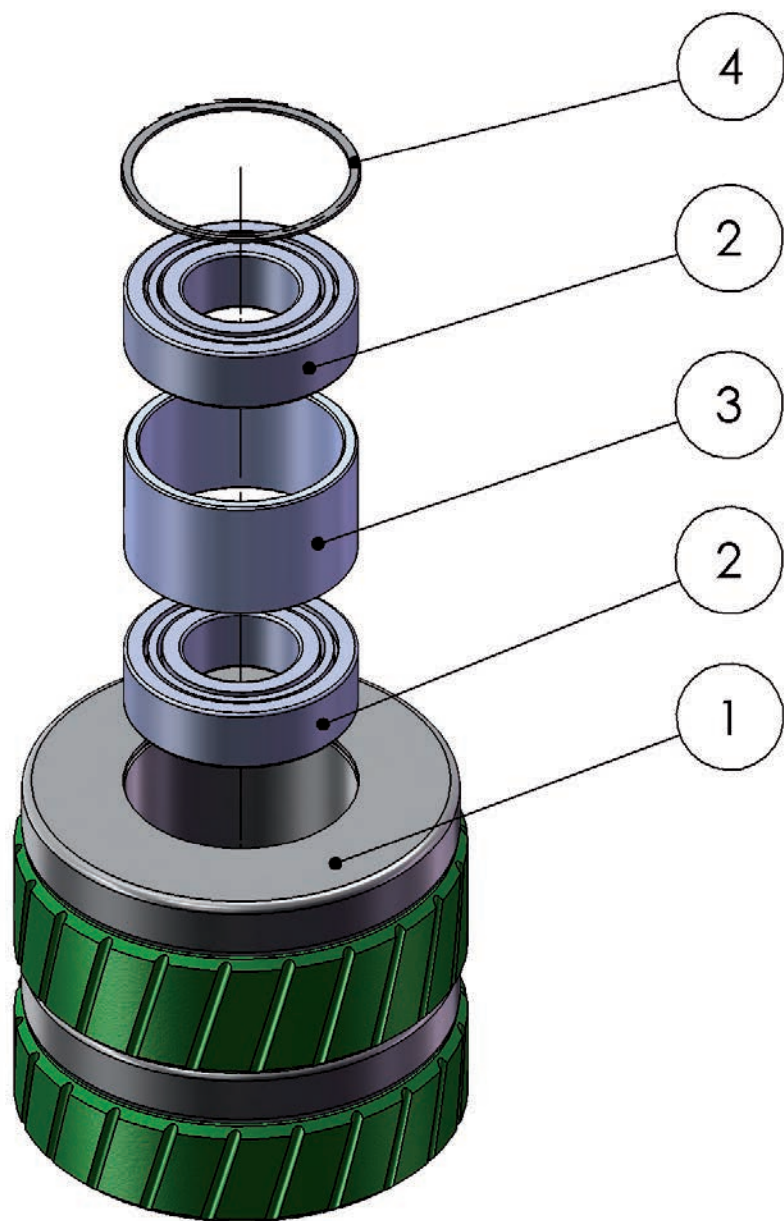


Figure 74

Item	Part number	Description	Qty.
1	9FH-01382	DOUBLE DRIVE ROLLER	1
2	9FH-22208	DRIVE ROLLER BEARING	2
3	9FH-01385	DRIVE ROLLER BEARING SPACER	1
4	9G2351-314	RETAINING RING	1



# IDLER GEAR ASSEMBLY 9FH-01287

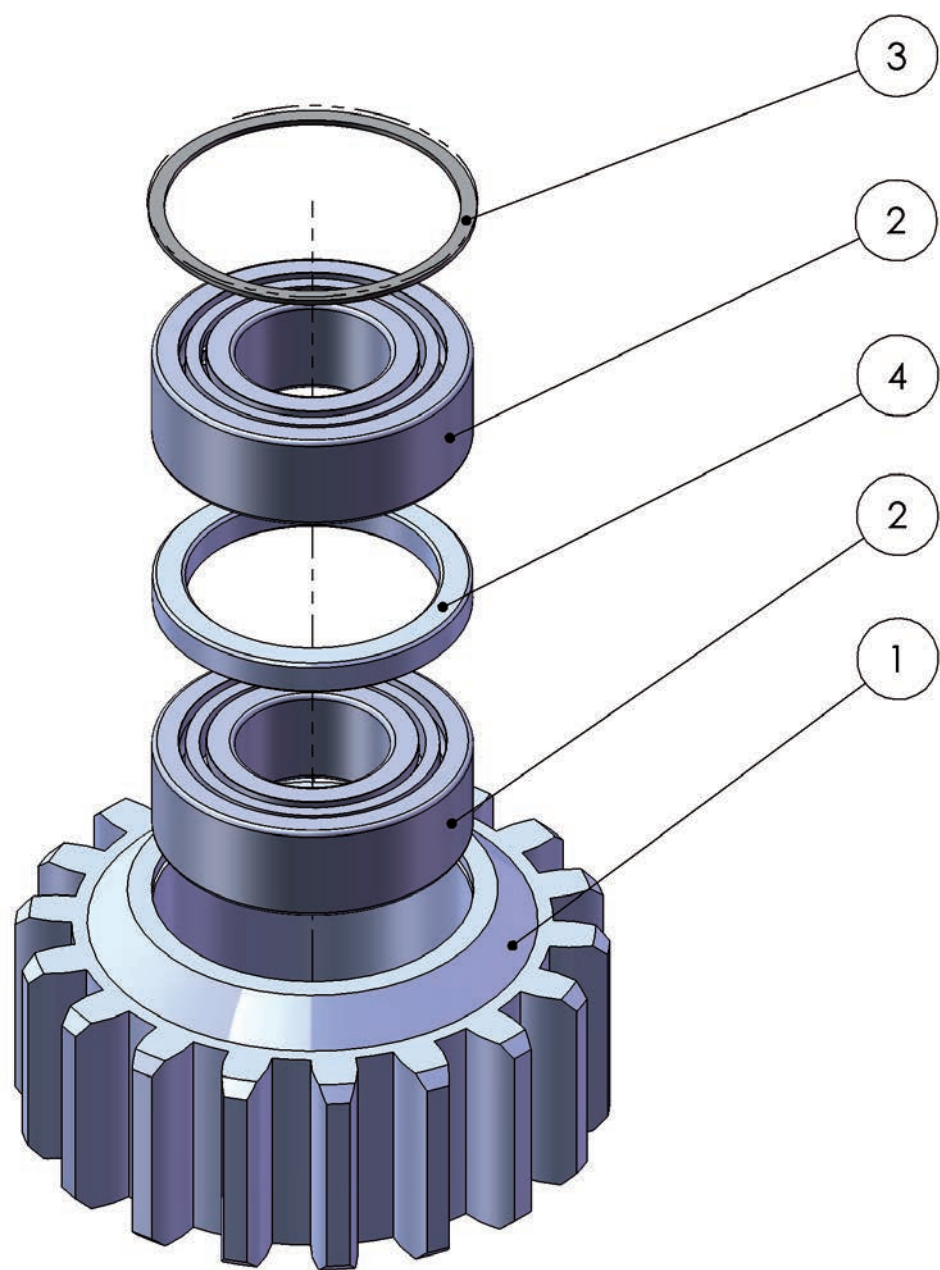


Figure 75

Item	Part number	Description	Qty.
1	9FH-01288	IDLER GEAR	1
2	9FH-22207	IDLER GEAR BEARING	2
3	9FH-WH283	IDLER GEAR RETAINING RING	1
4	9FH-01398	IDLER GEAR BEARING SPACER	1

# DRIVE ROLLER GEAR ASSEMBLY 9FH-01408

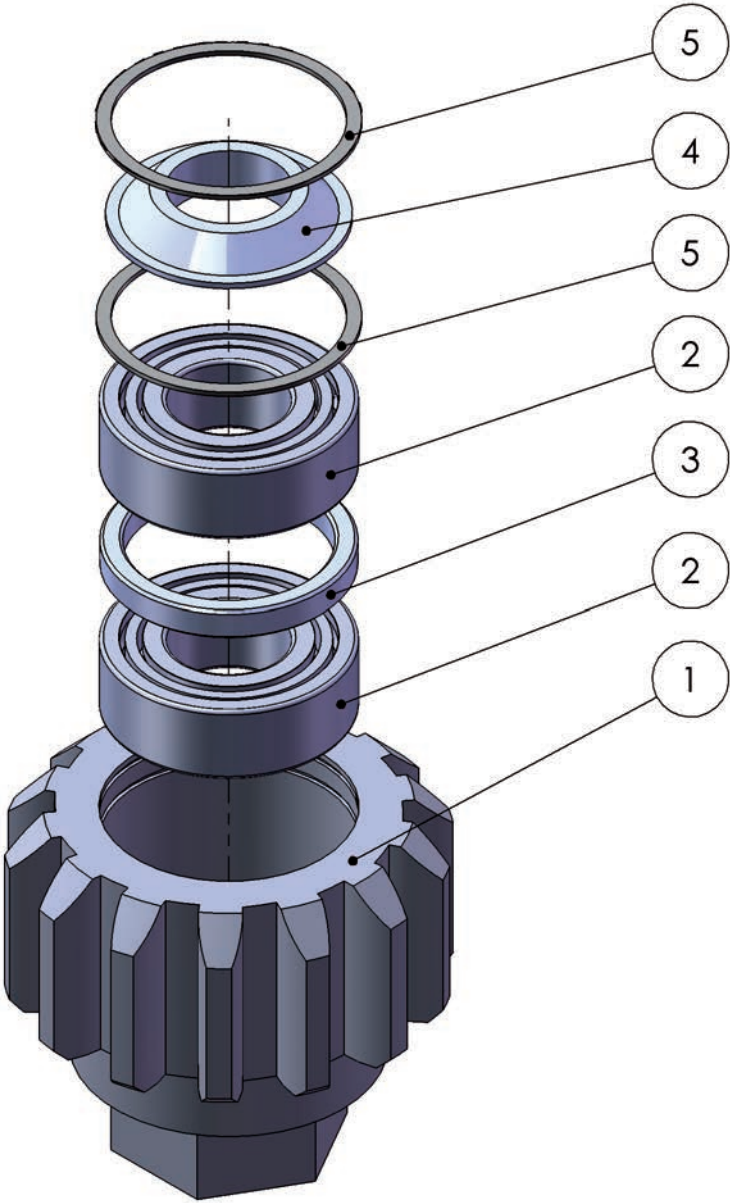


Figure 76

Item	Part number	Description	Qty.
1	9FH-01383	DOUBLE DRIVE ROLLER GEAR	1
2	9FH-22206	DOUBLE DRIVE RLR GEAR BEARING	2
3	9FH-01396	DRIVE ROLLER GEAR BEARING SPACER	1
4	9FH-01314	LOWER DRIVE ROLLER GEAR SPACER	1
5	9FH-WH244	DRIVE ROLLER GEAR RETAINING RING	2

## UPPER WRENCH SUB ASSEMBLY ORFS 9FH-10201

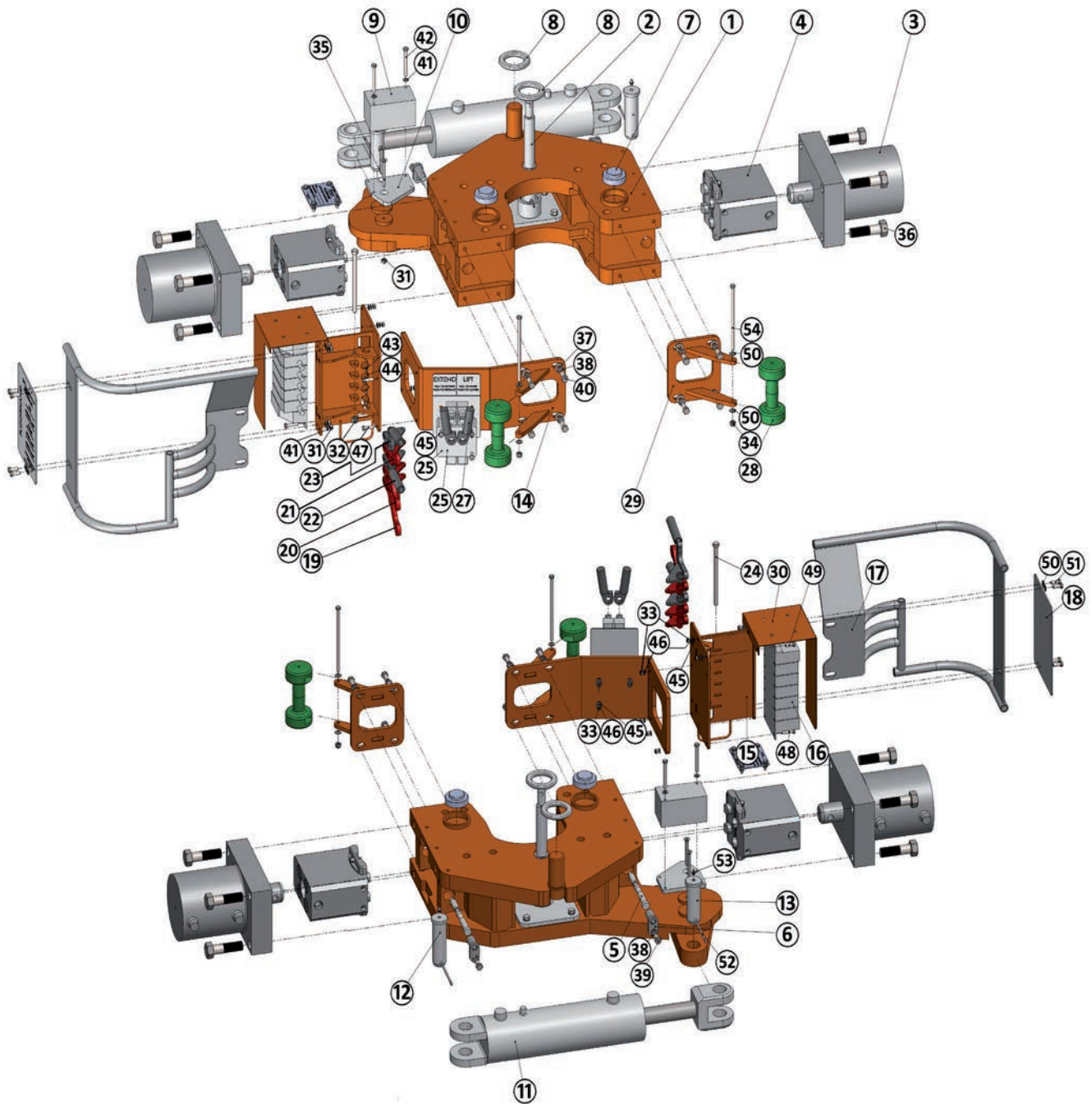


Figure 77

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	9FH-01029	UPPER WRENCH WELDMENT	1
2	9FH-01520	REMOVABLE SPINNER POST ASSEMBLY	1
3	9FH-01074-2	CLAMP CYLINDER	2
4	9FH-01060	DIE BLOCK ASSEMBLY	2
5	9FH-01055	DIE BLOCK RETAINING PINS	2

## UPPER WRENCH SUB ASSEMBLY ORFS

### 9FH-10201

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
6	9FH-01056	DIE BLOCK PIN RETAINER	2
7	9FH-01023	SPINNER SLIDE BEARING	2
8	9FH-01022	POST WASHER	2
9	9FH-01150	UPPER CLAMP MANIFOLD ASSEMBLY	1
10	9FH-01058	UPPER MANIFOLD BRACKET	1
11	9FH-01074-5	TORQUE CYLINDER	1
12	9FH-01051	LONG TORQUE CYLINDER PIN	1
13	9FH-01052	SHORT TORQUE CYLINDER PIN	1
14	9FH-01378	VALVE MOUNT	1
15	9FH-01552	VALVE MOUNT BRACKET	1
16	9FH-01149-73	5 STATION V20 CONTROL VALVE	1
17	9FH-01512	CONTROL VALVE GUARD	1
18	9FH-01018-1	CONTROL VALVE TAG	1
19	9FH-01555	LOWER WRENCH HANDLE	1
20	9FH-01556	UPPER WRENCH HANDLE	1
21	9FH-01557	SPIN CLAMP HANDLE	1
22	9FH-01558	TORQUE HANDLE	1
23	9FH-01559	SPIN IN/OUT HANDLE	1
24	9FH-01071	VALVE HANDLE SHAFT	1
25	9FH-01149-2	MANIPULATOR VALVE (2 BANK)	1
26	9FH-01307-2	EXTEND/LIFT MANIPULATOR VALVE TAG	1
27	9FH-01069	VALVE HANDLE, MANIPULATOR (F)	2
28	9BV70751	SAFETY HANDLE	2
29	9FH-01096	HANDLE BRACKET WELDMENT	1
30	9FH-01101	CONTROL VALVE COVER	1
31	9BN1137264	3/8-16 TYPE-C LOCK NUT	6
32	9BN1137187	1/2-13 NYLON LOCK NUT	1
33	9BN1137262	5/16-8 TYPE-C LOCKNUT	9
34	9BN1137185	3/8-16 NYLON LOCK NUT	2
35	9BN24295	3/8-16 X 3-1/2 FHSCS	2
36	9BN18519	1-1/8-12 x 4 HHCS DRILLED (CYLINDER BLOTS)	8
37	9BN1133817	1/2 SAE WASHER	8

## UPPER WRENCH SUB ASSEMBLY ORFS

### 9FH-10201

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
38	9BN1133895	1/2 SPLIT LOCKWASHER	10
39	9BN0115205	1/2-13 X 1 HHCS	2
40	9BN0115207	1/2-13 X 1-1/4 HHCS	8
41	9BN1133893	3/8 SPLIT LOCKWASHER	6
42	9BN24295	3/8-16 X 3-1/2 HHCS	2
43	9BN66004	3/16 X 3/4 CLEVIS PIN	5
44	9BN65016	1/16 X 1 COTTER PIN	5
45	9BN1133814	5/16 SAE FLAT WASHER	8
46	9BN133892	5/16 SPLIT LOCKWASHER	9
47	9BN0115057	5/16-18 X 1-1/4 HHCS	2
48	9BN0115059	5/16-18 X 1-1/2 HHCS	2
49	9BN0115055	5/16-18 X 1 HHCS	2
50	9BN1133815	3/8 SAE WASHER	8
51	9BN0115105	3/8-16 X 1 HHCS	4
52	9BN65153	1/4 X 4 COTTER PIN	2
53	9BN60102	1/8 STRAIGHT GREASE ZERK	2
54	9BN11130	3/8-16 x 8-1/2 HHCS	2
55	9FH-10512	UPPER WRENCH FITTING KIT (NOT SHOWN)	1
56	9FH-10502	UPPER WRENCH HOSE KIT (NOT SHOWN)	1



# REMOVABLE SPINNER POST ASSEMBLY

## 9FH-01520

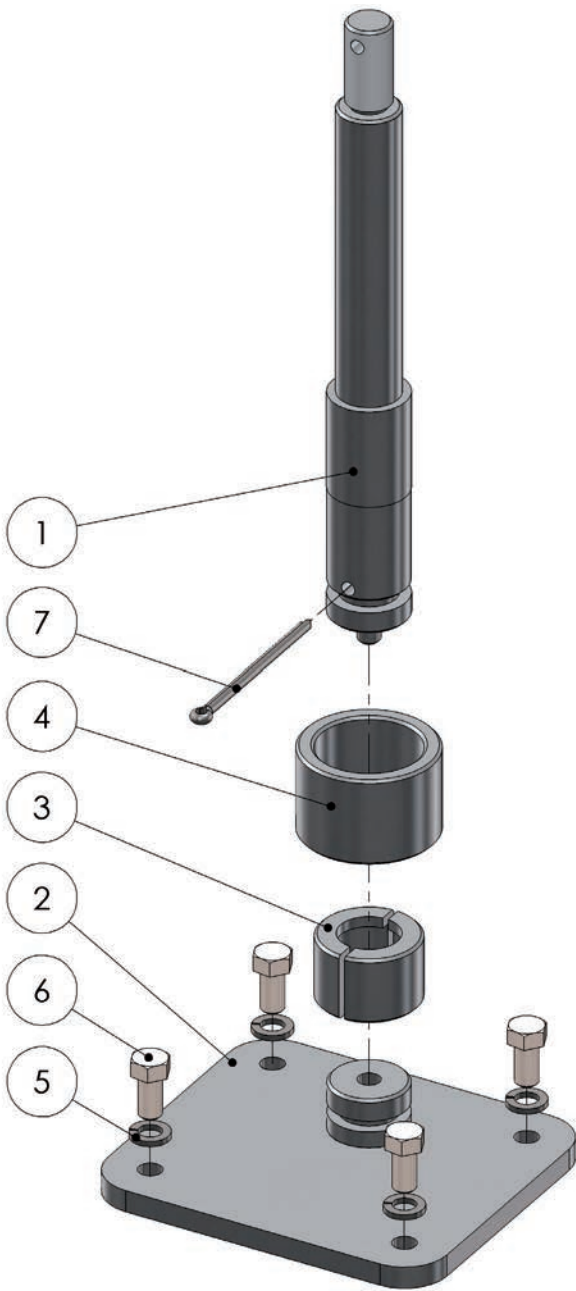


Figure 78

Item	Part number	Description	Qty.
1	FH-01514	SPINNER POST	1
2	FH-01515	SPINNER POST BASE ASSY	1
3	FH-01516	SPINNER POST SPLIT COLLET	1
4	FH-01517	SPINNER POST COLLAR	1
5	BN1133895	1/2 SPLIT LOCKWASHER	4
6	BN0115205	1/2-13 X 1 HHCS	4
7	BN65153	1/4 X 4 COTTER PIN	1

## LOWER WRENCH SUB ASSEMBLY ORFS

### 9FH-10101

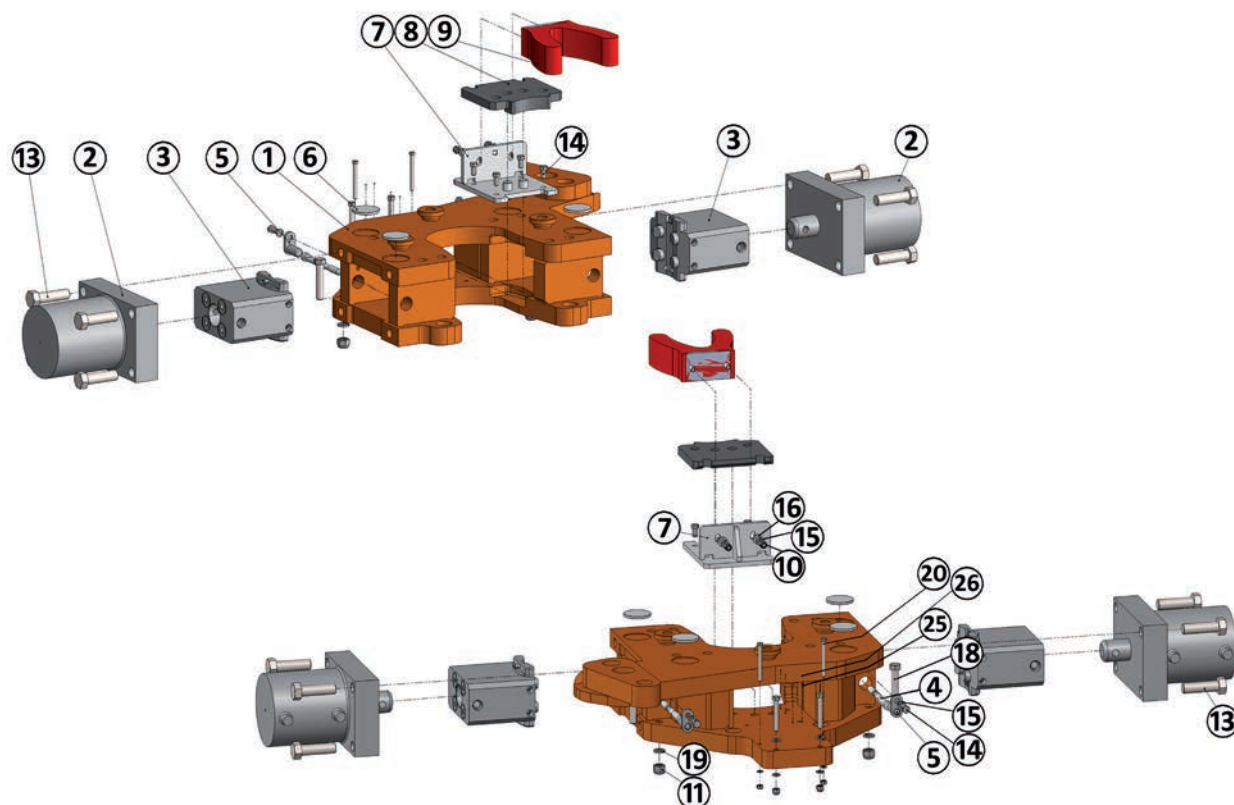


Figure 79

Item	Part number	Description	Qty.
1	9FH-01061	LOWER WRENCH WELDMENT	1
2	9FH-01074-2	CLAMP CYLINDER	2
3	9FH-01060	DIE BLOCK ASSEMBLY	2
4	9FH-01055	DIE BLOCK RETAINING PINS	2
5	9FH-01056	DIE BLOCK RETAINER	2
6	9FH-01050-1	DIE BLOCK / WRENCH SUPPORT BEARING	4
7	9FH-01102	MOUNTING BRACKET	1
8	9FH-01149-11	LOWER DIVERTER VALVE ASSEMBLY	1
9	9FH-01149-10	TORQUE MANIFOLD SHUTTLE VALVE	1
10	9FH-01329	PIPE BUMPER BASE	1
11	9FH-01330	BUMPER	1
12	9FH-01331	PIPE CLAW	1
13	9BN1137187	1/2-13 NYLON LOCK NUT	4
14	9BN1137190	3/4-10 NYLON INSERTED LOCKNUT	2

## LOWER WRENCH SUB ASSEMBLY ORFS

### 9FH-10101

Item	Part number	Description	Qty.
15	9BN1137264	3/8-16 TYPE-C LOCK NUT	2
16	9BN18519	1-1/8-12 X 4 HHCS DRILLED (CYLINDER BOLTS)	8
17	9BN0115205	1/2-13 X 1 HHCS	6
18	9BN1133895	1/2 SPLIT LOCKWASHER	6
19	9BN1133817	1/2 SAE WASHER	4
20	9BN0115217	1/2-13 X 3-1/2 HHCS	2
21	9BN0115369	3/4-10 X 4 HHCS	2
22	9BN1133898	3/4 SPLIT LOCKWASHER	2
23	9BN0115119	3/8-16 X 4 HHCS	2
24	9BN1133893	3/8 SPLIT LOCKWASHER	2
25	9BN1133891	1/4 SPLIT LOCKWASHER	4
26	9BN0115009	1/4-20 X 1-1/2 HHCS	4
27	9FH-01044	GUIDE PIN	3
28	9FH-10501	LOWER WRENCH HOSE KIT (NOT SHOWN)	1
29	9FH-10511	LOWER WRENCH FITTING (NOT SHOWN)	1
30	9FH-10110	LOWER WRENCH BOLT KIT	1

## DIE BLOCK ASSEMBLY 9FH-01060

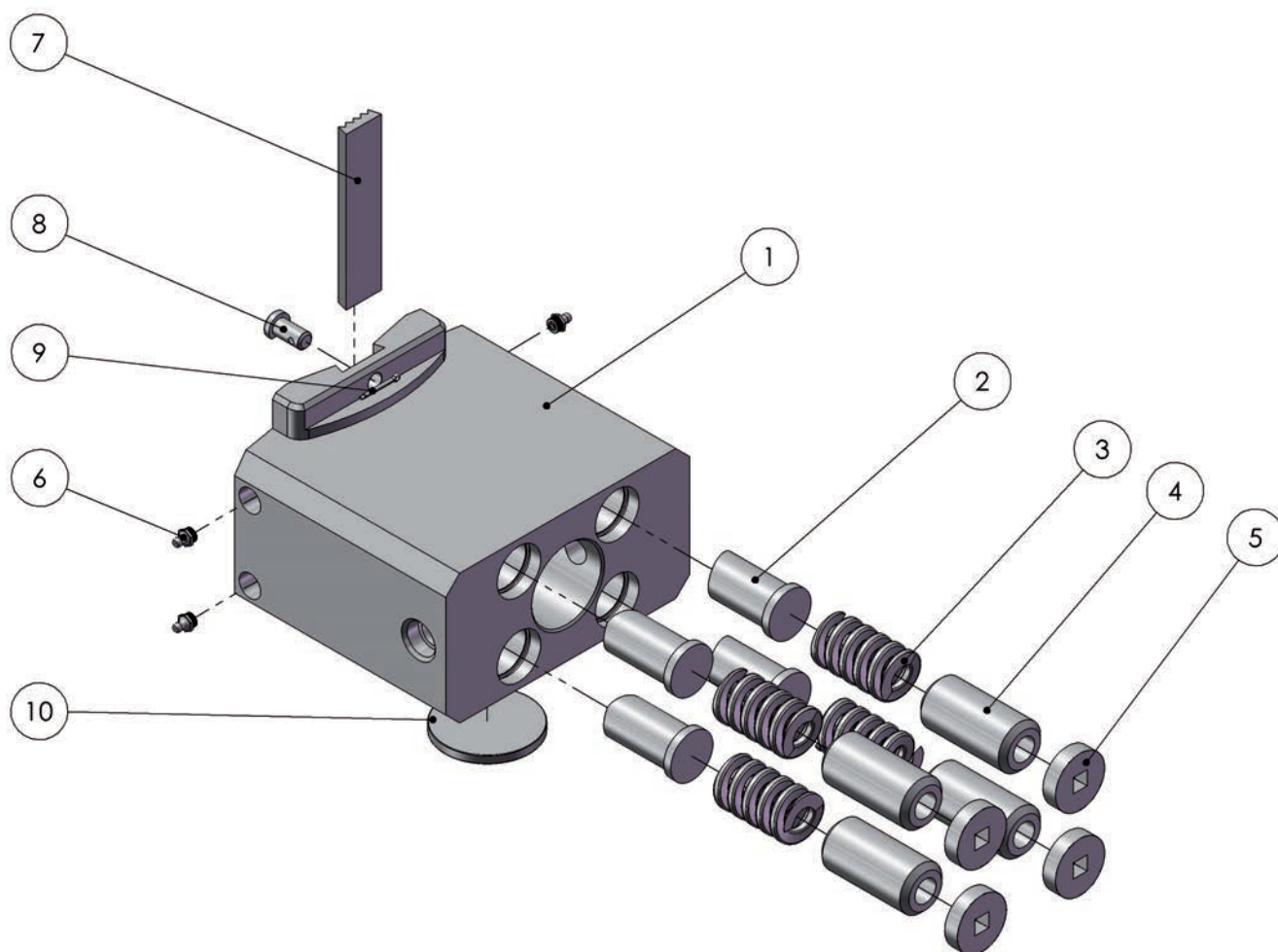


Figure 80

Item	Part number	Description	Qty.
1	9FH-01059	DIE BLOCK	1
2	9FH-01053	CENTERING BUTTON	4
3	9FH-01045-2	DIE BLOCK SPRING	4
4	9FH-01057	CENTERING BUTTON SPRING SPACER	4
5	9FH-01054	SPRING RETAINER PLUG	4
6	9BN60105	1/4-28 GREASE ZERK STRAIGHT	4
7	9FH-70622-1	BLUE DIAMOND TONG DIE	1
8	9FH-01216-1	DIE RETAINER PIN ONLY	1
9	9BN65076	1/8 X 1 COTTER PIN	1
10	9FH-01050-1	DIE BLOCK / WRENCH SUPPORT BEARING	1

# 2-7/8 ADAPTER KIT ASSEMBLY 9FH-10703

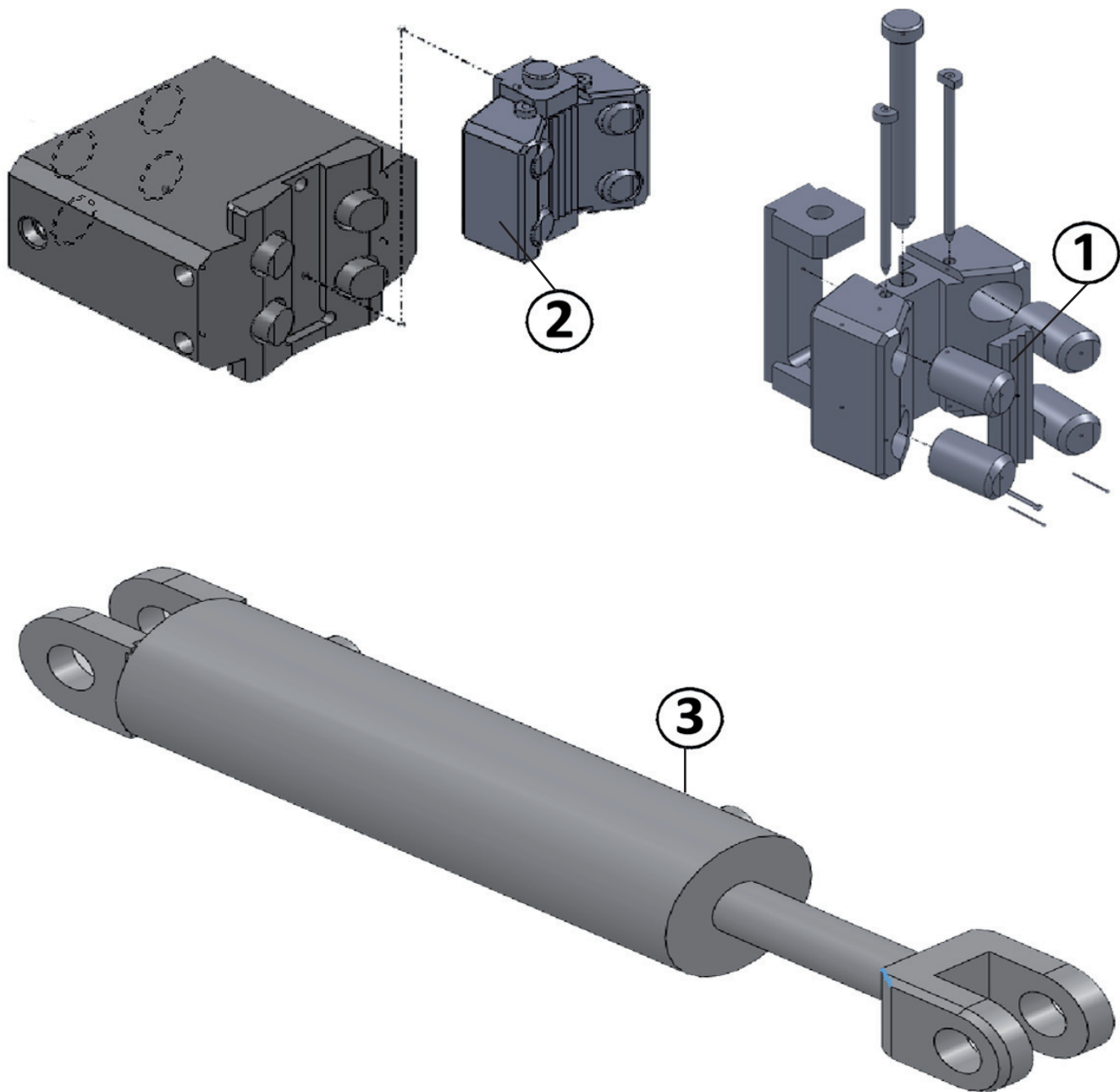


Figure 81

Item	Part number	Description	Qty.
1	9FH-70622-2	BLUE DIAMOND TONG DIE	4
2	9FH-01445	2-7/8 ADAPTER ASSEMBLY	4
3	9FH-01074-15A	LOW RANGE TORQUE CYLINDER ASSEMBLY	1



## 2-7/8 DIE BLOCK ADAPTER ASSY 9FH-01445

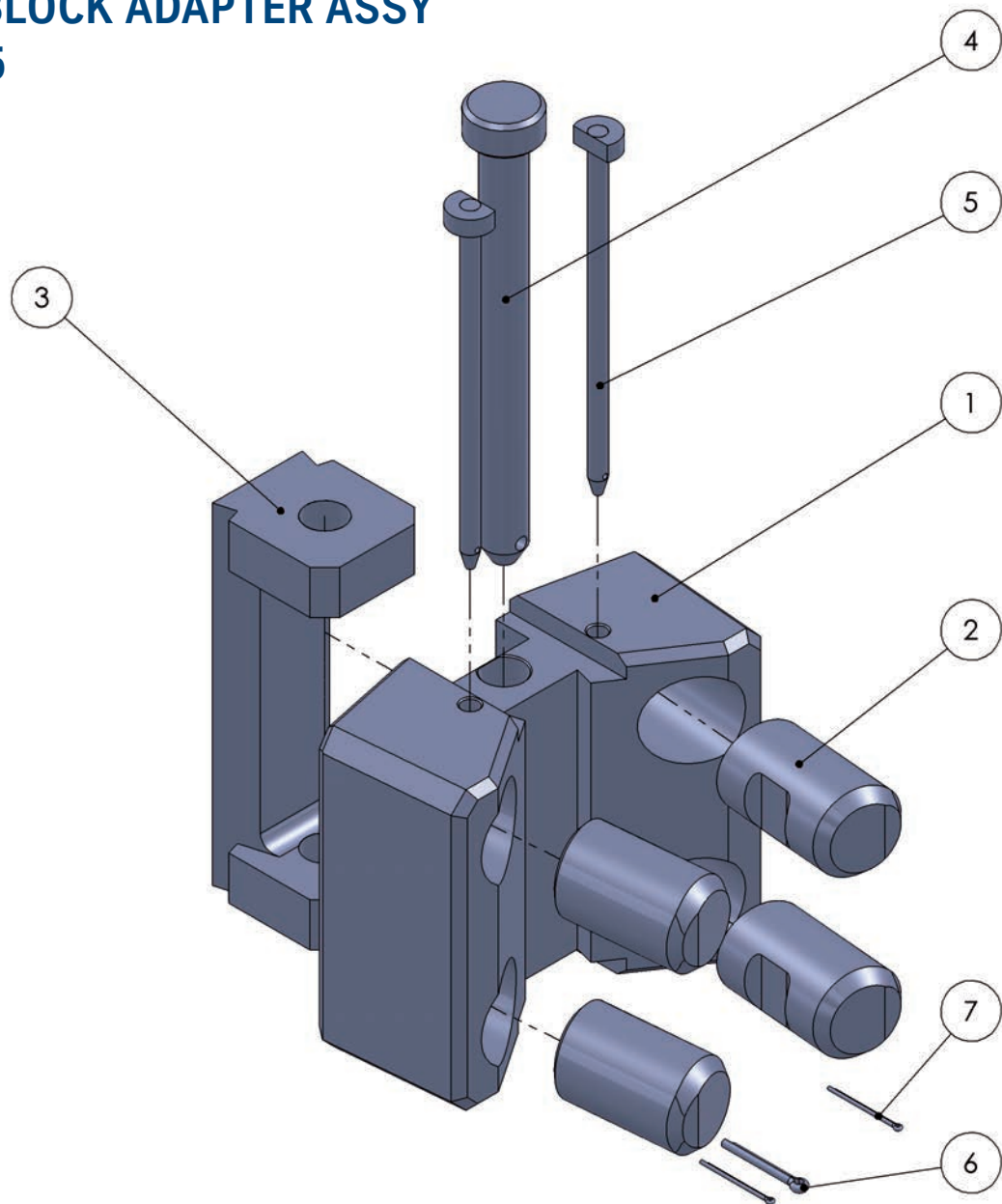


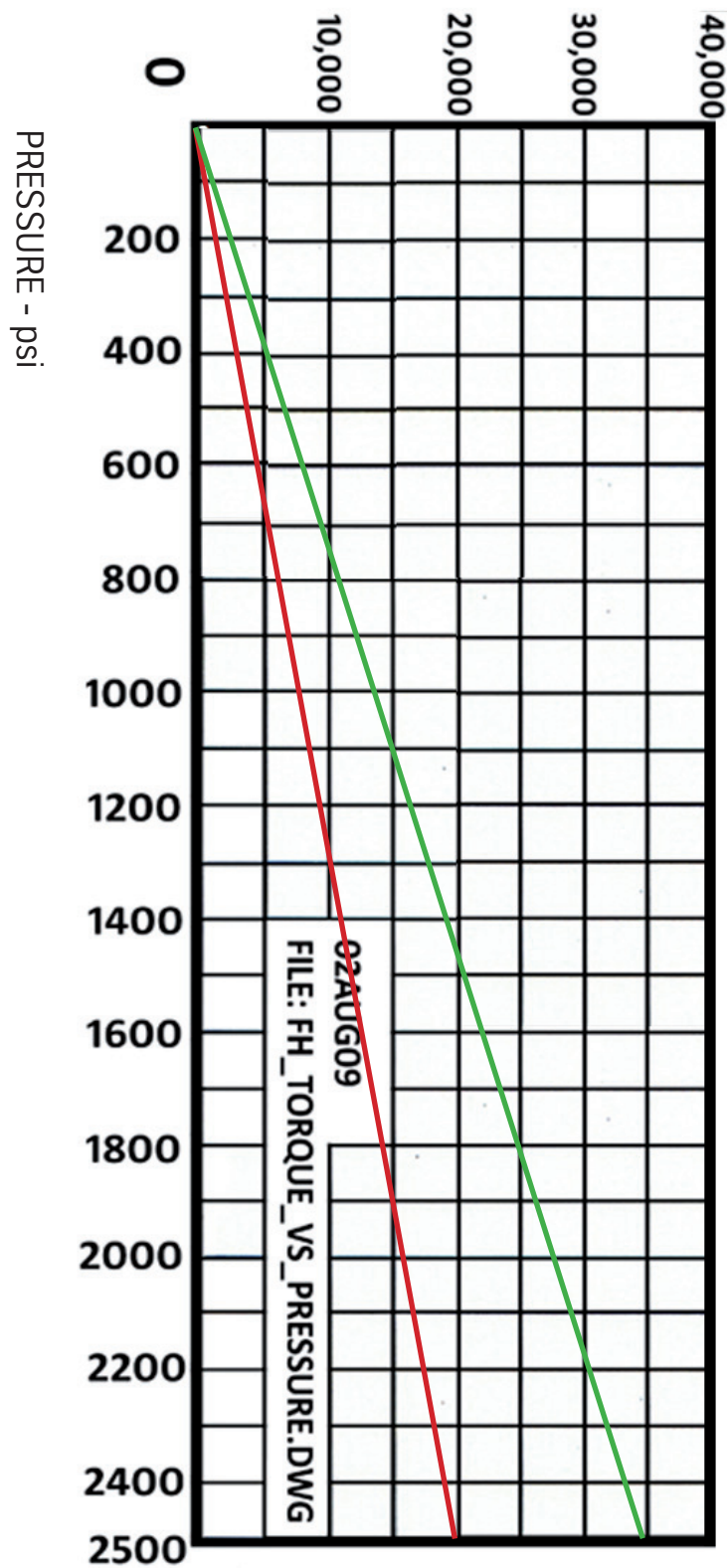
Figure 83

Item	Part number	Description	Qty.
1	9FH-01446	2-7/8 ADAPTER	1
2	9FH-01448	CENTERING BUTTON	4
3	9FH-01447	ADAPTER RETAINER	1
4	9FH-01449	2-7/8 ADAPTER PIN	1
5	9FH-01445-1	2-7/8 BUTTON RETAINING PIN	2
6	9BN65076	1/8 X 1 COTTER PIN	1
7	9BN65016	1/16 X 1 COTTER PIN	2

# LOW RANGE TORQUE CYLINDER CHART

Low Range Torque Cylinder (3 1/4" bore)

TORQUE - ft-lbs



MAKE UP TORQUE

BREAK OUT TORQUE

Figure 83

INSTALLATION SOCKET  
9FH-01386

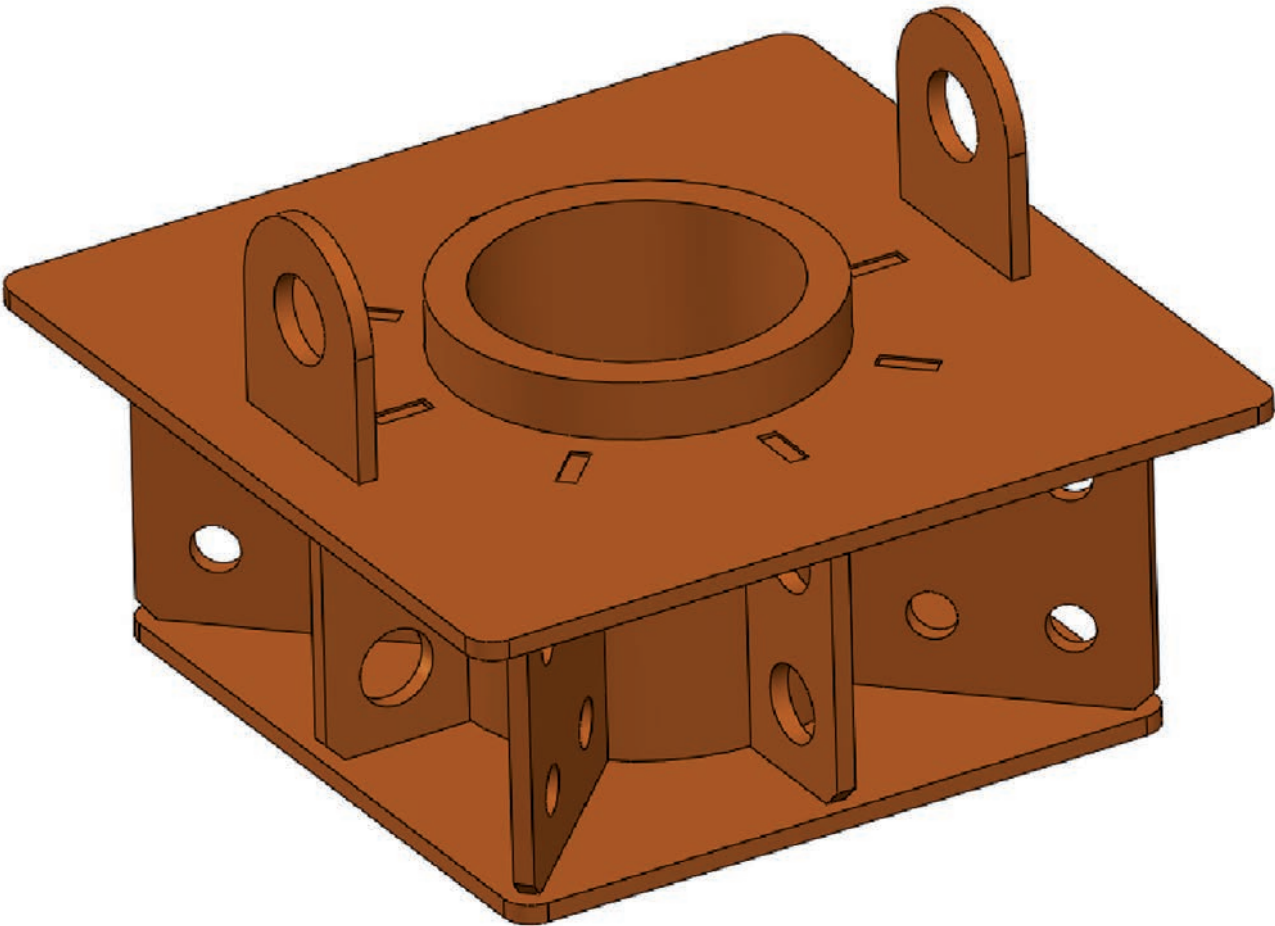


Figure 84

Item	Part number	Description	Qty.
1	9FH-01386	INSTALLATION SOCKET	1

# INSTALLATION SOCKET PIPE TUBE 9FH-01386-6

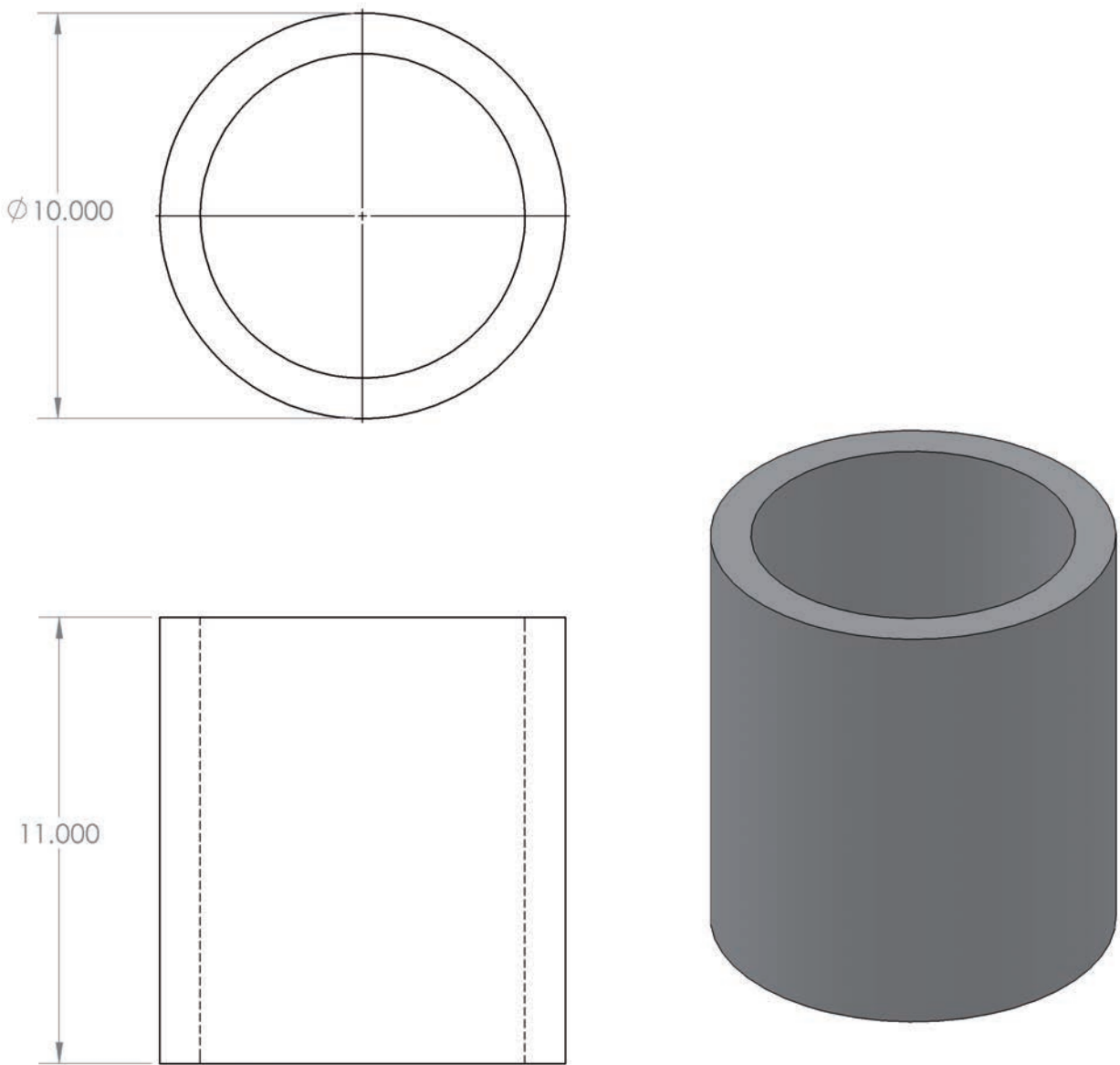


Figure 85

Item	Part number	Description	Qty.
1	9FH-01386-6	INSTALLATION SOCKET PIPE TUBE	1

## RANGE EXTENDER ASSEMBLY 9FH-01418

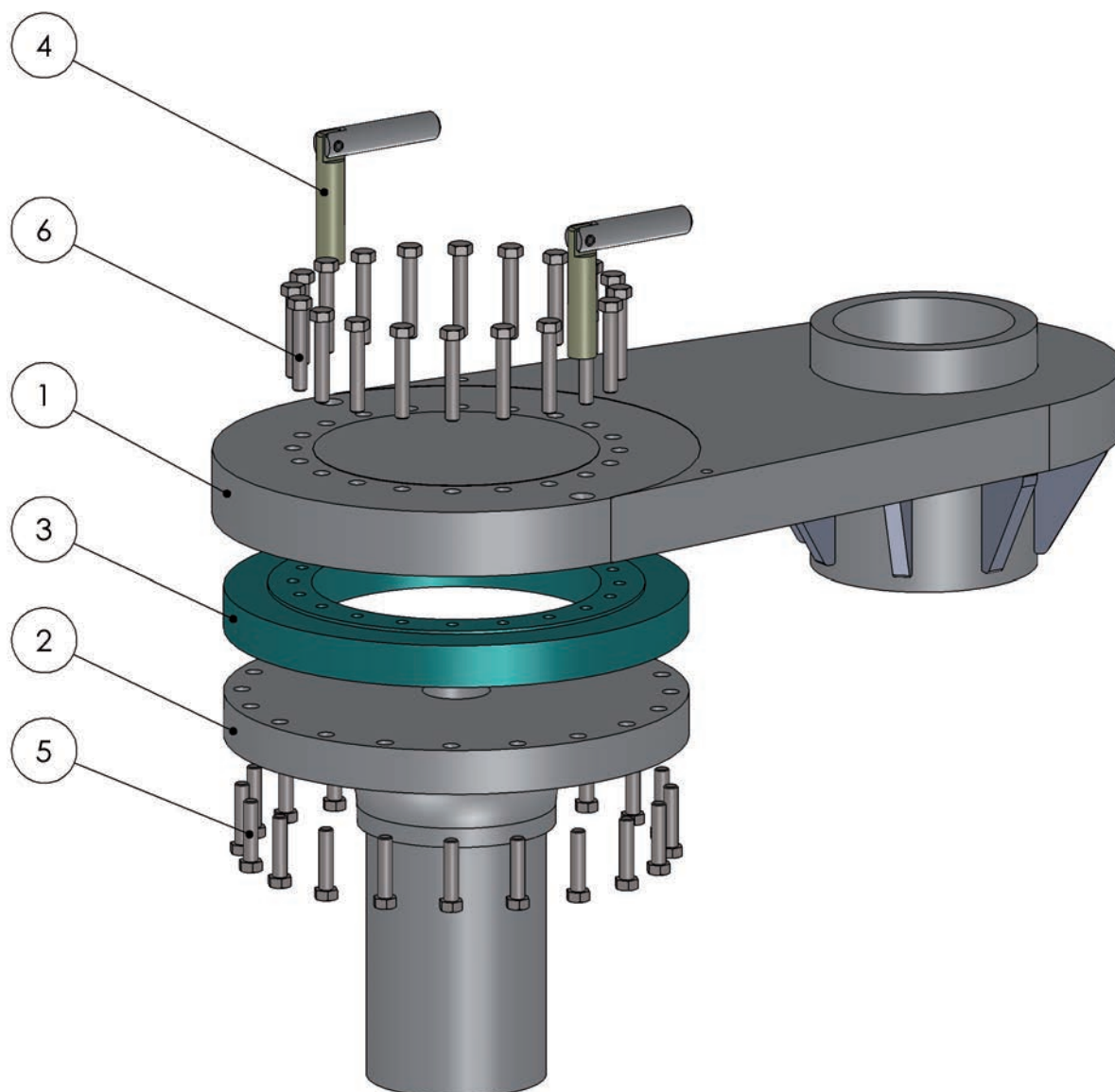


Figure 86

Item	Part number	Description	Qty.
1	9FH-01419	RANGE EXTENDER BODY	1
2	9FH-01420	RANGE EXTENDER BASE	1
3	9FH-01406-12	SLEWING BEARING	1
4	9FH-01371	LOCK SCREW ASSEMBLY	2
5	9BN115318	5/8-11 X 3-3/4 HHCS	20
6	9BN115314	5/8-11 X 2.75 HHCS	20



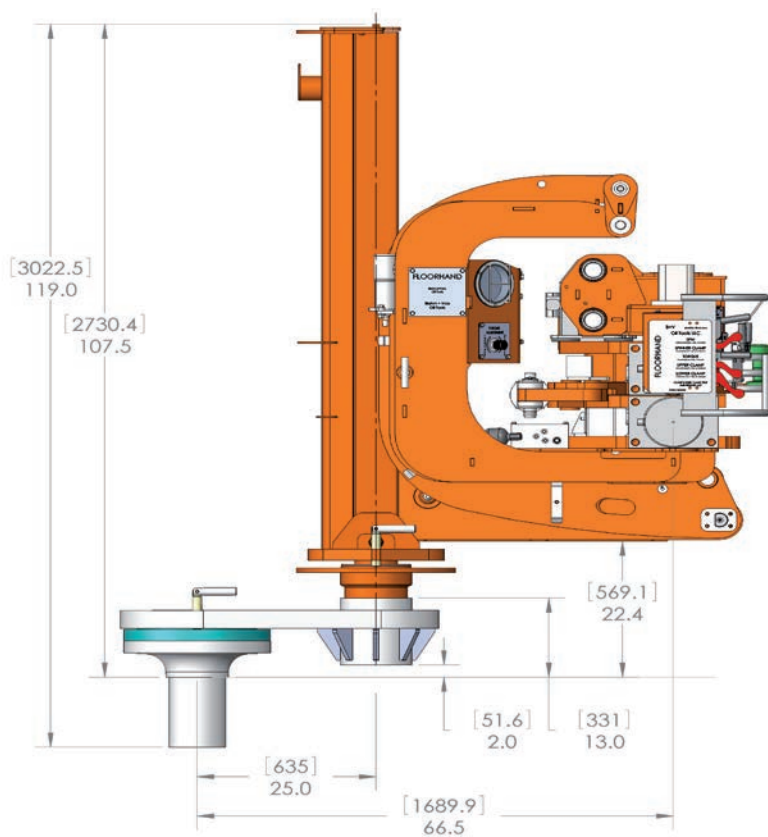


Figure 87

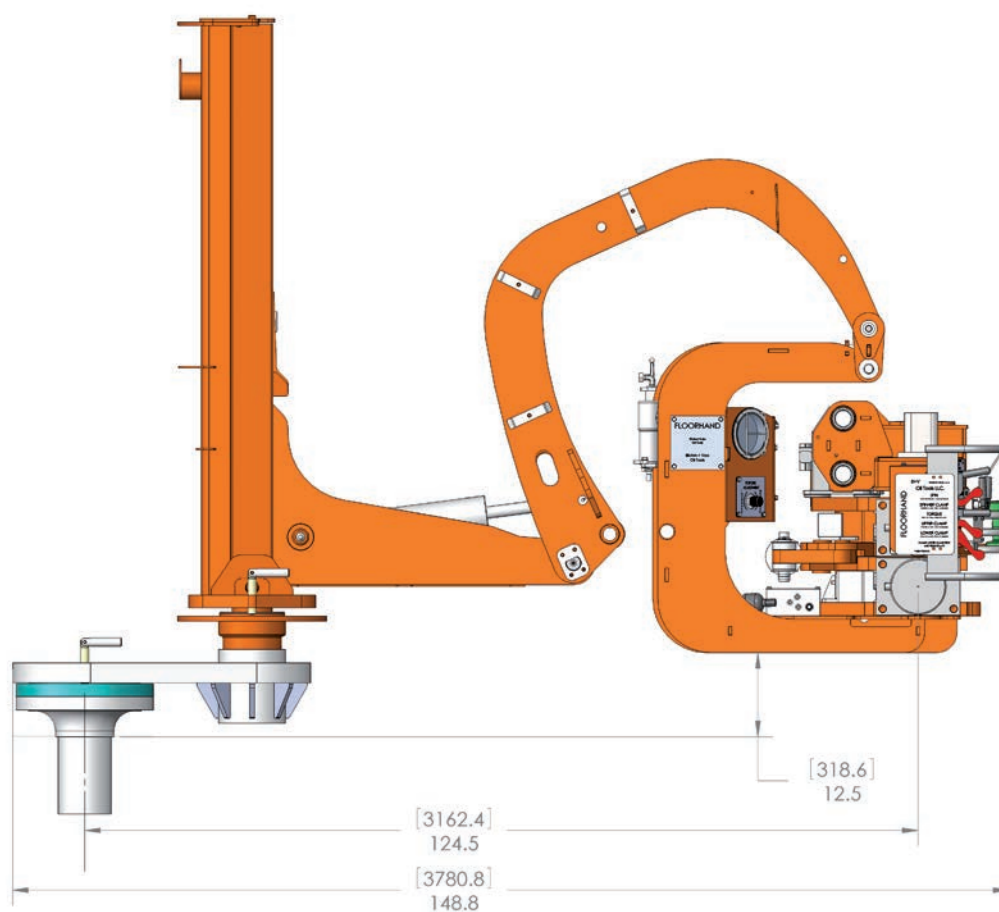


Figure 88

## SERVICE KIT 9FH-10841



Figure 89

Item	Part number	Description	Qty.
1	9FH-10842	TEST PORT HOSE / GAUGE ASSEMBLY	1
2	9FH-10843	TEST KIT STORAGE BOX	1
3	9FH-01154	FLOW METER	1
4	9FH-10844	HOSE / FITTING KIT FOR FLOW METER	1
5	9HCORBORK	ORB O-RING KIT	1
6	9HCORFSORK	ORFS O-RING KIT	1
7	9FH-01142-10SRK	FH MOTOR OUTPUT SHAFT REPAIR KIT	1
8	9FH-01149-1RK	CONTROL VALVE SECTION SEAL KIT	1
9	9FH-HPC2928-RK	CLAMP CYLINDER REPAIR KIT	1
10	9FH37820151RK	SPIN CLAMP CYLINDER REPAIR KIT	1
11	9FH37820145RK	LIFT CYLINDER REPAIR KIT	1
12	9FH37820123RK	TORQUE CYLINDER REPAIR KIT	1
13	9FH-HCPASSM	MANIPULATOR HANDLE HOUSING ASSEMBLY	1
14	9G6005-RK	REPAIR KIT FOR 6005 HYDRAULIC VALVE	1
15	9G6005-LK	HYDRAULIC VALVE LINKAGE KIT	1
16	9G6005-3	HANDLE BRACKET FOR G6005 VALVE	1

## HOSE KITS

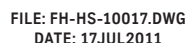
Hose Number	From	To
9FH-10500	FRAME HOSE KIT	
9HC10500-11	PRV SHUTTLE VALVE TEE	LOWER FLOW DIVIDER
9HC10500-13	UPPER MANIFOLD (FT)	COMBO MANIFOLD (FT)
9HC10500-14	TORQUE MANIFOLD (T)	RETURN MANIFOLD (RH 3/4 90 ORFS)
9HC10500-15	TORQUE MANIFOLD (CA)	TORQUE MANIFOLD (BRAKE)
9HC10500-18	TORQUE MANIFOLD (P)	TORQUE CYLINDER (DUMP PORT)
9HC10500-19	TORQUE MANIFOLD (CB)	TORQUE CYLINDER (MAKE)
9HC10500-30	PRESSURE FILTER OUT (BULKHEAD)	CONTROL VALVE (PRESSURE IN)
9HC10500-36	COMBO MANIFOLD (SCU)	SPINNER CLAMP CILNDER (UNCLAMP)
9HC10500-37	COMBO MANIFOLD (SCC)	SPINNER CLAMP (CLAMP)
9HC10500-38	PRESSURE LINE IN (BULKHEAD)	PRESSURE FILTER IN (BULK HEAD)
9HC10500-39	PRV (T)	RETURN MANIFOLD (TL 3/8 90 ORFS)
9HC10500-40	PRESSURE LINE	PRESSURE GAUGE
9HC10500-41	TORQUE GAUGE	TORQUE BLOCK
9HC10500-57	RETURN BLOCK (LH 3/4 90 ORFS)	RETURN BULKHEAD
9FH-10501	LOWER WRENCH HOSE KIT	
9HC10501-3	RH LOWER CLAMP CYLINDER (UNCLAMP)	LH LOWER CLAMP CYLINDER (UNCLAMP)
9HC10501-4	LOWER CLAMP CYLINDER (CLAMP)	COMBO MANIFOLD (LCA2)
9HC10501-5	LOWER CLAMP CYLINDER (CLAMP)	COMBO MANIFOLD (LCB2)
9HC10501-6	LOWER FLOW DIVIDER (TOP TO TOP)	COMBO MANIFOLD (LCA1)
9HC10501-9	LOWER FLOW DIVIDER (BOTTOM TO BOTTOM)	COMBO MANIFOLD (LCB1)
9HC10501-16	TORQUE MANIFOLD (CA)	COMBO MANIFOLD (CA)
9HC10501-17	TORQUE MANIFOLD (CB)	COMBO MANIFOLD (CB)
9FH-10502	UPPER WRENCH HOSE KIT	
9HC10502-1	UPPER MANIFOLD (ECB)	RH UPPER CLAMP CYLINDER (CLAMP)
9HC10502-2	UPPER MANIFOLD (ECA)	LH UPPER CLAMP CYLINDER (CLAMP)
9HC10502-7	LH UPPER CLAMP CYLINDER (UNCLAMP)	RH UPPER CLAMP CYLINDER (UNCLAMP)
9HC10502-8	UPPER MANIFOLD (RCA)	RH UPPER CLAMP CYLINDER (UNCLAMP)
9HC10502-12	UPPER MANIFOLD (EX)	PRV SHUTTLE VALVE
9FH-10503	SPINNER HOSE KIT	
9HC10503-21	RH SPINNER MOTOR (A)	LH SPINNER MOTOR (A)
9HC10503-50	LH SPINNER MOTOR CASE DRAIN (TEE)	RH SPINNER MOTOR CASE DRAIN
9HC10503-51	LH SPINNER MOTOR CASE DRAIN (TEE)	RETURN MANIFOLD (BR 3/8 90 ORFS)
9HC10503-52	RH SPINNER MOTOR (B)	SPINNER FLOW DIVIDER (K3)
9HC10503-53	LH SPINNER MOTOR (B)	SPINNER FLOW DIVIDER (KS)
9FH-10504	CONTROL VALVE HOSE KIT	
9HC10504-23	CONTROL VALVE (SPIN OUT)	LH SPINNER MOTOR (A)
9HC10504-24	CONTROL VALVE (SPIN IN)	SPINNER FLOW DIVIDER (K1)

Hose Number	From	To
9HC10504-25	CONTROL VALVE (LOWER UNCLAMP)	LH LOWER CLMAP CYLINDER (UNCLAMP)
9HC10504-26	CONTROL VALVE (UPPER CLAMP)	UPPER MANIFOLD (RCB)
9HC10504-27	CONTROL VALVE (UPPER CLAMP)	UPPER CLAMP (EX)
9HC10504-29	CONTROL VAVLE (LOWER CLAMP)	LOWER PRV VAVLE (#2)
9HC10504-31	CONTROL VAVLE (TORQUE "MAKE")	TORQUE MANIFOLD (VB)
9HC10504-32	CONTROL VALVE (TORQUE "BRAKE")	TORQUE MANIFOLD (VA)
9HC10504-33	CONTROL VAVLE (RETURN)	RETURN MANIFOLD (CENTER 3/4 STR ORFS)
9HC10504-34	CONTROL VALVE (SPINNER CLAMP "CLAMP")	COMBO MANIFOLD (BL 1/4)
9HC10504-35	CONTROL VALVE (SPINNER CLAMP "CLAMP")	COMBO MANIFOLD (TL 1/4)
<b>9FH-10505</b>	<b>MANIPULATOR VALVE HOSE KIT</b>	
9HC10505-28	CONTROL VALVE (LOWER UNCLAMP "TEE")	MANIPULATOR VALVE (PRESSURE IN)
9HC10505-43	MANIPULTOR RETURN	RETURN MANIFOLD (CENTER LOWER RH)
9HC10505-44	MANIPULTOR VALVE (EXTEND)	MANIPULTOR (EXTEND)
9HC10505-45	MANIPULATOR VALVE (RETRACT)	MANIPULTOR HEADER (RETRACT)
9HC10505-46	MANIPULTOR VALVE (RAISE)	MANIPULTOR HEADER (RAISE)
9HC10505-47	MANIPULTOR VALVE (LOWER)	MANIPULTOR HEADER (LOWER)

## RETURN MANIFOLD PORT I.D & HOSE LOCATIONS

PORT NO.	HOSE NO.	HOSE LOCATION
1	9HC10500-39	FROM PRV "T" TO PORT #1 RETURN MANIFOLD
2	N/A	PLUGGED
3	9HC10504-33	FROM CONTROL VALVE TO PORT #3 RETURN MANIFOLD
4	N/A	PLUGGED
5	9HC10503-51	FROM MOTOR CASE DRAIN TO PORT #5 RETURN MANIFOLD
6	9HC10500-57	FROM TANK OUTLET (FRAME TO PORT #6 RETURN MANIFOLD
7	N/A	PLUGGED
8	N/A	PLUGGED
9	9HC10505-43	FROM MANIPULATOR VALVE TO PORT #9 RETURN MANIFOLD
10	N/A	PLUGGED
11	9HC10500-14	FROM TORQUE MANIFOLD "T" TO PORT # 11 RETURN MANIFOLD
12	N/A	PLUGGED
TP	N/A	TEST PORT FITTING

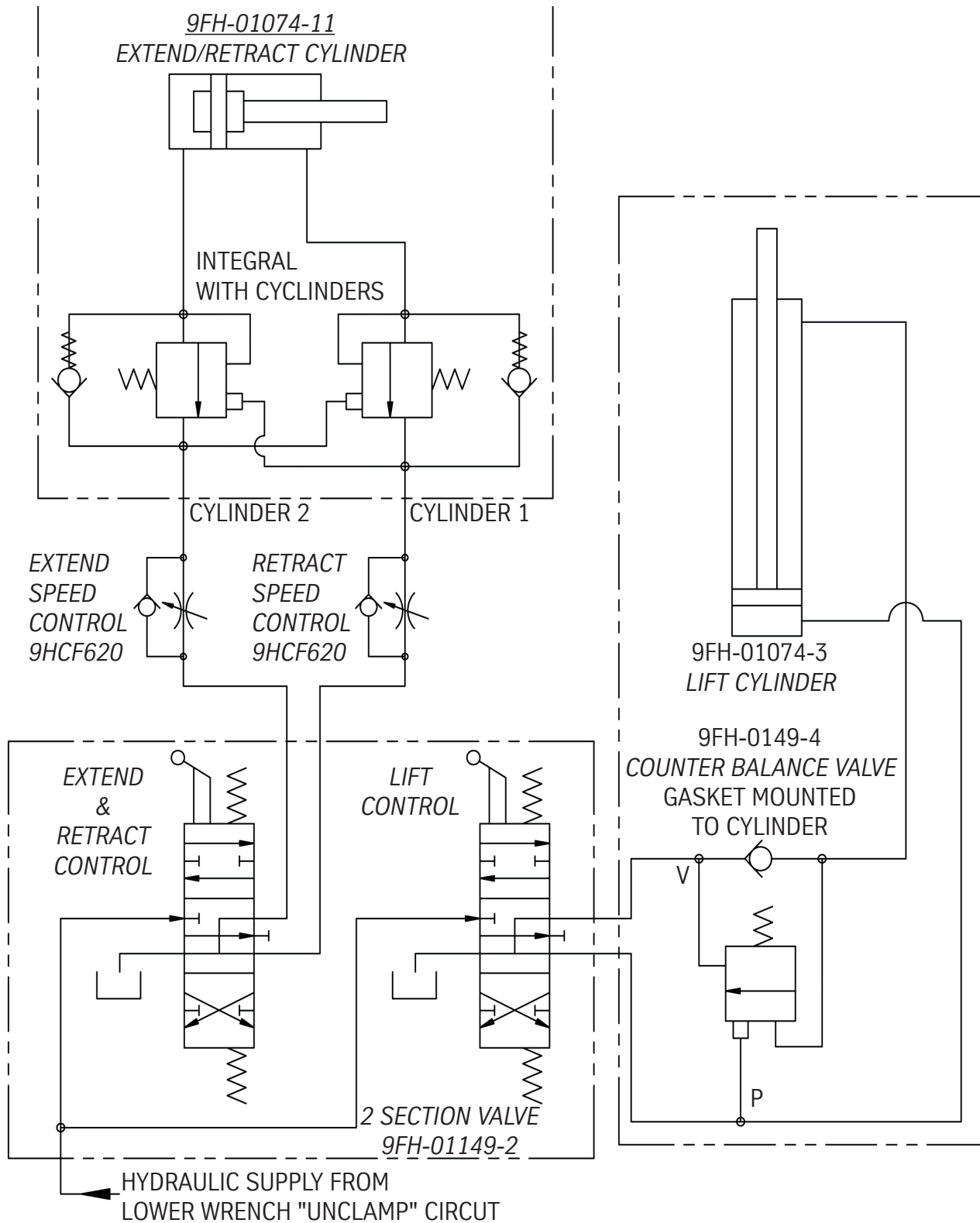
## DRAWINGS



### B+V FLOORHAND GEN II HYDRAULIC SCHEMATIC



# HYDRAULIC SCHEMATIC



## HYDRAULIC SCHEMATIC

FM2500 MANIPULATOR  
W/ COUNTERBALANCE CYLINDER

File: FH-HS-10014.dwg

Date: 11MAY2011

Figure 91

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