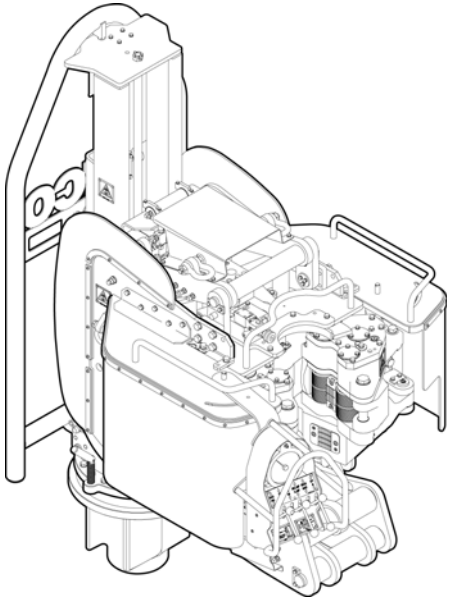




ST-80

Roughneck Service Manual

Reference	Reference Description	
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Document Number SM01050		Rev. C



Revision History

C	27.01.2010	Corrections to document. Addition of new cover sheet with revision history and change description sections.	C. Rodriguez	E. Axelson	J. Walker
	dd.mm.yyyy	Changes to	Originator	Checker	Approver
Rev	Date (dd.mm.yyyy)	Reason for issue	Prepared	Checked	Approved

Change Description

Revision	Change Description
C	Updated safety notes. Revised system pressure in the General information section. Corrected manifold pressure setting in the troubleshooting section. Corrected pressure setting at manifold in the Spin Rollers System troubleshooting section. Changed references from Varco to NOV. Changed cover sheet and added revision history and change description sections to reflect current template.

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General Information

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Intended Audience

This manual is intended for use by field engineering, installation, operation, and repair personnel. Every effort has been made to ensure the accuracy of the information contained herein. National Oilwell Varco® (NOV) will not be held liable for errors in this material, or for consequences arising from misuse of this material.

Conventions

Notes, Cautions, and Warnings

Notes, cautions, and warnings provide readers with additional information, and to advise the reader to take specific action to protect personnel from potential injury or lethal conditions. They may also inform the reader of actions necessary to prevent equipment damage. Please pay close attention to these advisories.

Note:



The note symbol indicates that additional information is provided about the current topics.

Caution:



The caution symbol indicates that potential damage to equipment or injury to personnel exists. Follow instructions explicitly. Extreme care should be taken when performing operations or procedures preceded by this caution symbol.

Warning:



The warning symbol 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.

Conventions

Notes, Cautions, and Warnings

Hot Surfaces:



The hot surface symbol indicates the presence of a hot surface or component. Touching this surface could result in bodily injury. To reduce the risk of injury from a hot component, allow the surface to cool before touching.

Illustrations

Illustrations (figures) provide a graphical representation of equipment components or screen snapshots for use in identifying parts or establishing nomenclature, and may or may not be drawn to scale. For component information specific to your rig configuration, see the technical drawings included with your NOV documentation.

Safety Requirements

NOV equipment is installed and operated in a controlled drilling rig environment involving hazardous situations. Proper maintenance is important for safe and reliable operation. Procedures outlined in NOV manuals are the recommended methods of performing operations and maintenance.



To avoid injury to personnel or equipment damage, carefully observe requirements outlined in this section.

Personnel Training

All personnel performing installation, operations, repair, or maintenance procedures on the equipment, or those in the vicinity of the equipment, should be trained on rig safety, tool operation, and maintenance to ensure their safety.



Personnel should wear protective gear during installation, maintenance, and certain operations.

Contact the NOV training department for more information about equipment operation and maintenance training.

Recommended Tools

Service operations may require the use of tools designed specifically for the purpose described. NOV recommends that only those tools specified be used when stated. Ensure that personnel and equipment safety are not jeopardized when following service procedures or using tools not specifically recommended by NOV.



Safety Requirements

General System Safety Practices

The equipment discussed in this manual may require or contain one or more utilities, such as electrical, hydraulic, pneumatic, or cooling water.



Read and follow the guidelines below before installing equipment or performing maintenance to avoid endangering exposed persons or damaging equipment.

- ☐ Isolate energy sources before beginning work.
- ☐ Avoid performing maintenance or repairs while the equipment is in operation.
- ☐ Wear proper protective equipment during equipment installation, maintenance, or repair.

Replacing Components

- ☐ Verify that all components (such as cables, hoses, etc.) are tagged and labeled during assembly and disassembly of equipment to ensure correct installment.
- ☐ Replace failed or damaged components with NOV certified parts. Failure to do so could result in equipment damage or injury to personnel.

Routine Maintenance

Equipment must be maintained on a routine basis. See the service manual for maintenance recommendations.

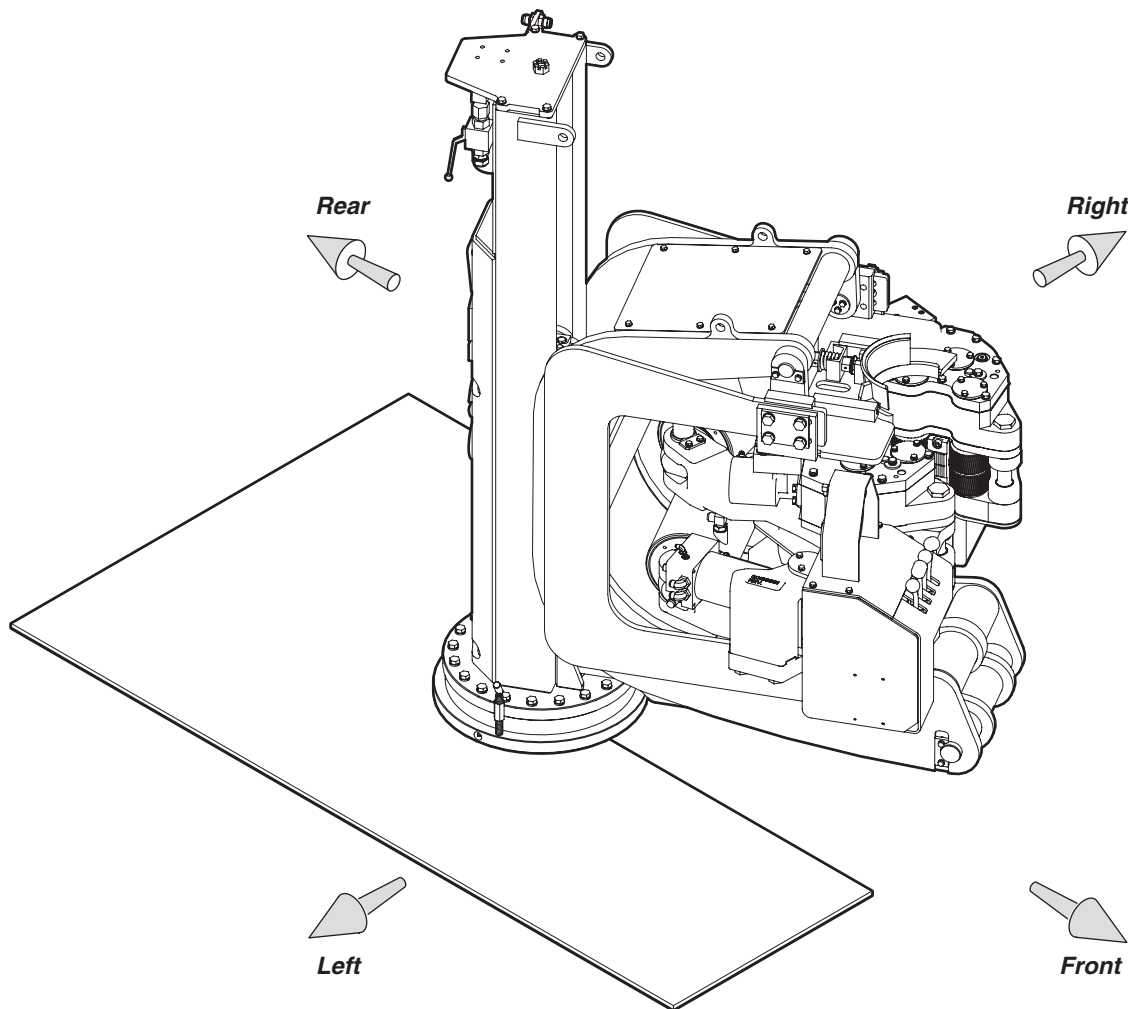


Failure to conduct routine maintenance could result in equipment damage or injury to personnel.

Proper Use of Equipment

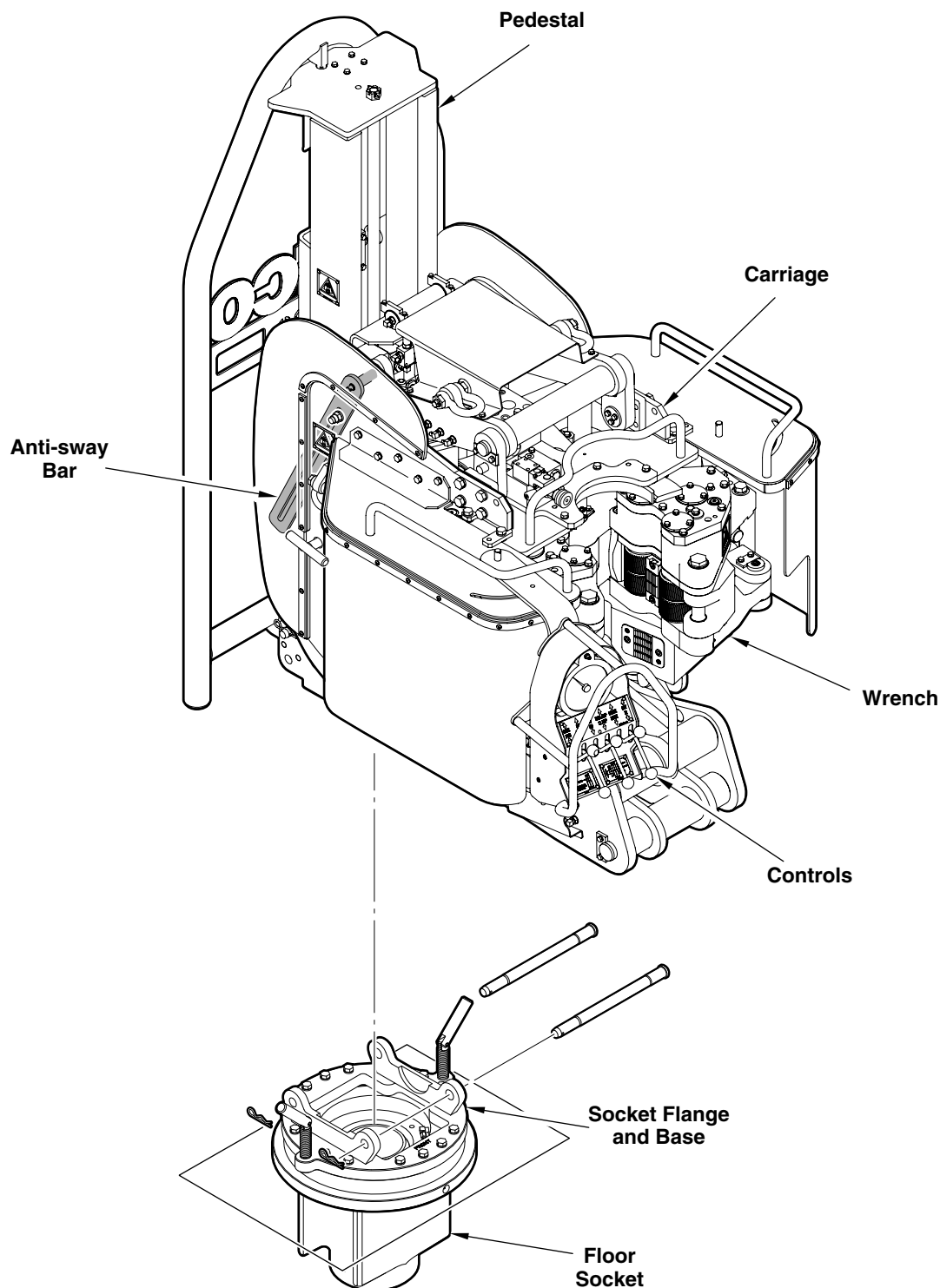
NOV equipment is designed for specific functions and applications, and should be used only for its intended purpose.

Tool Orientation



General Description

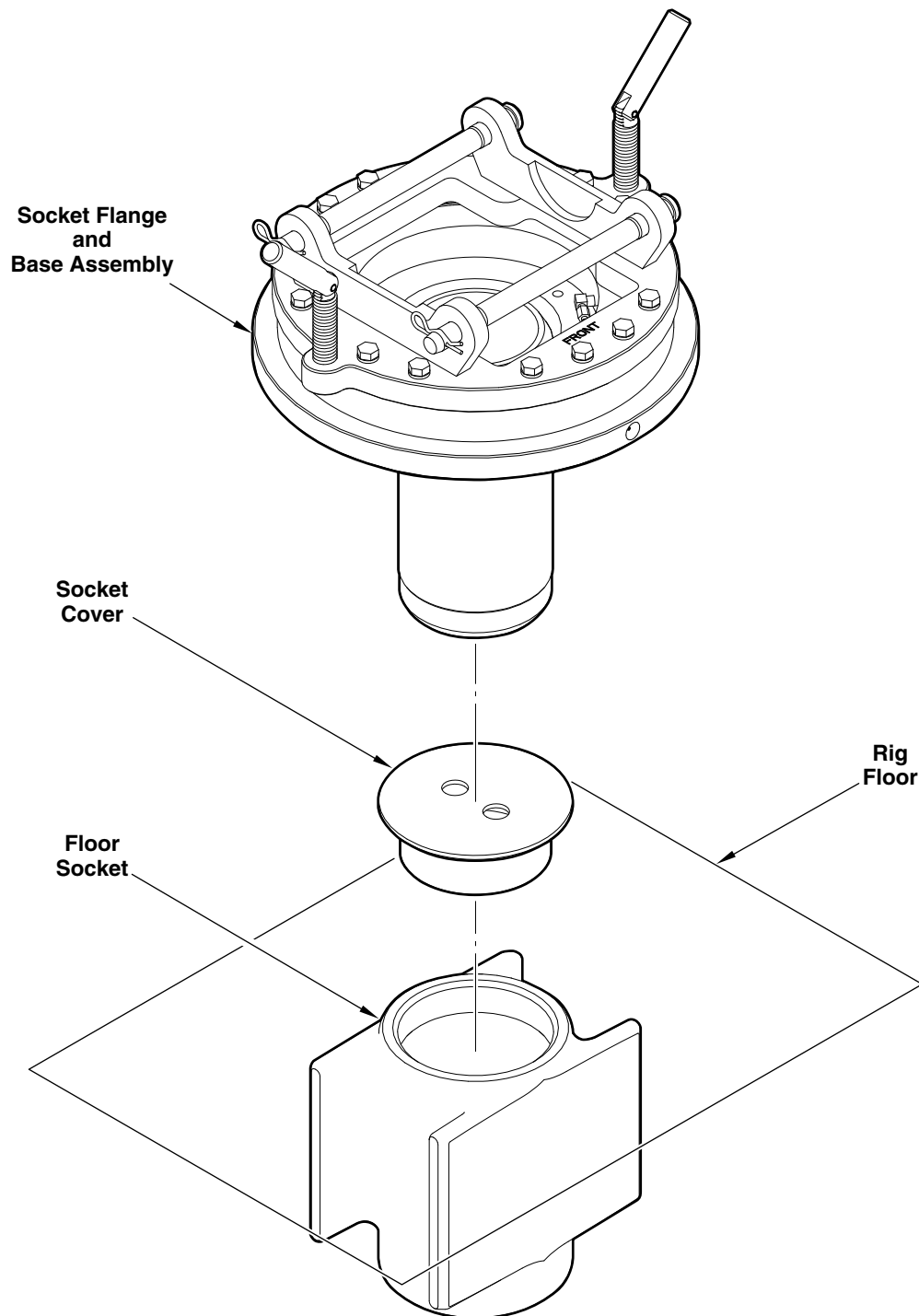
The ST-80 Roughneck can make or break all tool connections from 4 1/4" to 8 1/2" outside diameter, and can handle nominal drill pipe from 3 1/2" up to 6 5/8". It can also make and brake stabilizers, spiral colors and other bottom hole assembly (BHA) components with sufficient connection length.



General Description

Socket Flange

1

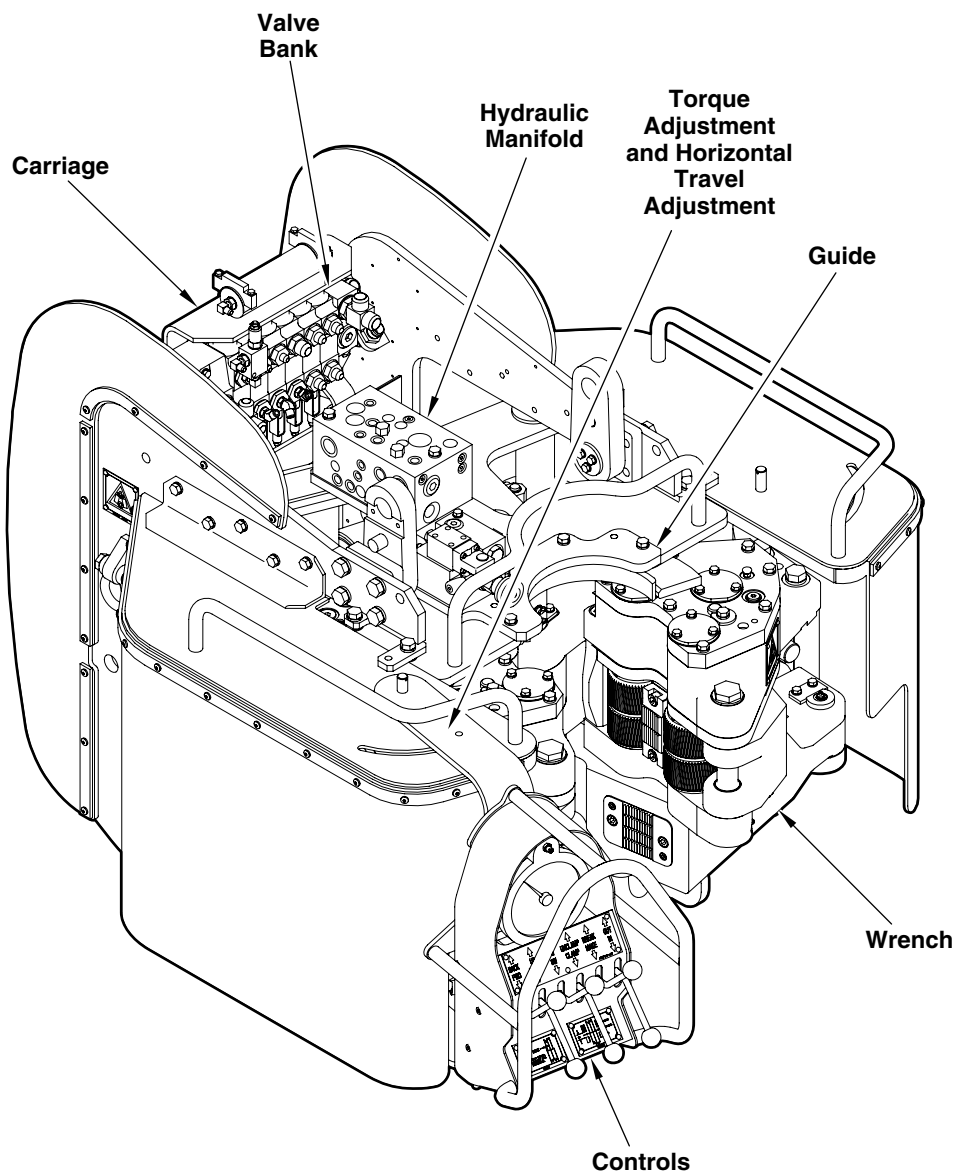




General Description

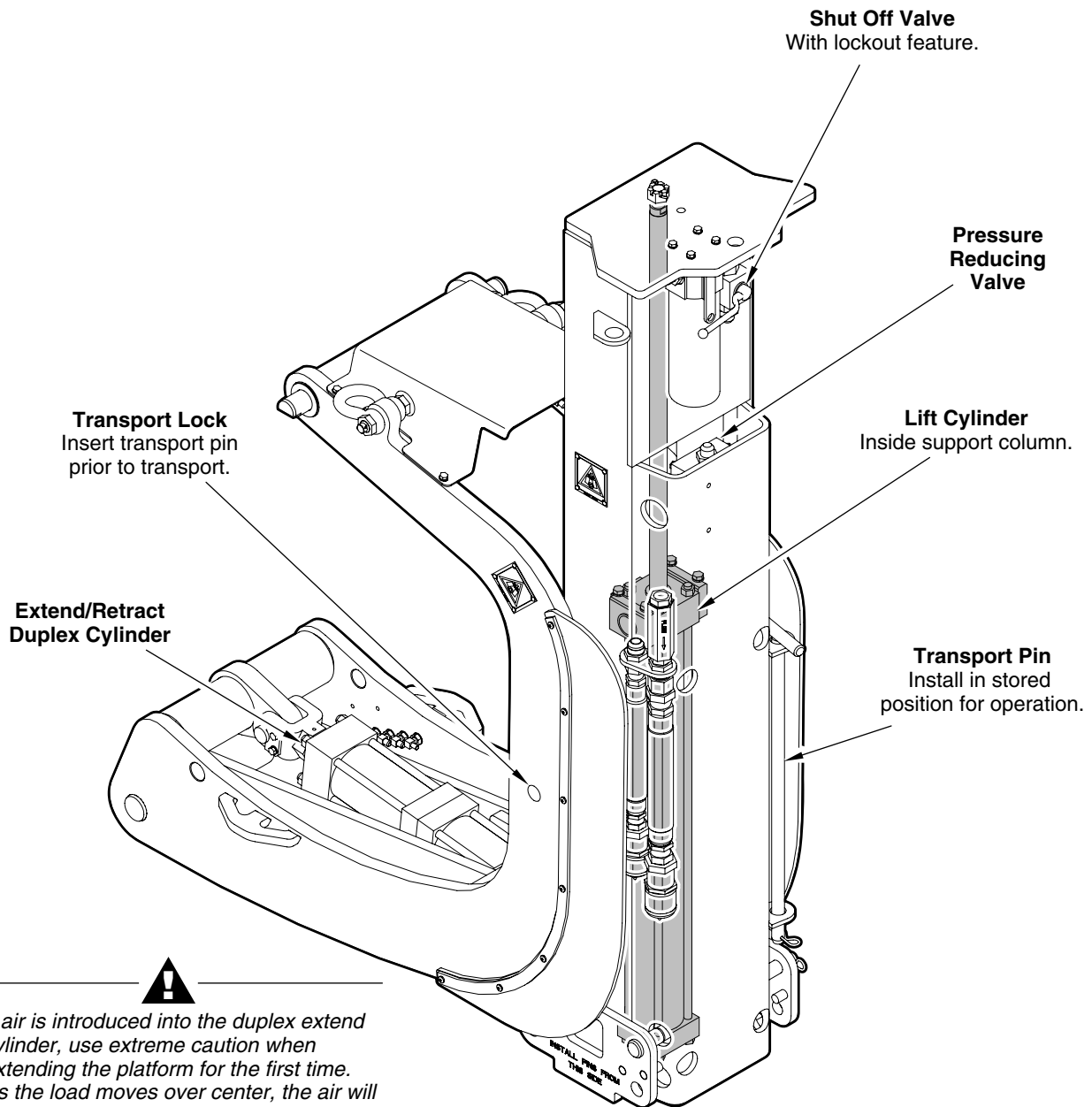
Carriage

1



General Description

Pedestal



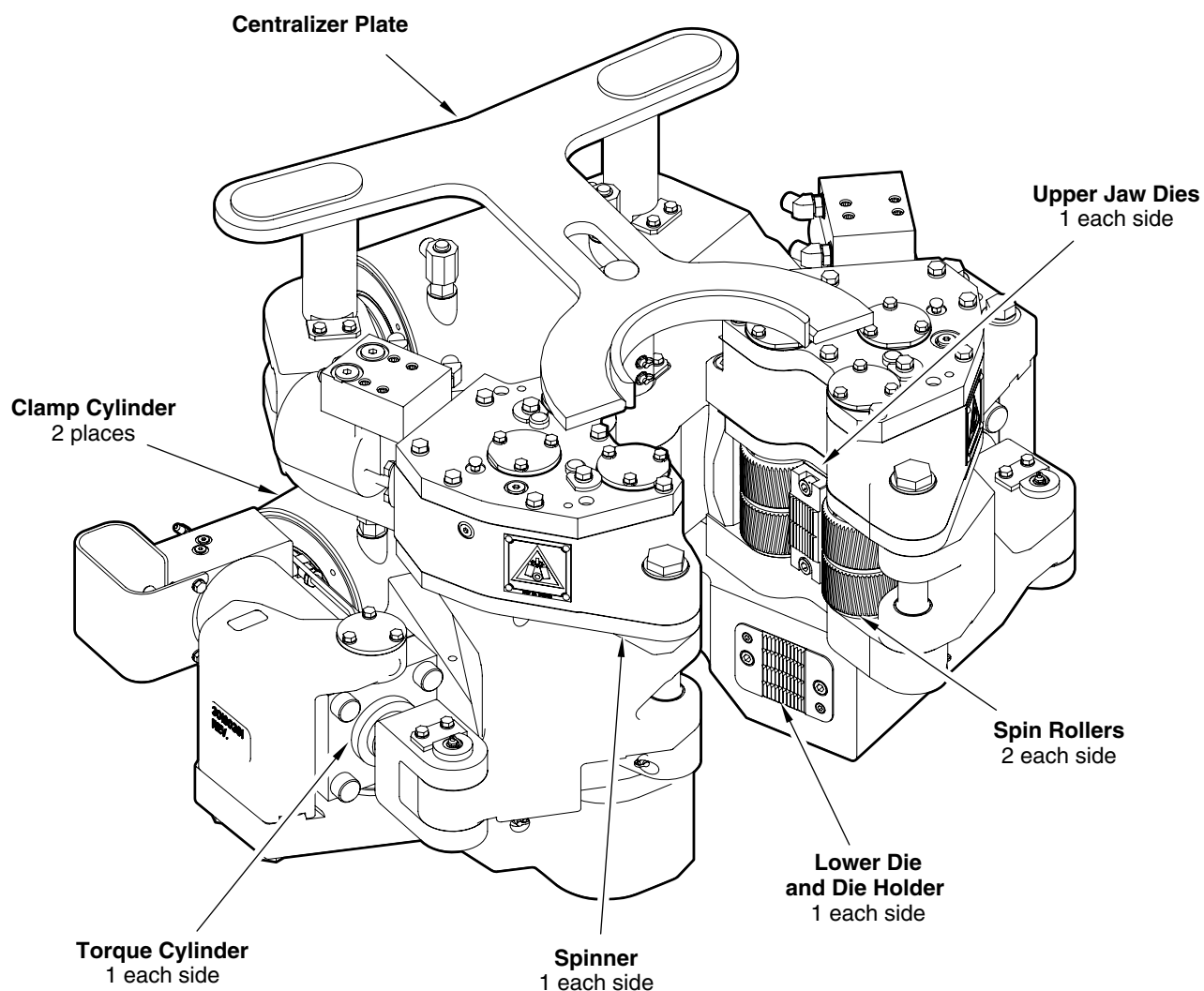
If air is introduced into the duplex extend cylinder, use extreme caution when extending the platform for the first time. As the load moves over center, the air will compress causing the support arm to extend rapidly. Support unit with tugger and stand to the side until air is purged.

General Description

Wrench

The ST-80 uses a combination spinning and torque wrench. The dies of the upper jaws are located between the spinner rollers. The spinner rollers grip the connection and spins with a torque of 1,750 ft lb.

The torque wrench can make up the connection with a maximum torque of 60,000 ft lb. The wrench can break out connections with a maximum torque of 80,000 ft lb.



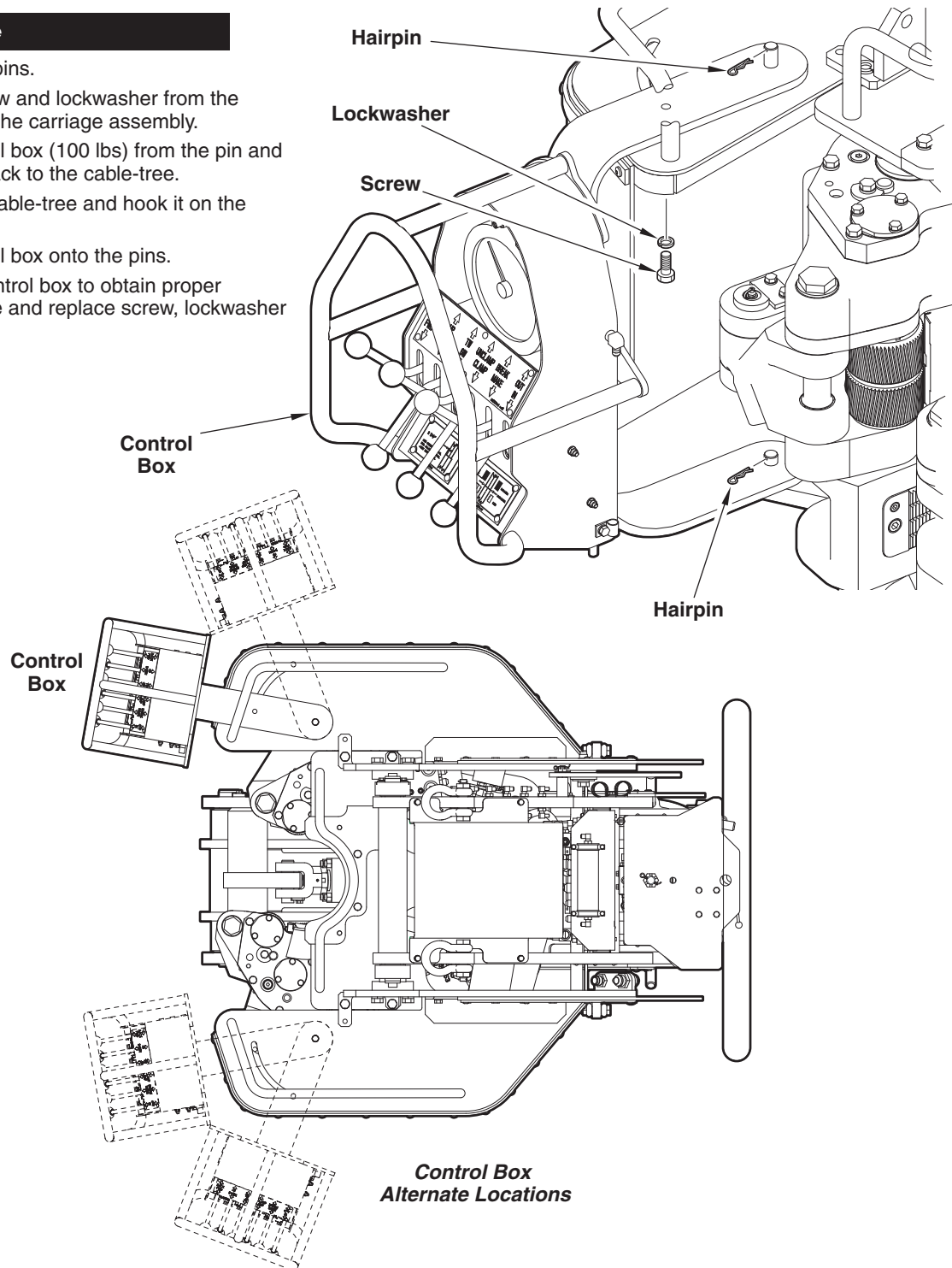
General Description

Controls

The ST-80 controls can be mounted on each side of the carriage. The orientation of the controls can be adjusted to accommodate for the best operating angle. The controls can be easily changed from one side of the ST-80 to the other side using the following procedure:

Procedure

1. Remove hairpins.
2. Remove screw and lockwasher from the underside of the carriage assembly.
3. Lift the control box (100 lbs) from the pin and give some slack to the cable-tree.
4. Unhook the cable-tree and hook it on the other side.
5. Lift the control box onto the pins.
6. Orient the control box to obtain proper working angle and replace screw, lockwasher and hairpin.

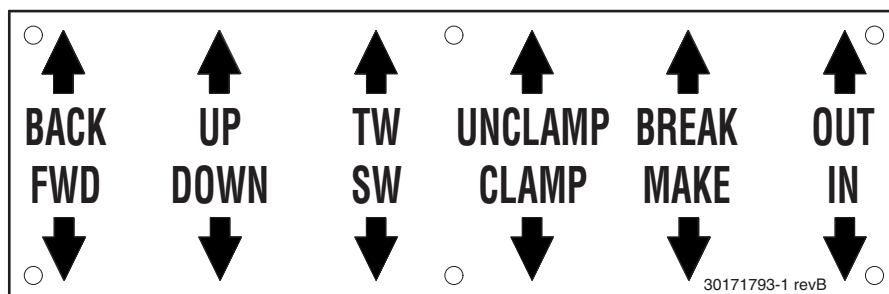




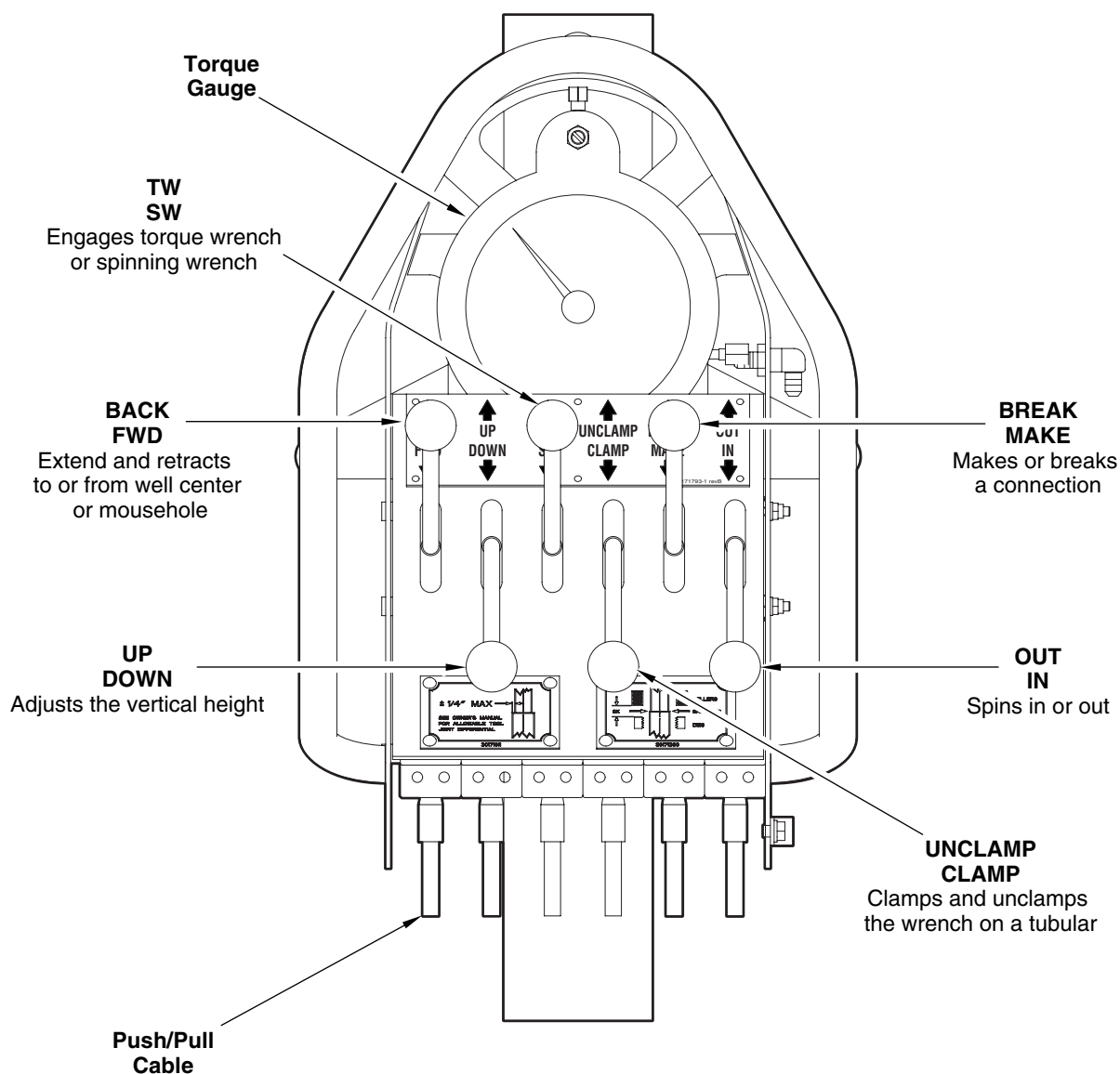
General Description

Controls

1



Detail of Control Plaque



Operating the ST-80

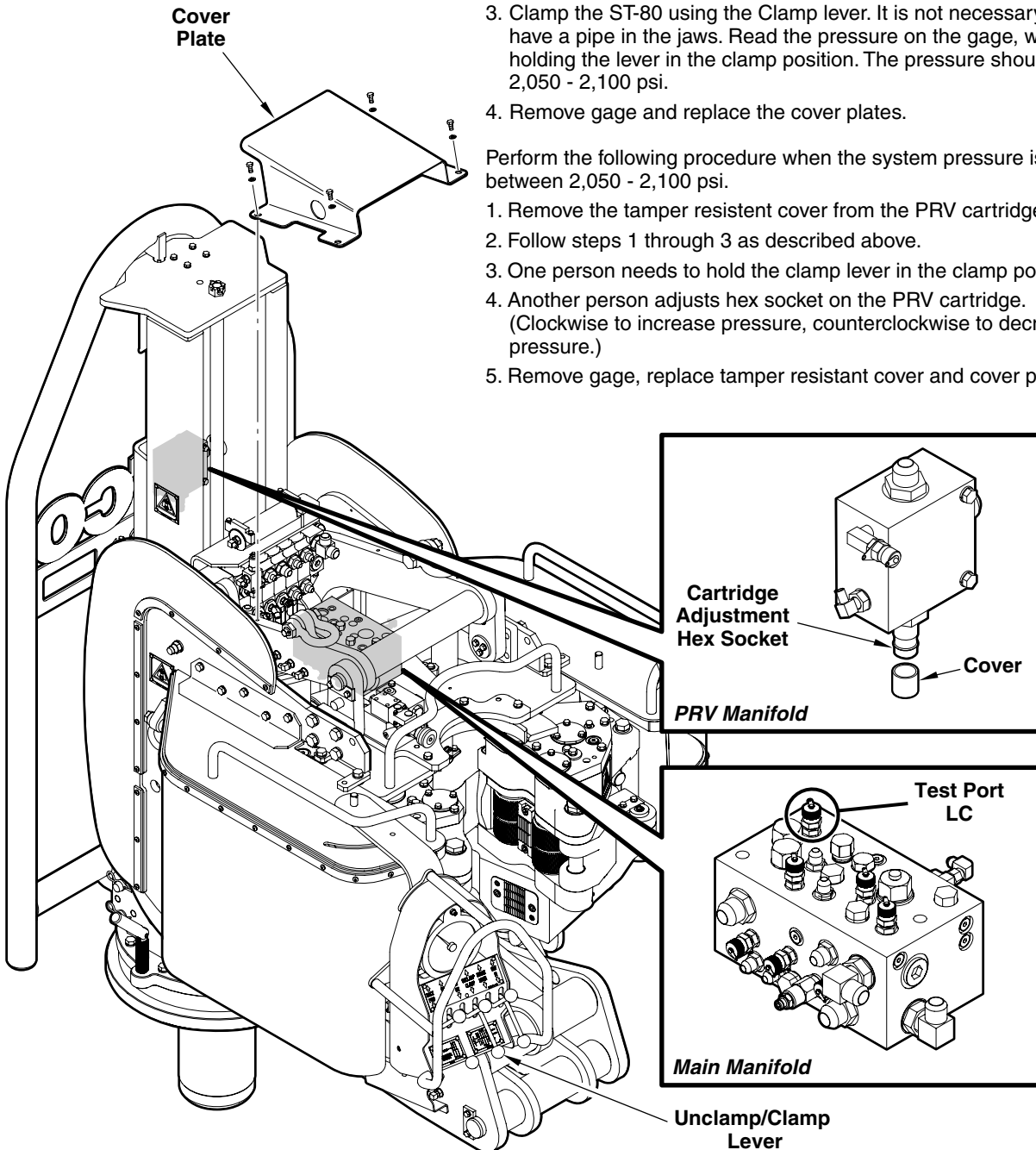
Checking System Pressure

Procedure

1. Remove the cover plate to gain access to the main manifold.
2. Attach a pressure gage to test port LC on the main manifold.
3. Clamp the ST-80 using the Clamp lever. It is not necessary to have a pipe in the jaws. Read the pressure on the gage, while holding the lever in the clamp position. The pressure should be 2,050 - 2,100 psi.
4. Remove gage and replace the cover plates.

Perform the following procedure when the system pressure is not between 2,050 - 2,100 psi.

1. Remove the tamper resistant cover from the PRV cartridge.
2. Follow steps 1 through 3 as described above.
3. One person needs to hold the clamp lever in the clamp position.
4. Another person adjusts hex socket on the PRV cartridge. (Clockwise to increase pressure, counterclockwise to decrease pressure.)
5. Remove gage, replace tamper resistant cover and cover plates.



Operating the ST-80

Positioning ST-80 Properly for Operation

1

Procedure

1. Adjust the ST-80 to fully retract. (push back the lever that is mounted on top of the carriage.)
2. Extend the ST-80 to its fullest extent. (pull the left handle on the control box.)
3. Raise the ST-80 to position the top of the box above the lower dies and below the spin rollers. (use the second handle to the left.)



Special attention is necessary if hard banding is present. Do not grip on hard banding.

4. Adjust the ST-80 until the base plate touches the connection diameter. (pull the lever that is mounted on top of the carriage.) Verify that the base plate is on the connection diameter and not on the taper or pipe. Adjust elevation as necessary, staying within the guidelines of step 3.



Over extension will show contact with the base plate, but will tilt the wrench out of alignment.

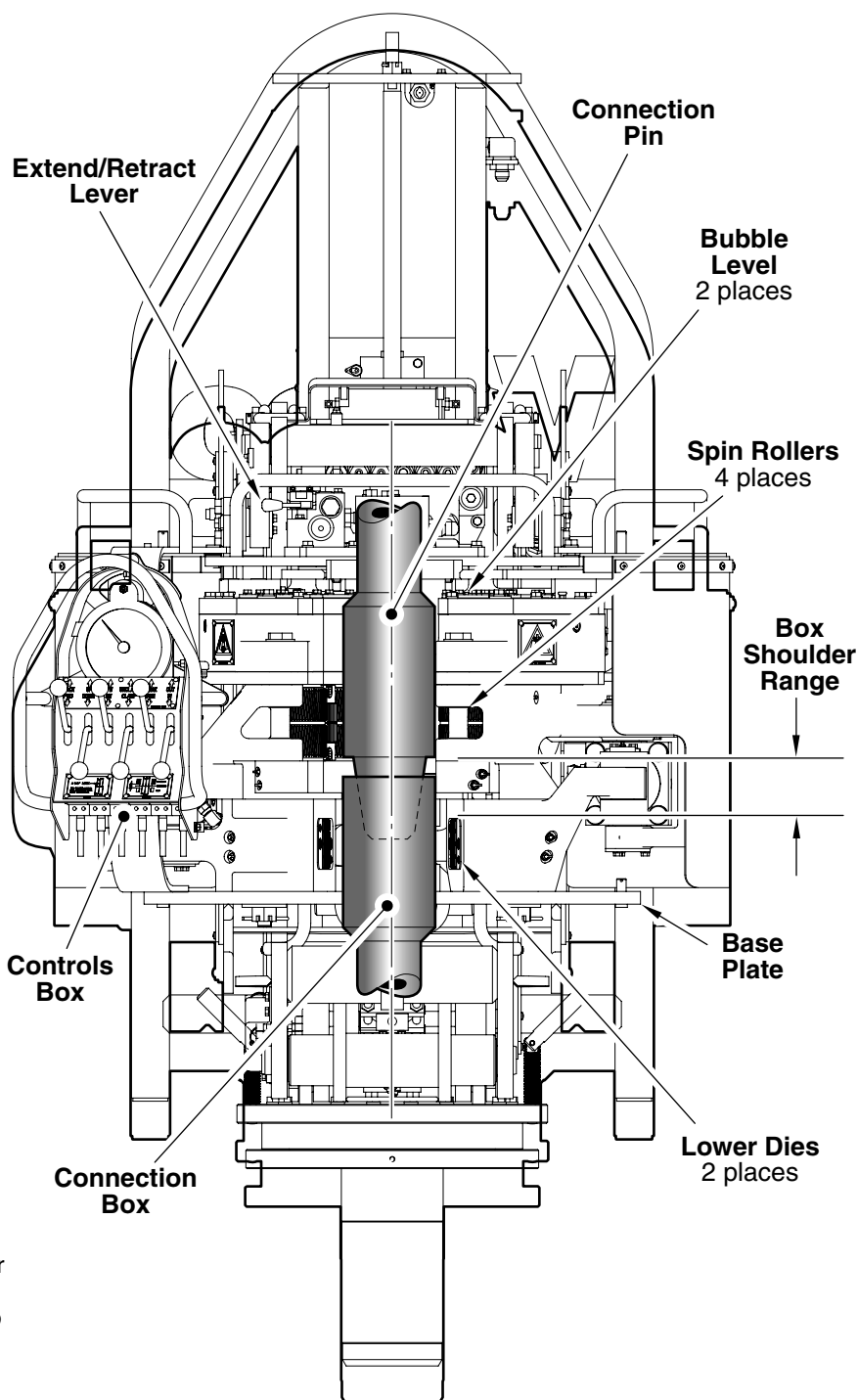
5. Verify correct adjustment. Retract and extend ST-80. (always full stroke using left handle on the control box). Lightly swing ST-80 by placing left hand on top of controls guard, and the right hand on front of lower left jaw body. Listen and feel for bumping contact against connection and verify bubble is within window.



Before operating the ST-80 for the first time, be sure to remove the transport pin and place it in its storage position.



The ST-80 requires adjustment whenever the connection or pipe diameter changes and requires periodic verification per step 5 of adjustment procedure.



Operating the ST-80

Making and Breaking Connections

1

Making Connections

- 1 CLAMP the jaws on the connection and release the handle.
- 2 Hold the TW/SW lever in the SW position. Wait 1 second before torquing.
- 3 Spin the connection IN.
- 4 Hold the TW/SW lever in the TW position. Wait 1 second before torquing.
- 5 Hold the BREAK/MAKE lever in the MAKE position until the desired torque is achieved.

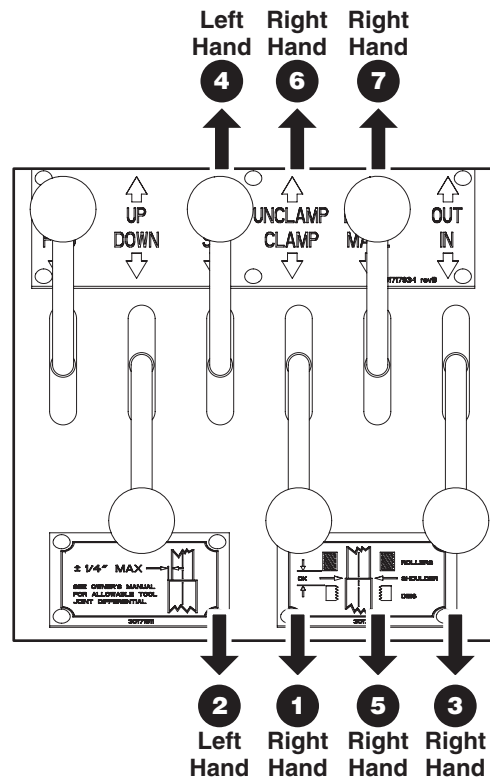


If the wrench does not reach the desired value in one stroke, repeat.

- 6 UNCLAMP the jaws.
- 7 Recycle the torque wrench to BREAK to prepare for the next connection.

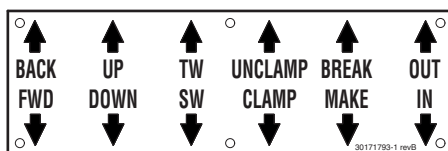


If the wrench does not reach the desired value in one stroke, repeat.

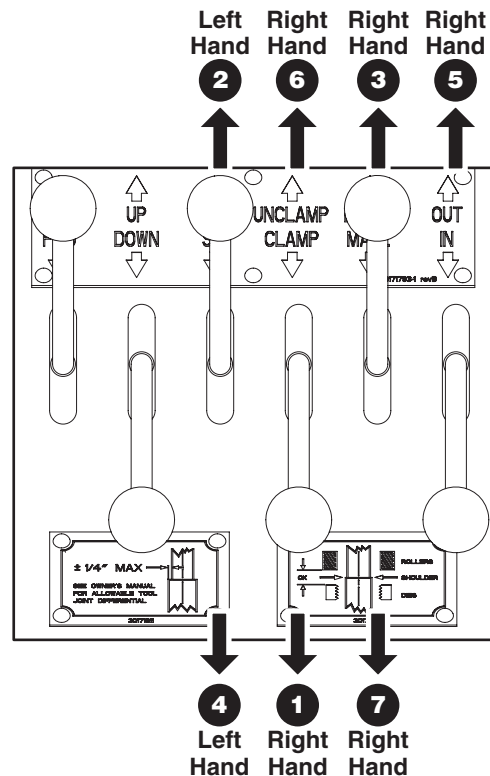


Breaking Connections

- 1 CLAMP the jaws on the connection and release the handle.
- 2 Hold the TW/SW lever in the TW position. Wait 1 second before torquing.
- 3 Hold the BREAK/MAKE lever in the BREAK position until the connection is broken.
- 4 Hold the TW/SW lever in the SW position. Wait 1 second before spinning.
- 5 Spin the connection OUT.
- 6 UNCLAMP the jaws.
- 7 Recycle the torque wrench to MAKE to prepare for the next connection.



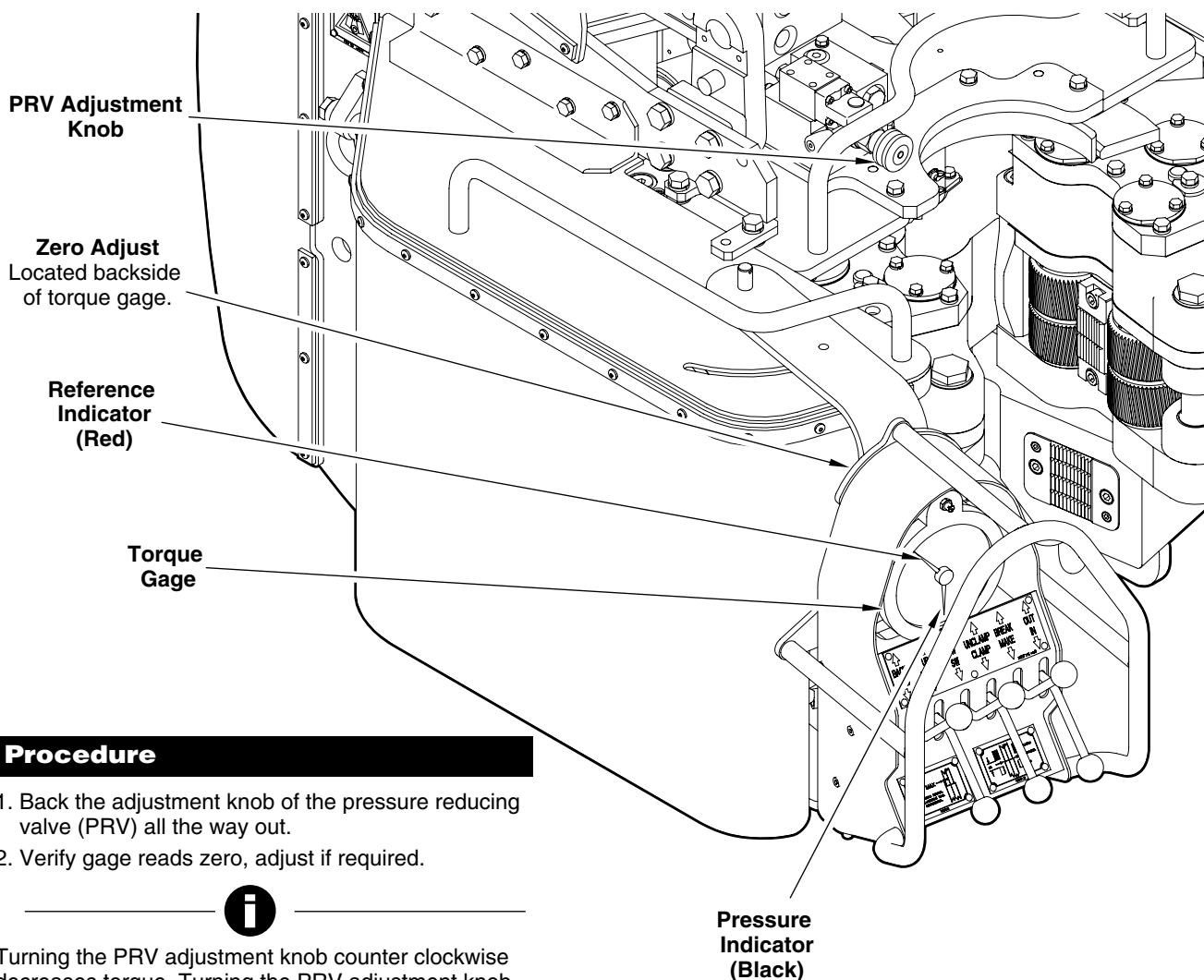
Detail of Control Plaque





Operating the ST-80

Adjusting the Makeup Torque



Procedure

1. Back the adjustment knob of the pressure reducing valve (PRV) all the way out.
2. Verify gage reads zero, adjust if required.



Turning the PRV adjustment knob counter clockwise decreases torque. Turning the PRV adjustment knob clockwise increases the torque.

2. Cycle jaws to break and clamp onto a tubular.
3. Spin the connection in.
4. Torque the connection.
5. While holding the torque handle, turn the PRV adjustment knob clockwise while watching the torque gage until the desired torque is achieved.



If torque cylinders reach end of stroke, the gage reads zero. Recycle jaws and retorque.

6. Position the reference indicator (red needle) on the torque gage at the desired torque value.



NOV offers an additional gage kit that can be installed in the driller's cabin (Remote Torque Gage kit, P/N 30173445).

Operating the ST-80

Adjust the Torque Gage



Zero out the torque gage every time you start up the ST-80, or when the torque setting has changed.

Return line pressure affects gage reading.

See Troubleshooting Section for gage responsiveness setting.

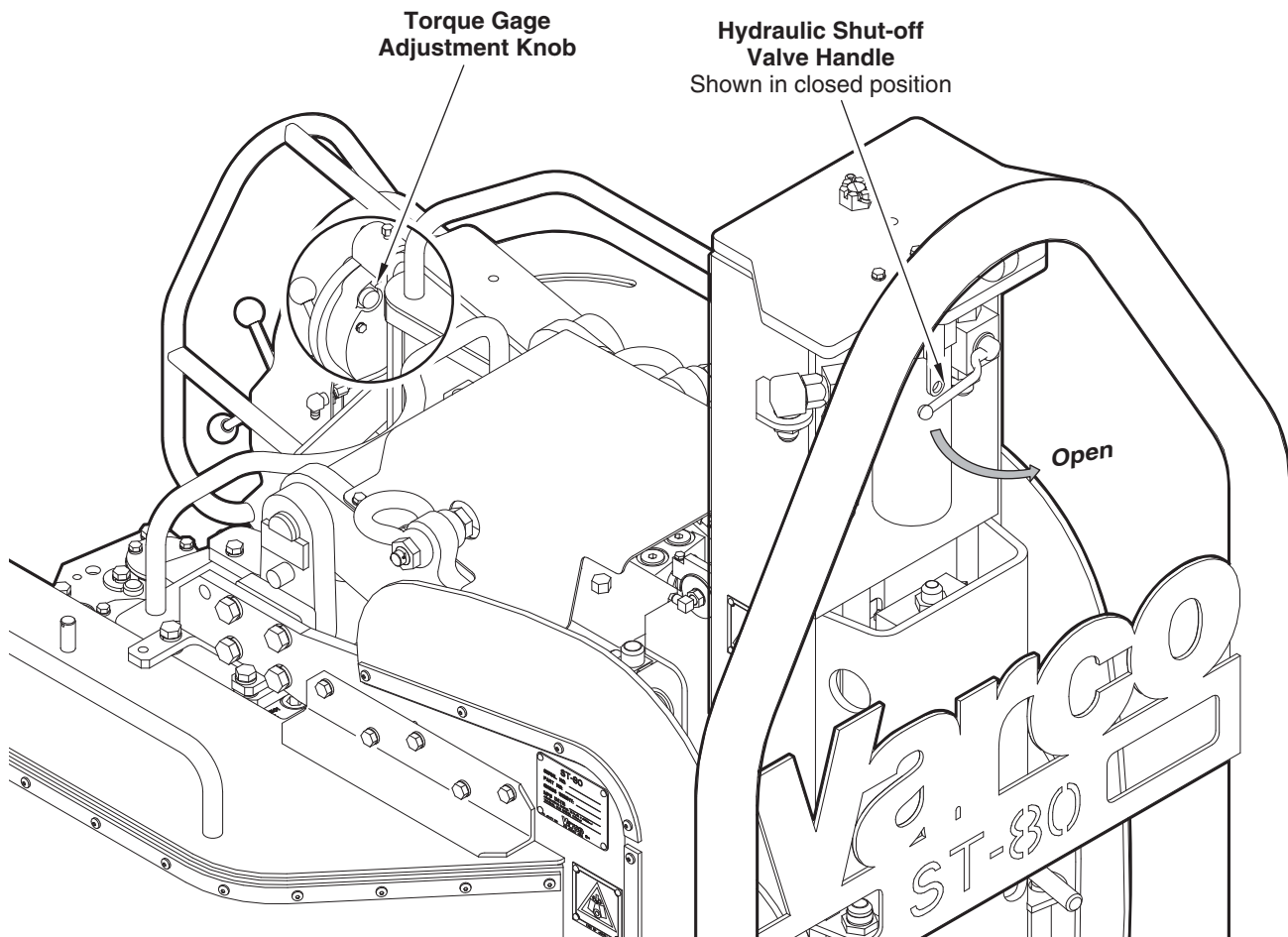
Procedure

Rotate the knob on the backside of the gage to zero out the torque gage dial.

1. Open the hydraulic shut-off valve handle to allow pressure to the system.
2. Rotate the small knob on the back of the gage so that it shows zero.



DO NOT operate the TORQUE lever while zeroing the torque gage dial.





Storing the ST-80

Palletize the ST-80 for indoor storage. A cargo container is appropriate for indoor or outdoor storage.

Avoid wide temperature and humidity variations. The ideal environment for storing the ST-80 is clean and dry with an ambient temperature of 60° F (16° C). If high humidity is unavoidable, NOV recommends storing the ST-80 at 70° F (21° C).

All exposed, unpainted metal surfaces are coated with rust preventive at the factory prior to shipment. Coat all unpainted metal surfaces with rust preventive prior to storage or transport.

Cover all openings to prevent water or dust from entering. NOV does not recommend using silica or dehydrating agents.

When the ST-80 is not being used for more than 3 months, perform the following:

1. Clean the ST-80.
2. Grease the ST-80 as described in the maintenance section.
3. Clean and cap all hydraulic quick disconnects (QDs).



NOV recommends Kendall Grade 5 (GE-D6C6A1) rust preventive, or an equivalent.



Place the transport pin in the transport position prior to storage and /or moving the ST-80 (refer to Transporting the ST-80).

Lifting the ST-80

Before lifting the ST-80, ensure that the pedestal is in the full down position and that the transport pin is installed in the transport position. When the ST-80 is in use, store the transport pin in the brackets located on the back of the support column. Use the two lifting shackles attached to lugs on top of the support arm whenever lifting the ST-80.

NOV recommends using a double chain sling with master link whenever lifting the ST-80.



Always use the lifting lugs and shackles provided. Nothing else is rated for, nor intended to support the full weight of the ST-80. (6850 lbs.)

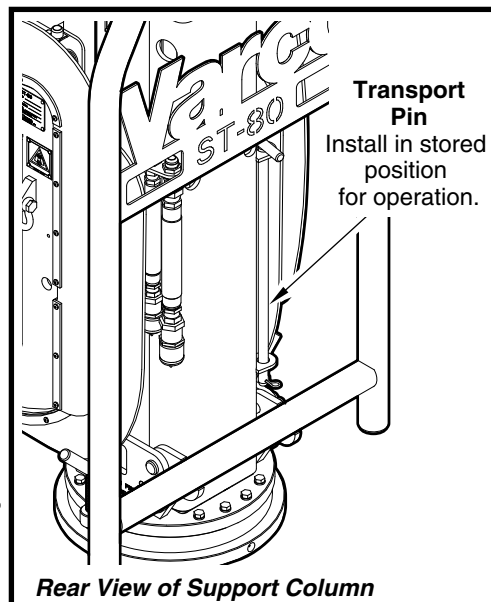
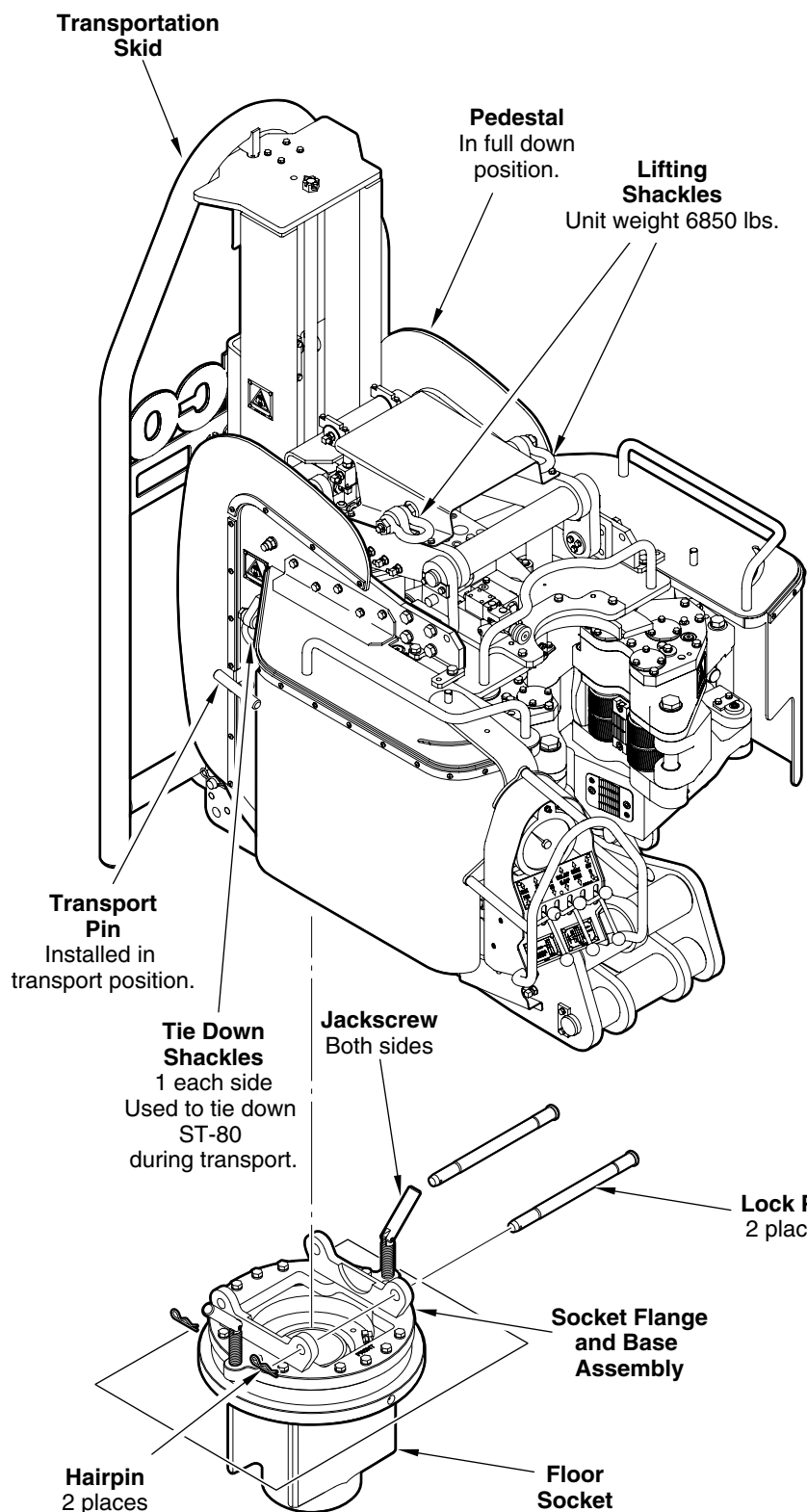
The ST-80 has a transportation skid that can be used to pull the ST-80 through the V-door onto the drill floor.



Hoisting operations should always be handled with care.

Lifting the ST-80

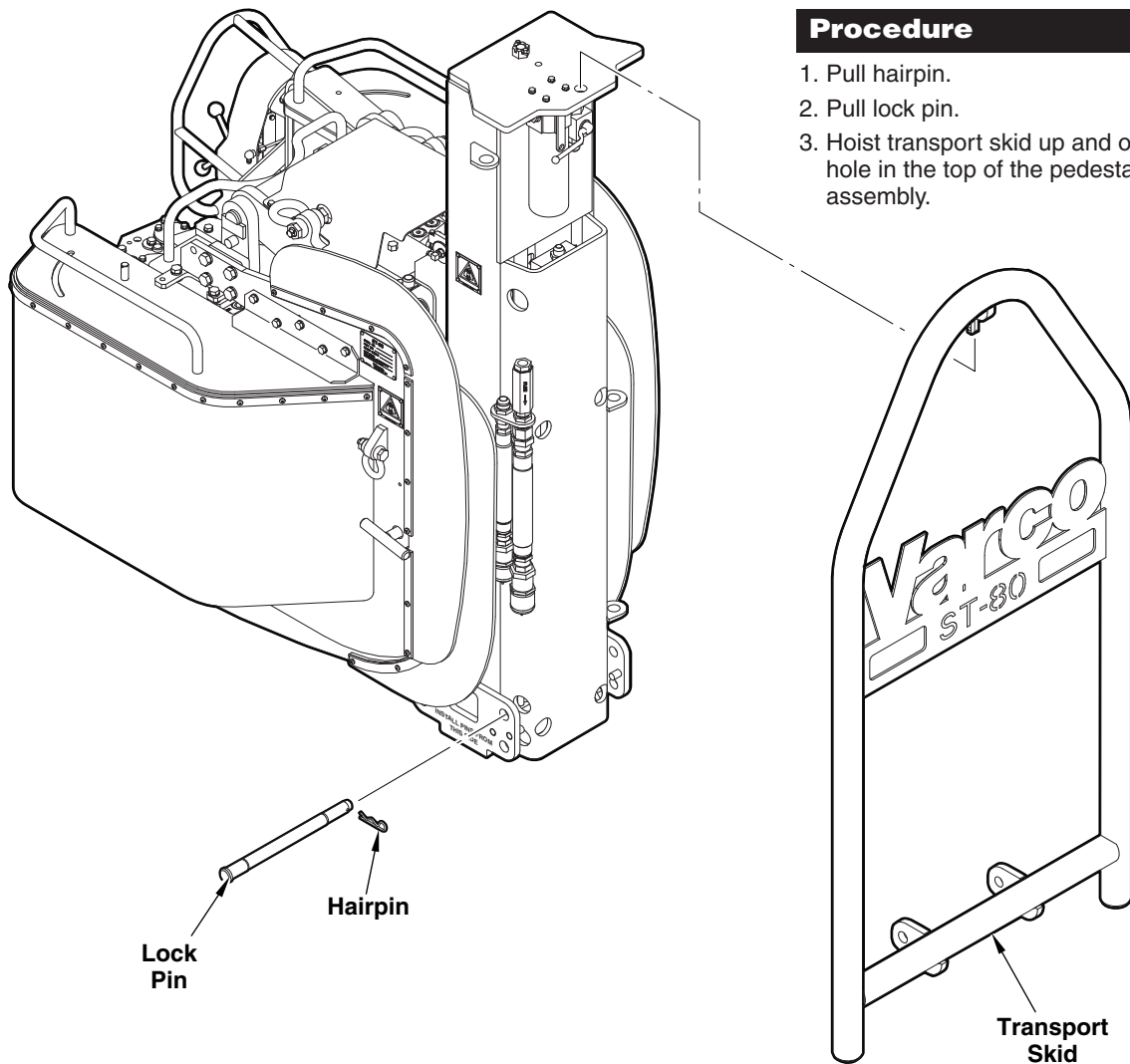
1



Lifting the ST-80

Procedure

1. Pull hairpin.
2. Pull lock pin.
3. Hoist transport skid up and out of the hole in the top of the pedestal assembly.





Transporting the ST-80

Whenever transporting the ST-80, ensure the unit remains vertical and is supported in a stable manner.

Always transport the ST-80 with the transportation skid installed. The skid increases stability.



Never lay the ST-80 on its side.

Attach tie-down straps to the two lifting shackles attached on the side of the ST-80 frame. Additional straps can be attached to major structural components of the ST-80 as required.



Never attach straps to, nor drape straps across the control assembly or side guards. These components are not designed to handle transport loads and if deformed and can create pinch points, potentially injuring personnel, and damaging the tool.

Using an ST-80 on Floating Vessels

Extra precautions are necessary when using an ST-80 on a floating vessel. There is an increased risk associated with using an ST-80 on floating vessels because the ST-80 can make sudden and unexpected movements.



NOV offers a special kit (P/N 30173525) for ST-80s used on floating vessels. The kit allows securing the ST-80 at well center, mousehole, and standby positions.

Floating vessels are subject to the actions of waves and wind, resulting in unpredictable floor motions. Such motions can cause an ST-80 to make sudden and unexpected movements. When this begins to occur, operations should cease and the ST-80 should be secured at standby position.

Procedure

When high waves and wind occur:

1. Immediately stop action.
2. Secure the Iron Roughneck to standby position.
3. If necessary to move the Iron Roughneck to a safe location, place the Iron Roughneck on a shipping skid.



Ensure the Iron Roughneck unit remains vertical and is stable during transport. Never position the Iron Roughneck on its side or back. Failure to heed this caution will cause damage to the equipment.

4. Use the lifting shackles to move the Iron Roughneck to a safe location.
5. When operating conditions are safe or normal, replace the Iron Roughneck into service.



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Specifications

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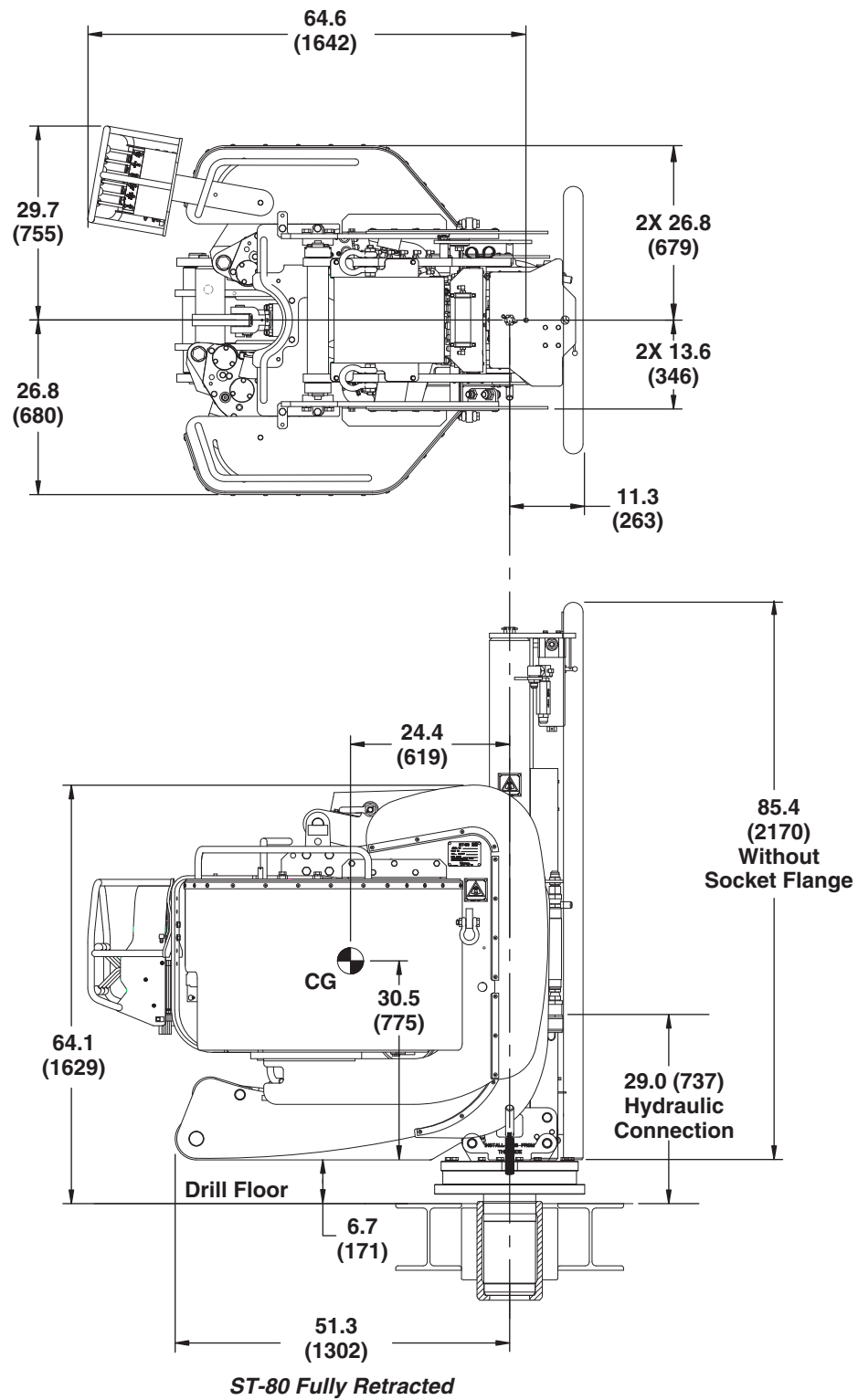


4





General Specifications





General Specifications

Hydraulic Requirements

Hydraulic supply pressure (max.)	2,500 psi
Hydraulic supply pressure (min.)	2,000 psi
Hydraulic flow rate required (min.)	28 gpm @ 1000 psi
Hydraulic flow rate required (max.)	40 gpm (150 l/min)
Supply connections (min.)	1-inch Hose (1 1/4 inch if hose length > 20 ft)
Return connections (min.)	1 1/4-inch Hose (1 1/2 inch if hose length > 20 ft)

Wrench Assembly

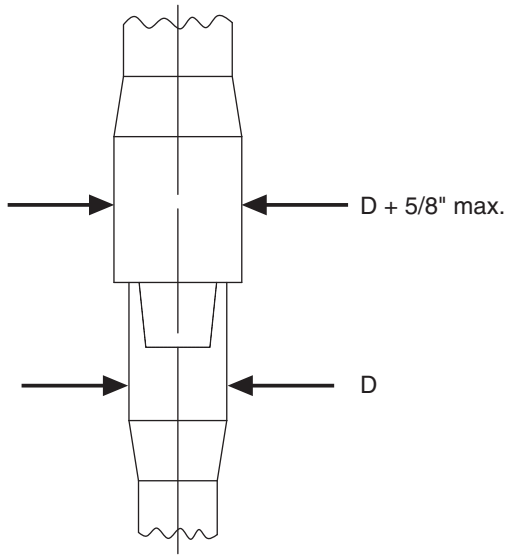
Motor spinning roller ratio	2:1
Spin speed (rollers)	135 rpm
Spin speed (Nom. 5" OD)	75 rpm
Make up torque	60,000 ft lb max.
Break out torque	80,000 ft lb max.

Shipping Data (approx., allowing for crate/palette)

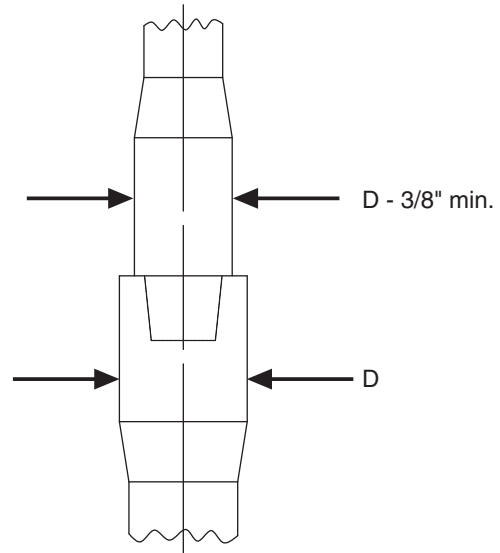
Height (without flange)	86 in.
Width	60 in.
Depth	65 in.
Weight	6,850 lb ST-80 480 lb Base Assembly



Allowable Tool Joint Differentials



Max. difference in diameter
pin larger than box.



Max. difference in diameter
pin smaller than box.

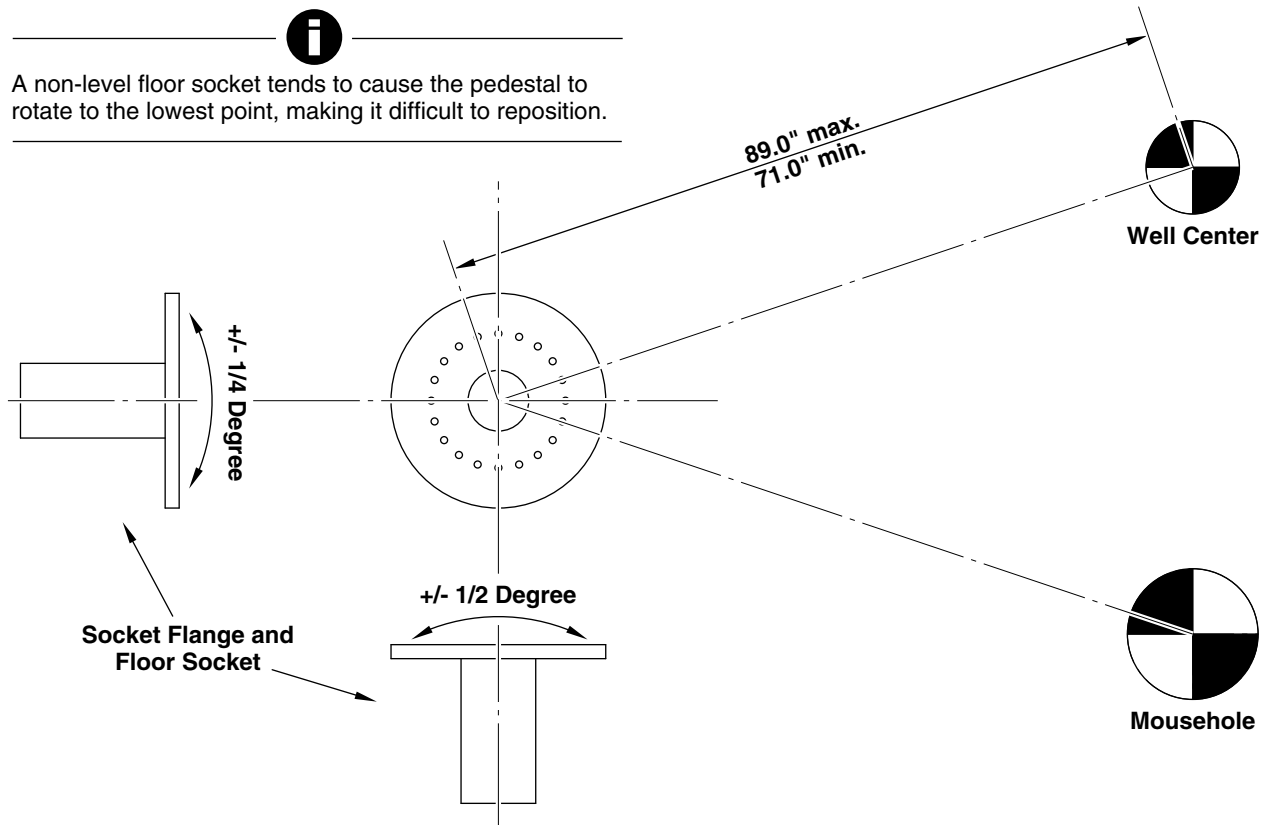


Neither pin nor box may be smaller than 4 1/4"
nor larger than 8 1/2".



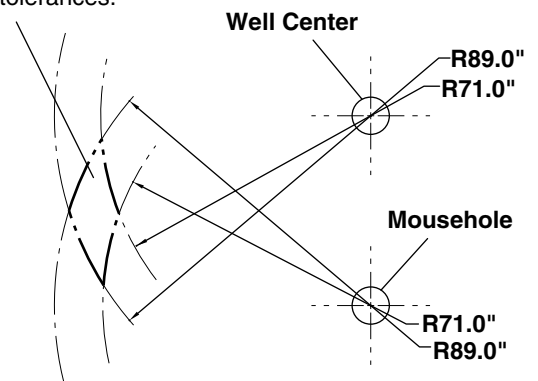
Installation Orientation and Tolerances

The ST-80 should be as level as possible in its socket. The following illustration shows the level tolerances for a typical ST-80 installation orientation.



The optimum place of the centerline of the socket of an ST-80 is determined by creating a diamond shape. This diamond shape is defined by the minimum (71.0") and maximum (89.0") reach of the ST-80.

Allowable Socket Center Position
Stay toward center to allow for tolerances.



i

When the diamond shape is defined in areas where no floor socket can be welded to the substructure, a reach extender can be used. See general arrangement drawing for additional dimensions and the reacting forces on the supporting structure of the rig.



Declaration of Conformity



2

DECLARATION OF CONFORMITY

MANUFACTURER: Varco
743 North Eckhoff St., Orange, California, 92868 USA

MACHINERY: ST-80 Iron Roughneck

COMPLIES WITH: The Machinery Directive 98/37/EC version 22 June 1998
The ATEX Directive 94/9/EC version 23 March 1994
The Pressure Equipment Directive 97/23/EC version 29 May 1997

COPY OF TECHNICAL
CONSTRUCTION
FILE LODGED WITH: Varco BJ, Nijverheidsweg 45, Etten-Leur, The
Netherlands, 4879 AP

Signed: 
John Parsons
Vice-President Engineering, Varco

Date: 1st AUGUST 2003.



Maintenance

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Maintenance

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Lubricant specifications

Refer to The Recommended Lubricants and Hydraulic Fluids document in the equipment User Manual.



The lubrication intervals described in this manual are based on lubricant supplier recommendations. Severe conditions such as extreme loads or temperature, corrosive atmosphere, and so on, may require more frequent lubrication



Inspection and lubrication

Inspecting hardware and fittings

Visually inspect the ST-80 for loose or missing hardware and fittings daily. Make sure all lock safety wire is undamaged and that the safety cable between the 3 guiding pins of the lower jaws is present.

Check the inline pressure filter weekly. Replace as necessary if the indicator is red during operation.

Inspect all hoses for wear or damage. Replace as necessary.

3



All hoses are clearly labeled. Consult hose kit drawings for proper routing and hose specification and always label when replacing hoses on the ST-80.

Lubricating the ST-80

The lubrication intervals described in this manual are based on lubricant supplier recommendations. Severe conditions such as extreme loads or temperature, corrosive atmosphere, etc., may require more frequent lubrication.

Worn bushings, binding parts, rust accumulations, and other abnormal conditions indicate more frequent lubrication is necessary.

Apply grease daily to all grease fittings as shown on the following page.



When greasing the spinner assembly, watch for clean grease extruding from under the spinning wrench rollers. If it becomes difficult to inject grease and no grease extrudes from under the spinner rollers, the grease vent maybe missing or clogged. This can jam the spinner rollers. Repair or replace as necessary.

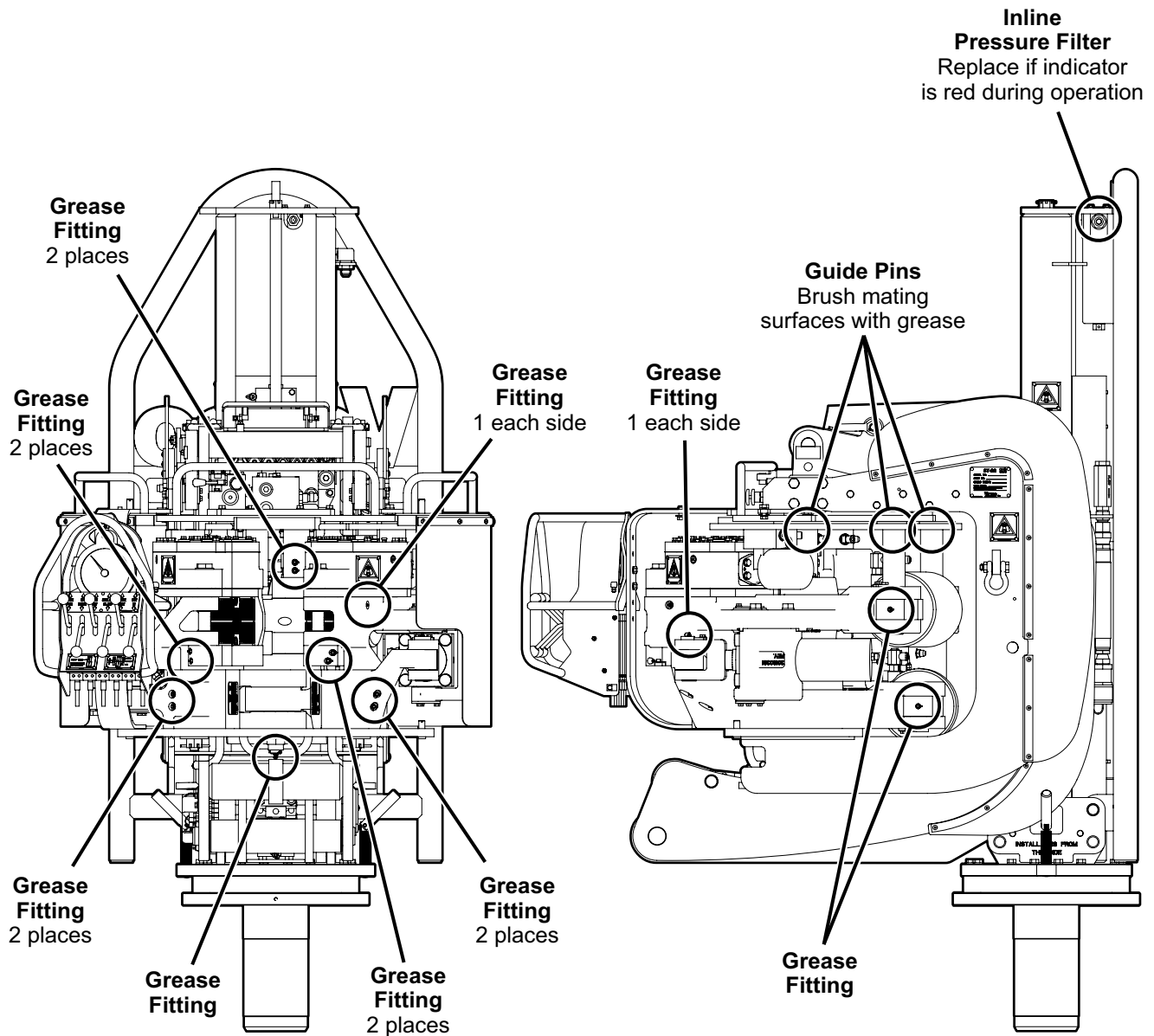


Clean any grease which falls to the floor to prevent possible injury due to slipping.



Inspection and Lubrication Daily

3



Each grease fitting is to be greased until clean grease is seen extruding from related component.

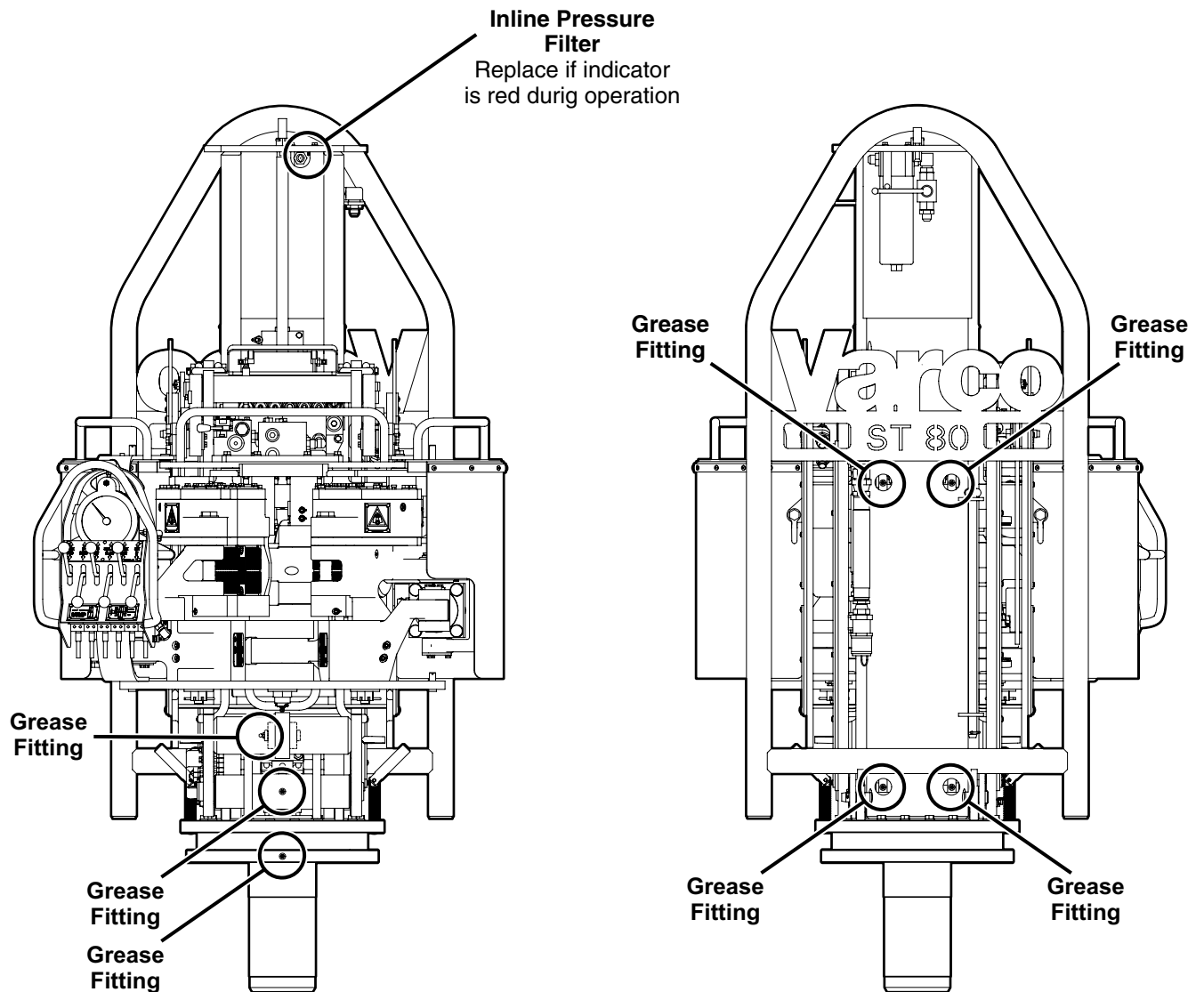


During operation, surfaces may become hot enough to cause bodily injury. To reduce the risk of injury from a hot component, allow the surface to cool before touching.



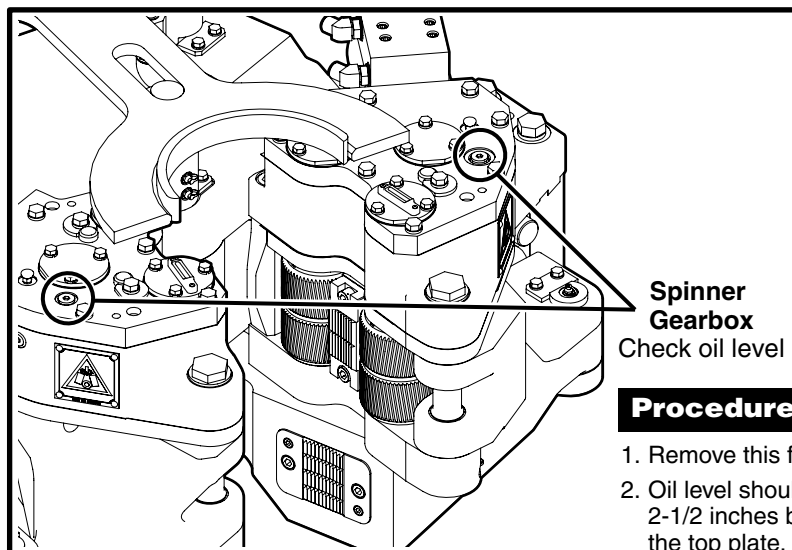
Inspection and Lubrication Weekly

3





Inspection and Lubrication Monthly



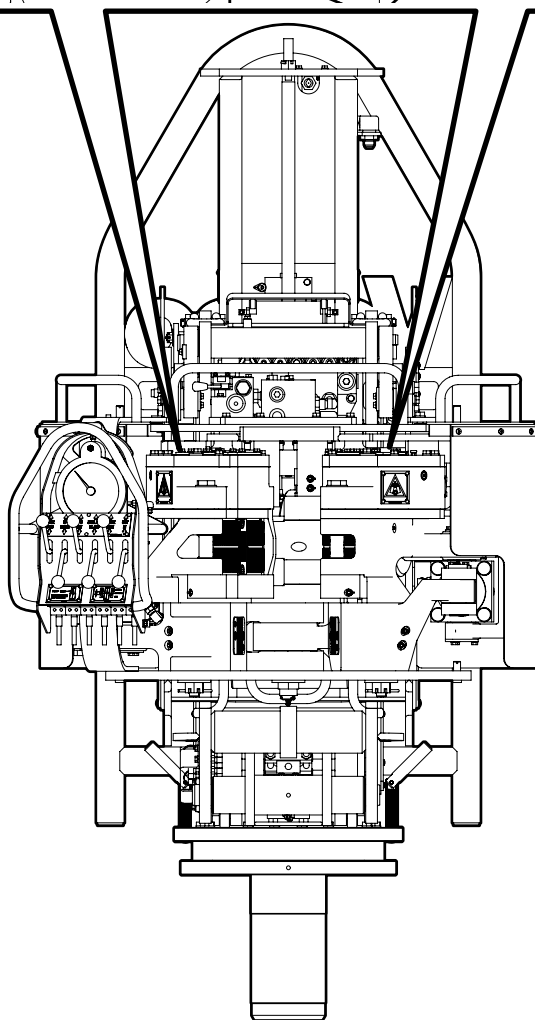
**Spinner
Gearbox**
Check oil level

Procedure

1. Remove this fitting and view oil level.
2. Oil level should be approximately 2-1/2 inches below the top surface of the top plate.



During operation, surfaces may become hot enough to cause bodily injury. To reduce the risk of injury from a hot component, allow the surface to cool before touching.

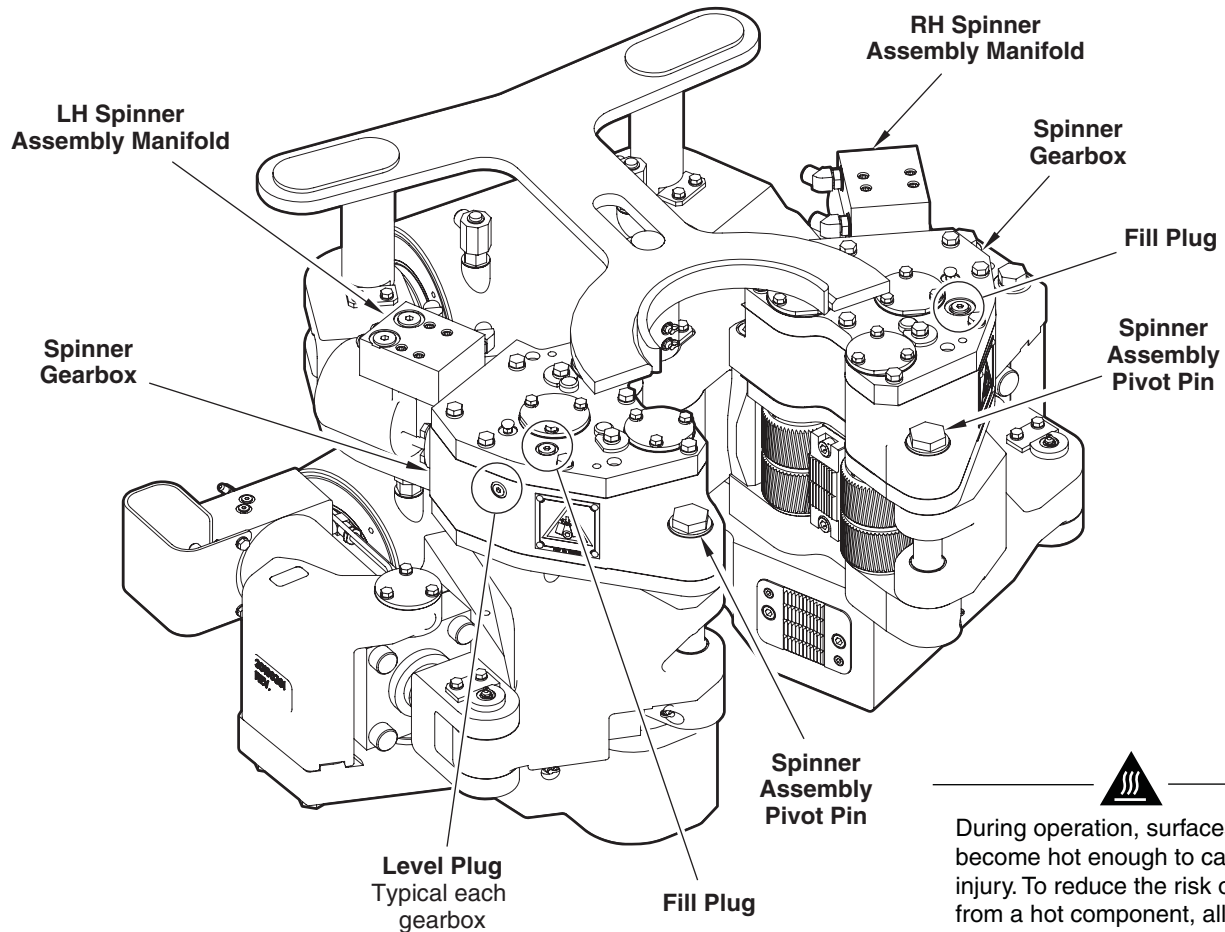




Inspection and Lubrication

6 Months

Changing the oil



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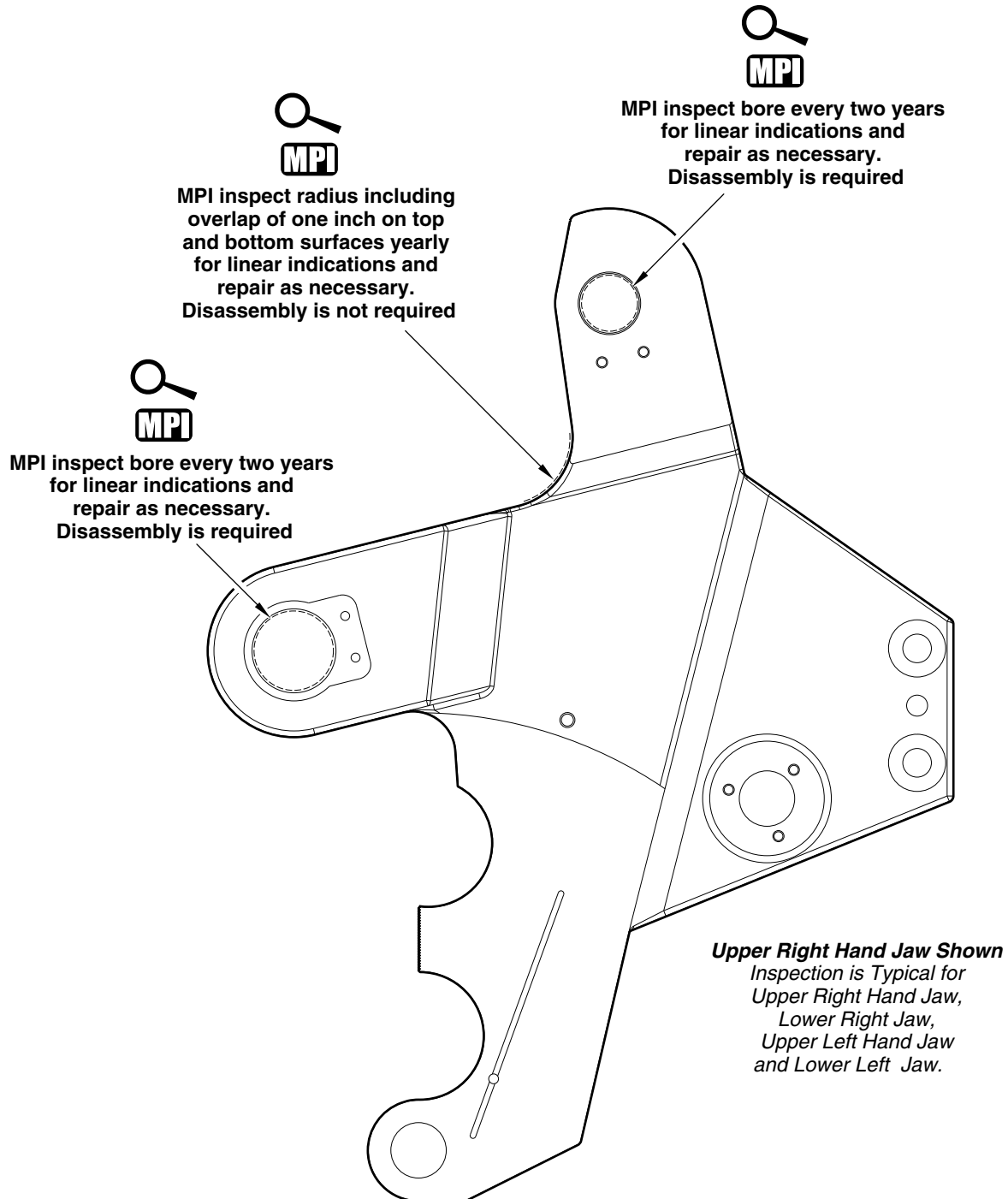
Procedure

Change the oil in the ST-80 spinner gear box every 6 months.

1. Disconnect the hydraulic hoses from the spinner assembly manifolds and cap fittings.
2. Remove the spinner assembly pivot pin.
3. Lift out the spinner assembly.
4. Remove fill and level plug.
5. Drain oil by tipping gearboxes. Look for sign of debris or contamination. Report any unusual findings to your local NOV Service Center.
6. Place the spinner assembly in position.
7. Apply anti-seize to the spinner assembly pivot pin and install it in the spinner assembly, torque to 350-400 ft lb.
8. Fill the gearboxes with fresh oil through the fill port (approx. 0.5 gallons). Refer to the *Recommended General Lubricants* Document in the User Manual.
9. Replace the fill and level plug.
10. Attach the hydraulic hoses to the spinner assembly manifold.
11. Operate the tool and verify SPIN-IN causes all rollers to turn CCW as viewed from above.



MPI Inspections





Disassembly and Assembly Precautions



Transport hydraulic components to a clean, dust-free service area before disassembling for service.

3



Disassembly procedures are performed when replacing damaged components that are causing a tool function to fail. Whenever performing a disassembly, practice preventive maintenance by:

- ❑ Cleaning and inspecting all disassembled parts.
- ❑ Replace all worn and damaged parts before they can cause another failure.
- ❑ Installing thread protectors on exposed threads.



Torque all fasteners to the limits given in DS 00008 (Design Specification Design Torque Standard) unless an alternative torque value is given in the procedure.



Disassembly and Assembly



Release all hydraulic oil pressure before disconnecting hydraulic lines. Hydraulic oil under pressure can penetrate skin and cause serious injury.

Before opening the hydraulic system, thoroughly clean the work area. Maintain system cleanliness by promptly capping all disconnected lines. Dirt is extremely harmful to hydraulic system components and can cause equipment failure and subsequent injury to personnel.

Ensure all hydraulic lines are isolated and the ball valve is closed before any work is performed on the ST-80

If air is introduced into the duplex extend cylinder, use extreme caution when extending the platform for the first time. As the load moves over center, the air will compress causing the support arm to extend rapidly. Support unit with tugger and stand to the side until air is purged.



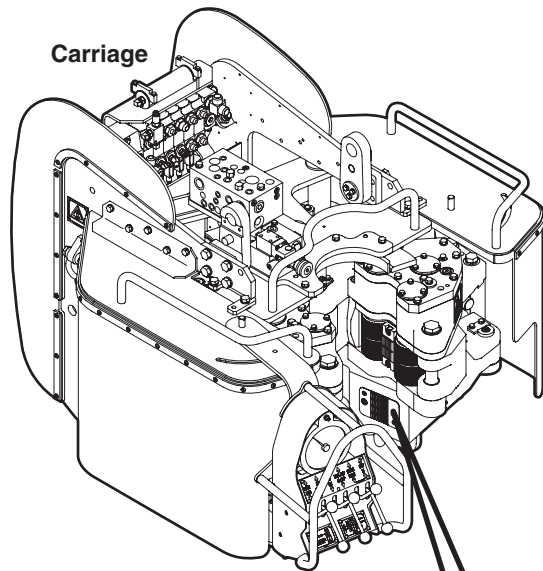
During operation, surfaces may become hot enough to cause bodily injury. To reduce the risk of injury from a hot component, allow the surface to cool before touching.



Disassembly and Assembly

Changing Dies

3



Procedure

Replacing upper dies

1. Clean the area around the dies and remove the two screws holding each die and discard screws.
2. Remove worn die.
3. Clean the backing surfaces with wire brush, inspect and grease lightly.
4. Install new dies and screws, torque to 138-152 ft lb.

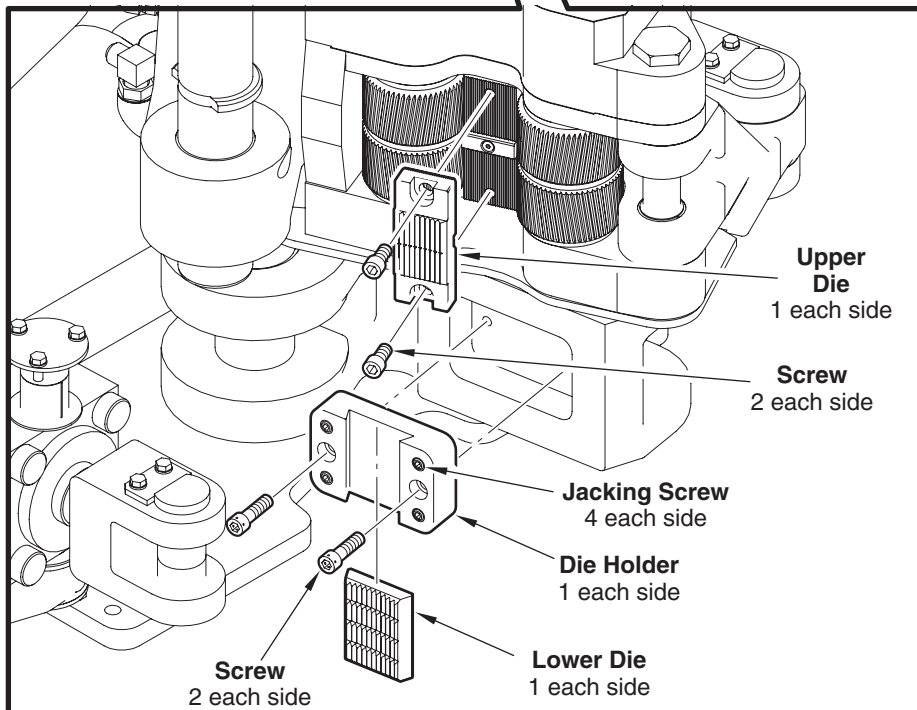
Replacing lower dies

1. Remove all main socket head screw (2 per die carrier) and all set screws (4 per die carrier) from both die carriers.
2. Screw handtight 1 socket head screw in each of the 4 corners.
3. Advance each of the 4 socket head screws 1/2 turn at a time in an X pattern until die carrier comes free.



Caution the die can slip out of the die holder once its free of the housing.

4. Remove die and socket head screws from die carrier.
5. Discard the existing screws, set screws and dies after disassembly.
6. Clean receiving pocket and die holder thoroughly, and liberally apply anti-seize to all mating surfaces before reinstalling them.
7. Install new dies in die carrier and slide die carrier back in pocket.
8. Install new screws and torque to 70-80 ft lb.
9. Install and tighten the jacking screws to prevent them from falling out (15-20 ft lb).



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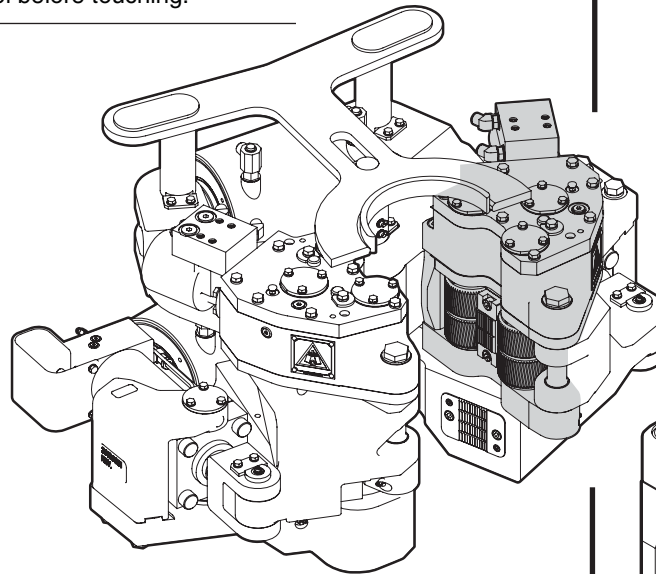


Disassembly and Assembly

Replacing Spin Rollers and Slide Rings



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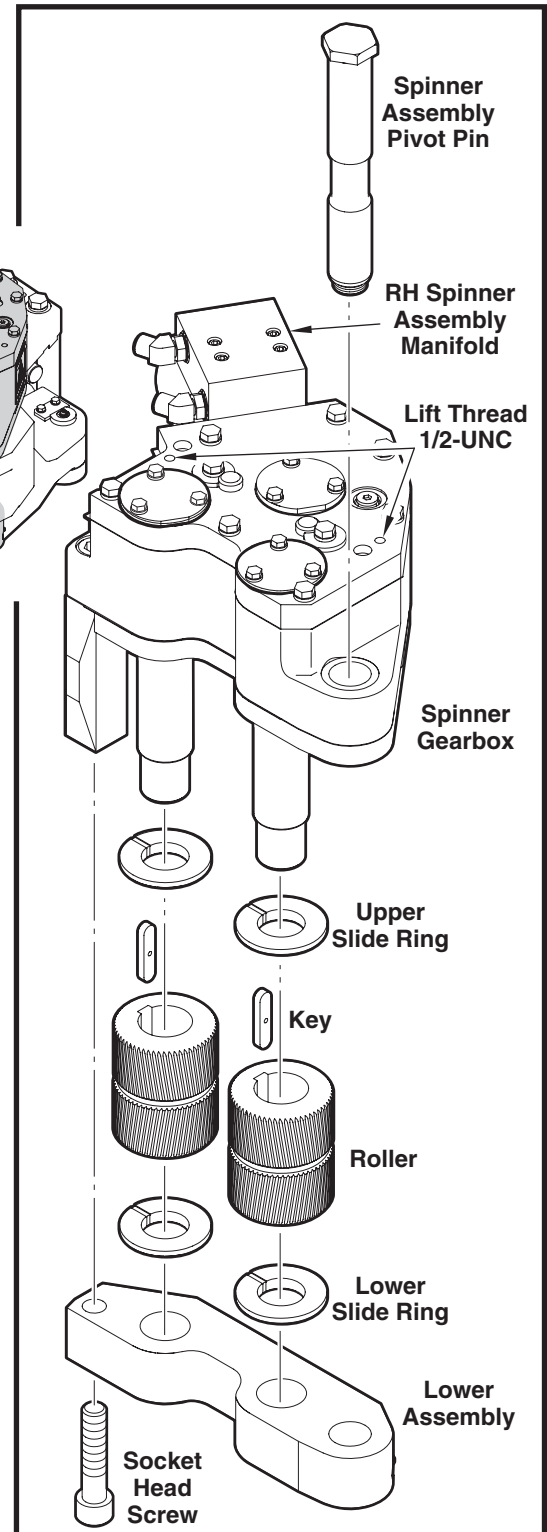


Disassembly

1. Disconnect the hydraulic hoses from the spinner assembly manifolds and cap fittings.
2. Remove the spinner assembly pivot pin.
3. Lift out the spinner assembly and place it on a table.
4. Remove the socket head screw from the bottom of the lower assembly.
5. Remove the lower assembly.
6. Slide off rollers, remove keys and upper and lower slide rings.

Assembly

1. Install upper slide rings with grooves.
2. Ensure the shaft keys are in place and slide on new rollers.
3. Install lower slide rings and replace the lower assembly.
4. Replace socket head screw in bottom of lower assembly. Apply anti-seize to entire length and torque to 450-500 ft lb.
5. Reassemble the spinner assembly to upper jaws and install spinner assembly pivot pin. Apply anti-seize to the threads of the pin and torque to 350-400 ft lb.
6. Attach hydraulic hoses to spinner assembly manifold.
7. Operate the tool and verify SPIN-IN causes all rollers to turn CCW as viewed from above.

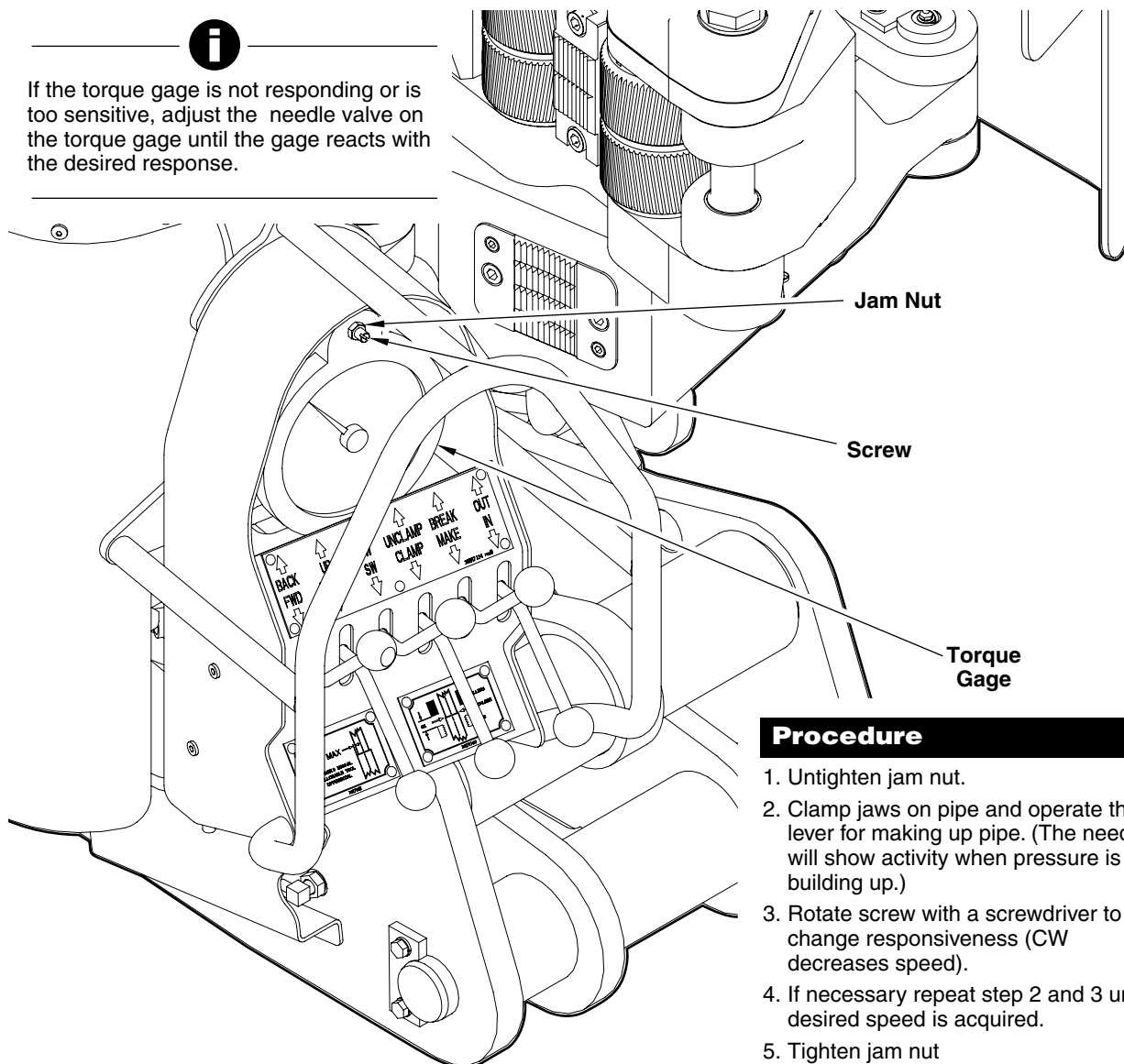




Adjusting Torque Gage Responsiveness



If the torque gage is not responding or is too sensitive, adjust the needle valve on the torque gage until the gage reacts with the desired response.



Procedure

1. Untighten jam nut.
2. Clamp jaws on pipe and operate the lever for making up pipe. (The needle will show activity when pressure is building up.)
3. Rotate screw with a screwdriver to change responsiveness (CW decreases speed).
4. If necessary repeat step 2 and 3 until desired speed is acquired.
5. Tighten jam nut



Do not screw out set screw all the way. It will loose engagement with counterpart.

Troubleshooting

Troubleshooting the ST-80 4-3

 Troubleshooting tables 4-4



Troubleshooting

1



2



3



4



Troubleshooting the ST-80

This section describes general troubleshooting methods and provides tables for troubleshooting specific problems or components.



Make sure all hydraulic lines are isolated and the ball valve is closed before any work is performed on the ST-80.

When troubleshooting the ST-80, make sure the hydraulic pressure is between 2,050 and 2,100 psi at the inlet of the manifold. Check the back pressure of the tank line (ensure the pressure does not exceed 30 psi).

1. Ensure that all hoses and QDs are properly connected.
2. Check manifold, fittings, QDs and hoses for leaks or damage.
3. Ensure the tool is lubricated per the *Maintenance* section.

The most important things to check after each rig move and before operating the ST-80 are:

1. Ensure that the ST-80 is fully inserted in the socket.
2. Ensure all QDs are fully engaged
3. Ensure the operating pressures are correct.
4. Verify the condition of the filter.
5. Check all fittings for leaks.
6. Lubricate entire ST-80 and check the condition of the filter per the *Maintenance* section.



Troubleshooting the ST-80

Troubleshooting tables

Operating mode problems

Symptom	Probable cause	Remedy
Tool runs slowly.	Hydraulic quick disconnect on supply or return lines not fully shouldered.	Tighten until fully shouldered.
	Power unit not delivering full flow.	Check power supply flow while spin out valve is actuated. Flow should be 35 GPM minimum.
	Power unit return line filter dirty.	Replace filter element of HPU.
	Pressure filter dirty.	Replace filter element of ST80.
	Torque pressure set too low.	Increase pressure setting.

Vertical positioning problems

Symptom	Probably cause	Remedy
Vertical positioning assembly moves in one direction only or does not move at all.	Power supply not operating, or pressure too low.	Re-establish hydraulic power.
	Lift cylinder damaged or dirty.	Clean or repair cylinder.
	Binding of carriage in pedestal.	Lubricate or replace side rollers.
	Push/Pull cable broken.	Replace cable.
Does not maintain vertical position	Counterbalance valve out of adjustment.	Replace, or adjust counterbalance valve to maintain vertical position.
	Lift cylinder leak.	Replace seals.

Troubleshooting the ST-80

Troubleshooting tables

Troubleshooting the torque wrench

System	Probable cause	Remedy
Torque cylinders do not makeup.	Torque valve set too low.	Increase setting.
	Torque valve or pressure reducing valve stuck closed, dirty, or damaged.	Check valves, clean or replace.
	Torque cylinders already at end of stroke.	Recycle the upper jaw for next bite.
	Torque setting damaged.	Check, clean, or replace.
Torque cylinders do not breakout.	Torque setting pressure reducing valve stuck closed, dirty or damaged.	Check valves, clean or replace.
Torque cylinders drift in makeup direction.	Sticking or worn main operating valve.	Disassemble valve, inspect for contamination or wear, and repair or replace.
	Excessive back pressure on return line.	Check for restriction in return line. Check hydraulic power supply. Check for other equipment using same tank line.
Torque cylinders drift in breakout direction.	Sticking or worn main operating valve.	Disassemble valve, inspect for contamination or wear, and repair or replace.
	Push/Pull cable broken.	Replace cable.
Torque cylinder don't move or move slowly.	Dirty return filter in power supply.	Replace filter element.
	Dirty inlet port or gage.	Clean inlet port or replace gage.
Torque gage does not indicate pressure during makeup	Dump valve stuck open (depressed, pressure does not build up) or set incorrectly.	Adjust full CW test if still no pressure reading, replace, readjust 1/4 turn from full CCW position.
	Torque cylinders reached end of stroke and actuated dump valve.	Reset for additional stroke.
	gage damper closed.	Open damper located on top front of gage (rotate counterclockwise).
	gage not adjusted to zero.	Rotate zero adjust knob on back of gage case. Recheck torque setting.
Torque gage goes not retrun to zero.	Tank line pressure.	Check and correct.
	Defective gage.	Replace.



Troubleshooting the ST-80

Troubleshooting tables

Troubleshooting the torque wrench (cont')

System	Probable cause	Remedy
Jaws slip on tool joint.	Worn or broken dies.	Replace dies.
	Hydraulic pressure too low.	Make sure the pressure at the manifold is set to 2,050-2,100 psi.
Upper torque wrench body lifts while cycling in makeup or breakout mode.	Interference between upper and lower body sets.	Check and remove interference.
Torque wrench clamp cylinders too slow or uneven.	Check valves on manifold contaminated or defective.	Clean, repair, or adjust valves.
	Lack of lubrication.	Lube all grease fittings.
	Push/Pull cable broken.	Replace cable.

Troubleshooting the spinner assembly

Symptom	Probable cause	Remedy
Spinner assemblies do not clamp or unclamp and/or motors do not run.	Flow restricted.	Locate cause or restriction and correct.
	Power supply defective.	Check power supply.
	Push/Pull cable broken.	Replace cable.
Spinner assemblies or motor creep with valve in neutral position.	Leaking or sticky valve.	Return valve to center position manually. If problem persists, inspect valve spool for wear or contamination. Repair or replace.
Motor runs irregularly.	Contaminated motor.	Repair motor or replace.
	Bent shaft.	Repair motor or replace.
Spinner assemblies do not move in unison.	Defective pivot.	Check hinge pins and bores and repair or replace as required.
	Lack of lubrication.	Lube all grease fittings.
	Defective piston/gland.	Repair or replace.
	Restriction in hydraulic line.	Check for pinched, clogged, or otherwise obstructed hydraulic lines. Clear obstruction.

Troubleshooting the ST-80

Troubleshooting tables

Troubleshooting the spinner assembly (cont')

System	Probable cause	Remedy
Spin rollers do not turn with motor running, or have insufficient power.	Sheared drive roller key.	Replace key.
	Nut that keeps bevel gear in place on motor shaft is backed off.	Remove motor, retighten nut and secure nut with lock tab.
	Motor seal blown.	Replace motor seals. Check that motor drain lines are open to tank.
	Flow restricted to motor.	Locate cause of restriction and correct.
	Defective roller bearings.	Replace bearings.
	Defective motor.	Repair motor.
	Motor Drive shaft broken.	Replace Shaft.
Loss of power, torque.	Power supply not operating.	Check power supply pressure gage for indication. Ensure that supply pressure remains high with operating valve energized.
	Restricted hydraulic lines.	Check for pinched, clogged, or otherwise obstructed hydraulic lines. Clear obstruction.
	Worn cylinder seals.	Replace seals.
Drill pipe or collars rub against spinner housing during spinning.	Spin rollers worn excessively.	Replace spin rollers.
Spin rollers slip.	Insufficient clamping pressure.	Check pressure at manifold set to 2,050-2,100 psi. Check for leaks in clamping lines and replace as required. Replace and check relieving valves in manifold (CB8, CB9 and RV1).
	Defective seal on spin clamp cylinder piston.	Replace seal.
	Slippery connection.	Clean connection.
	Spin rollers worn.	Replace spin rollers.
Spinner motor does not run.	Push/Pull cable broken.	Replace cable.

