

Operator's Manual

PH-15, PH-20, PFH-15 and PFH-20
Coulter Command System

Great Plains

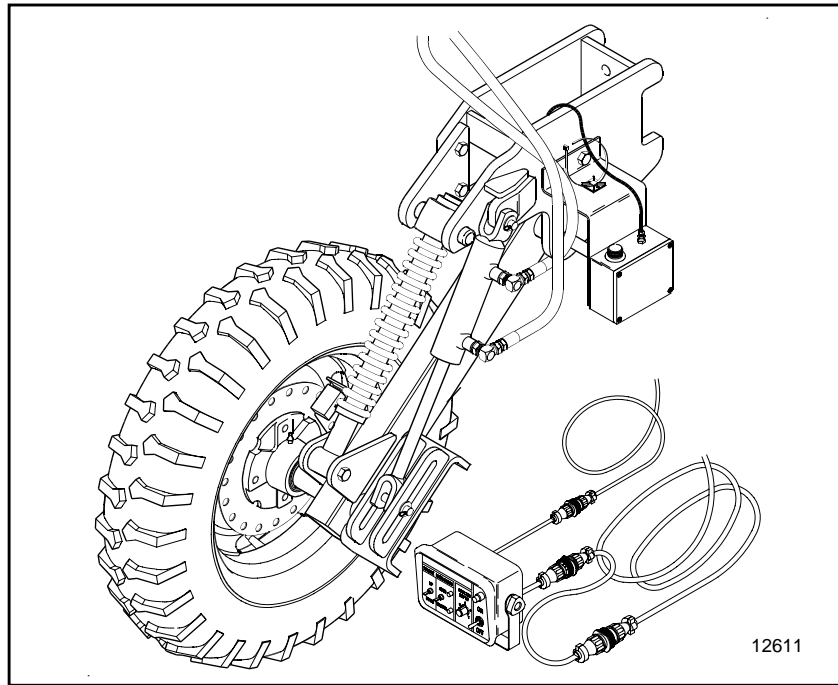
Manufacturing, Inc.

P.O. Box 5060 • Salina, Kansas 67402-5060



Read the operator's manual entirely. When you see this symbol, the subsequent instructions and warnings are serious - follow without exception. Your life and the lives of others depend on it!

Great Plains



Cover illustration may show optional equipment not supplied with standard unit.

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Important Safety Information

Look for Safety Symbol

The SAFETY ALERT SYMBOL indicates there is a potential hazard to personal safety involved and extra safety precaution must be taken. When you see this symbol, be alert and carefully read the message that follows it. In addition to design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.



Be Aware of Signal Words

Signal words designate a degree or level of hazard seriousness. The signal words are:

⚠ DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

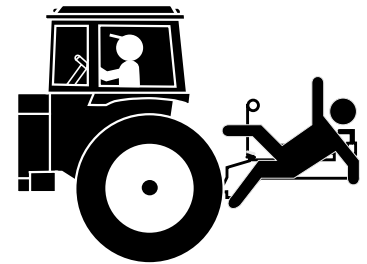
⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Keep Riders Off Machinery

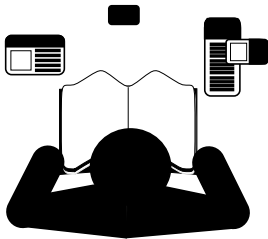
Riders obstruct the operator's view. Riders could be struck by foreign objects or thrown from machine.

- ▲ Never allow riders on implement.
- ▲ Never allow children to operate equipment.



For Your Protection

- ▲ Thoroughly read and understand *Safety Decals*, page 4. Read all instructions noted on decals.



Handle Chemicals Properly

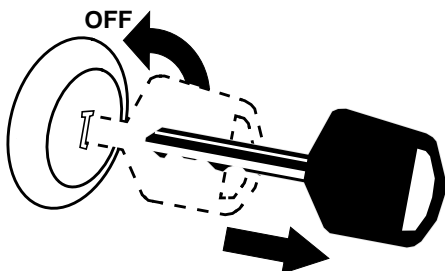
Agricultural chemicals can be dangerous. Improper use can seriously injure persons, animals, plants, soil and property.

- ▲ Wear protective clothing.
- ▲ Handle all chemicals with care.
- ▲ Follow instructions on container label.
- ▲ Avoid inhaling smoke from any type of chemical fire.
- ▲ Store or dispose of unused chemicals as specified by chemical manufacturer.



Shutdown and Storage

- ▲ Lower machine to ground, put tractor in park, turn off engine, and remove key.
- ▲ Detach and store implement in an area where children normally do not play. Secure implement with blocks and supports.

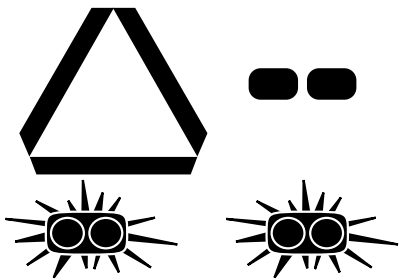


Important Safety Information

Use Safety Lights and Devices

Slow-moving tractors, self-propelled equipment and towed implements can create a hazard when driven on public roads. They are difficult to see, especially at night.

- ▲ Use flashing warning lights and turn signals whenever driving on public roads.
- ▲ Use lights and devices provided with implement.



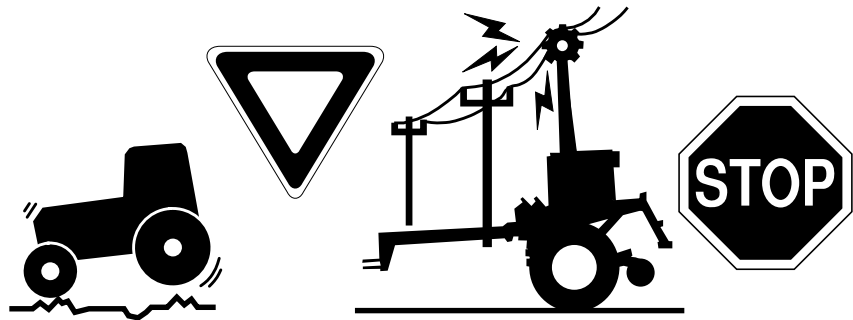
Transport Machinery Safely

Maximum transport speed for implement is 20 mph. Some rough terrains require a slower speed. Sudden braking can cause a towed load to swerve and upset.

- ▲ Do not exceed 20 mph. Never travel at a speed which does not

allow adequate control of steering and stopping. Reduce speed if towed load is not equipped with brakes.

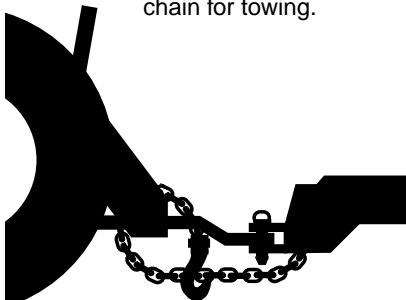
- ▲ Comply with state and local laws.
- ▲ Do not tow an implement that, when fully loaded, weighs more than 1.5 times the weight of towing vehicle.



Use A Safety Chain

- ▲ Use a safety chain to help control drawn machinery should it separate from tractor drawbar.
- ▲ Use a chain with a strength rating equal to or greater than the gross weight of towed machinery.
- ▲ Attach chain to tractor drawbar support or other specified anchor location. Allow only enough slack in chain to permit turning.
- ▲ Replace chain if any links or end fittings are broken, stretched or damaged.

- ▲ Do not use safety chain for towing.



Practice Safe Maintenance

- ▲ Understand procedure before doing work. Use proper tools and equipment. Refer to this manual for additional information.
- ▲ Work in a clean, dry area.
- ▲ Lower implement to ground, put tractor in park, turn off engine, and remove key before performing maintenance.

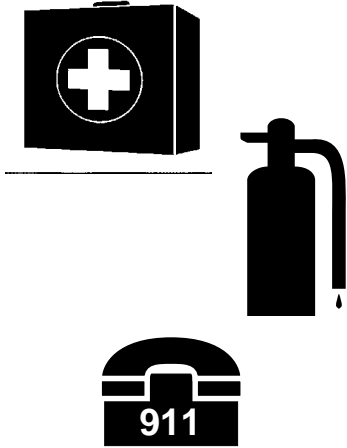
- ▲ Allow implement to cool completely.
- ▲ Inspect all parts. Make sure parts are in good condition and installed properly.
- ▲ Remove buildup of grease, oil or debris.
- ▲ Remove all tools and unused parts from implement before operation.



Important Safety Information

Prepare for Emergencies

- ▲ Be prepared if a fire starts.
- ▲ Keep a first aid kit and fire extinguisher handy.
- ▲ Keep emergency numbers for doctor, ambulance, hospital and fire department near phone.



Wear Protective Equipment

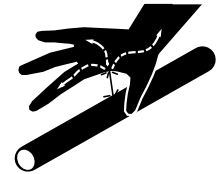
- ▲ Wear protective clothing and equipment.
- ▲ Wear clothing and equipment appropriate for the job. Avoid loose-fitting clothing.
- ▲ Because prolonged exposure to loud noise can cause hearing impairment or hearing loss, wear suitable hearing protection such as earmuffs or earplugs.
- ▲ Because operating equipment safely requires your full attention, avoid wearing radio headphones while operating machinery.



Avoid High Pressure Fluids Hazard

Escaping fluid under pressure can penetrate skin, causing serious injury.

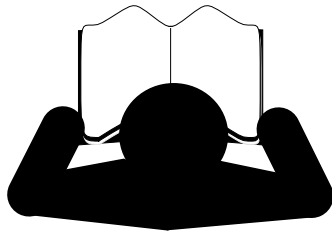
- ▲ Avoid the hazard by relieving pressure before disconnecting hydraulic lines.
- ▲ Use a piece of paper or cardboard, NOT BODY PARTS, to check for suspected leaks.
- ▲ Wear protective gloves and safety glasses or goggles when working with hydraulic systems.
- ▲ If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.



Safety at All Times

Thoroughly read and understand this manual before operating implement. Refer to *Safety Decals*, page 4. Read all instructions noted on decals.

- ▲ Be familiar with all implement functions.
- ▲ Operate implement from driver's seat only.
- ▲ Do not leave tractor or implement unattended with engine running.
- ▲ Do not dismount a moving tractor. Dismounting a moving tractor could cause serious injury or death.



- ▲ Do not stand between the tractor and implement during hitching.
- ▲ Keep hands, feet and clothing away from power-driven parts.
- ▲ Wear snug-fitting clothing to avoid entanglement with moving parts.
- ▲ Watch out for wires, trees, etc., when raising implement. Make sure all persons are clear of working area.
- ▲ Do not turn tractor too tight, causing implement to ride up on wheels.

Tire Safety

Tire changing can be dangerous and should be performed by trained personnel using correct tools and equipment.

- ▲ When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side—not in front of or over tire assembly. Use a safety cage if available.
- ▲ When removing and installing wheels, use wheel-handling equipment adequate for weight involved.



Introduction

Great Plains welcomes you to its growing family of new product owners. This implement has been designed with care and built by skilled workers using quality materials. Proper setup, maintenance and safe operating practices will help you get years of satisfactory use from the machine.

Description of Unit

The Precision Hitch Coulter Command System couples a microprocessor with electro-hydraulics to provide a state-of-the-art system for maintaining coulter depth regardless of the terrain or soil type. It also provides coulter depth adjustment from the tractor cab.

The Coulter Command System contains a depth sensing wheel, an electronic control box, a speed sensor, a depth sensor box, a lift control switch, a wiring harness, a top link and a hydraulic control valve. It uses the tongue cylinder from your Precision Hitch.

This manual applies to the following:

- 148-382A Precision Hitch Coulter Command, Non Fertilizer
- 148-383A Precision Hitch Coulter Command, For Fertilizer

Refer to the Precision Hitch operator's manual for detailed information on safely operating, adjusting, troubleshooting and maintaining the Precision Hitch. Refer to the parts manual for Coulter Command part identification.

- 148-365M PH-15, PH-20, PFH-15 and PFH-20 Operator's Manual
- 148-365P PH-15, PH-20, PFH-15 and PFH-20 Parts Manual

Using This Manual

This manual will familiarize you with safety, assembly, operation, adjustments, troubleshooting and maintenance. Read this manual and follow the recommendations to help ensure safe and efficient operation.

The information in this manual is current at printing. Some parts may change to assure top performance.

Definitions

The following terms are used throughout this manual.

Right-hand and left-hand as used in this manual are determined by facing the direction the machine will travel while in use unless otherwise stated.

IMPORTANT: A crucial point of information related to the preceding topic. For safe and correct operation, read and follow the directions provided before continuing.

NOTE: Useful information related to the preceding topic.

Owner Assistance

If you need customer service or repair parts, contact a Great Plains dealer. They have trained personnel, repair parts and equipment specially designed for Great Plains products.

Your machine's parts were specially designed and should only be replaced with Great Plains parts. Always use the serial and model number when ordering parts from your Great Plains dealer.

Your Great Plains dealer wants you to be satisfied with your new machine. If you do not understand any part of this manual or are not satisfied with the service received, please take the following actions.

1. Discuss the matter with your dealership service manager. Make sure they are aware of any problems so they can assist you.
2. If you are still unsatisfied, seek out the owner or general manager of the dealership.
3. For further assistance write to:

Product Support

Great Plains Mfg. Inc., Service Department

PO Box 5060

Salina, KS 67402-5060

Section 1 Assembly and Setup

Prestart Checklist

Check

- All major frame components

- Fasteners and pins that were shipped with the Coulter Command System.
NOTE: All hardware from the factory has been installed in the location where it will be used. If a part or fastener is temporarily removed for assembly reasons, remember where it goes. Keep the parts separated.

- Have a minimum of 2 people at hand while assembling the Coulter Command System.

- Have a forklift or loader along with chains and safety stands ready for the assembly task.

- If you are unsure where a fastener is used, refer to the Parts Manual to identify it.

See Figure 1-1.

Install the coulters depth sensing wheel assembly (1) to the front 4" x 4" coulters tool bar tube with the two 5/8 x 6 inch u-bolts (2), lock washers (3) and nuts (4).

Position the center of the coulters depth sensing wheel mount bracket 2 1/4 inches to the right of the center of the Precision Hitch beam. This will leave about 2 3/4 inch clearance between the inside of the depth sensing tire and the edge of the hitch center beam.

Depth Sensing Wheel

If your Precision Hitch is equipped with liquid fertilizer (PFH), the fertilizer drive wheel doubles as the coulters depth sensing wheel and will require additional sensor assembly and adjustment.

If you do not have the liquid fertilizer option (PFH), the coulters command will contain a coulters depth sensing wheel which is subassembled and preadjusted.

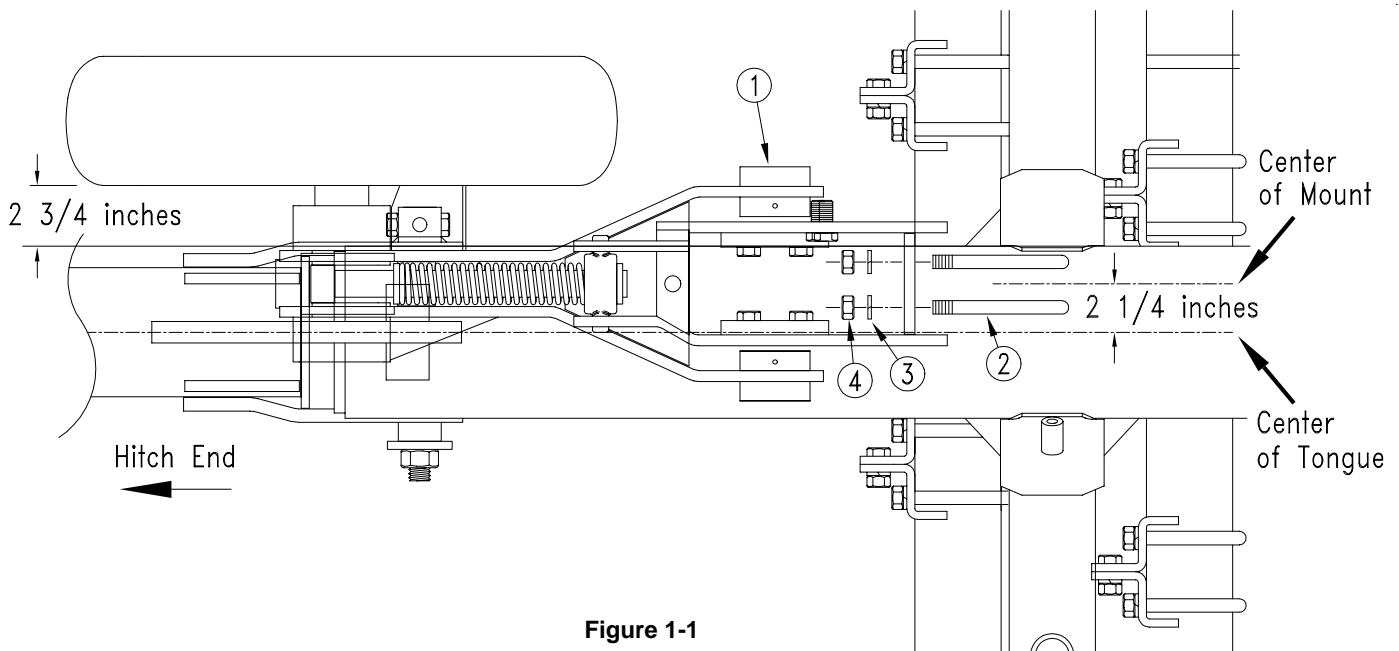


Figure 1-1
Depth Sensing Wheel

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Section 1 Assembly and Setup

Sensor Box

If the sensor box is not preassembled to the depth sensing wheel, refer to Figure 1-2 and the following instructions.

1. Assemble sensor spindle (1) to left end of fertilizer drive wheel rockshaft with three 1/4 x 3/4 inch bolts (2) and lock washers (3).
2. Bolt the bearing (4) between two flangettes (5) and to the back side of the sensor mount plate (6) with 5/16 x 3/4 inch carriage bolts (7), lock washers (8) and nuts (9). Do not tighten nuts at this time.

NOTE: Position the heads of the bolts against the flangettes with lock washers and nuts pointing outward. Locking collar on bearing should point away from the sensor mount plate and toward the coulter depth sensing wheel.

3. Place rubber gasket (10) between sensor box (11) and the sensor mount plate (6). Screw sensor box to sensor mount plate with #10 x 7/16 inch pan head screws (12) and star lock washers (13).
4. Remove cover from sensor box and inspect the internal linkages. The circular disk (14) should be linked to the flat bar (15) with a formed round bar link (16). Make sure the round bar link is in place and secured with a spring clip extension spring (17) that is connected between the circular disk and the flat bar through the small holes.

5. Slide bearing and sensor mount plate subassembly over sensor spindle (1), and bolt sensor mount plate to drive wheel mount bracket with 1/2 x 1 1/2 inch bolts (18), lock washers (19) and nuts (20).
6. Place circular disk (13) over threaded end of sensor spindle (1) and install a 3/8 inch washer (21) and flange nut (22). Do not tighten flange nut at this time.
7. With the circular disk in place, slide the sensor mount plate subassembly in or out until the vertical flat bar link (15) and the circular disk are aligned.
8. Tighten two set screws on the bearing (4) to hold the subassembly in place.
9. Tighten the flangette bolts (7) being careful not to damage the internal linkages.
10. Set sensor box cover and cover screws aside and continue with speed sensor assembly.

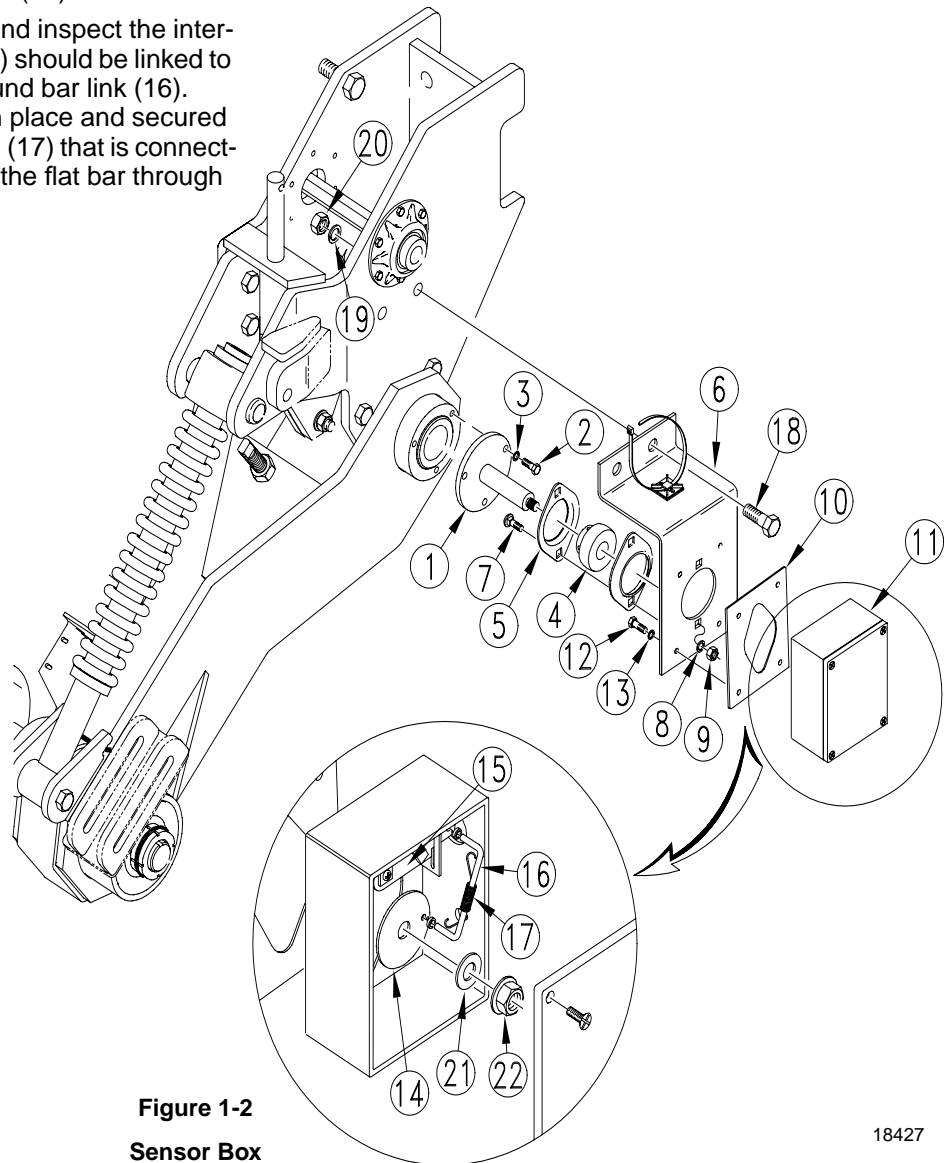


Figure 1-2
Sensor Box

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Section 1 Assembly and Setup

Gauge Wheel Lift Cylinder

Refer to Figure 1-3.

1. Install the base end of the lift cylinder (1) to gauge wheel mount bracket with a 1/2 x 1 3/4 inch clevis pin (2) and a 1/8 x 3/4 inch cotter pin (3) provided with the cylinder.

NOTE: The ports on the cylinder should point away from the depth sensing gauge wheel.

2. Place the rod end of the lift cylinder between the slotted lugs on the gauge wheel arm. Place a flat washer (4) on the outside of each slotted lug on the gauge wheel arm. Pin in place with a 1 1/2 x 2 3/4 inch clevis pin (5) and a 1/8 x 3/4 inch cotter pin (3).

Speed Sensor

Refer to Figure 1-4.

1. Remove the tire and rim from the depth sensing wheel and bolt the speed sensor plate (1) between the wheel and rim.
2. Screw the speed sensor (2) to the sensor mounting bracket at bottom of the gauge wheel with #6 x 1/2 inch pan head screws (3), lock washers (4) and flat washers (5).
3. Position sensor to just touch the speed sensor plate (1) and tighten screws.
4. Route co-axial cable (6) from sensor, across gauge wheel arms, and up the side opposite the tire.
5. Screw the end fitting into the co-ax connector on top of the sensor box (7).
6. Slide co-axial cable into notches at the bottom of gauge wheel arms and fasten to the side of gauge wheel arm with the cable tie mounts (8) and cable ties (9). Make sure the cable does not rub anything as depth sensing wheel moves up and down.

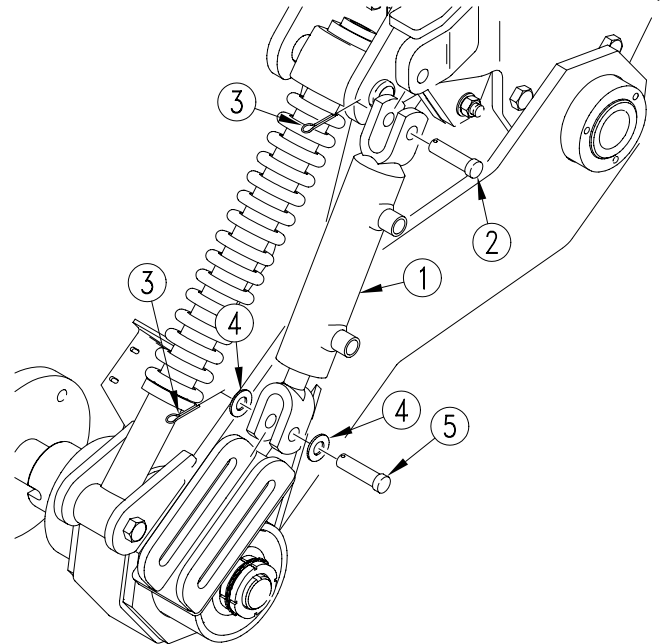


Figure 1-3

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Gauge Wheel Lift Cylinder

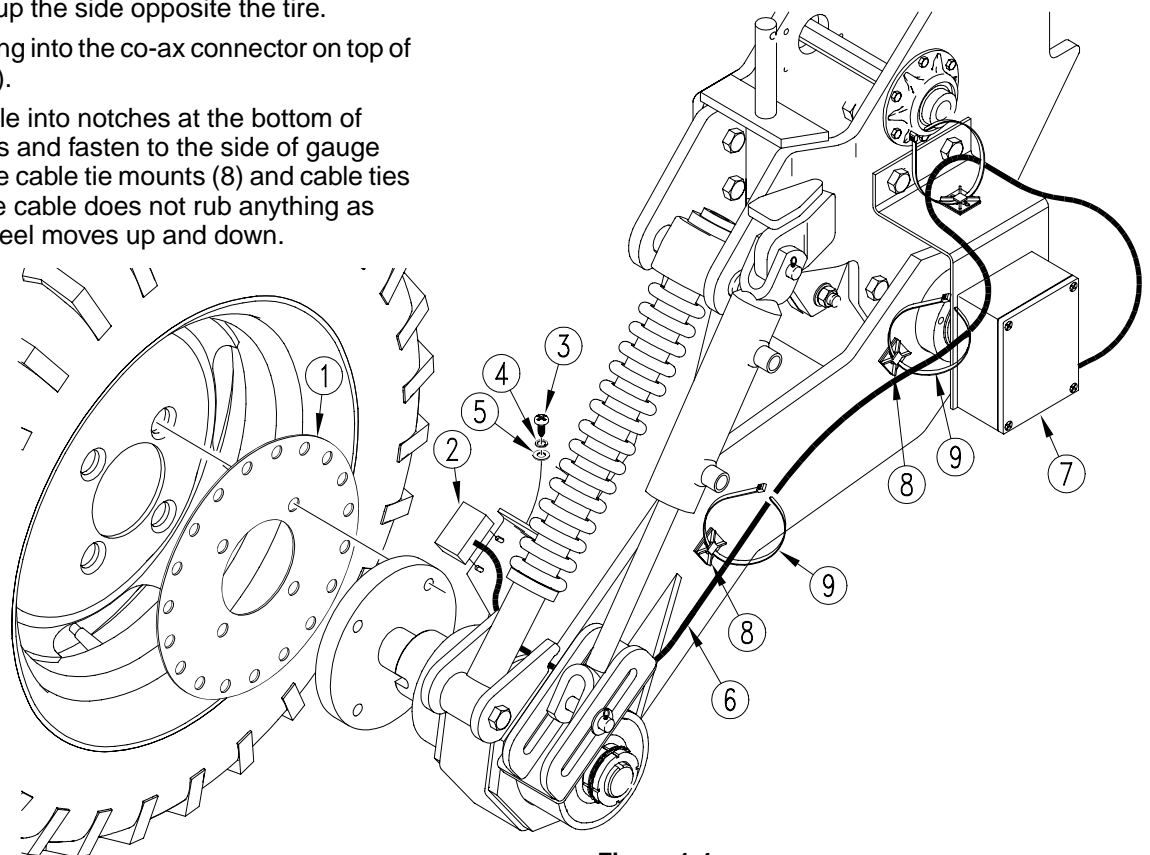


Figure 1-4

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Gauge Wheel Lift Cylinder

Section 1 Assembly and Setup

Lift Switch

Refer to Figure 1-5.

1. Bolt the plunger activated lift switch (1) to the switch mount located next to the left transport lift cylinder at rear of the Precision Hitch transport frame with two #10 x 3/4 inch pan head screws (2), flat washers (3), lock washers (4) and nuts (5). Do not tighten screws at this time.
2. Fasten rockshaft switch cam (6) to transport rockshaft just below the lift switch. Position the cam so it contacts the lift switch when hitch is raised and moves away from the lift switch when hitch is lowered. Position the worm gear screw on the cam mounting band to the bottom of the rockshaft so it does not interfere with the lift switch.
3. Adjust lift switch in the slotted holes so the plunger moves in about 1/8 inch when the cam activates it and tighten the #10 screws. Do not bottom out the plunger on the lift switch.
4. Rotate the cam assembly so it hits the plunger when the hitch is raised just enough to begin to pick the openers off the ground.

Wiring Harness

Refer to Figure 1-5.

1. Route the wiring harness (7) through 8 x 8 inch hitch tube and to the lift switch at the rear of the machine. Plug into the lift switch and support the cable with cable tie mounts (8) and cable ties (9) or strap the cable to the hydraulic hoses.
2. Plug the 4-pin connector of the wiring harness to sensor box on the depth sensing wheel and support the cable with cable mounts and ties.
3. Route the 9-pin connector through the spring hose loop and to the tractor hitch. This will plug into the 9-pin female connector from the control box extension cable.
4. Plug the other three short leads into the leads from the solenoids on the hydraulic control valves (10 and 11) after they are installed.

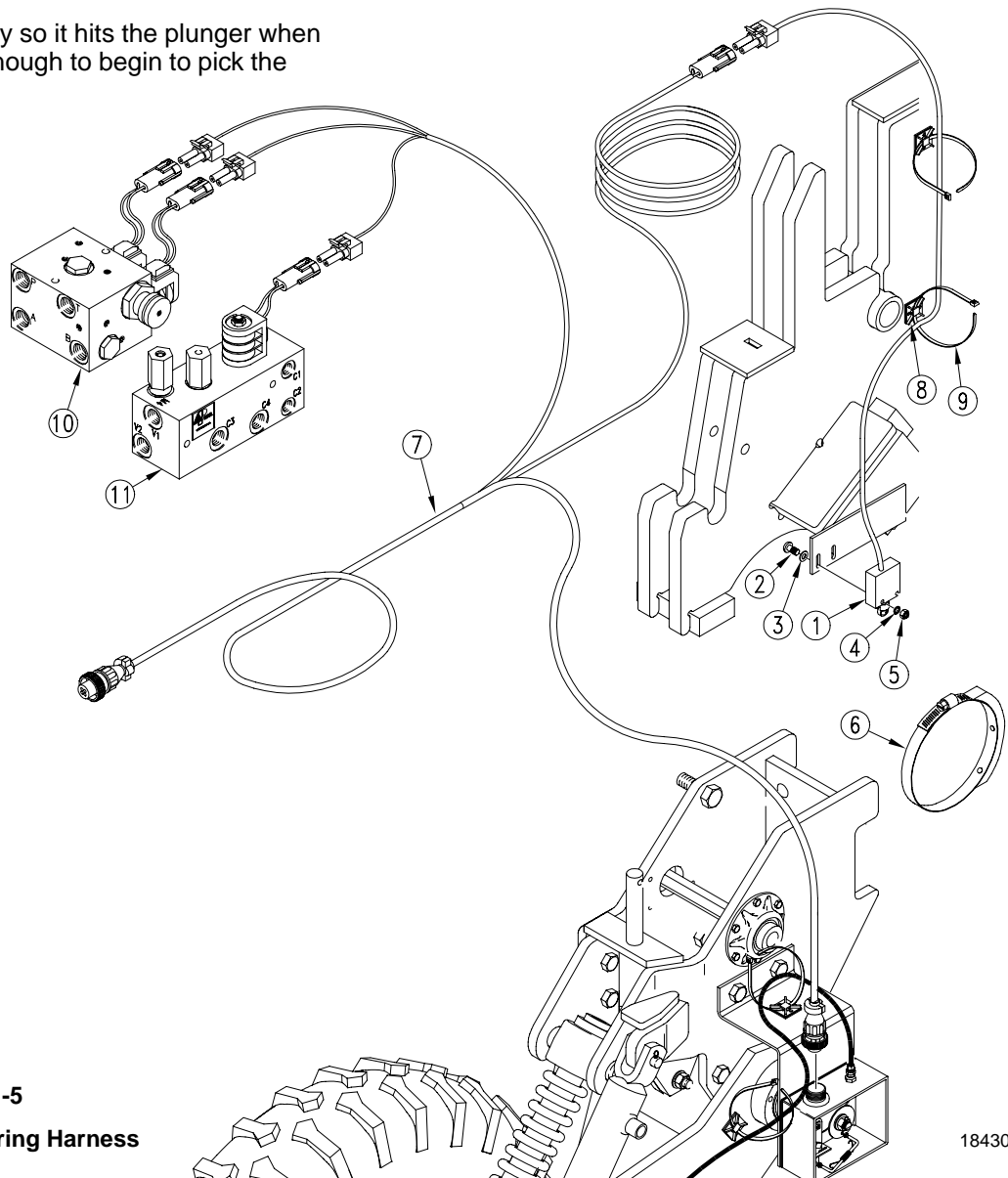


Figure 1-5
Lift Switch and Wiring Harness

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Section 1 Assembly and Setup

Tongue Cylinder

Refer to Figure 1-6.

1. Remove stroke pointer gauge (1) at the rod end of the tongue cylinder. Retorque cylinder tie rod bolts to 95 ft-lbs.
2. Remove stroke pointer (2) at cylinder rod clevis.
3. Turn tongue cylinder with rod end pointing forward and down and with ports turned up. Use clevis pin (3), flat washer (4) and cotter pin (5) to replace stroke pointer pin at what is now the base end of the cylinder.
4. Connect rod end to tongue with clevis pin (6) and hair pin cotter (7).

5. Remove elbow fitting (8) at base end of tongue cylinder and screw the 1/16 inch orifice plate (9) into base end port. Screw orifice plate in far enough so it does not interfere with elbow fitting.
6. Replace fitting.

IMPORTANT: Failure to install the orifice plate will not allow Coulter Command to operate correctly.

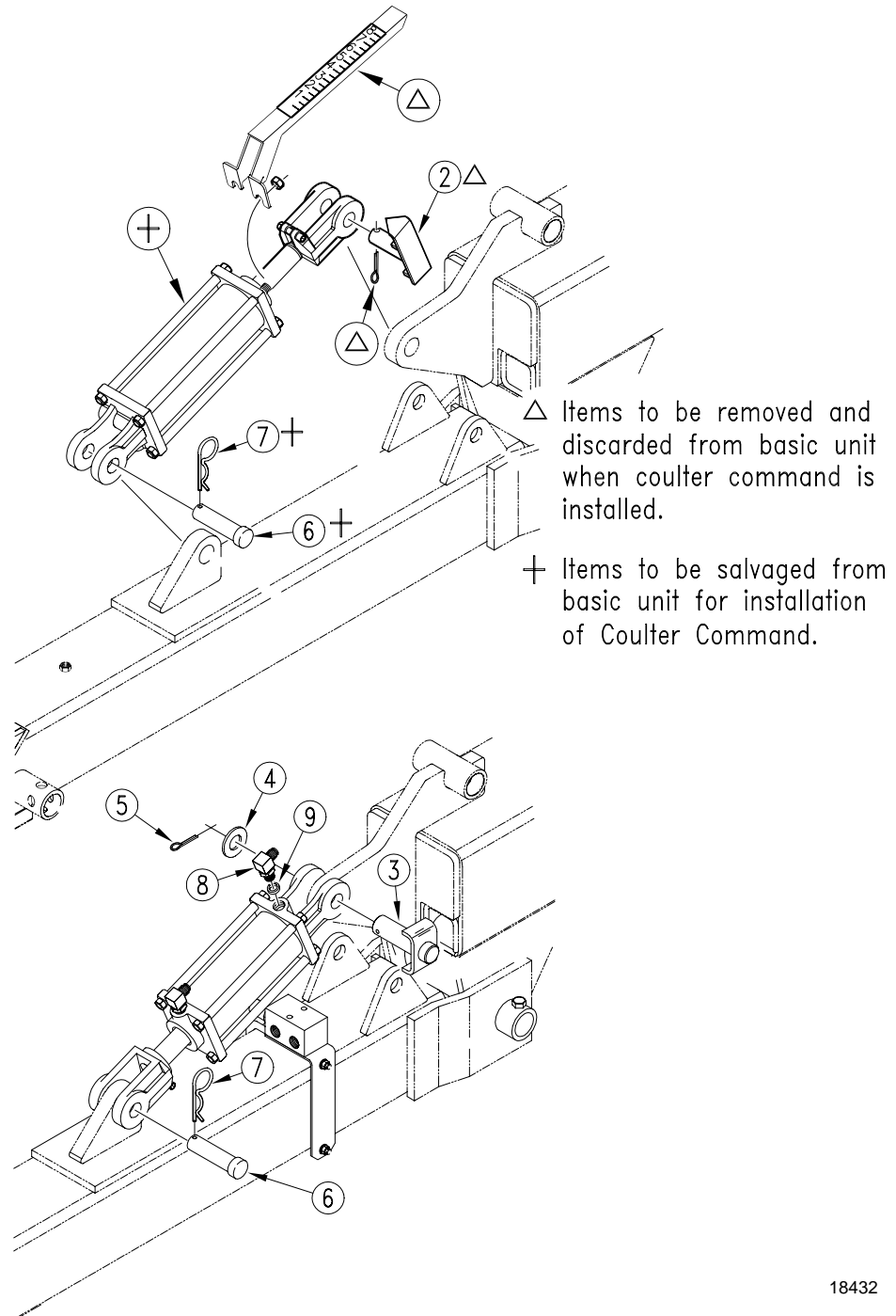


Figure 1-6
Tongue Cylinder

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Section 1 Assembly and Setup

Hydraulic Control Valve

Refer to Figure 1-7.

1. Bolt the electronic depth control valve (1) to the top of the valve mount bracket (2) with 5/16 x 4 inch bolts (3), lock washers (4) and hex nuts (5). Position valve so solenoids set above the middle of the top surface of valve mount.
2. Bolt the lift circuit manifold (6) to the side of the valve mount bracket with 5/16 x 4 inch bolts (7), lock washers (4) and hex nuts (5). Position valve so the four ports point away from valve mount and solenoid points up.
3. Attach the valve mount to the Precision Hitch with 1/2 x 5 1/2 inch bolt (8), lock washer (9) and hex nut (10). Assemble the bolt through the pivot tube (11) located behind the tongue cylinder. Position valve mount so dual solenoids face toward rear of machine.

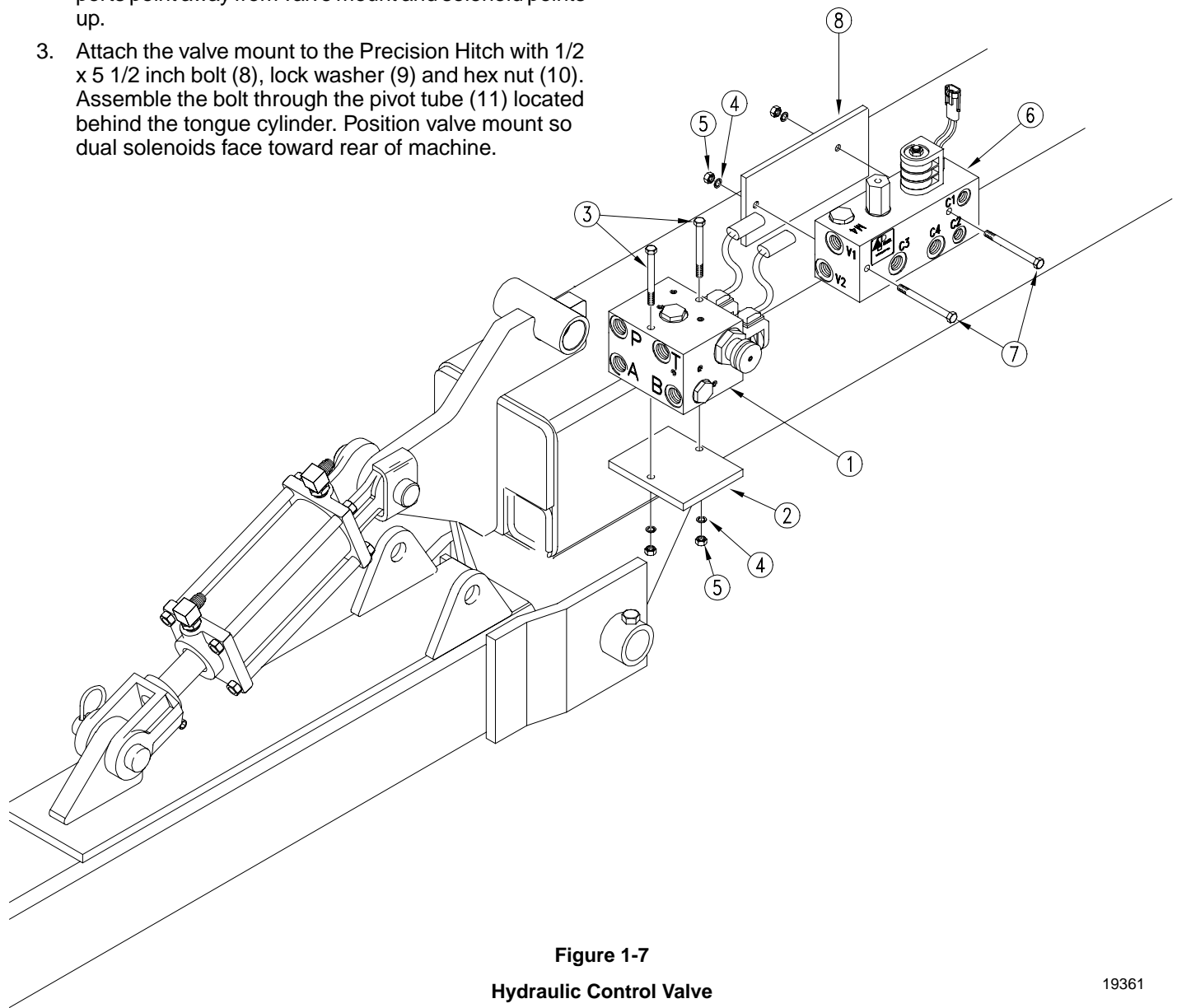


Figure 1-7

Hydraulic Control Valve

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Section 1 Assembly and Setup

Hydraulic Connections

Refer to Figure 1-8.

1. On the top valve assemble the 3/4 elbows (1) to valve ports marked "P" and "T" and the 3/4 straight adapters (2) to valve ports marked "A" and "B".
2. On the lower valve assemble the 3/4 straight adapters (2) to valve ports marked "V1" and "V2" and the 3/4 elbows (1) to valve ports marked "C3" and "C4".
3. Assemble the 9/16 elbows (3) to valve ports marked "C1" and "C2" of the lower valve.
4. Assemble the remaining two 9/16 elbows (3) to the ports on the side of the gauge wheel lift cylinder (4).
5. Remove hoses (5) from tongue cylinder and assemble them to the elbows at parts "P" and "T" on the top valve.
6. Connect the 20 inch long hose (6) between port "B" of the top valve and the tongue cylinder base end fitting.
7. Connect the 30 inch long hose (7) between port "A" of the top valve and the tongue cylinder rod end fitting.
8. Remove hoses (8) from the front side of the relief valve (9) which is mounted on the tongue tube and assemble them to the elbows at ports "C3" and "C4" on the lower valve.

NOTE: The hose coming from the base end of the transport lift cylinders connects to port "C3". The hose coming from the rod end of the transport lift cylinders connects to port "C4".

9. Connect a 36 inch long hose (10) to port "C1" of the lower valve and the elbow on the base end of the gauge wheel lift cylinder.
10. Connect a 36 inch long hose (10) to port "C2" of the lower valve and the elbow on the rod end of the gauge wheel lift cylinder.
11. Remove the plug from the top of the lower valve at the port labeled "M4" and replace it with the relief cartridge (11). Torque the cartridge to 30 ft-lbs.
12. Remove the relief valve and mount (9) which is mounted to the tongue tube by removing the 3/8 inch u-bolt. Discard the relief valve and its mount.
13. Route the three wiring harness leads, mentioned on page 8, step 4, under the valve mount.
14. Plug lead "A" into solenoid "A".
15. Plug lead "B" into solenoid "B".
16. Plug lead "S1" into solenoid "S1".

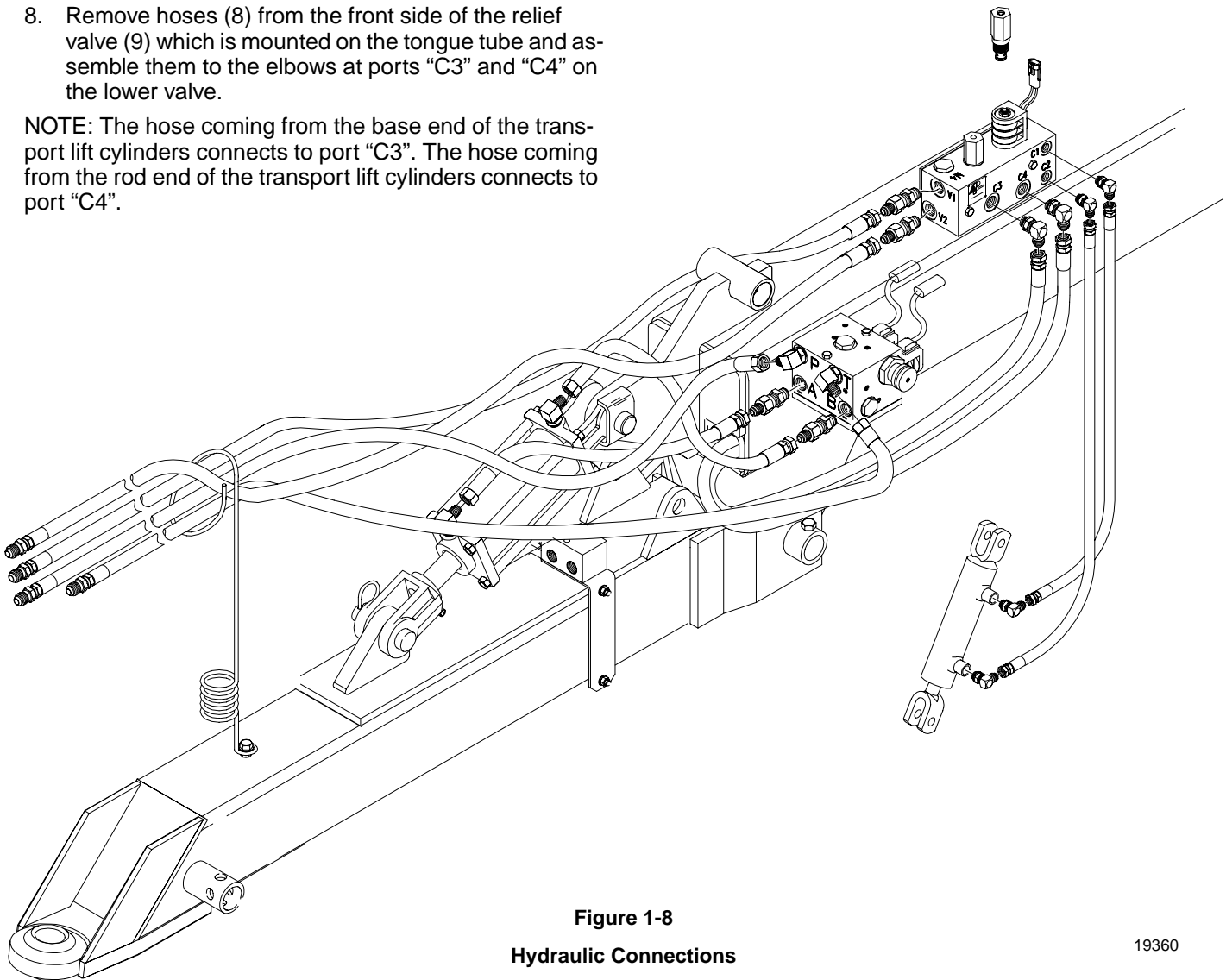


Figure 1-8

Hydraulic Connections

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Section 1 Assembly and Setup

Control Box

1. Mount the control box, Figure 1-9, at a convenient location in the tractor cab. Connect the 12' extension cable to the 9-pin connector on the back of the control box and route the cable back toward the tractor drawbar area making sure it will not get kinked or pinched.
2. Connect the power cord to a good uninterrupted 12 volt power source on the tractor. Connecting directly to the battery is recommended. Plug the cord into the lead with the 2-Pin connector on the back of the control box. The polarity of the power supply is very important to prevent circuit damage. The **white** wire of the power cord must be connected to the "+" positive battery terminal and the **black** wire to the "-" negative battery terminal.

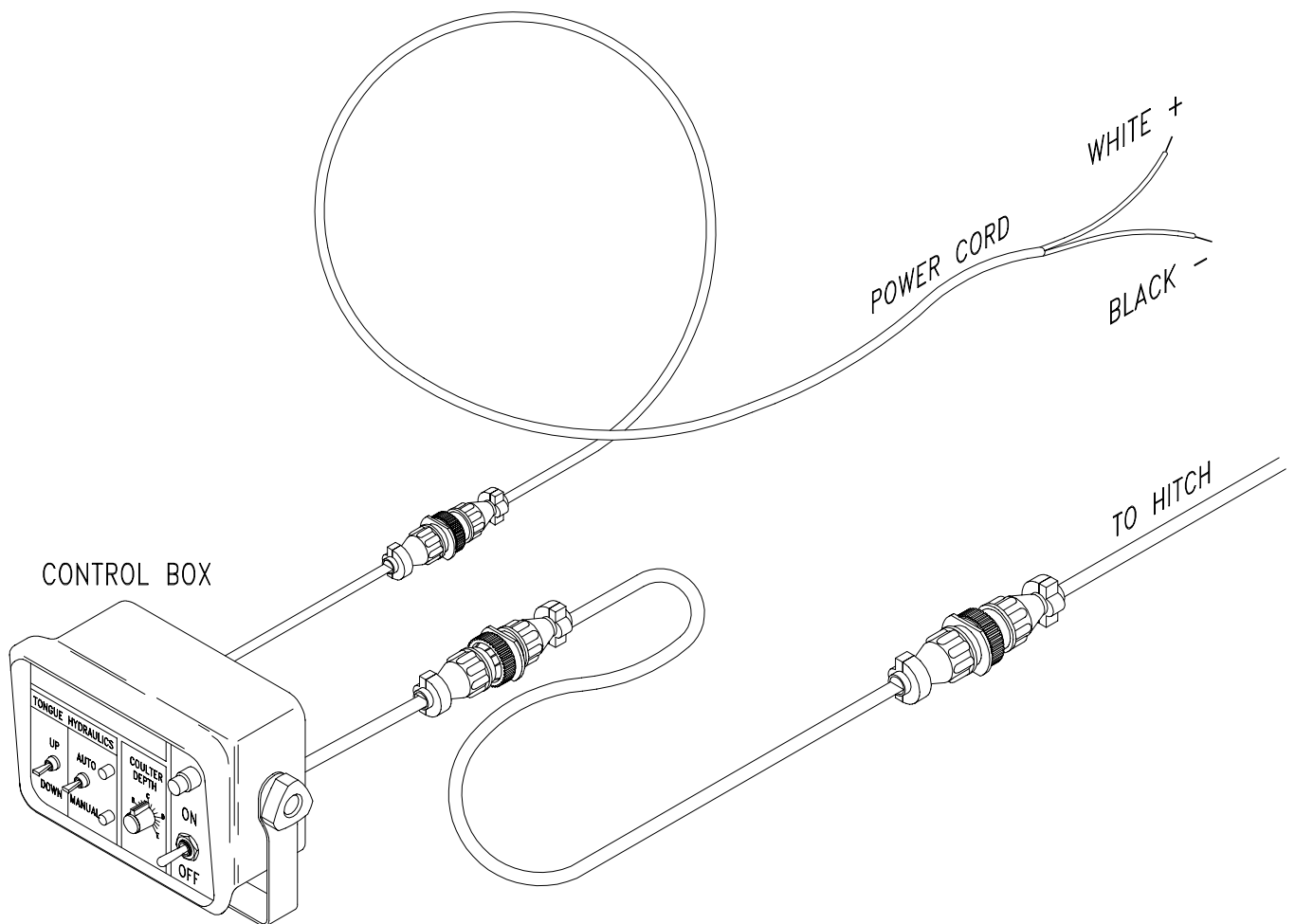


Figure 1-9
Control Box

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Sensor Box Adjustments

Refer to Figure 1-10.

Coulter command depth sensing wheel assemblies which are preassembled at the factory are preadjusted and should not require further adjustment. If the sensor box at the depth sensing wheel has been field installed, or if its linkage gets out of adjustment, it must be adjusted using one of the following two procedures:

1. The best and most accurate means of adjusting the linkage inside the sensor box makes use of a voltmeter which reads 0-12 volts DC. The Control Box in the tractor must be properly connected to a power source and the POWER switch must be ON. The TONGUE HYDRAULICS switch should be in the MANUAL mode. The wiring harness must be connected to the control box and the sensor box. The depth sensing wheel should be off the ground with the arm rotated down as far as its spring-loaded down-pressure link will allow. Remove the cover from the sensor box and inspect the internal linkage for proper assembly as shown in Figure 1-10.

With the depth sensing wheel in the max down position, the voltage potential between the lead containing the WHITE WIRE and the ground lead (BLACK WIRE) in the gauge wheel sensor box (#1) should be 5 volts DC plus or minus 1/4 volt. To adjust the gauge wheel sensor box linkage, loosen the 3/8 inch hex flange nut (#2) on the sensor spindle and rotate the circular disk (#3) until the voltage potential between the lead containing the WHITE WIRE and the ground lead (BLACK WIRE) (#1) is 5 volts DC plus or minus 1/4 volt. Rotating the circular disk counterclockwise increases voltage potential, and rotating the circular disk clockwise

decreases the voltage potential.

2. The second means of adjusting the linkage inside the sensor box involves measuring from the inside edge of the box to the left pivot of the formed round-bar link. The depth sensing wheel should be off the ground and rotated down as far as its spring-loaded down-pressure link will allow. Remove the cover from the sensor box and inspect the internal linkage for proper assembly as shown in Figure 1-10.

With the depth sensing wheel in the max down position, the pivot between the vertical flat-bar link and the formed round-bar link should be 15/16 inch from the front inside edge of the sensor box.

With the sensor box linkage properly assembled, loosen the 3/8 inch hex flange nut on the sensor spindle and rotate the circular disk until the pivot between the vertical flat-bar link and the formed round-bar link is 15/16 inch + or - 1/16 inch from the front inside edge of the box. Be careful not to rotate the circular disk as you retighten the nut. Replace the sensor box cover. Once the voltage potential reads 5 volts DC, + or - 1/4 volt, tighten the 3/8 inch flange nut. Be careful not to rotate the circular disk as you tighten the nut. Replace the sensor box cover.

Some models of the sensor box have a mark on the vertical flat-bar link which should line up with a mark on the link's slotted mount plate at the correct preset voltage. With the depth sensing wheel in the max down position, the marks should line up at a voltage of 5 volts DC + or - 1/4 volt. Aligning the marks is more accurate than relying on the 15/16 inch measurement.

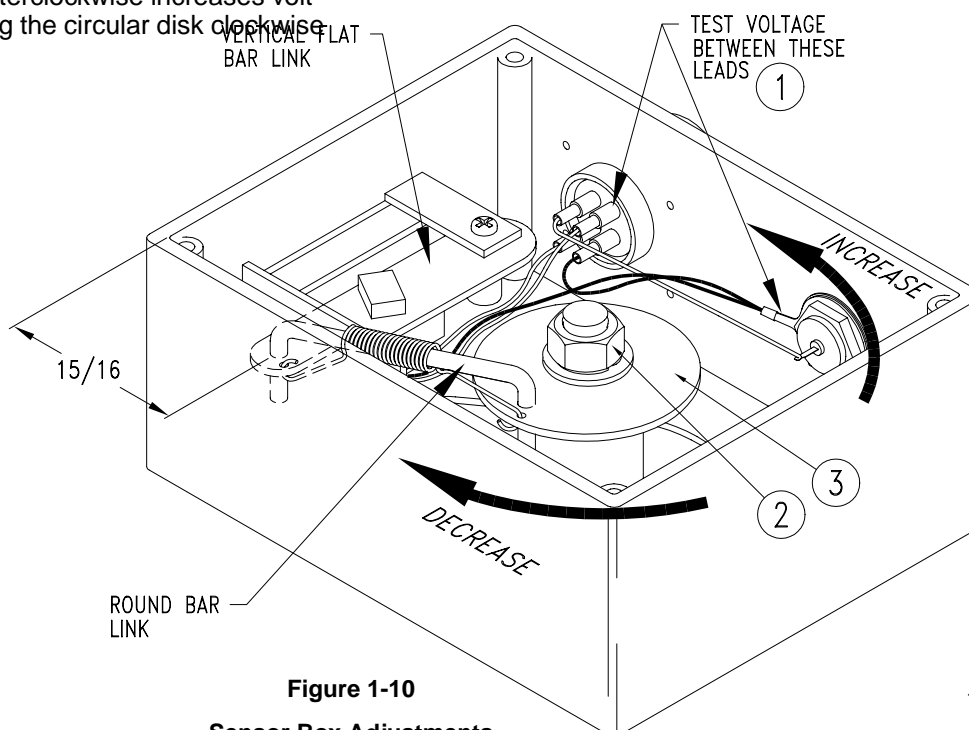


Figure 1-10
Sensor Box Adjustments

12619

Section 2 Operating Instructions

The Coulter Command couples a microprocessor with electro-hydraulics to provide a state-of-the-art system for maintaining coulters regardless of the terrain or soil type. It also provides coulters depth adjustment from the tractor cab. A manual feature allows manual control of the front hydraulic tongue cylinder for hitching, unhitching, or making adjustments. To understand the Coulter Command system, one must be familiar with the functions of the Hydraulics and the Electronic controls.

Load Sensing Hydraulics

To operate Coulter Command, some tractors with load-sensing or constant-flow hydraulics require a bypass valve, Great Plains part number 810-400C. Contact your Great Plains dealer to order the bypass valve.

NOTE: Failure to install a bypass valve on load-sensing tractors may cause major tractor damage. Consult your tractor dealer to verify if the bypass valve is needed.

After installing the bypass valve, set valve as follows:

1. Close bypass valve for no oil flow by turning knob (1) on valve clockwise. See Figure 2-1.

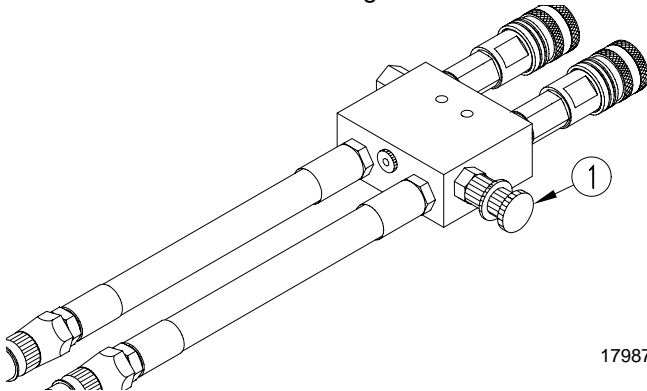


Figure 2-1
Bypass Valve

2. Adjust flow-control valve for tractor to a maximum of 10 gpm. If you do not have a flowmeter, hook a standard 8-inch stroke, 4-inch bore cylinder to the circuit. At 10 gpm, the cylinder will take about 2.6 seconds to extend.
3. Engage tractor hydraulics for Coulter Command.
4. Using a pressure gauge, turn knob on bypass valve counterclockwise until pressure gauges reads 1800 psi. Lock bypass valve at this setting.

Hydraulic Hook-Up & Function

Tractors with closed-center hydraulic systems and variable displacement hydraulic pumps.

(If you are not familiar with your tractor's hydraulics, consult your tractor dealer.)

For tractors with closed-center hydraulics or pressure/flow compensated hydraulics which are powered by a variable displacement hydraulic pump, turn the knurled control knob on the left side of the hydraulic valve completely clockwise and lock it in place with the circular lock disk. Do not apply any torque to the control knob after it bottoms out or valve damage may occur. Be sure the lock disk is snugged to prevent the control knob from vibrating loose in field operation.

The tongue cylinder hydraulic circuit consists of the hoses from ports "P" and "T". Once the hydraulic valve is set for CLOSED CENTER operation, the Coulter Command tongue cylinder circuit requires live hydraulic power supplied to the port labeled "P". This is accomplished by pushing FORWARD on the tractor remote hydraulic lever and LOCKING IT OPEN in this position.

- On John Deere tractors equipped with SOUND-GUARD R Body you must use the LEVER LOCK CLIP John Deere Part No. R52667 to lock the lever in the forward position. See your tractor dealer for purchase and installation of this clip.
- On John Deere 7000 Series tractors, rotate valve detent selector to MOTOR POSITION to lock the lever in the forward position.
- On Case-IH Magnum tractors use the circuit designed for HYDRAULIC MOTOR CONTROL and lock the lever forward in the detent position. The detent pressure will probably have to be turned up to its maximum setting. DO NOT tie the hydraulic lever on past the detent position with a strap. This could shift the spool beyond its designed operating position and cause system damage. See your tractor dealer for hydraulic system details.
- On other model tractors use the circuit designed for HYDRAULIC MOTOR CONTROL and lock the lever forward in the detent position. The detent pressure will probably have to be turned up to its maximum setting or some other mechanical detent holder will have to be used to hold the lever forward. See your tractor dealer for the proper means of providing constant pressure/flow to the tongue cylinder circuit.

The Coulter Command hydraulic circuit requires a flow rate of 8 to 12 gallons per minute for efficient operation. On high flow rate tractors, the flow control on the tractor remote may have to be turned down so as not to exceed 12 gallons per minute. Flow rates higher than 12 gallons per minute will not damage the valve, but may cause poor Coulter Command performance.

The remote tractor hydraulic lever will have to be locked in

Section 2 Operating Instructions

position to supply oil to the "P" port of the hydraulic control valve, regardless of whether you want to control the tongue hydraulic cylinder manually or automatically.

The Precision Hitch transport hydraulic circuit contains the hoses from the ports marked "V1" and "V2". This circuit must be connected to one of the remaining circuits for raising and lowering the transport system. This circuit must receive hydraulic pressure for raising the machine even while the hydraulic tongue circuit is "locked in" for continuous use. If the machine will not raise when the hydraulic tongue circuit is "locked in," consult your tractor dealer. You may need to run the transport hydraulic circuit on a "priority circuit" and the hydraulic tongue circuit on an alternate remote if the tractor hydraulics allows live hydraulic power to other remotes. If the "priority circuit" is the only circuit suitable for HYDRAULIC MOTOR CONTROL, then run the transport hydraulic circuit on the "priority circuit" and run the hydraulic tongue circuit on an alternate remote with the Coulter Command valve in the OPEN CENTER MODE.

Tractors with open center hydraulic systems or fixed displacement hydraulic pumps.

(If you are not familiar with your tractor's hydraulics, consult your tractor dealer.)

For tractors with open-center hydraulics or on tractors with fixed displacement hydraulic pumps turn the knurled control knob on the left side of the hydraulic valve completely counterclockwise and lock it in place with the circular lock disk. Be sure the lock disk is snugged to prevent the control knob from vibrating loose in field operation.

The Precision Hitch transport hydraulic circuit contains the hoses from the ports marked "V1" and "V2". This circuit must be connected to tractor's "priority circuit" to supply hydraulic pressure for raising the machine even while the hydraulic tongue circuit is "locked in" for continuous use. The "No.1" hydraulic circuit on most open-center tractors is the priority circuit.

The tongue cylinder hydraulic circuit consists of the hoses from ports "P" and "T". Connect "P" and "T" to a circuit other than the "priority circuit". Once the hydraulic valve is set for OPEN CENTER operation, the Coulter Command tongue cylinder circuit requires live hydraulic power supplied to the port labeled "P". This is accomplished by pushing FORWARD on the tractor remote hydraulic lever and LOCKING IT OPEN in this position. The remote tractor hydraulic lever will have to be locked in position to supply oil to the "P" port of the hydraulic control valve, regardless of whether you want to control the tongue hydraulic cylinder manually or automatically.

The Coulter Command tongue hydraulic circuit requires a flow rate of 8 to 12 gallons per minute for efficient operation. On high flow rate tractors, turn down the flow rate on the tractor remote, if possible, so as not to exceed 12 gallons per minute. Flow rates higher than 12 gallons per minute will increase the heat generated by the Coulter Command circuit when it circulates this high flow of oil.

When operating the Coulter Command tongue hydraulic circuit in the OPEN CENTER mode, use poppet style quick couplers on the hoses connecting to the tractor. These quick couplers allow better flow through some tractor remotes and may produce less heat when circulating continuous hydraulic flow through them. Parker Hannifin offers the poppet style Pioneer quick coupler in their 8010 Series couplers. For tractors with Pioneer quick couplers use Pioneer 8010-4P poppet style male couplers when operating in the OPEN CENTER mode. See Figure 2-2.

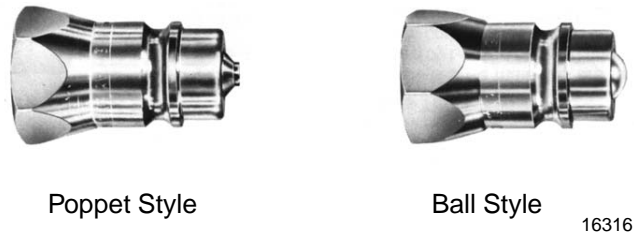


Figure 2-2
Quick Couplers

Operation of Electronic Controls

1. Connect power cord to an uninterrupted, 12-volt power source on tractor. Connecting directly to battery is recommended. Plug cord into lead with two-pin connector on back of control box. The polarity of the power supply is very important to prevent circuit damage. The **white** wire of the power cord must be connected to the "+" positive battery terminal and the **black** wire to the "-" negative battery terminal.
2. Connect the control box cable to the back of the control box and route it out of the tractor. Connect it to the hitch wiring harness.
3. With the remote tractor hydraulic lever locked in position to supply oil to the "P" port of the hydraulic control valve, turn the power switch on.
 - a. For manual tongue hydraulic cylinder operation, simply move the UP-DOWN switch the desired direction. Moving the switch to the UP position extends the tongue cylinder, and moving the switch to the DOWN position retracts the tongue cylinder. If UP retracts the cylinder, then your remote hydraulic lever is not supplying oil to the "P" port of the hydraulic control valve, or the wires going to the solenoids are reversed. By moving the UP-DOWN switch, the AUTO-MANUAL switch automatically switches to the MANUAL mode. If you want to manually hold the tongue hydraulic cylinder in the position set by the automatic controls without moving it, just switch the AUTO-MANUAL switch to MANUAL.
 - b. For automatic coultter depth control, simply switch the AUTO-MANUAL switch to AUTO and dial in the desired coultter depth you wish to maintain with the coultter depth control knob. (The markings on the knob settings are for reference only and do not represent a depth measurement.)

Section 2 Operating Instructions

WARNING

Make sure all people, animals, and objects are clear of the coulters tool bar before switching the **tongue hydraulics** to the **AUTO** mode.

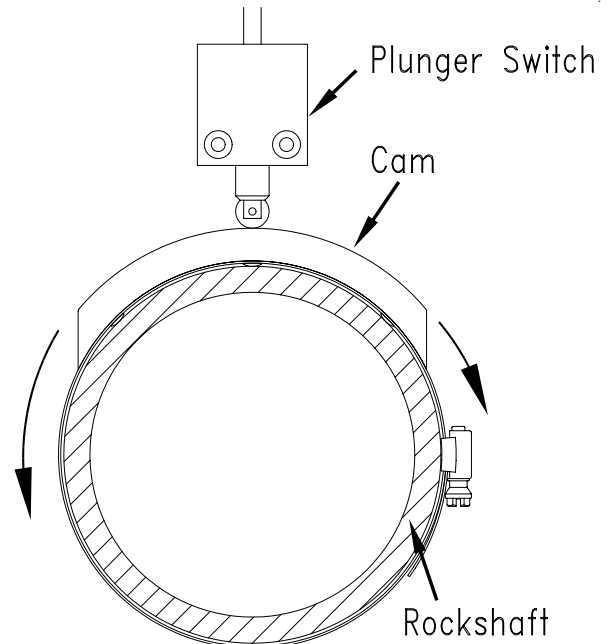
Turning the coulters depth switch clockwise makes the coulters run shallower, and turning the coulters depth switch counterclockwise makes the coulters run deeper. If the Precision Hitch is not moving or is on a hard surface, turning the coulters depth switch may not cause the tongue cylinder to retract to the desired position. The coulters may not penetrate to the desired depth until the Precision Hitch is moving. A pulsing of the valve may be the only reaction when adjusting the COULTER DEPTH knob on a stationary machine. The coulters depth setting can always be changed "on-the-go" if you desire.

With the AUTO-MANUAL switch in the AUTO mode, the coulters will always maintain a consistent depth regardless of terrain, soil type or speed. When lifting and turning in the field, the tongue cylinder will remain in its last automatically set mid stroke position. When the machine is lowered, the coulters will automatically return to their pre-set depth.

Field Adjustments

Lift Switch

Refer to Figure 2-3. The switch at the rear of the Precision Hitch determines the point in the lift cycle at which the automatic feature of the Coulter Command will be interrupted and the depth sensing gauge wheel will be lifted off the ground for turning around. Since the Precision Hitch transport tires can be lowered during operation to provide flotation for the drill or planter in soft soil conditions, coulters command should not be interrupted, and the depth sensing gauge wheel should not be lifted until after the transport tires are lowered to the point where they are no longer used for system flotation. This is usually the point in the lift cycle when the drill or planter openers are just being lifted out of the ground.



Lift Switch Field Adjustments
Figure 2-3

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A cam fastened to the rockshaft activates a plunger switch which causes the automatic feature of the Coulter Command to be interrupted and the depth sensing gauge wheel to be lifted off the ground for turning the Precision Hitch around in the field.

1. To properly adjust the lift switch timing, loosen and rotate the cam assembly so it hits the plunger roller of the lift switch when the Precision Hitch is raised just enough to begin to pick the openers out of the ground. **BE CAREFUL NOT TO "BOTTOM OUT" THE LIFT SWITCH PLUNGER** when the plunger roller climbs the surface of the cam. Tighten the cam onto the rockshaft.
2. To adjust the lift switch position loosen the two #10 screws and slide it up or down in the slotted switch mount holes so the plunger moves in only about 1/8 inch when the cam activates it. **DO NOT "BOTTOM OUT" THE LIFT SWITCH PLUNGER.**

**WARNING**

Shut the tractor off and put all hydraulic valve levers in neutral position before attempting to work on or crawl under the machine. Do not crawl under a raised machine without the transport locks securely in place. Sudden hydraulic activation or failure could cause serious injury or death.

A properly adjusted lift switch allows the automatic coultter depth feature to be interrupted early in the lift cycle. This provides the fastest lift cycle times when turning around in the field. Operating the lift switch early in the lift cycle, also provides the maximum amount of time for the depth sensing gauge wheel cylinder to completely extend as the machine is lowered back to field position. It is important that the depth sensing gauge wheel cylinder always be fully extended when the Precision Hitch is in field position to allow the depth sensing gauge wheel to float through its full range of motion.

Speed Sensor

The Coulter Command depth control system automatically compensates for changes in ground speed. A speed sensor and speed sensor plate mounted behind the coultter depth sensing wheel monitors the ground speed so the Coulter Command can adjust for it. This sensor should be in close proximity to the speed sensor plate. In general, it should never need adjustment. If the sensor does get moved, it should be adjusted against the speed sensor plate until it just touches the plate in the closest part of the rotation. A bent speed sensor plate should be straightened or replaced immediately. To adjust the speed sensor, loosen the two #6 screws on the sensor and slide it toward the speed sensor plate. Rotate the depth sensing wheel to the position where the speed sensor plate is closest to the sensor mount, and retighten the sensor mount screws where the sensor just touches the speed sensor plate.

Hydraulic Valve

All adjustable valve cartridges on the hydraulic valve blocks are preset at the manufacturer and should not be tampered with. Tampering with a cartridge valve could result severe frame damage to the Precision Hitch.

The only required adjustment is on the upper hydraulic control valve. This valve contains a rotary knob for setting the Coulter Command to be used with either OPEN CENTERED or CLOSED CENTERED tractor hydraulics. Check the owners manual of your tractor to determine what type of hydraulic system you have.

Refer to "**Hydraulic Hook-Up & Function**" on page 14 of this manual for setting the hydraulic control valve for your style of tractor.

Section 3 Troubleshooting

Section 3 Troubleshooting

Problem	Possible Cause	Solution
Coulters move up when the down switch is operated and down when the up switch is operated.	Not supplying oil to the "P" port of the hydraulic valve.	Reverse the remote hydraulic lever in the tractor.
	Solenoids wired backward or hoses from port "A" and port "B" reversed at the hydraulic valve.	Unplug solenoids and swap wire leads to them.
Automatic Coulters depth control stops adjusting coulters depth	TONGUE HYDRAULICS switch bumped to MANUAL mode.	Flip TONGUE HYDRAULICS switch back to AUTO mode
	Tractor remote hydraulic lever not locked for constant oil supply to valve.	Lock Tractor remote hydraulic lever with rubber tarp strap or other means.
	System variables out of adjustment	Turn power switch OFF and back on again so system variables can reset. Then flip the AUTO-MANUAL switch to AUTO and resume operation.
Turning the COULTER DEPTH knob does not set coulters deep enough.	If the tongue cylinder runs completely retracted, the tractor drawbar is too high.	Use a straight drawbar or one which sweeps down.
	If in extremely hard conditions with the machine standing the tongue cylinder pulses but does not retract.	This is perfectly normal. The cylinder will not penetrate the coulters on a stationary machine in hard conditions. Pull forward and check coulters depth on a moving machine.
	If the COULTER DEPTH knob is turned to "A" and the tongue cylinder will not completely retract when moving through the field then the internal sensor box linkage is not set correctly.	Adjust the sensor box internal linkage. See " Sensor Box Adjustments " on page 13.
	If the sensor box linkage is properly adjusted and tongue cylinder constantly pulses while moving through the field but the front tongue cylinder will not retract, you do not have enough system weight.	Add fertilizer or water to liquid tanks. Add tool bar weight brackets to coulters tool bars.
The hydraulic valve constantly pulses when you are stopped to refill or adjust something.	Hard soil conditions are hindering coulters penetration while stopped.	Flip TONGUE HYDRAULICS switch to MANUAL mode while you are stopped or turn coulters command power OFF. Pulsing does not hurt the valve, but can be annoying.
Turning the COULTER DEPTH switch to "E" does not allow the coulters to run shallow enough.	The internal sensor box linkage is not set correctly.	Adjust the sensor box internal linkage. See " Sensor Box Adjustments " on page 13.
Depth sensing gauge wheel not lifting off the ground when Precision Hitch is raised.	Coulters Command power is OFF or 12 volt power has been interrupted.	Coulters Command must be connected and the power must be ON for the depth sensing gauge wheel to raise when the Precision Hitch is raised. The depth sensing gauge wheel should raise with the transport lift circuit with Coulters Command in either the AUTO or MANUAL mode as long as the power is ON.
	The lift switch has become disconnected or the lift switch cam on the rockshaft is not properly adjusted.	Adjust the lift switch cam. See " Lift Switch " under Section 2 " Operating Instructions " on Page 16. Check cable connections on lift switch leads.

Section 3 Troubleshooting

Problem	Possible Cause	Solution
Coulter depth erratic or will not adjust when you turn the "DEPTH CONTROL" dial.	Moisture present in the master control box.	The master control box in the tractor must be kept dry. Moisture on the circuit board or in the control terminals will cause false readings.
	Hydraulic flow rates of more than 12 gallons per minute to the hydraulic control valve when operating in the CLOSED-CENTER mode.	Turn down the flow rate on the tractor remote which is providing oil to the tongue hydraulic circuit.
Transport lift cylinders will not lift the Precision Hitch for transport.	Inconsistent 12-volt power supply.	Connect the power cord directly to the battery. The Coulter Command electrical circuit must have a good uninterrupted power supply. Fluctuations in the power supply will cause inconsistent electrical readings.
	OPEN-CENTER tractors with multiple sets of hydraulic outlets use the #1 circuit for priority flow which slows down or cuts off flow to the other circuits. This problem will occur if Coulter Command ports "P" and "T" are plugged into the #1 circuit.	Connect transport lift circuit ports "V1" and "V2" to the #1 hydraulic circuit on OPEN-CENTER tractors. Ports "P" and "T" of the Coulter Command hydraulics should connect to another circuit other than the #1 circuit on OPEN-CENTER tractors.
System generating excess heat when operating in the OPEN CENTER MODE.	On CLOSED-CENTER tractors the Coulter Command should be connected to a circuit capable of HYDRAULIC MOTOR CONTROL for supplying constant pressure/flow to remote locations. If the machine will not raise when the hydraulic tongue circuit is "locked in," consult your tractor dealer. You may need to run the transport hydraulic circuit on a "priority circuit" and the hydraulic tongue circuit on an alternate remote if the tractor hydraulics allows live hydraulic power to other remotes.	On CLOSED-CENTER tractors, if the "priority circuit" is the only circuit suitable for HYDRAULIC MOTOR CONTROL or supplying constant pressure/flow to remote locations, then run the transport hydraulic circuit on the "priority circuit" and run the hydraulic tongue circuit on an alternate remote with the Coulter Command valve in the OPEN CENTER MODE. See "Tractors with open center hydraulic systems or fixed displacement hydraulic pumps," page 15.
	The OPEN CENTER - CLOSED CENTER control knob is not turned completely counterclockwise.	Turn the knurled control knob on the left side of the hydraulic valve completely counterclockwise and lock it in place with the circular lock disk.
	Ball style quick couplers may produce more heat when circulating continuous hydraulic flow through them.	Use poppet style male quick couplers. For tractors with Pioneer quick couplers use Pioneer 8010-4P poppet style male couplers when operating in the OPEN CENTER mode. See Figure 2-2, page 15.

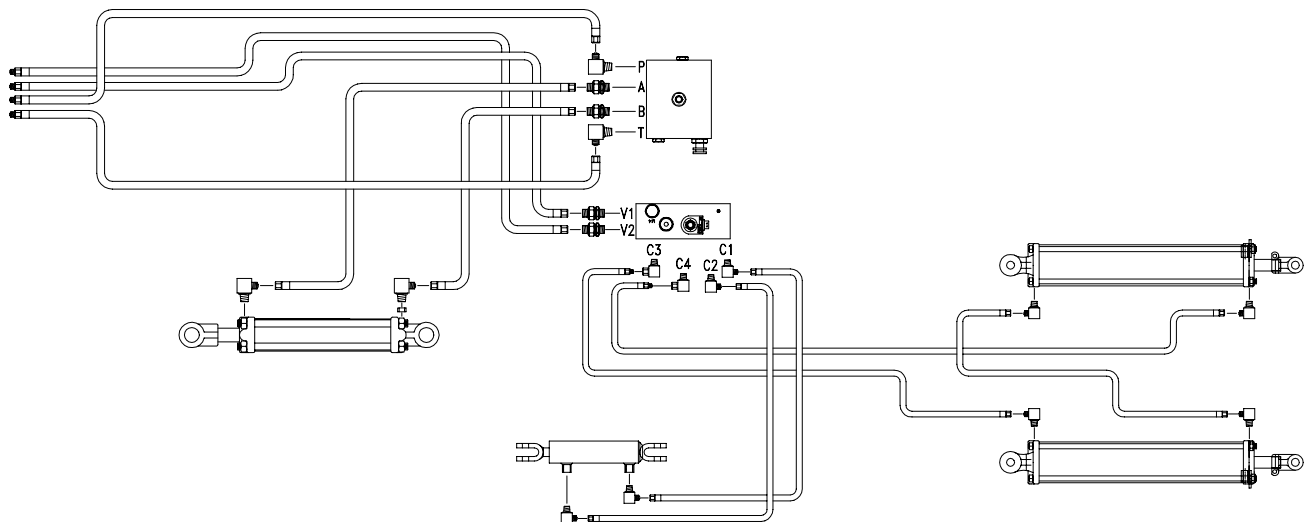
Section 3 Troubleshooting

Problem	Possible Cause	Solution
Depth sensing gauge wheel not lowering to the ground when Precision Hitch is lowered, or depth sensing gauge wheel cylinder not fully extending when the machine is lowered.	The lift switch cam on the rockshaft is not properly adjusted.	Adjust the lift switch cam. See "Lift Switch" under Section 2 "Operating Instructions" on Page 16.
	Relief valve "M3" is set too low.	Turn valve adjustment screw on top of valve "M3" one eighth turn clockwise. Valve "M3" is preset to relieve at 600 psi. Turning the adjustment screw one eighth turn clockwise increases the relief setting by approximately 75 psi. CAUTION Any attempt to set valve "M3" above 1200 psi could result in system malfunction. Setting the valve "M3" above 750 psi will slow down the lift cycle time.
Transport lift cylinders will not retract completely. (Transport tires will not lift off the ground.)	Relief valve "M4" is set too low.	Turn valve adjustment screw on top of valve "M4" one eighth turn clockwise. Valve "M4" is preset to relieve at 900 psi. Turning the adjustment screw one eighth turn clockwise increases the relief setting by approximately 75 psi. CAUTION Any attempt to set valve "M4" above 1200 psi could result in transport frame or transport rockshaft damage.

System Schematics

If problems occur in the hydraulic or electric systems, refer to the schematics below and on page 21 to help locate the problem.

Hydraulic Schematic

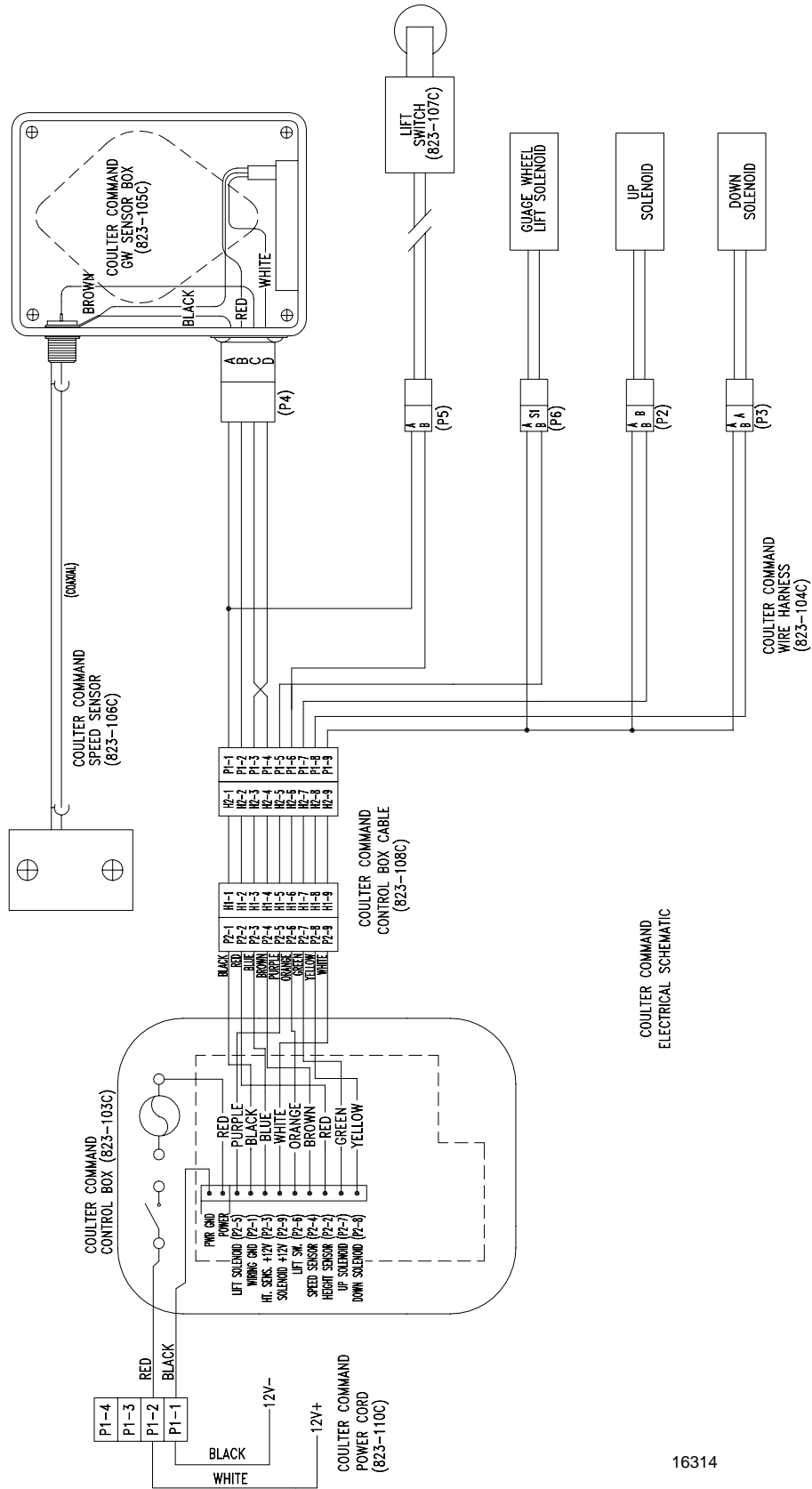


COULTER COMMAND
HYDRAULIC SCHEMATIC

16313

Section 3 Troubleshooting

Electrical Schematic



COULTER COMMAND ELECTRICAL SCHEMATIC

16314

Section 4 Maintenance & Lubrication

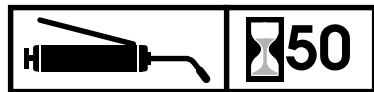
Section 4 Maintenance & Lubrication

Maintenance

The Coulter Command is relatively maintenance free. The switches, sensors, and linkages should not need any routine adjustment unless they are moved or damaged.

Lubrication

Lubrication Symbols



Lubrication is required every 50 hours of operation.



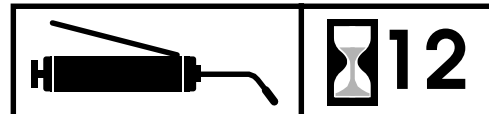
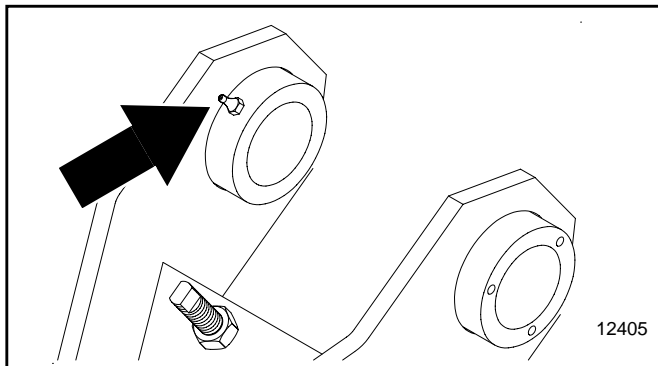
Use a multipurpose spray club. Use as required. Do not over lubricate.



Lubrication is required every 10 hours of operation.



Lubrication is required

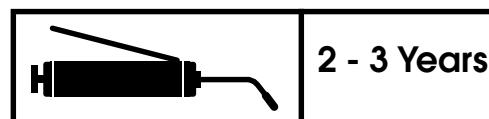
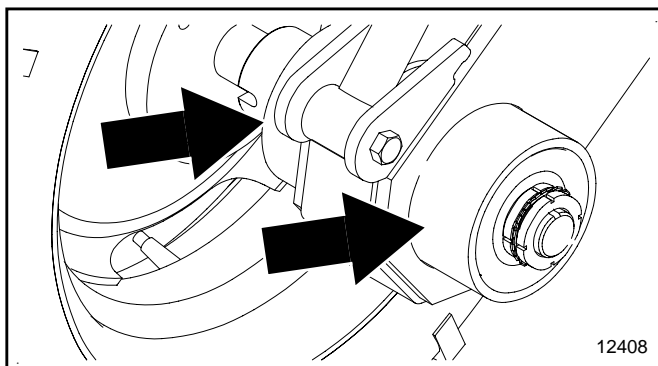


Depth Sensing Arm Wheel Pivot

Located on the depth sensing wheel Pivot Arm (2 Total)

Type of Lubrication: Multi-Purpose Lithium Base Grease

Quantity: Until grease begins to emerge



Axle Bearings







Repack

Type of Lubrication: Wheel Bearing Grease

Quantity: Full Pack

Appendix

Torque Values Chart for Common Bolt Sizes

Bolt Size (Inches)	Bolt Head Identification						Bolt Size (Metric)	Bolt Head Identification					
													
	Grade 2		Grade 5		Grade 8			Class 5.8		Class 8.8		Class 10.9	
in-tpi ¹	N · m ²	ft-lb ³	N · m	ft-lb	N · m	ft-lb	mm x pitch ⁴	N · m	ft-lb	N · m	ft-lb	N · m	ft-lb
1/4" - 20	7.4	5.6	11	8	16	12	M 5 X 0.8	4	3	6	5	9	7
1/4" - 28	8.5	6	13	10	18	14	M 6 X 1	7	5	11	8	15	11
5/16" - 18	15	11	24	17	33	25	M 8 X 1.25	17	12	26	19	36	27
5/16" - 24	17	13	26	19	37	27	M 8 X 1	18	13	28	21	39	29
3/8" - 16	27	20	42	31	59	44	M10 X 1.5	33	24	52	39	72	53
3/8" - 24	31	22	47	35	67	49	M10 X 0.75	39	29	61	45	85	62
7/16" - 14	43	32	67	49	95	70	M12 X 1.75	58	42	91	67	125	93
7/16" - 20	49	36	75	55	105	78	M12 X 1.5	60	44	95	70	130	97
1/2" - 13	66	49	105	76	145	105	M12 X 1	90	66	105	77	145	105
1/2" - 20	75	55	115	85	165	120	M14 X 2	92	68	145	105	200	150
9/16" - 12	95	70	150	110	210	155	M14 X 1.5	99	73	155	115	215	160
9/16" - 18	105	79	165	120	235	170	M16 X 2	145	105	225	165	315	230
5/8" - 11	130	97	205	150	285	210	M16 X 1.5	155	115	240	180	335	245
5/8" - 18	150	110	230	170	325	240	M18 X 2.5	195	145	310	230	405	300
3/4" - 10	235	170	360	265	510	375	M18 X 1.5	220	165	350	260	485	355
3/4" - 16	260	190	405	295	570	420	M20 X 2.5	280	205	440	325	610	450
7/8" - 9	225	165	585	430	820	605	M20 X 1.5	310	230	650	480	900	665
7/8" - 14	250	185	640	475	905	670	M24 X 3	480	355	760	560	1050	780
1" - 8	340	250	875	645	1230	910	M24 X 2	525	390	830	610	1150	845
1" - 12	370	275	955	705	1350	995	M30 X 3.5	960	705	1510	1120	2100	1550
1-1/8" - 7	480	355	1080	795	1750	1290	M30 X 2	1060	785	1680	1240	2320	1710
1 1/8" - 12	540	395	1210	890	1960	1440	M36 X 3.5	1730	1270	2650	1950	3660	2700
1 1/4" - 7	680	500	1520	1120	2460	1820	M36 X 2	1880	1380	2960	2190	4100	3220
1 1/4" - 12	750	555	1680	1240	2730	2010							
1 3/8" - 6	890	655	1990	1470	3230	2380							
1 3/8" - 12	1010	745	2270	1670	3680	2710							
1 1/2" - 6	1180	870	2640	1950	4290	3160							
1 1/2" - 12	1330	980	2970	2190	4820	3560							

¹ in-tpi = nominal thread diameter in inches-threads per inch

² N · m = newton-meters

³ ft-lb = foot pounds

⁴ mm x pitch = nominal thread diameter in millimeters x thread pitch

Torque tolerance + 0%, -15% of torquing values. Unless otherwise specified use torque values listed above.

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