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SmarTrax™ Installation Manual



John Deere 8x00, 8x10 Series

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John Deere 8x00, 8x10 Series Steering Installation

The instructions in this document are to be used to install the Smartrax Steering Kit for the following models of John Deere Wheel Tractors:

JD8100, JD8110, JD8200, JD8210, JD8300, JD8310, JD8400, JD8410

This steering system can be installed on John Deere 8x00, 8x10 Series Wheel Tractors with standard configuration of hydraulics and 12 volt power supply. There are no special requirements.



John Deere 8410 Wheel Tractor

Routing Left and Right Steer Lines

STEPS	KEY POINTS
1) Start by removing the LHS engine bay cover to allow easy access to mount the Steering Assist Manifold. This is achieved by pulling down on the release-lever indicated below.	



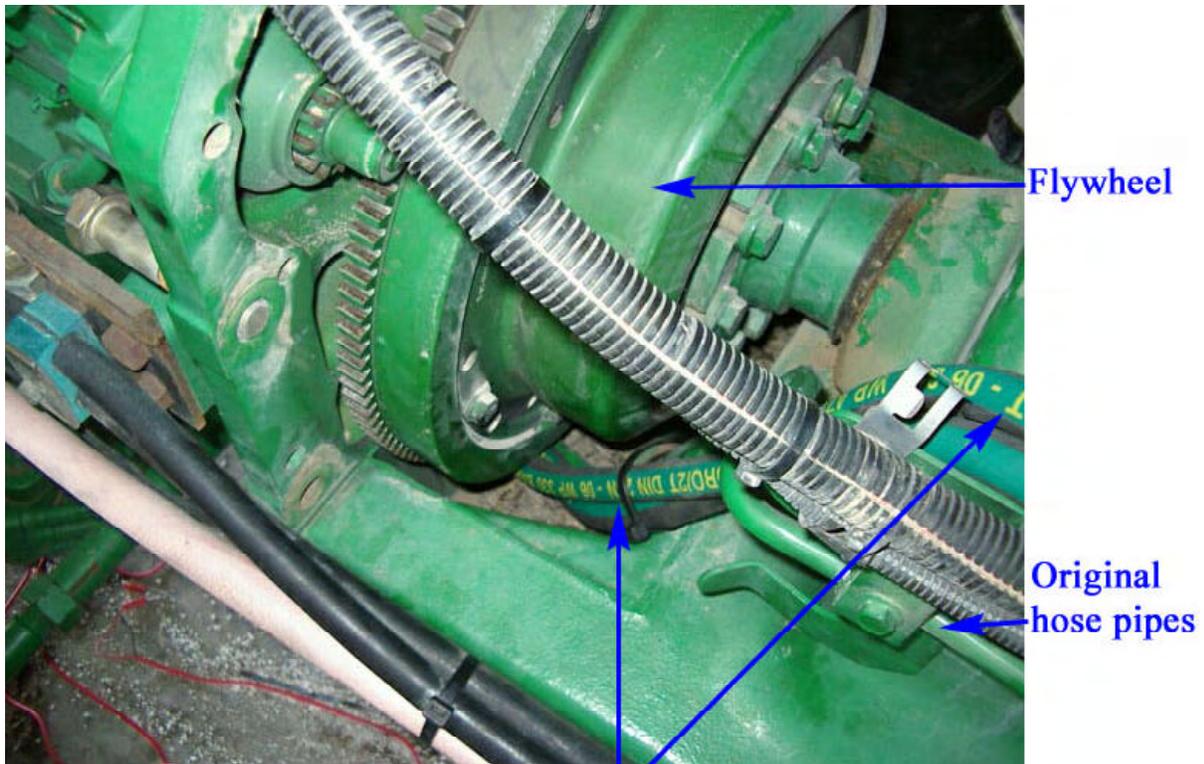
Steering Assist Manifold mounting location

STEPS

- 2) Remove the flywheel cover by removing the securing bolts.
- 3) Route the 13/16" ORFS ends of the supplied **Right-Steer & Left-Steer** hoses down past the flywheel and towards the front of the transmission housing, where the Steering Override Manifold is to be mounted.
- 4) When routing the hoses, cable tie hoses to original hose pipes.

KEY POINTS

NOTE: Ensure supplied hoses are capped to prevent any dirt ingress.

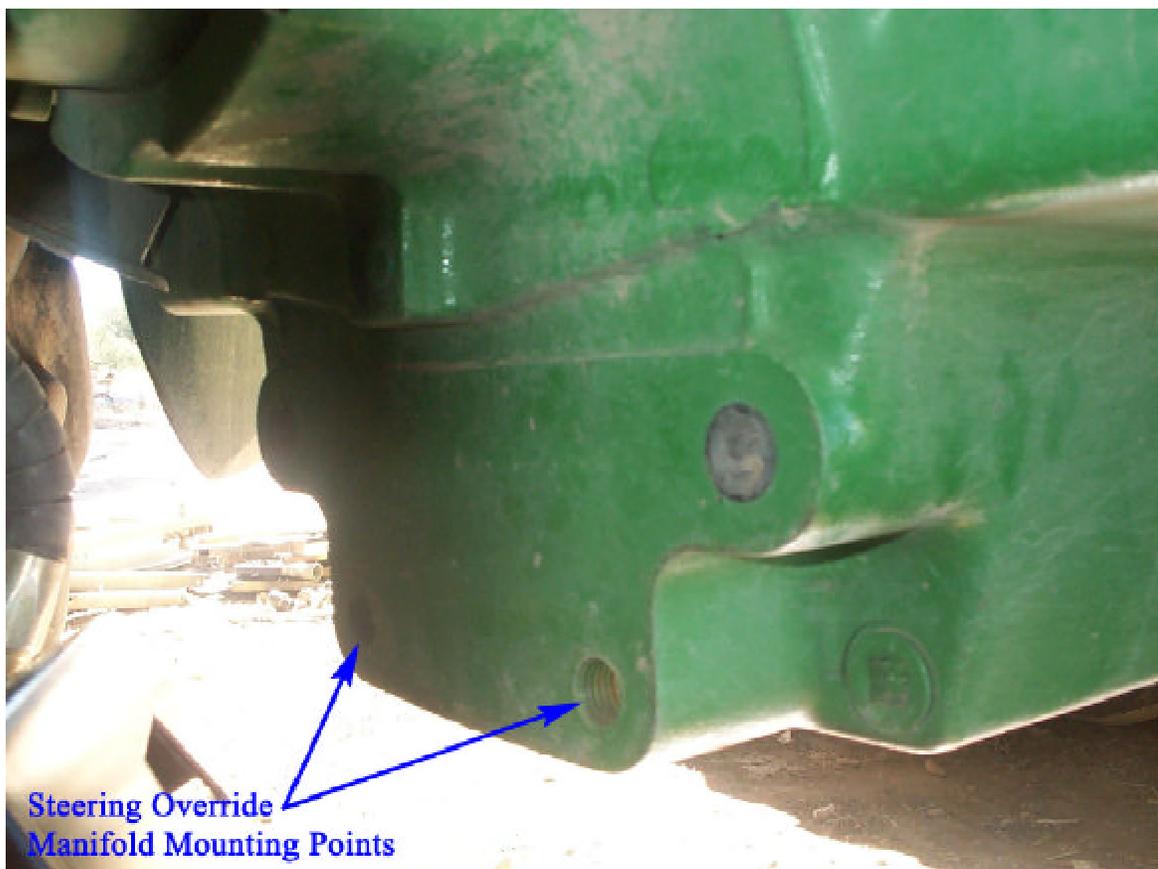


Route supplied Right-Steer and Left-Steer hoses down past flywheel and towards front of transmission housing

Supplied Right-Steer & Left-Steer hose routing

Mounting Steering Override Manifold

STEPS	KEY POINTS
<p>5) Prior to installing the Steering Override Manifold, connect the extension tubes and 90-degree elbows to ports A & B on the Steering Override Manifold.</p> <p>NOTE: The DIN plugs on the pressure switches can be disassembled and reassembled with the plug positioned at increments of 90-degrees to ensure that the lugs do not interfere with the steering override manifold bracket.</p> <p>6) The mounting points for the Steering Override Manifold are located on the front of the transmission housing. The two existing mounting holes are shown in figure below.</p>	



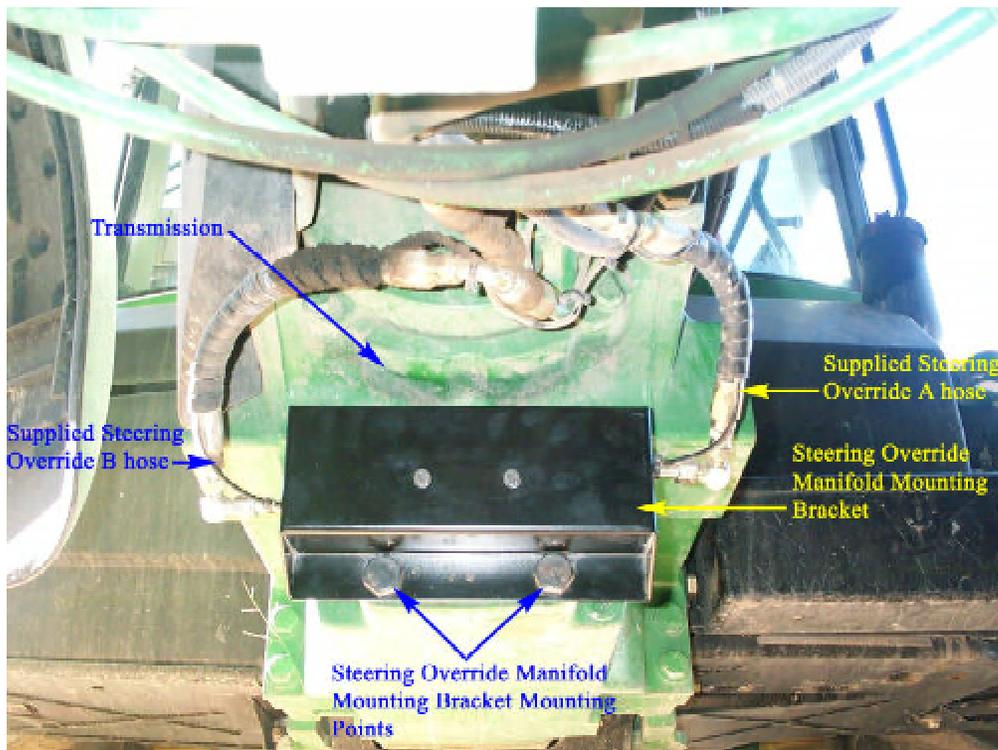
Steering Override Manifold mounting location

STEPS

- 7) Mount steering override manifold to supplied bracket as shown using the supplied hardware.
- 8) Move the complete Steering Override Manifold & Bracket assembly to the mounting location.
- 9) Use the 2 M20 x 40 mm hex head bolts to mount the assembly **loosely** to the front of the transmission as shown below.
- 10) Once Steering Override Manifold & bracket assembly is mounted, connect the supplied Steering Override A & B hoses to ports A & B on the Steering Override Manifold respectively.

KEY POINTS

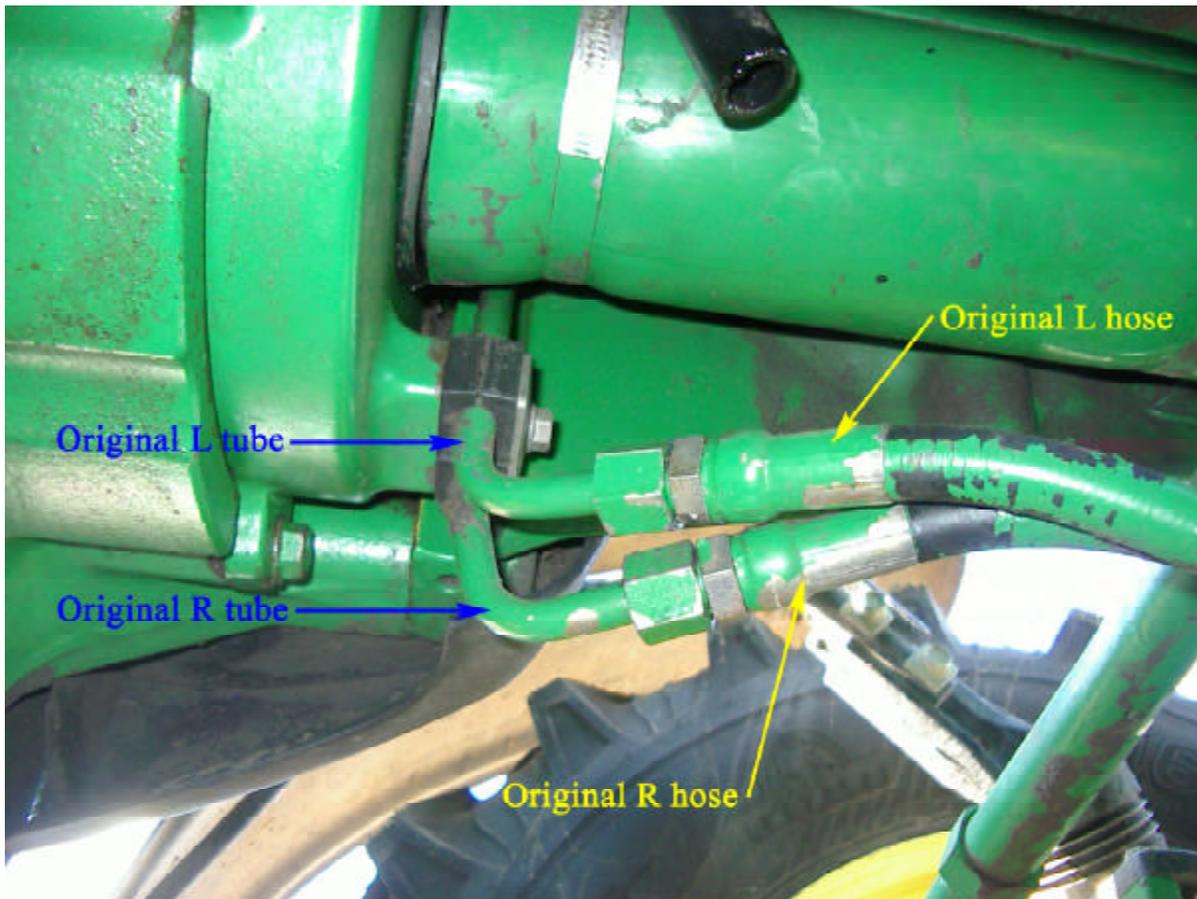
NOTE: Installation of the cables to the Steering Override Pressure switches (*located either side of the manifold*) will need to be done at a later stage in the installation (**refer to section - Solenoid Cable Connection & Routing**). Therefore, mounting the bracket loosely is advised. Once cabling has been installed **ENSURE** that the bracket mounting bolts are tightened.



Steering Override Manifold assembly mounted

Installing Left, Right, and Steering Override A & B Hoses

STEPS	KEY POINTS
11) Prior to connecting the supplied Right-Steer & Left-Steer hoses, disconnect the original R & L hoses from the original R & L tubes.	



Original R & L tubes & original L & R hoses before install

STEPS

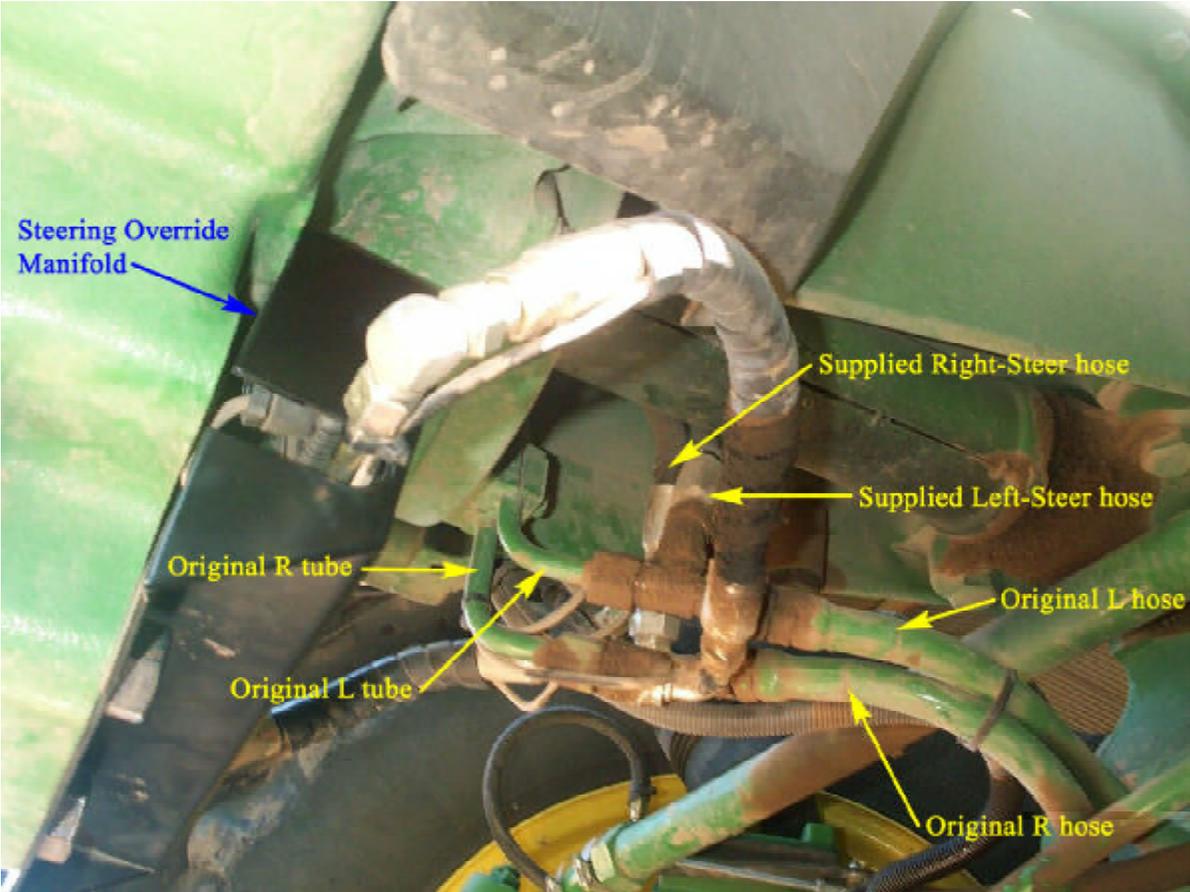
- 12) Connect the supplied **Left-Steer** hose first.
- 13) Connect a supplied tee connector to the original L tube and the supplied **Left-Steer** hose to the branch of the tee. Connect the original L hose to the remaining end of the tee connector.

KEY POINTS



Supplied Left-Steer hose connection to original L tube & original L hose

STEPS	KEY POINTS
14) To connect the supplied Right-Steer hose, disconnect Right Steer hose from Right Steer tube, connect the supplied tee connector to the original R hose. 15) Connect the supplied Right-Steer hose to one branch of the tee connector.	

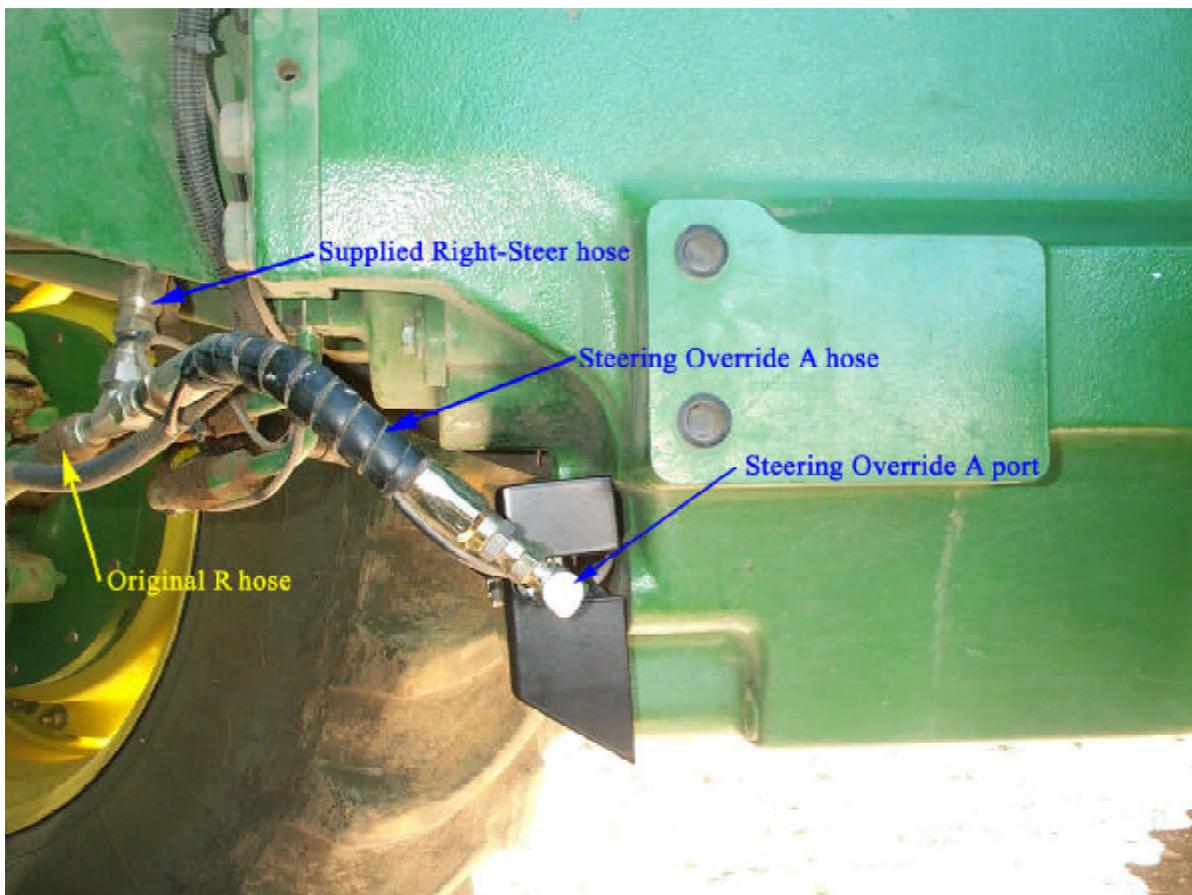


Supplied Right-Steer hose connection to original R tube

STEPS

- 16) Connect the **Steering Override A** hose to the remaining run end of the previously installed **Right-Steer** tee connector.

KEY POINTS



Steering Override A hose connection

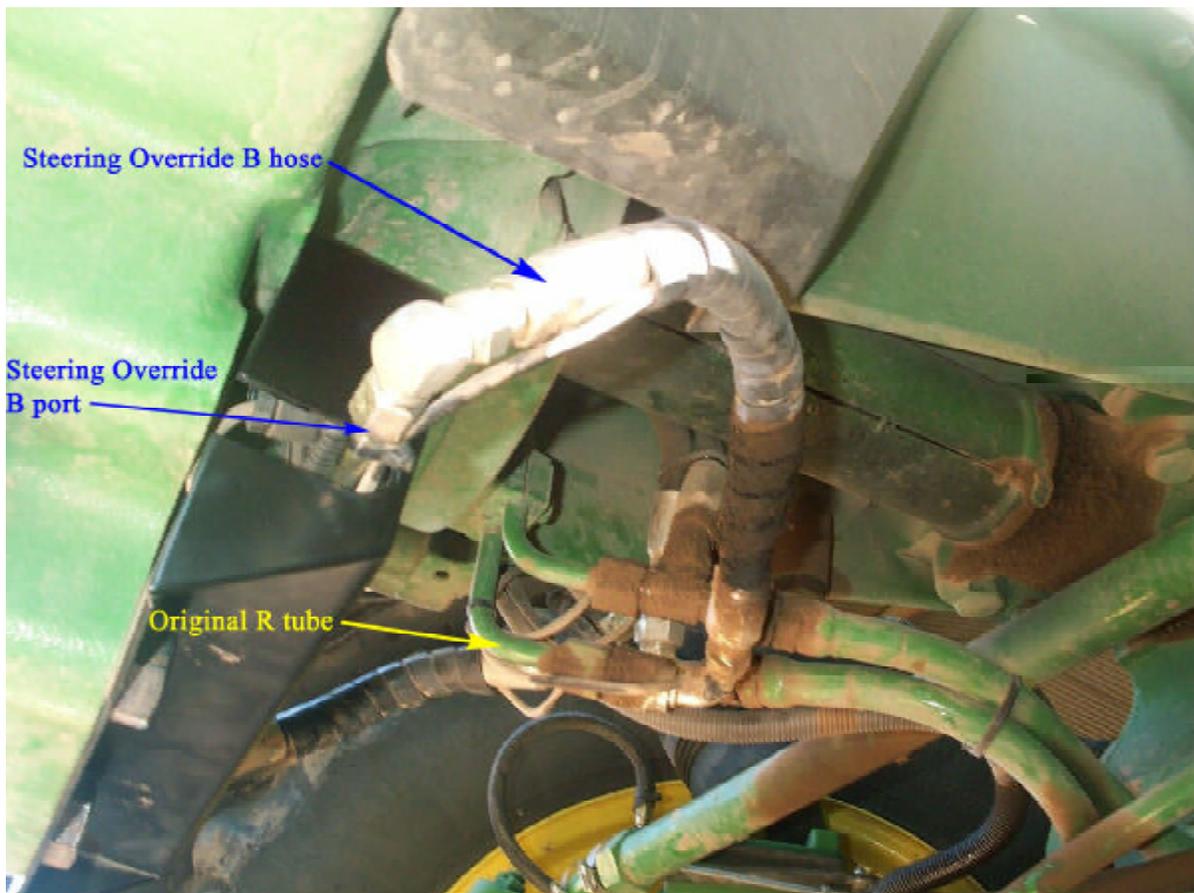
STEPS

- 17) Next, connect the **Steering Override B** hose to the original R tube using supplied M/M 13/16" ORFS adaptor.
- 18) Pull the supplied **Left-Steer & Right-Steer** hoses back towards the Steering Assist Manifold mounting location and secure to the original hoses using cable ties.

Once the supplied Left-Steer & Right-Steer hoses are correctly routed under the flywheel, reinstall the flywheel cover.

KEY POINTS

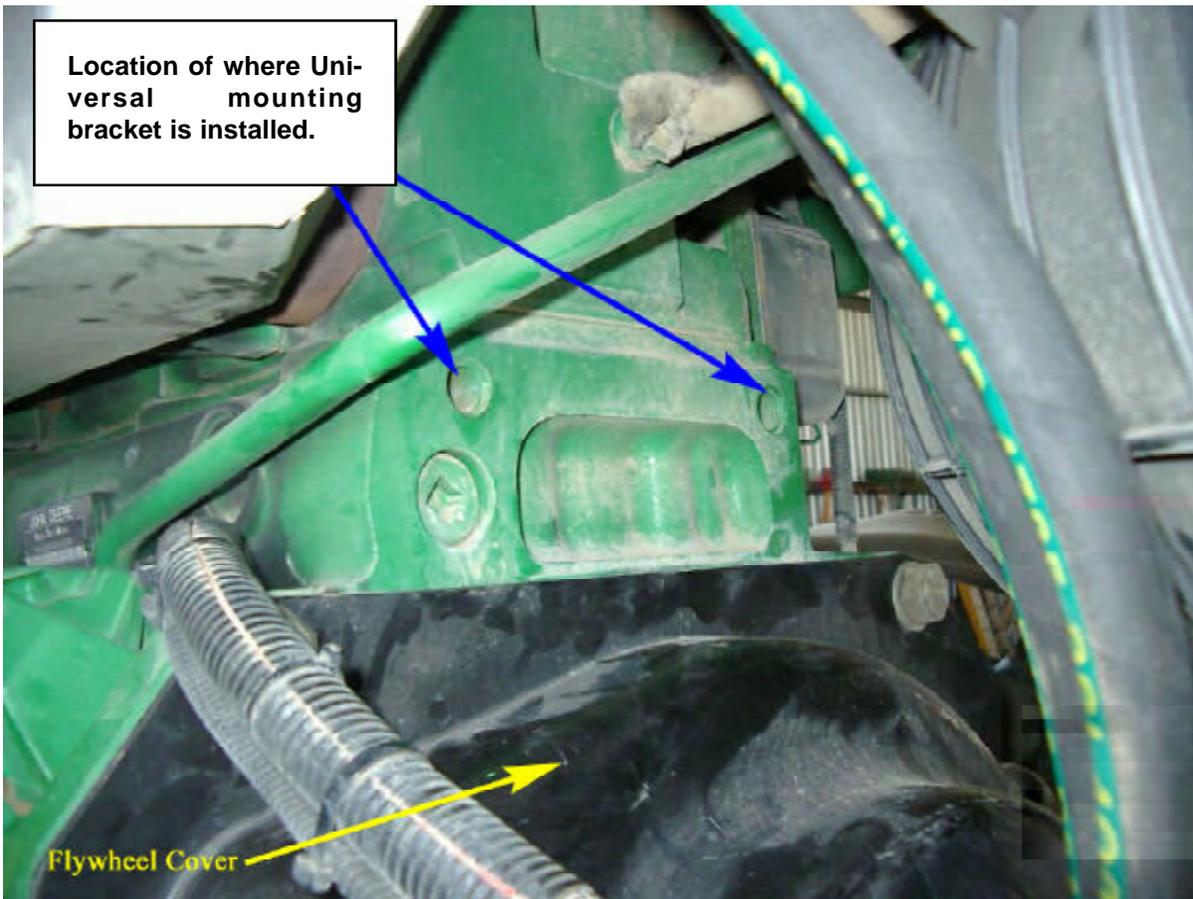
NOTE: Ensure all **excess** hose is routed over the flywheel, **NOT** around the front of the transmission and the hoses are tied securely.



Steering Override B hose connection

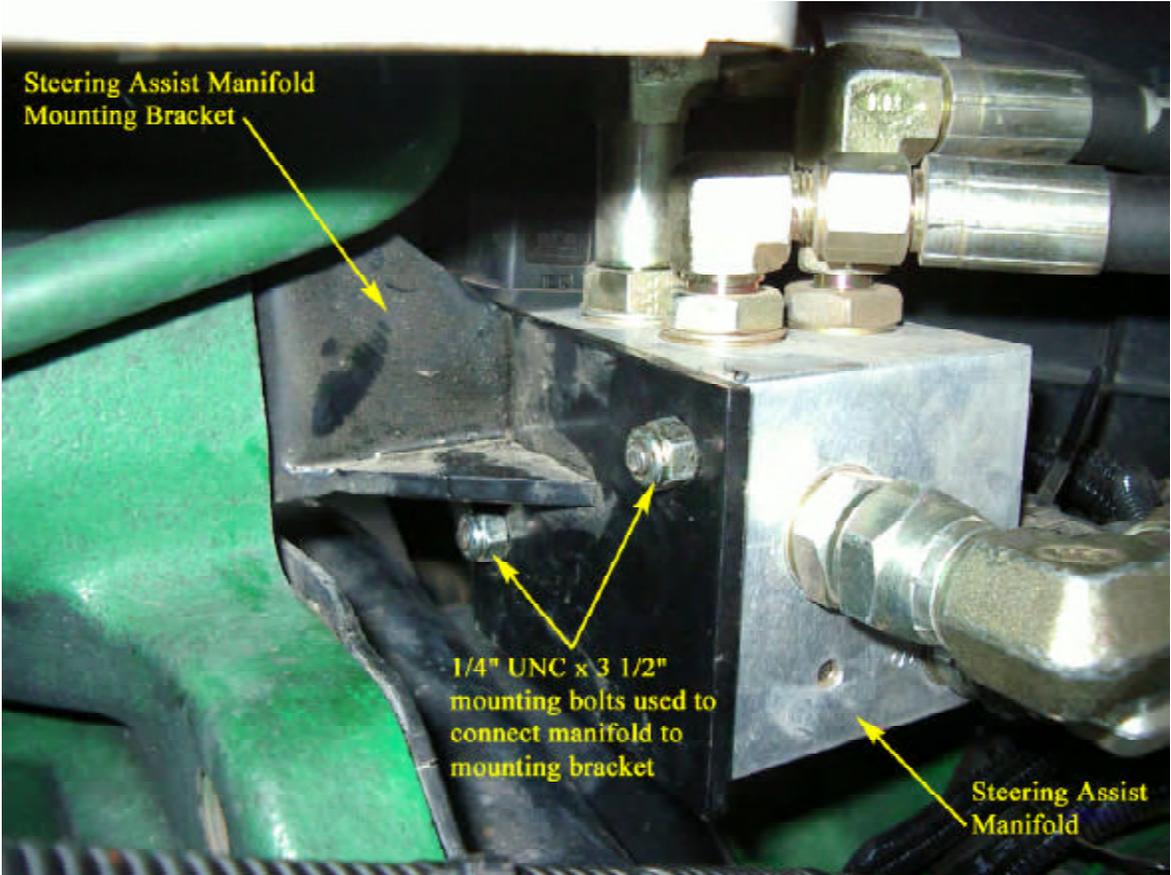
Installing Steering Assist Manifold

STEPS	KEY POINTS
<ol style="list-style-type: none"><li data-bbox="188 317 797 411">1) The suggested mounting point for the Steering Assist Manifold is located in front of the air filter, within the engine bay.<li data-bbox="188 443 773 537">2) The Universal Mounting Bracket is mounted on the 2 existing mounting points shown below.	



Universal Mounting Bracket installation points

STEPS	KEY POINTS
3) Attach supplied bracket to the mounting points using 2 - 3/4" UNC x 1 1/2" hex head bolts and flat washers as shown below.	



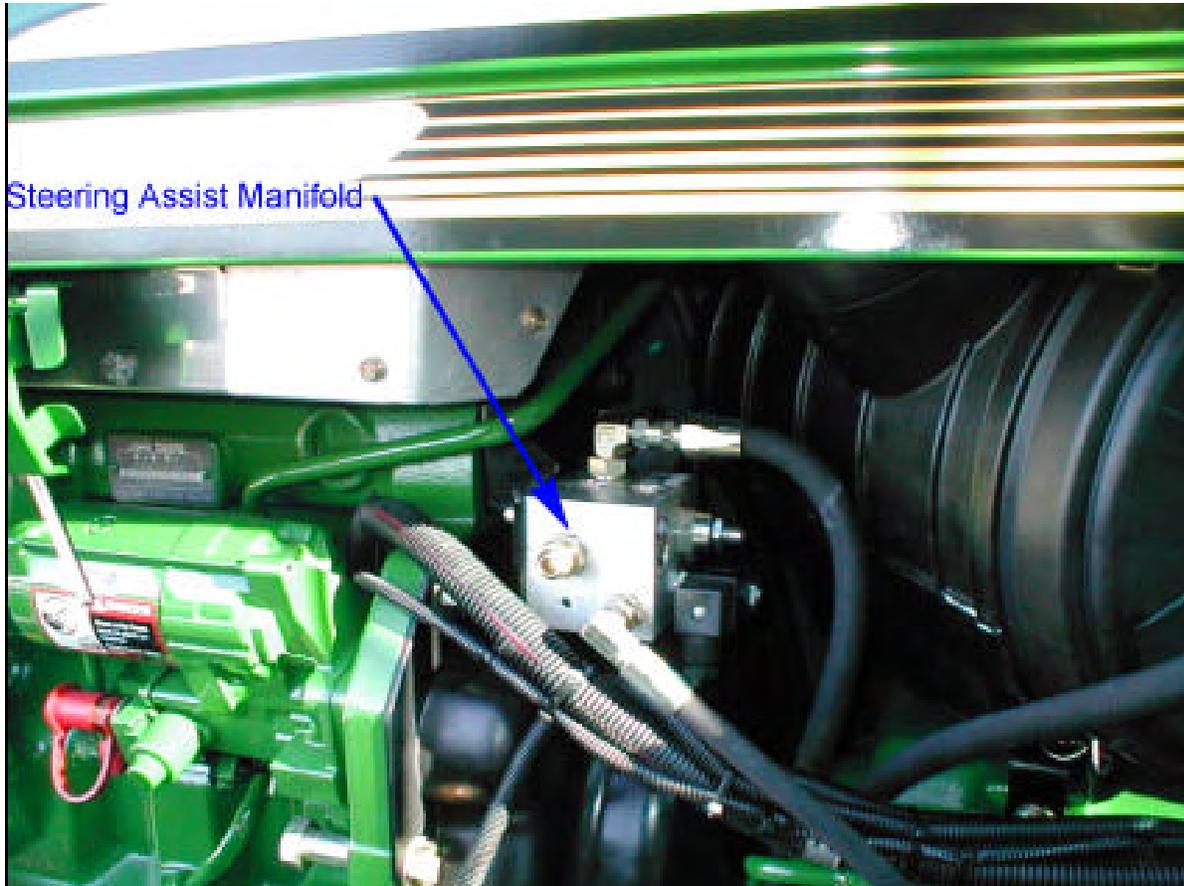
Steering Assist Manifold mounted to mounting bracket

STEPS

- 4) The Steering Assist Manifold is bolted to the bracket using the supplied bolts.
- 5) The figure below displays the Steering Assist Manifold installed.

KEY POINTS

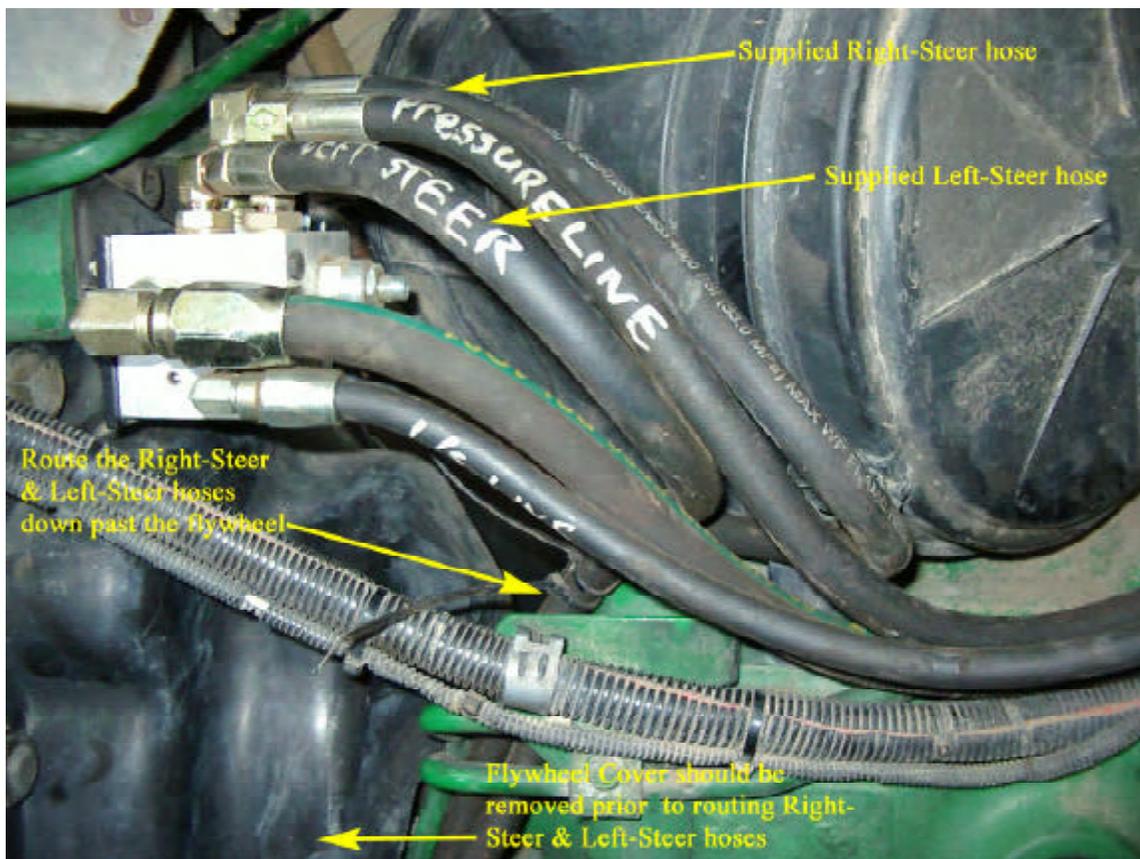
NOTE: Ensure the mounting bracket is positioned so that the manifold mating face is in the vertical plane as shown below.



Steering Assist Manifold mounted

Steering Assist Manifold hose routing

STEPS	KEY POINTS
1) Connect the supplied Right-Steer & Left-Steer hoses to the B & A ports on the Steering Assist Manifold, respectively.	NOTE: Ensure any excess hose from the supplied Right-Steer & Left-Steer hoses are neatly secured under the air filter.



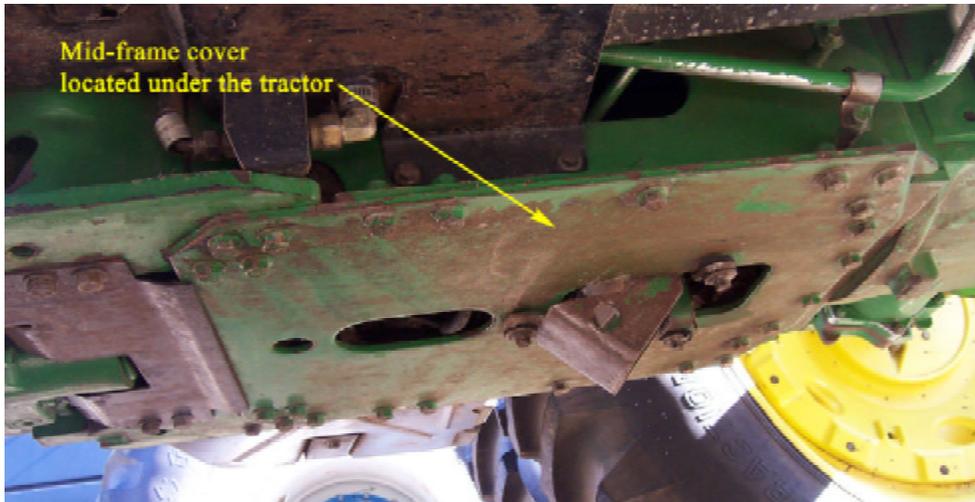
Supplied Right-Steer & Left-Steer hose routing from Steering Assist Manifold
(NOTE: Valve in picture is different from one currently used.)

STEPS

- 2) Connect the supplied **Tank, Pressure** and **Load Sense** hoses to the T, P and LS ports of the Steering Assist Manifold.
- 3) Route the hoses toward the mid-frame cavity under the tractor. To access to the mid-frame cavity, remove the mid-frame cover by removing the 24 bolts holding it onto the underside of the tractor.

KEY POINTS

NOTE: Take care when removing the mid-frame cover from under the tractor as the plate is quite heavy and the cavity may be filled with stubble, dust and oil collected during operations.



Remove Mid-frame cover

STEPS

- 4) Once mid-frame cover has been removed, remove and discard the original T hose that is connected between the EF port of the priority valve and the transmission.

KEY POINTS

NOTE: As the original T hose has been found to become inflexible on older tractors making connection to the supplied tee connector difficult, a **Replacement Tank** hose has been supplied to replace the original T hose.

NOTE: Before re-fitting the mid-frame cover, the remaining hydraulic hoses should be installed. Pressure testing the tractor's hydraulic system and checking for leaks should be carried out so that a visual check can be performed while the mid-frame cover is removed.

It is **IMPORTANT** to note that the mid-frame cover is a structural member of the tractor frame and **MUST** be installed correctly.

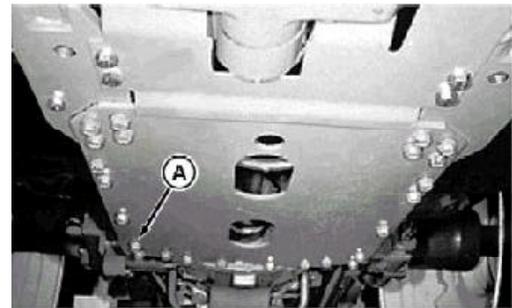
The mid-frame cover and bolts must be cleaned and tightened correctly to prevent machine failure.

Follow the correct procedure for refitting the mid-frame cover:

- i) Clean mid-frame and mid-frame cover bolting surfaces.
- ii) Clean, fit, and tighten mid-frame cover-to-mid-frame bolts, using the following torque specifications:

Small Mid-Frame Cover bolt (A) - Specification. Torque = 130 Nm (95 lb-ft).

Large Mid-Frame Cover bolt (B) - Specification. Torque = 339 Nm (250 lb-ft).

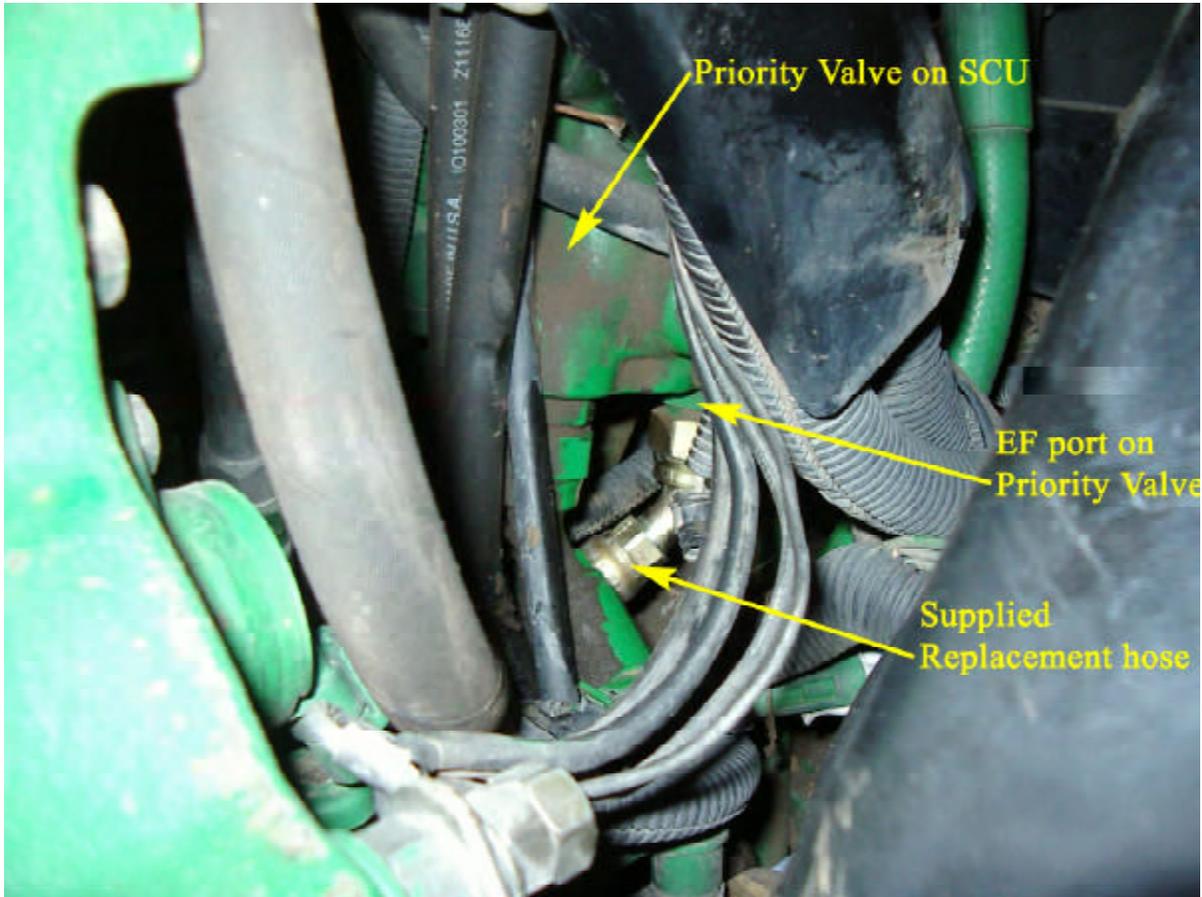


Early Design



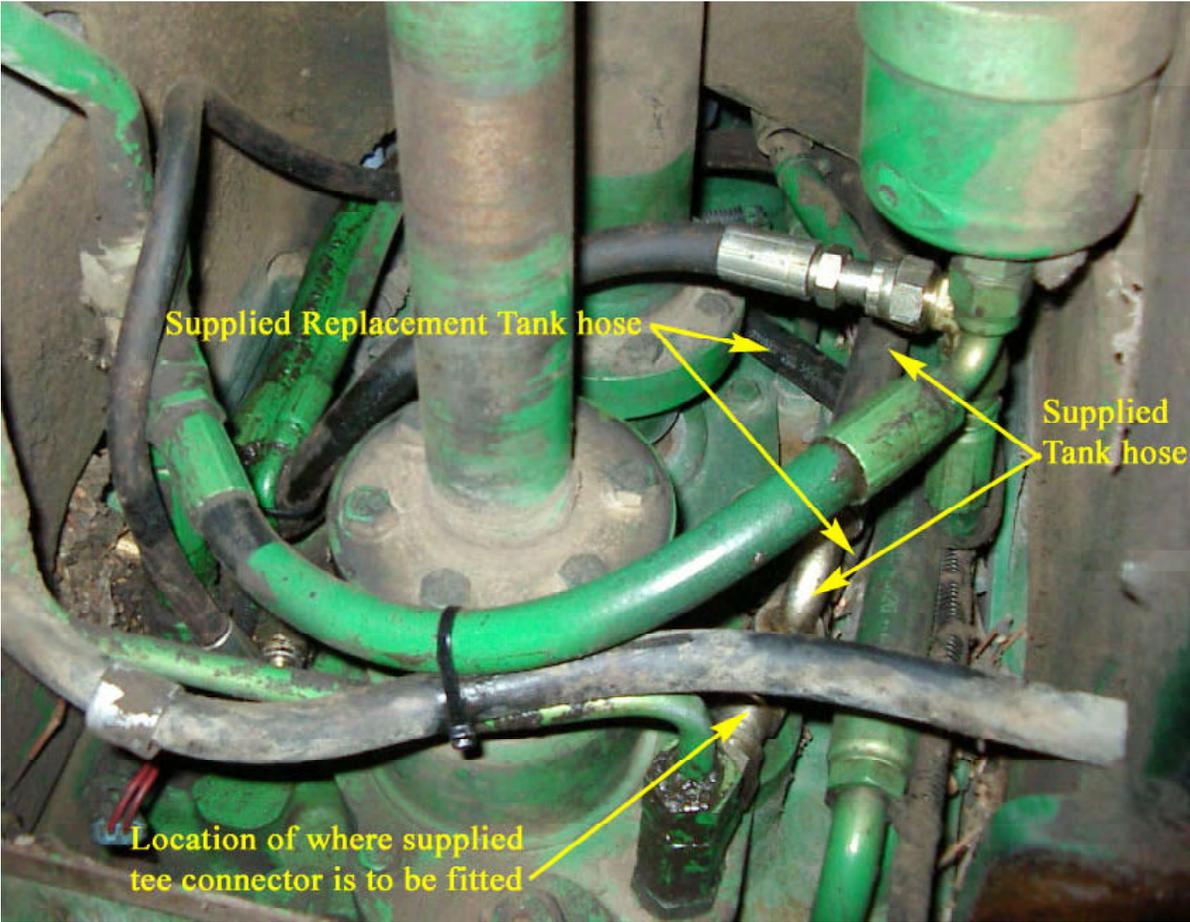
Later Design

STEPS	KEY POINTS
5) Connect the Replacement Tank hose to the EF port on the priority valve.	



Supplied Tank hose & Replacement hose connections

STEPS	KEY POINTS
<p>6) Prior to installing the supplied Tank hose, attach a supplied tee connector to the point where the Replacement Tank hose connects to the transmission.</p> <p>7) Connect the supplied Tank hose to the branch of the tee and the Replacement Tank hose to the run end of the tee.</p>	

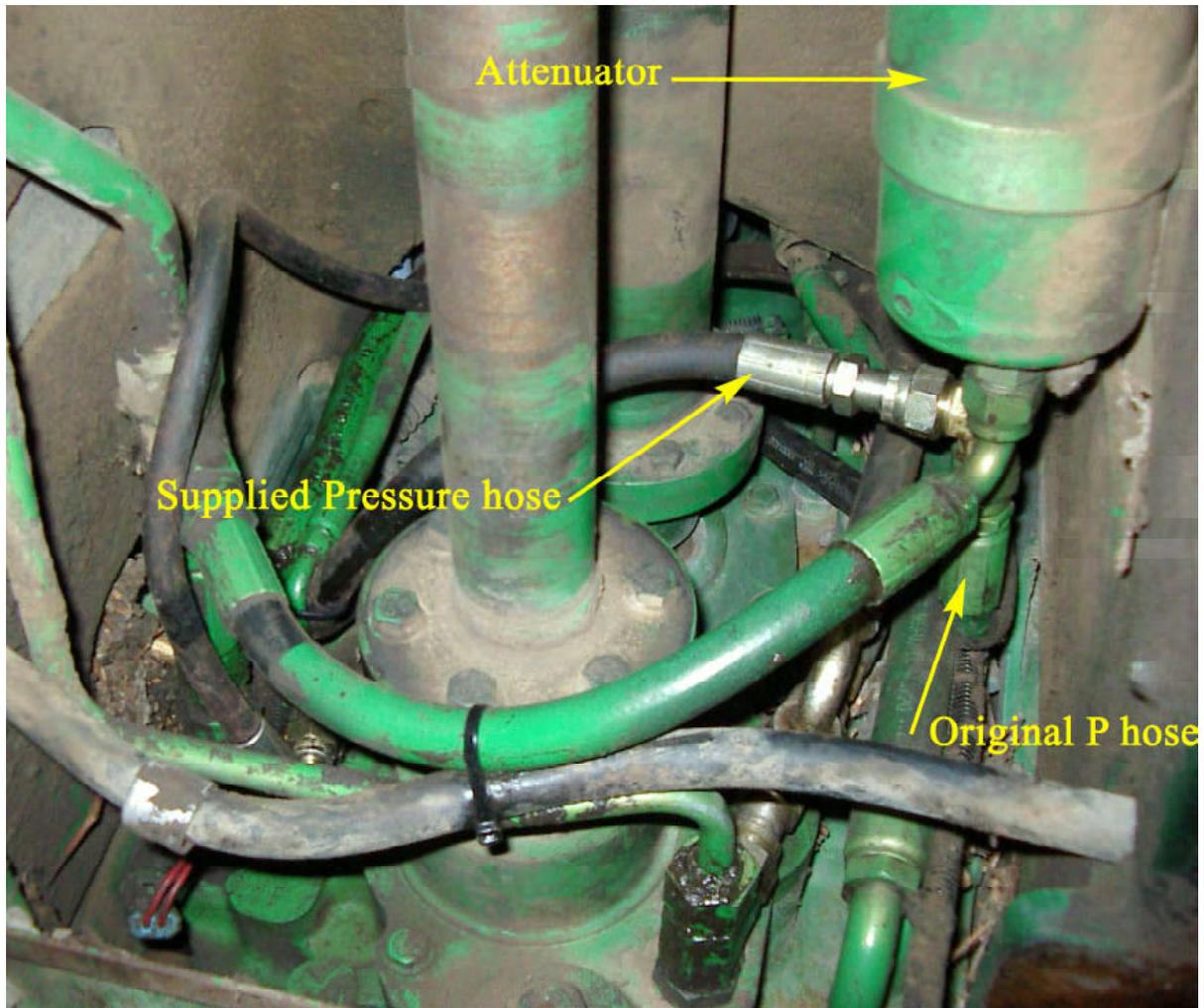


Supplied Tank hose & Replacement hose connections

STEPS

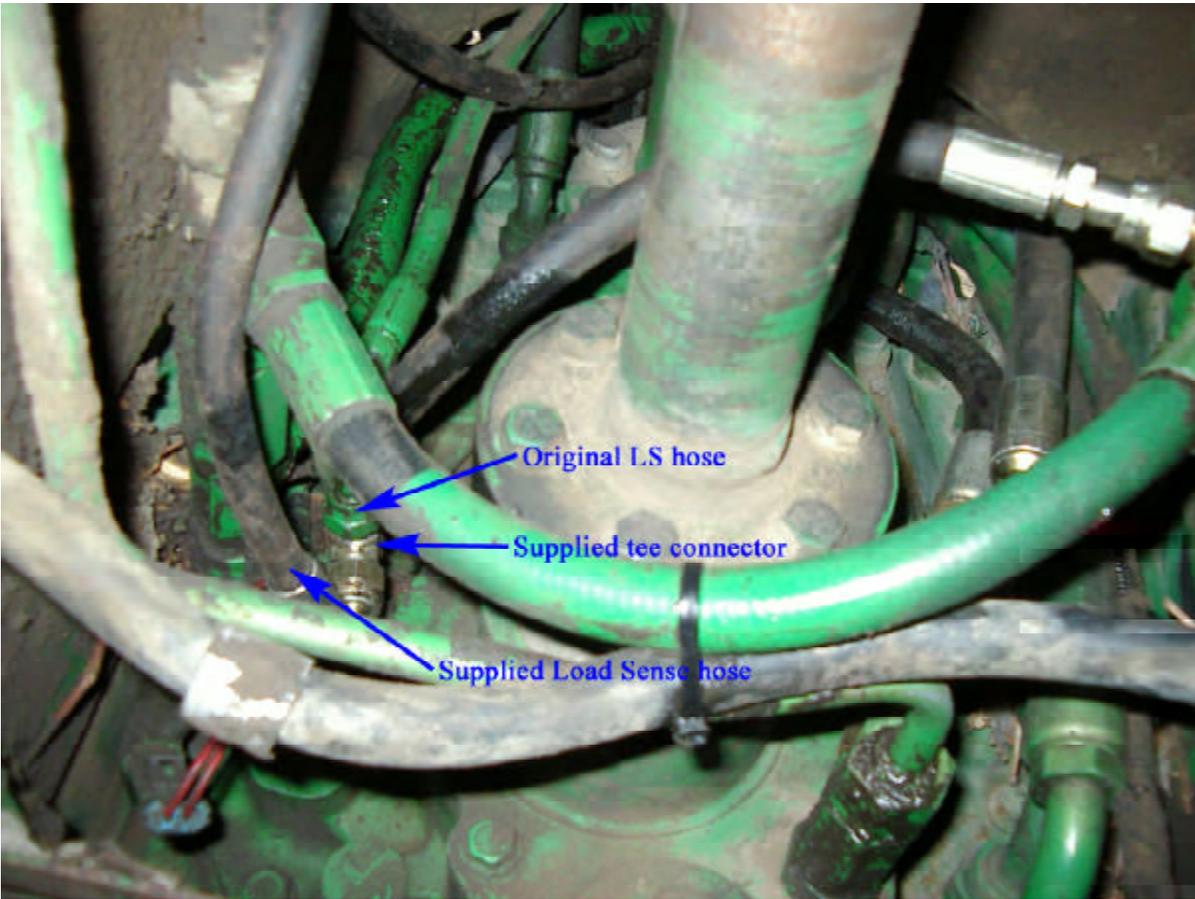
- 8) Prior to installing the supplied **Pressure** hose, remove the original P hose from the attenuator and attach a supplied tee connector to the port on the attenuator.
- 9) Connect the supplied **Pressure** hose to the branch of the tee and then re-connect the original P hose to the remaining run end of the tee.

KEY POINTS



Supplied Pressure hose connection to Attenuator

STEPS	KEY POINTS
<p>10) Prior to installing the Load Sense hose, disconnect the original LS hose from the transmission.</p> <p>11) Insert a supplied tee connector to the port on the transmission and then connect the supplied Load Sense hose to the branch of the tee.</p> <p>NOTE: The GDP pressure switch may have to be removed to provide better access to the GDP LS port.</p> <p>12) Re-connect the original LS hose on the run end of the tee connector.</p>	



Supplied Load Sense hose connection to transmission

STEPS

- 13) Pressure test the system once all hoses and fittings have been installed onto the Steering Assist Manifold. Turn the tractor steering wheel to full lock, both ways for several seconds and check for leaks.
- 14) It is important to purge the hydraulic lines before the Smartrax can be activated because the hydraulic circuit will contain entrapped air after being open to atmosphere. Turning the tractor steering wheel lock-to-lock several times will purge the system.
- 15) Fix the hoses in place securely and neatly with cable ties.

KEY POINTS

Tighten steering override bracket and reinstall mid frame cover once hydraulic installation is complete and tested.

Installing Steering Position Sensor (S.P.S.)

STEPS	KEY POINTS
<ol style="list-style-type: none"><li data-bbox="237 306 797 365">1) The S.P.S. is mounted near the RHS front wheel of the tractor.<li data-bbox="237 432 841 558">2) Prior to installing the S.P.S. mounting bracket, remove the original bolts A & B. Using an M12 x 1.75 bottoming tap, make sure that the holes are threaded to full depth.<li data-bbox="237 592 646 621">3) Install the original bolts A & B.	<p data-bbox="935 306 1446 399">NOTE: It is important to mount the S.P.S. near the RHS front of the tractor to minimize the possibility of damage.</p> <p data-bbox="935 432 1446 525">NOTE: Ensure that the thread in each hole is not damaged when tapping out holes.</p>



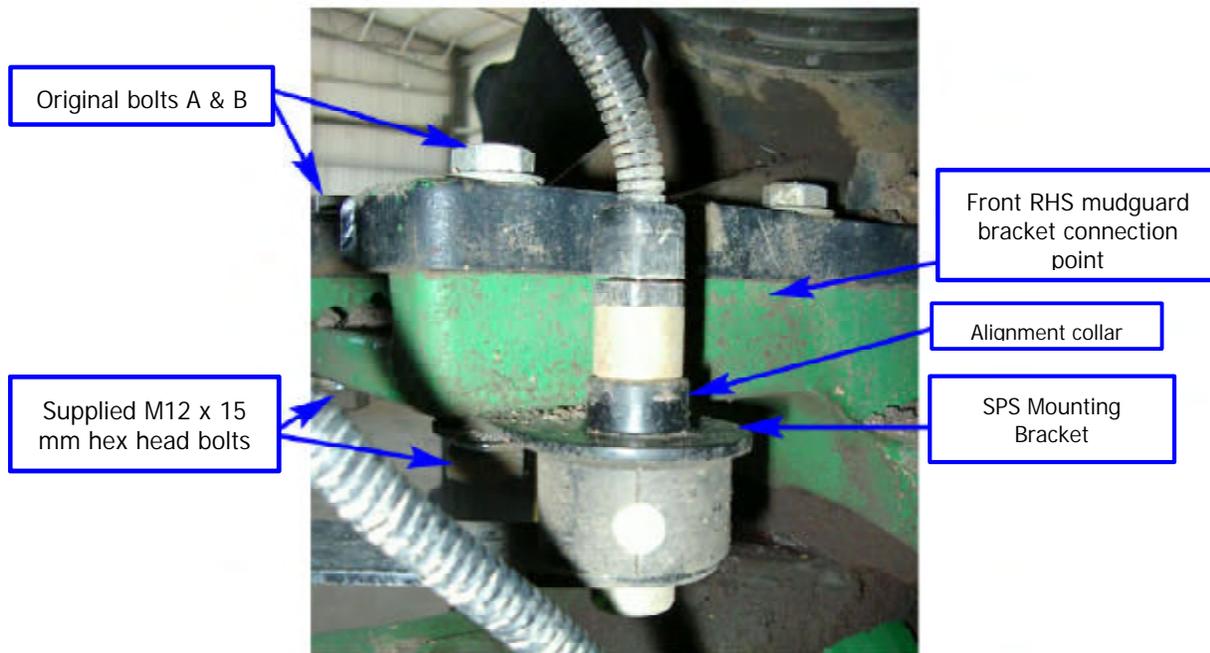
S.P.S. mounting holes

STEPS

- 4) **Secure the S.P.S. Mounting Bracket** under the mudguard bracket connection point, using the 2 M12 x 20 mm hex head bolts and flat washers supplied.

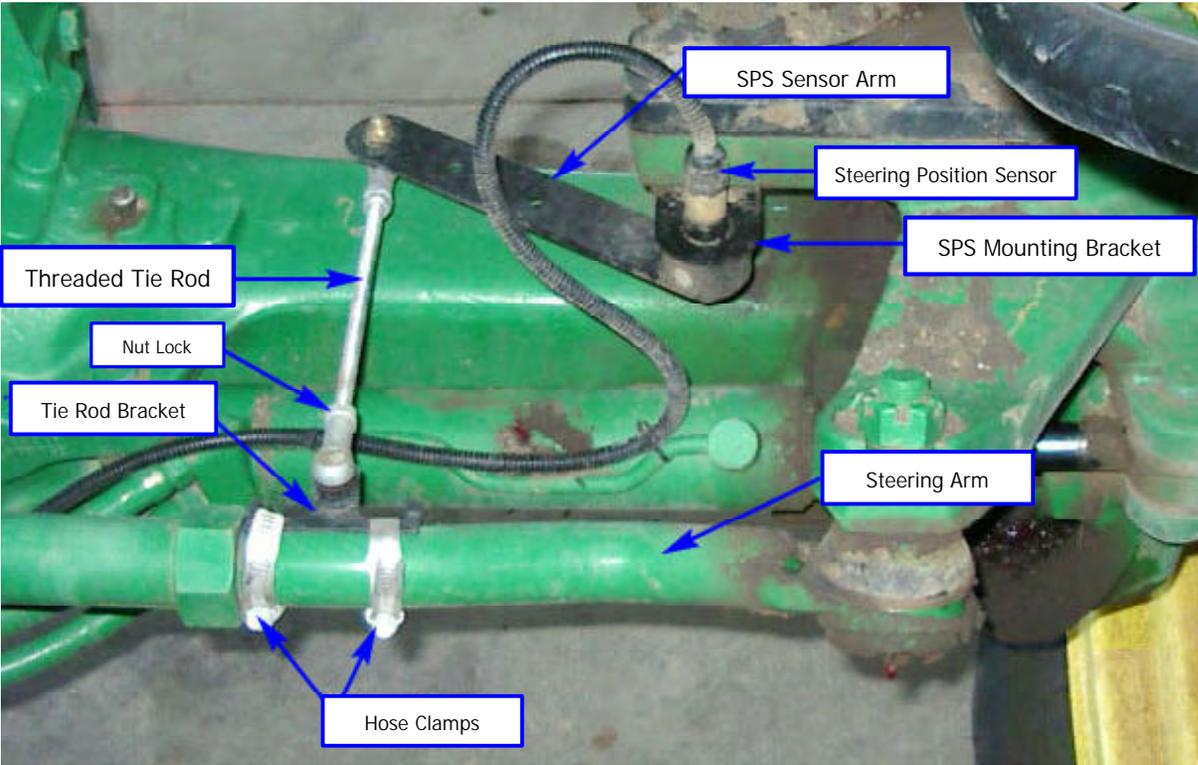
KEY POINTS

NOTE: Ensure the alignment collar is positioned on topside of the **S.P.S.** Mounting Bracket.



Mounting the S.P.S. Mounting Bracket

STEPS	KEY POINTS
<p>5) On the RHS front wheel tractor Steering Arm, secure the S.P.S. Tie Rod in place using the Tie Rod Bracket and Hose Clamps supplied, as shown in the configuration below. The tag of the tie rod bracket should be horizontal and facing backwards.</p>	
<p>6) Connect the tie rod through the tie rod bracket and secure with a nyloc nut.</p>	
<p>7) Connect the opposite end of the tie rod through the S.P.S. sensor arm and secure with a nyloc nut. The distance between the tie rod ends should be set to 240 mm (9 1/2") (center-to-center). Bottom out the end of the tie rod and adjust the opposite end to the required position. Lock the adjusted tie rod into position using the lock nut.</p>	



Mounting the S.P.S. Kit components

STEPS

- 8) The figure below shows the configuration assembly of the **S.P.S.** sensor.
- 9) Slide the **S.P.S.** sensor hub through the mounting bracket and alignment collar followed by a fiber washer.
- 10) Slide the magnet housing, which is attached to the **S.P.S.** sensor arm onto the protruding sensor hub.
- 11) **Ensure that the '1' mark on the sensor hub is aligned over the center of the silicon filled magnet hole in the sensor arm magnet housing. Confirm that the tractor wheels are pointing forward and centered.**
- 12) Finally, slide the fiber washer and supporting collar onto the bottom of the sensor hub and ensure the bottom of the sensor hub is aligned with the bottom of the supporting collar. Tighten both grub screws.

KEY POINTS

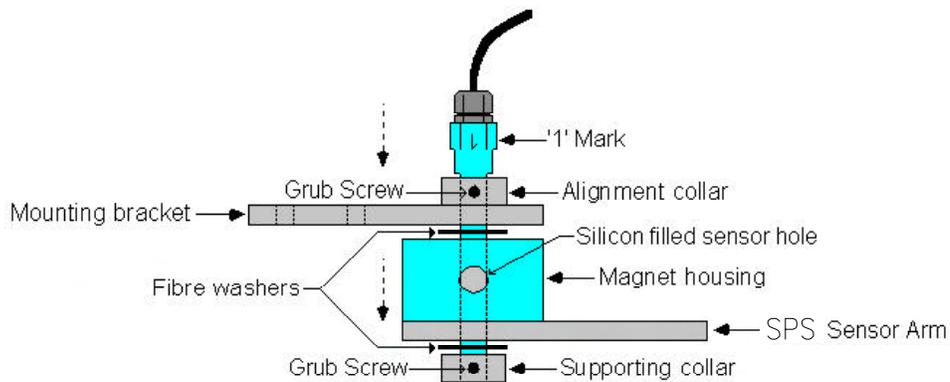


Diagram S.P.S. Assembly

- 13) Start the tractor and carefully turn the steering wheel from lock to lock watching the installed **S.P.S.** to ensure that it does not fold in on itself or straightens to any less than 10 degrees.
- 14) If it is clear that the **S.P.S.** assembly will be damaged at or before full lock is reached, user must adjust the distance between tie rod ends and/or the position of the tie rod bracket and re-test.



Take care when checking the sensor assembly for wheel angle interference. Failure to do so may result in permanent damage to the sensor if the assembly is incorrectly fitted.

Cable Connections

- ◆ Connect labeled ends of cable to hydraulic valve, override manifold, and S.P.S.
- ◆ Route Cable into Cab.
- ◆ Secure cable away from moving parts and heat sources.

Start-Up Procedures

- ◆ Turn wheels fully to purge hydraulic system of air.
- ◆ Set valve timing for a lock to lock time of approximately 15 seconds.

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Limited Warranty

What Does this Warranty Cover?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Product under normal use, maintenance, and service.

How Long is the Coverage Period?

Raven Applied Technology Products are covered by this warranty for 12 months after the date of purchase. This warranty coverage applies only to the original owner and is nontransferable.

How Can I Get Service?

Bring the defective part and proof of purchase to your Raven Dealer. If your Dealer agrees with the warranty claim, the Dealer will send the part and proof of purchase to their distributor or to Raven Industries for final approval.

What Will Raven Industries Do?

Upon confirmation of the warranty claim, Raven Industries will, at our discretion, repair or replace the defective part and pay for return freight.

What is not Covered by this Warranty?

Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit or other special damages. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.

R A V E N

John Deere 8x00, 8x10 Series
SmarTrax™ Installation Manual
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Simply improving your position.™



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