

# Automated Steering Kit Installation Guide


*Kit: EDX-JD8020, P/N 911-2007-000*

## Fits John Deere Tractor Models:

8120    8220    8320    8420    8520



## Read and Follow Safety Messages

- In these instructions, you will see the heading **WARNING** and the safety alert symbol . They indicate a hazardous situation that, if not avoided, could result in death or serious injury. The safety messages provide information to identify a hazard associated with potential injury.
- Before installing, operating, or performing maintenance or service on any part of the system:
  - Read and understand this installation guide and all of the safety information
  - Read and understand the Automated Steering System User Guide
- Do not allow anyone to operate without instruction
- Keep these instructions and all related safety information with the manual for your machine and other implements.

If you have any questions or need assistance, contact your local dealer or distributor.

## Overview

A series of equipment specific kits has been developed to work in conjunction with your automated steering system. For the machine models listed above, these kits contain the components for:

- the steering hydraulics
- the wheel angle sensor (WAS)
- the steering wheel switch (SWS - for steering override)

The items in each kit are detailed in the tables that follow the safety warnings below. After the kit tables, there are four step-by-step installation sections, one for each of the kits.

Please read this manual thoroughly before beginning the installation.

### **WARNING:**

To avoid serious injury or death during machine operation, install the appropriate kit for your machine make and model.

## Machine Preparation

### **⚠ WARNING:**

Inspect the machine and perform any needed maintenance (for example, contaminated hydraulic fluid) before installing the Automated Steering Hydraulic Installation Kit. This kit cannot perform as intended on a machine that is not maintained properly. Errors in performance increase the risk of operator and bystander injury or death.

Failure to maintain clean hydraulic fluid and operational hydraulic components can cause loss of directional control resulting in serious injury or death.

To avoid serious injury, wear hand and eye protection and use wood or cardboard when checking for leaks.

Turn off the machine and power off the automated steering controller when installing or performing maintenance.

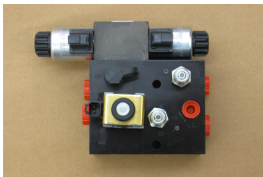




Before attempting to install any of the components, park the machine on a clean level floor with adequate clearance to work all around.

Before you perform any drilling, cutting or fastening, ensure that no other machine components, such as hydraulic hoses or electrical wiring, will be damaged. Failure to follow this warning may cause physical injury and/or damage to the machine.

To prevent hydraulic system contamination, it is essential to thoroughly clean hydraulic system fittings and hose connections prior to disconnecting or removing. Use a spray cleaner such as 'Brake Clean' to prevent hydraulic system contamination. Note that o-rings used on ORB and ORFF type fittings, referred to in the Kit Contents section, may be damaged by solvent cleaners such as 'Brake Clean'. If a fitting is to be cleaned internally, the o-ring should first be removed and cleaned with a fiberless cloth.

### Kit Contents - Steering Hydraulics


Unpack the hydraulics installation kit and identify the required parts as shown. Kit items are A, B, C etc. with an H (Hydraulic) prefix.

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HA	760-0020-000	1	Assy, hyd valve block - 15L/Proportional  (Hydraulic steering block)	
<b>Bag H1 contains HB, HC, and HD</b>				
HB	760-2058	1	Adapter, hyd 90 elbow - #6maleJIC x #6maleORB  (LS port on hydraulic steering block)	
HC	760-2061-000	2	Adapter, hyd 90 elbow - #6maleJIC x #8maleORB  (A and B ports on hydraulic steering block)	
HD	760-2060	2	Adapter, hyd - #6maleJIC x #8maleORB  (P and T ports on hydraulic steering block)	
HE	640-0021	1	Hyd block mnt, JD8020	

## Kit Contents - Steering Hydraulics *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
<b>Bag H2 contains HG and HH</b>				
HG	675-2006	2	Bolt - 3/8NC x 3-3/4" Gr5 ZP	
	678-1054	2	Washer, narrow flat - 3/4"OD x 13/32"ID x 1/16" thk ZP	
	676-1035	2	Nut, nylock - 3/8NC ZP	
<b>Bag H3 contains HJ and HK</b>				
HJ	760-2069	2	Adapter, hyd run tee - #8 ORFF	
HK	760-2063	2	Adapter, hyd - #6maleJIC x M14maleORB	
<b>Bag H4 contains HL, HM, HN, HO, and HP</b>				
HL	760-0002	1	Hyd load shuttle - #6femORB	
HM	760-2049	1	Adapter, hyd 90 elbow - #6maleORFF x #6maleORB	
HN	760-2040	1	Adapter, hyd 90 elbow - #6maleORB x #6femORFFswiv	
HO	760-2056	1	Adapter, hyd - #6maleJIC x #6maleORB	

## Kit Contents - Steering Hydraulics *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HP	760-2058	1	Adapter, hyd 90 elbow - #6maleJIC x #6maleORB	
HQ	760-1070	2	Hose, hyd - 3/8" x 98", #6femJIC x #8femORF90	
HR	760-1066	1	Hose, hyd - 3/8" x 19", #6femJIC x #6femJIC	
HS	760-1014	1	Hose, hyd - 3/8" x 22", #6femJIC x #6femJIC90	
HT	760-1067	1	Hose, hyd - 1/4" x 60", #6femJIC x #6femJIC	
HU	760-1078	1	Hose, hyd - 1/4" x 44", #6femORF x #8femORF	
HV	677-2001	20	Tie strap, 11" heavy duty	

## Kit Contents - Wheel Angle Sensor

Unpack the wheel angle sensor kit and identify the required parts as shown. Kit items are A, B, C etc. with a W (Wheel) prefix.

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
<b>Bag 710-0099-000 contains WA to WJ</b>				
WA	720-0045-000#	1	WAS assembly	
WB	750-5002-000	1	Sensor, dual output, BEI	
WC	602-1087-000	1	Connector arm, steering, long	
WD	675-1191-000	2	Screw, mach, 8-32 x 3" PPH ZP	
WE	676-1054-000	4	Nut, nylock - 8/32NC ZP	
WF	675-1150-000	2	Screw, 8-32 x 1", Allen socket cap, ZP	
WG	675-2031-000	1	Threaded rod, 5/16-24 x 12"	
WH	676-1053-000#	4	Nut, 5/16-24 standard ZP	
WI	760-0018-000#	2	Rod end swivel with stud, 5/16-24	
WJ	675-2010	2	Bolt - 5/16NC x 3/4" Gr5 ZP	 
	678-1077-000	2	Washer, lock 5/16, ZP	

## Kit Contents -Wheel Angle Sensor (continued)

Bag W3 contains WK and WL

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WK	675-0106-000	2	Clamp, 1-1/4" polypropylene, EDX
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WL	675-2005	2	Bolt - 3/8NC x 3-1/4" Gr5 ZP
	678-1054	2	Washer, narrow flat - 3/4"OD x 13/32"ID x 1/16" thk ZP
	676-1035	2	Nut, nylock - 3/8NC ZP



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WM	640-0070-000	1	WAS rod mount, EDX-JD8020
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WN	640-0104-000	1	EDX WAS housing mount, EDX-JD8020
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## Kit Contents - Steering Wheel Switch

Unpack the steering wheel switch kit and identify the required parts as shown. Kit items are A, B, C etc. with an S (Switch) prefix.

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
SA	478-0008	2	Magnet, flex - 1/2"W x 1"L x 1/8"T, plain, 1	
SB	675-0077	1	Epoxy, Hardman 04001 - single double bub	
SC	602-1062	1	Bracket, steering wheel switch mounting	
SD	726-1054 or 051-0443-10	1	Assy, steering wheel switch	
SE	677-2002	4	Tie strap, 7" releasable	
SF	675-1138-000	1	Screw, 8-18 x 3/4" Hex	

# Installation - Automated Hydraulic Steering Kit

## ⚠ WARNING:

Before installing, disconnecting or repairing the hydraulic hoses and components, turn off the machine and relieve all pressure from the hydraulic system by turning the steering wheel left and right. Failure to remove the pressure can result in serious injury or death from unexpected machine movement.

To avoid burn injury when installing, disconnecting or repairing the hydraulic hoses and components, turn off the machine and allow the system to cool down prior to touching the parts of the machine that are heated.

### 1. Prepare the hydraulic steering block.

#### NOTE:

*Make sure the hydraulic steering block is clean and dust free.*

Prepare the hydraulic steering block as follows: (Figure 1).

- Install straight fittings **HD** in the **P** and **T** ports
- Install elbow fitting **HB** in the **LS** port
- Install elbow fittings **HC** in the **A** and **B** ports

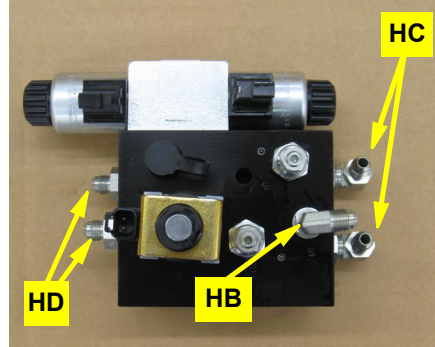


Figure 1: Prepared steering block

### 2. Install the mounting bracket.

- a. Locate the two bolts securing the trailer-wiring bracket to the rear casting of the tractor. Using these two bolts, install the hydraulic mounting bracket **HE** onto the tractor casting (Figure 2a).

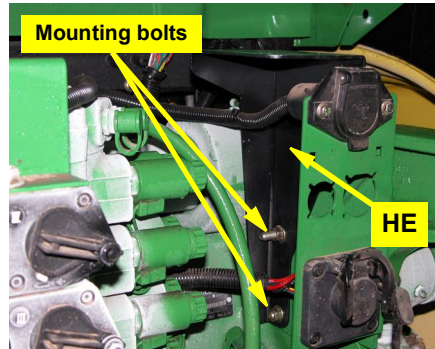


Figure 2a: Installed steering block bracket

- b. Secure the hydraulic steering block **HA** to the bracket **HE** using hardware **HG** (Figure 2b).

#### NOTE:

*Leave enough space to mount the steering controller **HI** between the front face of the short side of **HF** and the hydraulic steering block.*

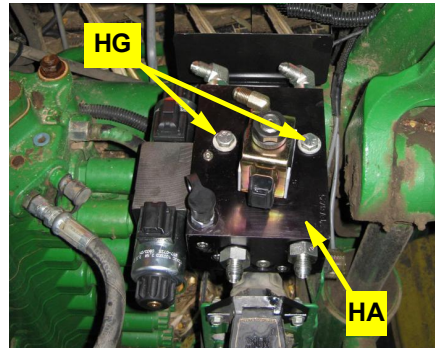


Figure 2b: Installed steering block.



3. **Install the steering output fittings.**

- a. Raise the hood on the tractor and remove the black air conditioning belt shield on the left side in front of the cab.

The shield is held in place by two Allen head screws. For easier accessibility, you may want to remove the battery box shield (Figure 3a).

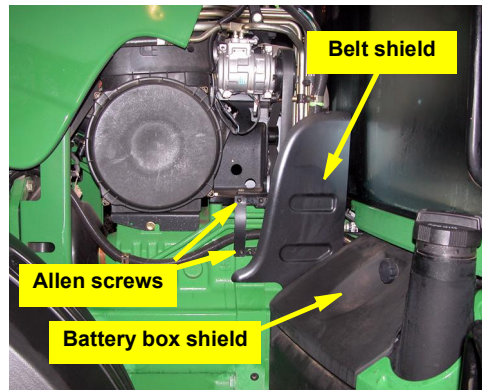


Figure 3a: Removing the air conditioning belt shield

- b. Locate the junction of the steel and rubber sections of the steering lines (Figure 3b).

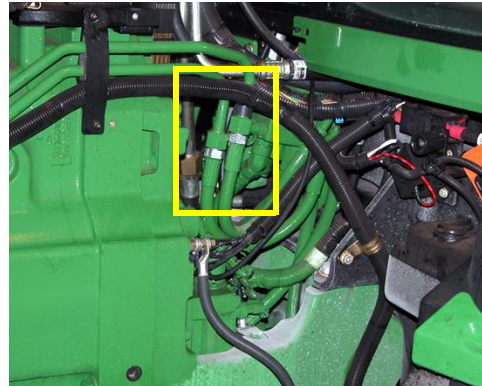


Figure 3b: Junction of steel and rubber steering line sections

- c. Install run-tees **HJ** at the junction of the steel and rubber sections of the steering lines. (Figure 3c)

Leave the run-tee fittings loose so you can align them when you attach the hoses. Place the plastic caps on the open ends of the fittings to prevent leakage before you install the hoses.

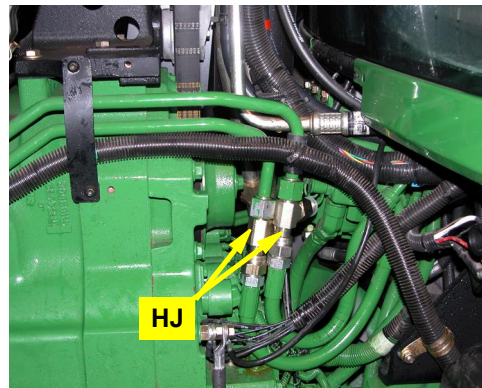


Figure 3c: Installed steering line run-tees

4. **Install the steering output hoses.**

**NOTE:**

*Make sure that the hose ends are equipped with plastic caps to prevent dirt from entering during hose routing. A piece of stiff wire may be required to guide the hose through proper routing locations.*

- a. Route the hydraulic steering output hoses **HQ** from the run-tees, under the tractor cab (Figure 4a), then along the left side of the tractor and back to the hydraulic steering block.

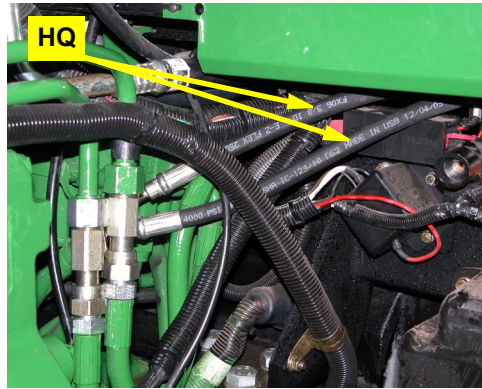


Figure 4a: Routing the steering output hoses from the run-tees to the steering block

- b. Connect the steering output hoses **HQ** to the **A** and **B** ports of the hydraulic steering block (Figure 4b).

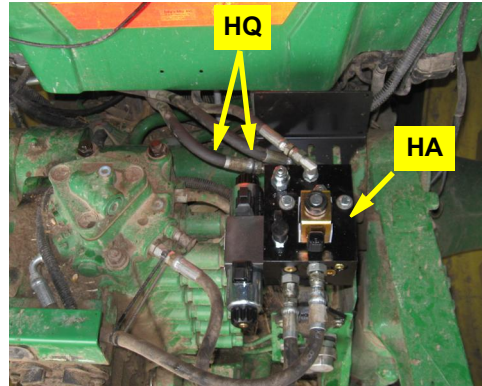


Figure 4b: Steering output hoses connected to A and B ports on the steering block (LS hose and P and T hoses also shown connected - see step 8)

- c. Connect the steering output hoses **HQ** to the run-tees **HJ** (Figure 4c).

Check that the hoses are clear of moving parts and secure them with the provided tie straps.

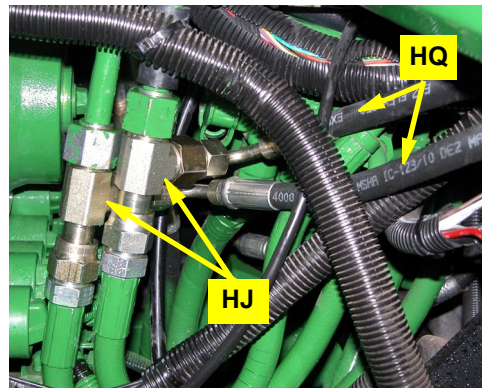


Figure 4c: Steering output hoses connected to run-tees

5. **Install the tractor pressure and tank fittings.**

- a. Remove test port fittings labeled **P** and **T** from the applicable top plate on the tractor hydraulic remote and install adapter fittings **HK** in both locations (Figures 5a-i to 5a-iii).

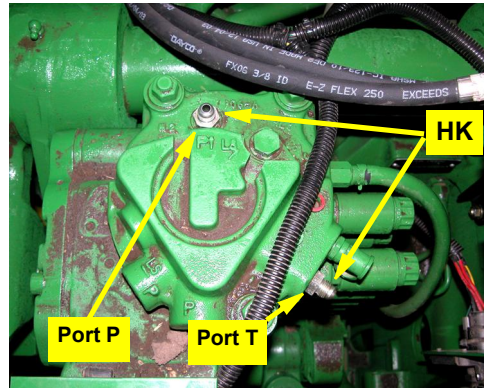


Figure 5a-i: Installed fittings at P and T test ports

**NOTE:**

Steps 6 and 7 following describe the installation of the load sense shuttle in the tractor's load sense line. The tractor's existing load sense line will be either a rubber hose or a steel pipe. If it is a steel pipe, that pipe must be replaced with a rubber hose (provided). See step 7 if your tractor has a steel load sense line.

6. **Install the load sense shuttle when existing load sense line is a rubber hose.**

**NOTE:**

The tractor will have either a regular flow hydraulic pump or a high flow hydraulic pump. The load sense shuttle valve is slightly different for the two pumps.

- a. For the regular flow pump, install adapter fittings **HM**, **HN** and **HO** in the load sense shuttle **HL** (Figure 6a-i).

For the high flow pump, install adapter fittings **HM**, **HN** and **HP** in the load sense shuttle **HL** (Figure 6a-ii).

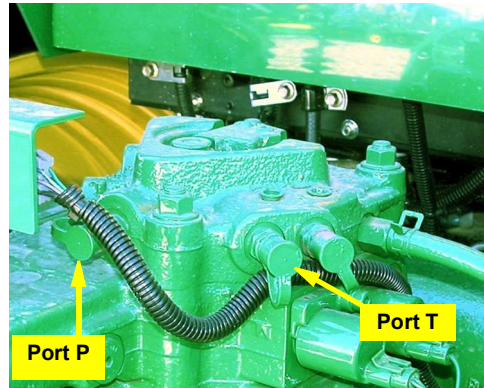


Figure 5a-ii: Optional hydraulic top plate

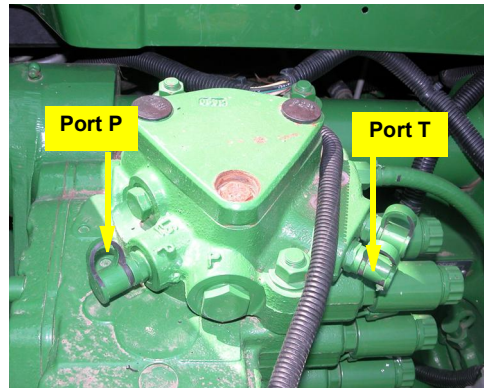


Figure 5a-iii: Optional hydraulic top plate

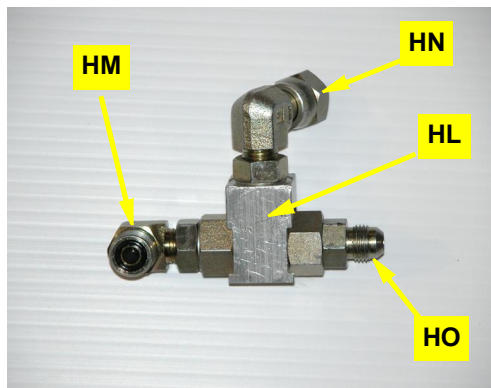


Figure 6a-i: Assembled load sense shuttle for regular flow pump

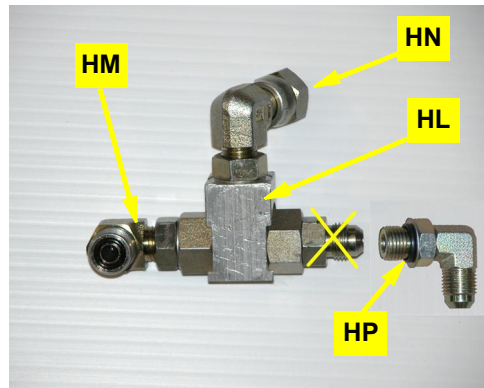


Figure 6a-ii: Assembled load sense shuttle for high flow pump

6. **Install the load sense shuttle when existing load sense line is a rubber hose (*continued*).**
- b. Locate the load sense actuator on the hydraulic pump under the tractor cab on the right side. Disconnect the load sense hose from the load sense actuator (Figure 6b).

**NOTE:** *Figure 6b shows a high flow pump. Install the load sense shuttle with adapter **HP**. You will connect the load sense hose from the hydraulic steering block to **HP**.*

- c. Attach the load sense shuttle's elbow swivel adapter **HN** to the load sense actuator. Reconnect the tractor load sense hose to load sense shuttle adaptor **HM** (Figure 6c).

**NOTE:** *Figure 6c shows a regular flow pump. Install the load sense shuttle with adapter **HO**. You will connect the load sense hose from the hydraulic steering block to **HO**.*

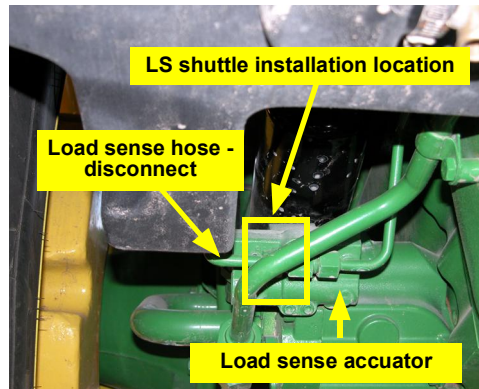


Figure 6b: Load sense shuttle location - high flow pump shown

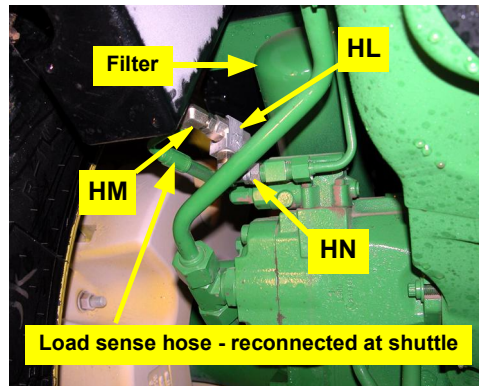


Figure 6c: Installed load sense shuttle - regular flow pump shown (the filter identifies the pump as regular flow)

7. **Install the load sense shuttle when existing load sense line is a steel pipe.**

**NOTE:** *A tractor with a steel load sense line can have a regular flow pump or a high flow pump. Therefore, the different fittings for the load sense shuttle described in step 6 apply equally at this step.*

- a. Locate the tractor's steel load sense line on the back side of the pump that connects to the rear casting of the tractor (Figure 7a-i). Disconnect it from the pump.
- b. Disconnect the steel load sense line from the fitting at the rear casting (Figure 7a-ii). Remove the pipe.

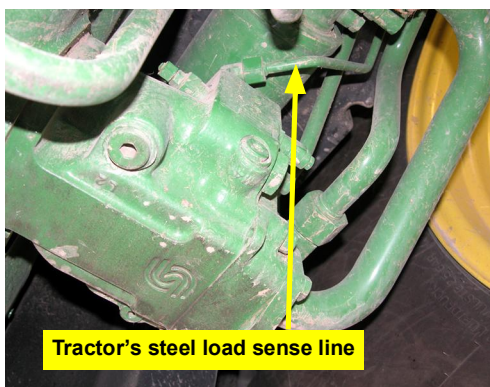


Figure 7a-i: Tractor's steel load sense line at pump



Figure 7a-ii: Tractor's steel load sense line at rear casting

- 7. **Install the load sense shuttle when existing load sense line is a steel pipe (*continued*).**
- c. Route the replacement hose **HU** from the pump location rearwards to the rear casting. Connect the hose at the rear casting (Figures 7b-i to 7b-iii).

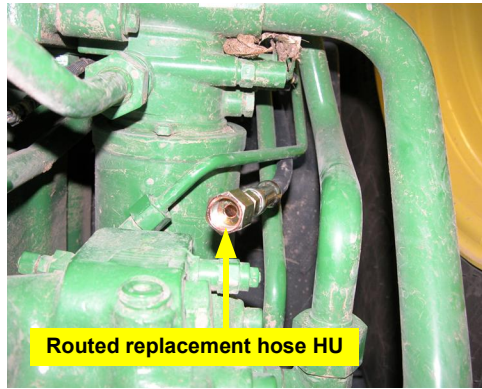


Figure 7b-i: Replacement hose at pump (steel load sense line not yet removed)

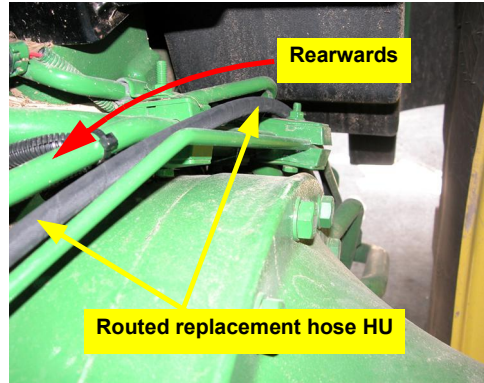


Figure 7b-ii: Hose routed between pump and rear casting

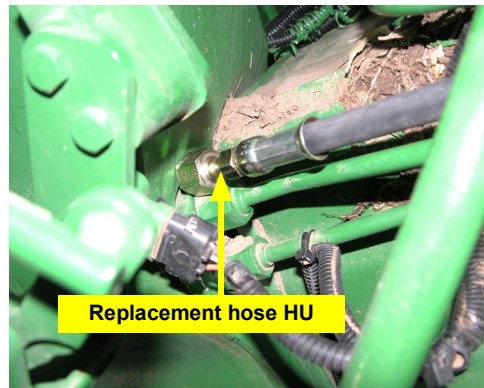


Figure 7b-iii: Replacement hose at rear casting (steel load sense line not yet disconnected)

- d. Connect replacement hose **HU** to shuttle adapter fitting **HM**. Attach the shuttle's elbow swivel adaptor **HN** to the pump where you disconnected the tractor's load sense pipe from (Figure 7c).
- e. Connect the other end of **HU** to the fitting at the rear casting (Figure 7b-iii).

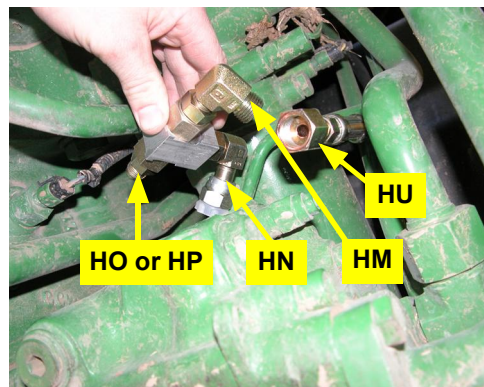


Figure 7c: Install load sense shuttle

8. **Install the pressure, tank, and load sense hoses.**

- a. Install tank hose **HR** and pressure hose **HS** between the tractor test port fittings (Figures 5a-i to 5a-iii) and the **T** and **P** ports of the hydraulic steering block (Figure 8a).
- b. Connect the load sense hose **HT** to the **LS** port of the hydraulic steering block (Figure 8a).

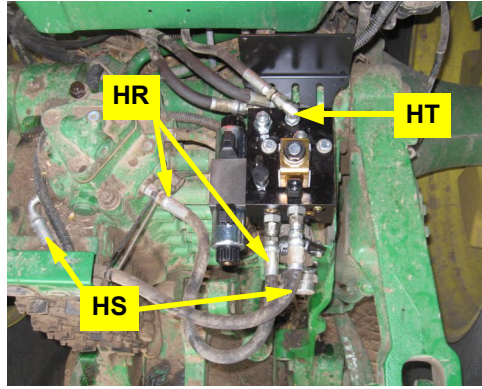


Figure 8a: Installed tank and pressure hoses and LS hose connected at steering block

- c. Route the load sense hose **HT** down to the open connection on the load sense shuttle (**HO** or **HP**). Route the hose down the side of the tractor and secure it to other rigid plumbing. Make sure all hoses are routed properly and free from entanglement (Figures 8b).

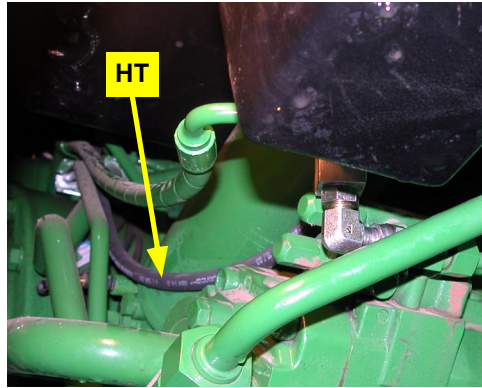


Figure 8b: Routing LS hose from steering block to load sense shuttle

- d. Connect the load sense hose **HT** to the load sense shuttle's straight adapter **HO** or elbow adaptor **HP** if fitted (Figure 8c).

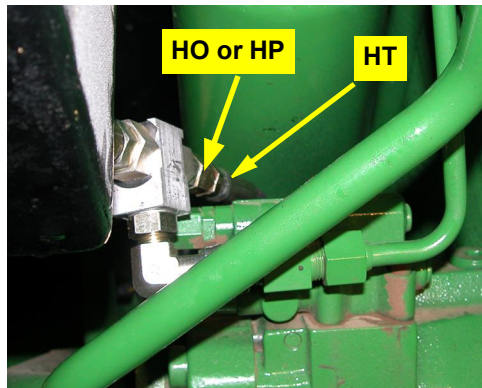


Figure 8c: Load sense hose connected to LS shuttle

9. **Verify operation.**

**⚠ WARNING:** *During tests of the hydraulic system, the machine may move unexpectedly. Be prepared for machine movement to avoid injury.*

*Keep others away and stay clear of mechanical steering linkages to prevent serious injury or death from pinch point hazards while manually operating the hydraulic steering circuit.*

- a. Tighten all connections and clean up the installation area around the tractor and make certain that it is safe to operate.
- b. Start the tractor and check hydraulic connections for any leaks.
- c. Rotate the steering wheel from one extreme to the other and back.

# Installation - Wheel Angle Sensor (WAS)

## ⚠ WARNING:

Switch off the machine's engine while installing or adjusting the WAS. Keep others away and stay clear of mechanical steering linkages to prevent serious injury or death from pinch point hazards while manually operating the hydraulic steering circuit.

### 1. Prepare the wheel angle sensor.

- a. Using the provided hardware **WD** and **WE**, attach the WAS **WB** to the WAS housing **WA**. Install the bolts up through the bottom of the housing. The WAS wire connector **WB** can be mounted 90° to any of the WAS housing sides (Figure 1a).

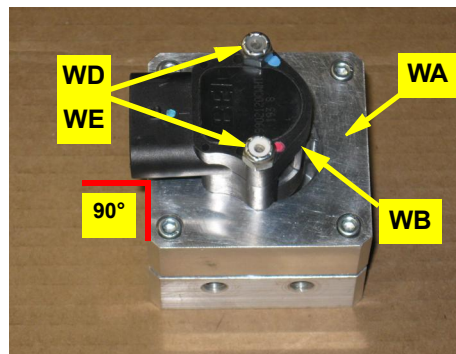


Figure 1a: Prepared WAS housing\connector

- b. Cut four holes off the WAS arm **WC** at the opposite end from the WAS shaft mounting hole (Figure 1b).

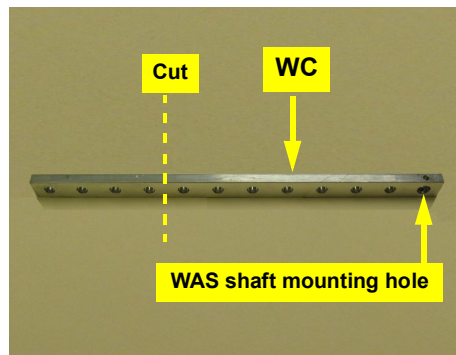


Figure 1b: WAS connector arm preparation

- c. Using hardware **WE** (nut) and **WF** (screw), attach the cut WAS arm **WC** to the WAS assembly. The arm should be mounted in the same direction as the WAS wire connector **WB** (Figure 1c).

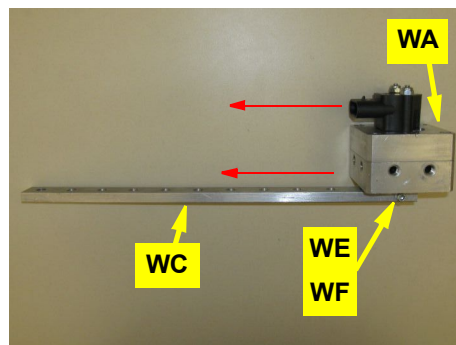


Figure 1c: Attached WAS arm

- d. Check which axle type your tractor has. The axle type determines the length of the cut threaded rod and the assembled threaded rod (Figures 1d-i and 1d-ii).

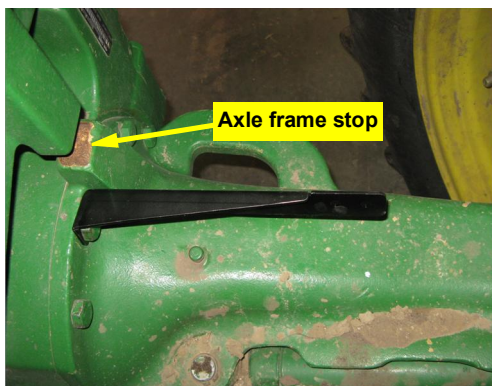


Figure 1d-i: 1st axle type

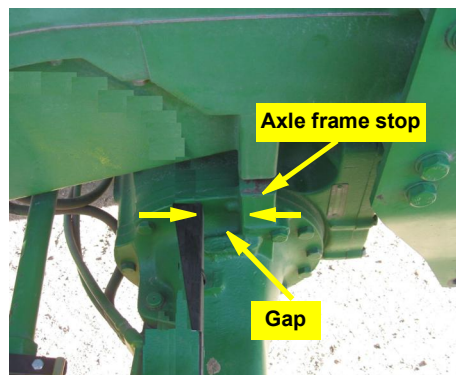


Figure 1d-ii: 2nd axle type



1. Prepare the wheel angle sensor (continued).

**NOTE:**

Before you cut the threaded rod **WG** at step 1e, screw the provided nuts **WH** onto the rod so that they are inside the cut you will make. After you have cut the rod, the nuts can help clean the threads.

- e. For axles with housing bolts close to the axle frame stop (1st axle type) cut the rod to be  $5\frac{3}{4}$ " long (Figure 1e-i).

For axles with housing bolts further away from the axle frame stop (2nd axle type) cut the rod to be  $2\frac{3}{4}$ " long (Figure 1e-ii).

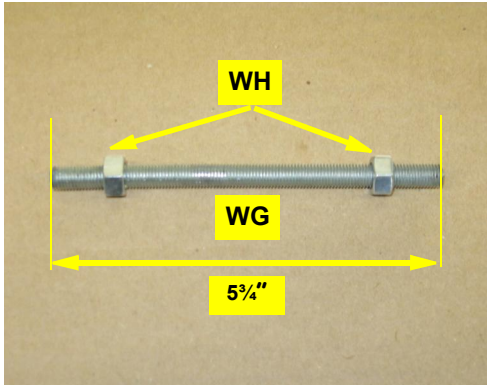
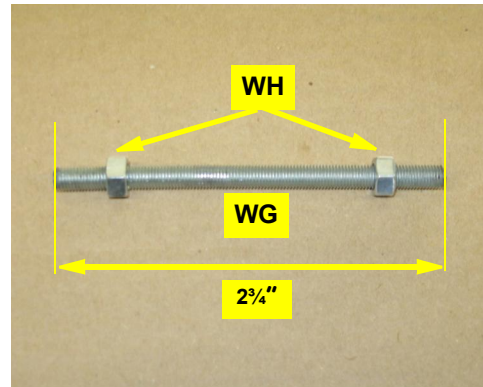


Figure 1e-i: Cut threaded rod - 1st axle type



- f. Screw the lock nuts **WH** and swivel rod ends **WI** onto the cut threaded rod **WG**. For axles with housing bolts close to the axle frame stop (1st axle type) set the center-to-center stud measurement to 7" (Figure 1f-i). Leave **WH** loose until you complete linkage adjustment at step 2e.

For axles with housing bolts further away from the axle frame stop (2nd axle type) set the center-to-center stud measurement to 4" (Figure 1f-ii). Leave **WH** loose until you complete linkage adjustment at step 2d.

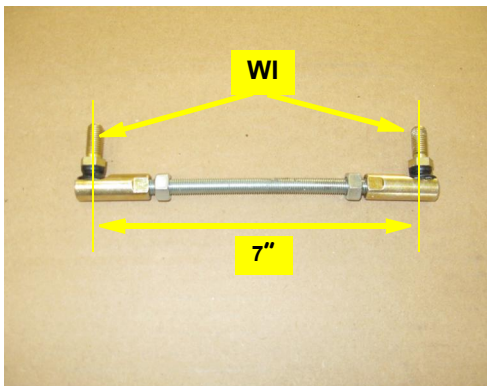


Figure 1f-i: Assembled threaded rod - 1st axle type

Figure 1e-ii: Cut threaded rod - 2nd axle type

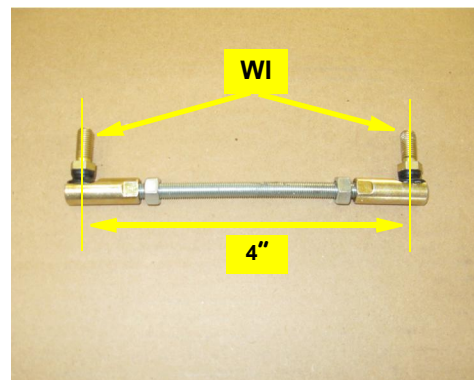


Figure 1f-ii: Assembled threaded rod - 2nd axle type

2. **Install the WAS.**

**NOTE:**

*In the following section the photos are of the first axle type where the WAS mounting bracket bolt is close to the axle frame stop. If your tractor has the second axle type, mount the bracket accordingly.*

- a. Locate the top front axle bolt, next to the axle stop, on the right side of the tractor. Install the WAS mounting bracket **WN** here (Figures 2a-i and 2a-ii).



Figure 2a-i: WAS mounting bracket location



Figure 2a-ii: Installed WAS mounting bracket

- b. Use the provided hardware **WL** to install the clamp **WK** and rod mount **WM** to the tie rod next to the lock nut (Figure 2b).

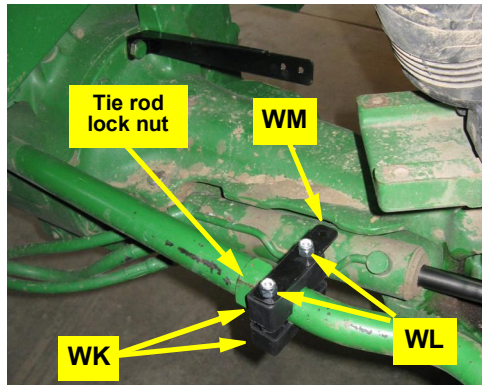


Figure 2b: Installed link clamp and bracket

- c. Attach the WAS assembly to the bracket **WN** using the provided hardware **WJ** as shown. Make sure the WAS connector is pointing inwards (Figure 2c).

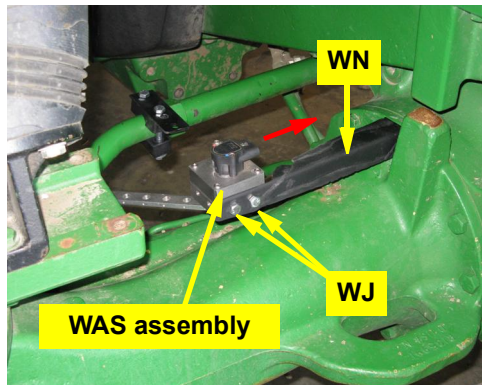


Figure 2c: Installed WAS assembly

2. **Install the WAS (continued).**

- d. Using the remaining hardware **WH**, install the assembled WAS linkage from step 1f between the rod bracket **WM** and the last hole in the WAS connector arm **WC**. Install the linkage with the swivel studs downwards but leave the swivel stud nuts **WH** loose (Figure 2d).

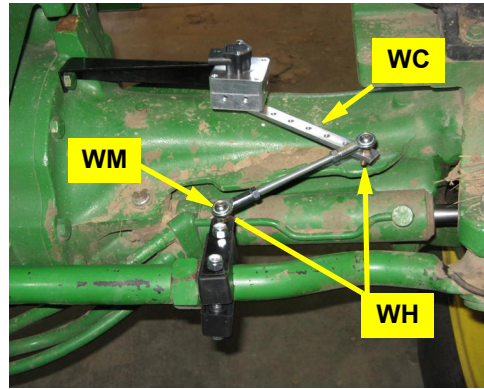


Figure 2d: WAS linkage rod connected

- e. With all hardware **WH** loose, slowly turn the wheels full left lock then full right lock (Figures 2e and 2f). Check that the linkage moves freely without binding and adjust the linkage if necessary.
- f. When the linkage does move freely and without binding, tighten hardware **WH** on the rod and the swivels.



Figure 2e: Full left lock



Figure 2f: Full right lock

# Installation - Steering Wheel Switch (SWS)

## 1. Prepare the sensor bracket.

- a. Drill a  $\frac{3}{16}$ " hole in the opposite end from the already drilled hole in the sensor bracket **SC** (Figure 1a).

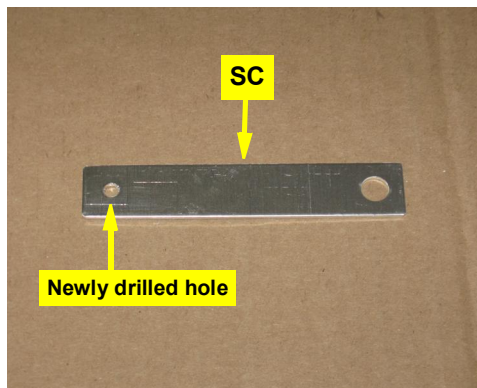


Figure 1a: Newly drilled sensor bracket

- b. Put a  $90^\circ$  bend in the center of sensor bracket **SC** (Figure 1b).



Figure 1b: Newly bent sensor bracket

- c. Connect sensor **SD** to sensor bracket **SC** (Figure 1c).

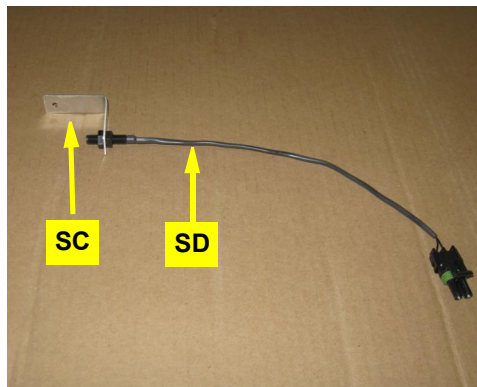


Figure 1c: Sensor installed in sensor bracket

## 2. Attach the magnets to steering shaft.

- a. The magnets will be installed on the steering shaft with the top of the magnet  $\frac{1}{4}$ " from the top of the mat border. Clean this area thoroughly.
- b. Mix epoxy **SB** as directed on package.
- c. Using the epoxy, attach both magnets **SA**  $180^\circ$  from each other on the steering shaft (Figure 2).

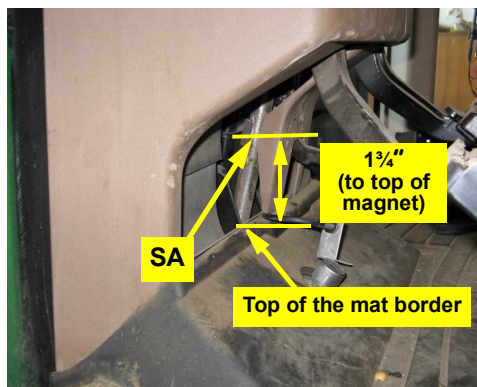


Figure 2: Installed magnets

3. **Attach the aluminum bracket and sensor.**
  - a. Measure 1½" up the plastic steering shaft cover from the top of the mat border.
  - b. Using the provided self-tapping screw **SF**, attach sensor bracket **SC** to the plastic cover at the point you measured (Figure 3).
  - c. Using the two plastic nuts on the sensor position the sensor tip 1/8" to 1/4" from the magnets.

**NOTE:** *After installation, turn the steering wheel to check for clearance between magnets and sensor.*

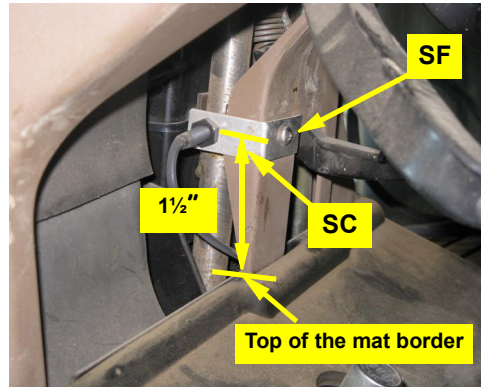


Figure 3: Installed sensor bracket and sensor

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