

Automated Steering Kit Installation Guide

Kit: EDX-JD7020SF, P/N 911-2033-000

Fits John Deere 7020SF Tractor Models *:

6110	6120	7220	6230 **	7130 **
6210	6220	7320	6330 **	7230 **
6310	6320	7420	6430 **	7330 **
6410	6420	7520		7430
				7530


* Excludes machines with air brakes

** 'Premium' option machines only



Note: There are minor variations to the hydraulic installation for the models listed above. This guide makes it clear which models a particular step applies to. There are also major variations to the steering wheel switch (SWS) installation so this guide has two SWS installation sections, SWS1 and SWS2. This guide makes it clear which models each SWS installation applies to.

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 beginning 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 kits 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 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.

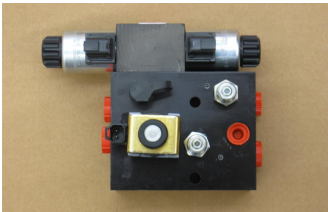



Before attempting to install any of the components, park the machine on a clean level floor with adequate clearance to work all around.

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.




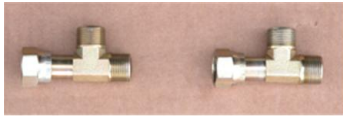




To prevent hydraulic system contamination, it is essential to thoroughly clean hydraulic system fittings and hose connections prior to disconnecting or removing. Use a degreasing solvent spray cleaner such as a brake cleaner to prevent hydraulic system contamination. Note that o-rings used on ORB and ORFF type fittings, referred to in the Kit Contents section, may be damaged by degreasing solvent cleaners. If a fitting is to be cleaned internally, you should first remove and clean the o-ring 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	Assembly, hyd valve block - 15L\proportional (Hydraulic steering block)	
Bag H1 contains HB and HC				
HB	760-2061-000	4	Adapter, hyd 90 elbow - #6maleJIC x #8maleORB (P [pressure], T [tank] and A and B [steering] ports on hydraulic steering block)	
HC	760-2058-000	1	Adapter, hyd 90 elbow - #6maleJIC x #6maleORB (LS port on hydraulic steering block)	
HD	640-0092	1	Hydraulic steering block mounting bracket	

Kit Contents - Steering Hydraulics (*continued*)

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
Bag H2 of 6 contains HE				
HE	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	
(Mount hydraulic steering block HA on HD)				
Bag H3 contains HF				
HF	675-2059	2	Bolt, 7/16" x 1-1/4" Gr5, ZP	
	678-1116	2	Washer, flat, 7/16"ID x 1-1/4"OD, ZP	
(Mount bracket HD on machine frame)				
Bag H5 contains HJ and HK				
HJ	760-2063	2	Adapter, hyd - #6maleJIC x M14maleORB (Pressure test port and tank line)	
HK	760-2069	2	Adapter, hyd run-tee - #8ORFF (Steering lines)	
Bag H6 contains HL, HM, HN and HO				
HL	760-0002	1	Assembly, hydraulic load sense shuttle valve - #6femORB	
HM	760-2040	1	Adapter, hyd 90 elbow - #6maleORB x #6femORFF swivel	
HN	760-2048	1	Adapter, hyd - #6maleORFF x #6maleORB	
HO	760-2058	1	Adapter, hyd 90 elbow - #6maleJIC x #6maleORB	

Kit Contents - Steering Hydraulics *(continued)*

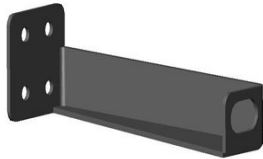



REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HP	760-1155	1	Hose, hyd - 3/8" x 84", #6femJIC swivel x #6femJIC 90 swivel (Pressure hose)	
HQ	760-1062	1	Hose, hyd - 3/8" x 40", #6femJIC swivel x #8femJIC 90 swivel (Tank hose)	
HR	760-1020	1	Hose, hyd - 1/4" x 79", #6femJIC swivel both ends (Load sense hose)	
HS	760-1154	2	Hose, hyd - 3/8" x 18", #6femJIC swivel x #6femORFF 90 swivel (Steering hoses)	
HT	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.

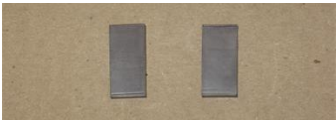




REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
Bag 710-0099-000 contains WA to WJ				
WA	720-0045-000#	1	WAS assembly	
WB	750-5002-000	1	Sensor, dual output, BEI	
WC	602-1087-000	1	Connector arm, steering	
WD	675-1191-000	2	Screw, mach, 8-32 x 3", PPH ZP	
WE	676-1054-000	4	Nut, nylock 8-32NC, ZP	
WF	675-1150-000	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	675-2010-000	2	Bolt, 5/16NC x 3/4" Gr5 ZP	 
	678-1077-000	2	Washer, lock 5/16, ZP (Attach WAS assembly to WK)	

Kit Contents - Wheel Angle Sensor *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
WK	640-0134-000	1	WAS assembly mounting bracket	
WL	640-0070-000	1	WAS link rod bracket	
Bag W3 contains WM and WN				
WM	675-1139-000	2	Screw, 1/4-20 x 1/2", hex cap, SS	
	676-1040-000	2	Nut, 1/4NC Gr5 ZP (Mount WN on WL)	
WN	675-0129-000	1	Clamp, 1-5/8" - 1.1/2" TBOLT, SS	

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"thk, 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	Assembly, steering wheel switch/cable	
SE	677-2002	4	Tie strap, 7" releasable	

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.

See Appendix for a schematic of the hydraulic circuits.

1. Prepare the hydraulic steering block.

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

Remove the plastic plugs from hydraulic steering block **HA** and install adapter fittings **HB** in the P, T, A and B ports and adapter fitting **HC** in the LS port (Figure 1).

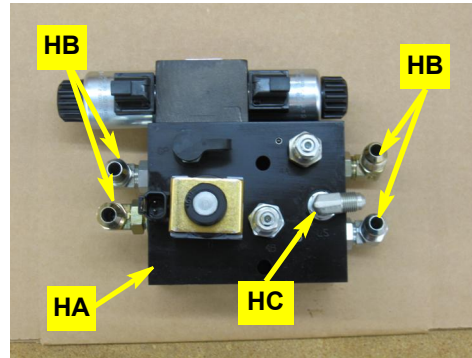


Figure 1: Prepared hydraulic block

2. Install the steering block mounting bracket.

Locate the two spare holes in the right side of the machine frame forward of the right rear wheel. Using hardware **HF** in those holes, mount steering block mounting bracket **HD** against the machine frame (Figure 2 with inset).

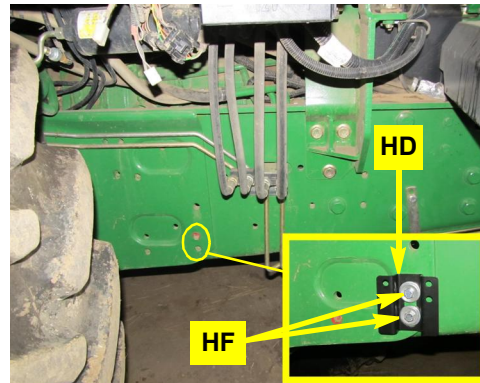


Figure 2 with inset: Installed steering block mounting bracket

3. Install the hydraulic steering block

Using hardware **HE**, mount hydraulic steering block **HA** on bracket **HD** as follows (Figure 3):

- Mount **HA** with its solenoids rearward (so with the A and B ports upward).

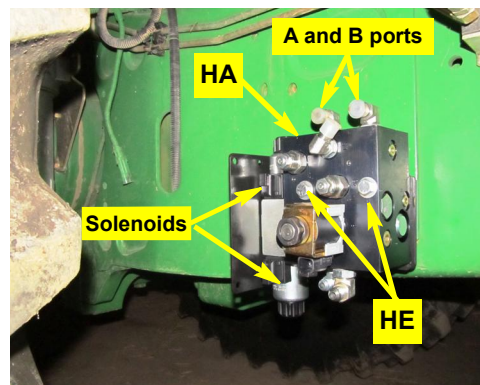


Figure 3: Installed steering block

4. **Install the pressure fitting.**

NOTE: *The location of the pressure connection varies for different models in the machine group covered by this installation guide. Follow the appropriate step for your machine. Remove the SMV sign bracket as required.*

- a. **10 and 20 series:** Locate the pressure test port on the rear of the remote valve stack at the rear of the machine. Remove the quick release valve and install fitting **HJ** (Figure 4a and inset - **HJ** not shown, but see Figure 4b).
- b. **30 series:** Locate the pressure test port on the top of the remote valve stack at the rear of the machine (Figure 4b). Remove the quick release valve (Figure 4b - left inset) and install fitting **HJ** (Figure 4b - right inset).

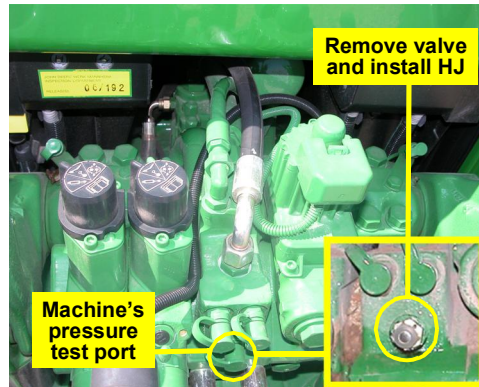


Figure 4a with inset: Pressure test port location and preparation - 10 and 20 series

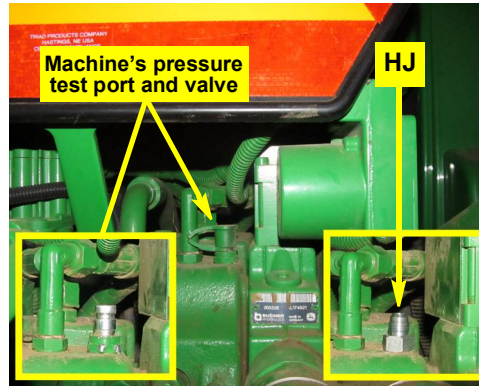


Figure 4b with insets: Pressure test port location and preparation - 30 series

5. **Prepare the load sense valve.**

Prepare load sense valve **HL** as follows (Figure 5a):

- Install adapter **HM** in valve's function port
- Install adapter **HN** in the valve's source port
- Install adapter **HO** in the valve's load sense port (to hydraulic steering block)

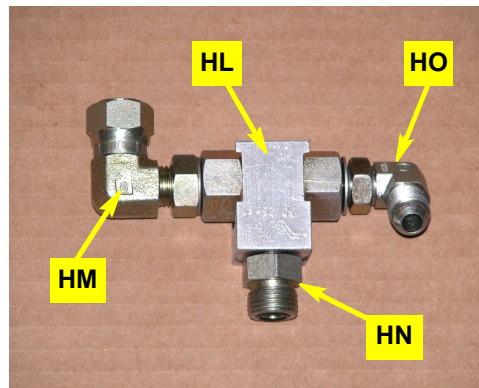


Figure 5a: Prepared load sense valve

6. **Install the load sense valve**

NOTE: *The exact installation of the load sense valve varies for different models in the machine group covered by this installation guide. Follow the appropriate step for your machine.*

- a. **6020 models:** Locate the machine's load sense hose connected at the top of the hydraulic valve stack (Figure 6a with inset) and disconnect it. Connect load sense valve adapter **HM** to the load sense port then reconnect the machine's load sense hose to load sense valve adapter **HN** (Figure 6a inset).

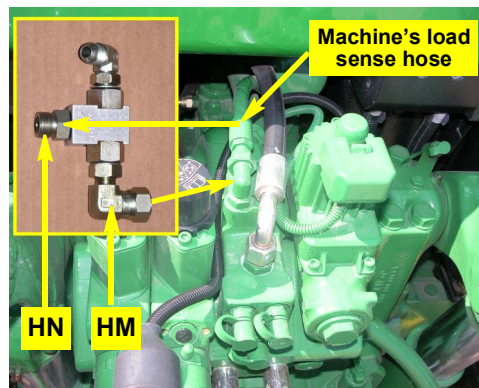


Figure 6a with inset: Load sense valve installation - 6020 models

6. **Install the load sense valve (continued)**

b. **7020 models:** Locate the machine's load sense line connection at the right side of the hydraulic valve stack (inside the right upper 3-point hitch linkage - Figure 6b with inset) and disconnect it. Connect load sense valve adapter **HM** to the steel load sense line then reconnect the machine's load sense hose to load sense valve adapter **HN** (Figure 6b inset).

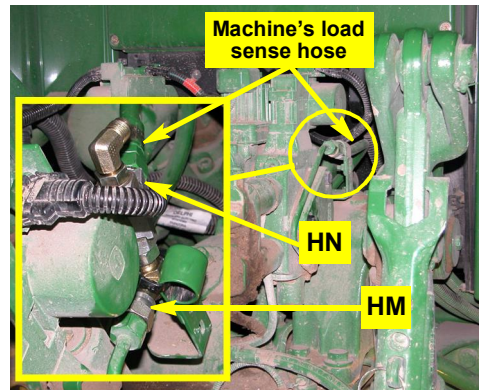


Figure 6b with inset: Load sense valve installation - 7020 models

c. **6010 models:** Locate the machine's load sense line at the top right of the hydraulic valve stack (Figure 6c with inset) and disconnect it. Connect load sense valve adapter **HM** to the load sense port then reconnect the machine's load sense line to load sense valve adapter **HN** (Figure 6c inset).

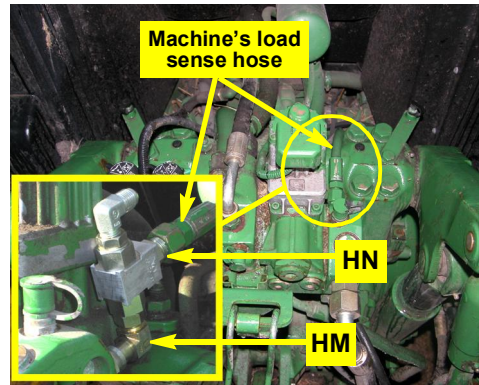


Figure 6c with inset: Load sense valve installation - 6010 models

d. **6030 and 7030 models:** Locate the machine's load sense line at the top of the hydraulic valve stack (Figure 6d with inset) and disconnect it. Connect load sense valve adapter **HM** to the load sense port then reconnect the machine's load sense line to load sense valve adapter **HN** (Figure 6d inset).

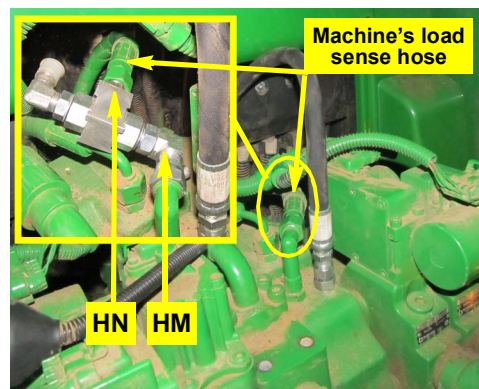


Figure 6d with inset: Load sense valve installation - 6030 and 7030 models

7. **Install the tank fitting.**

Locate the hydraulic filter on the right side, below the cab, just forward of the rear axle. Remove the plug on the top of the filter (Figure 7-i) or on the side, pointing outward (Figure 7-ii) and install adapter **HJ** (Figure 7-i and 7-ii insets).

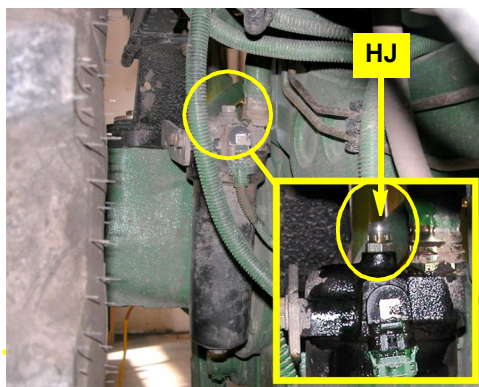


Figure 7-i with inset: Tank fitting installed, top location

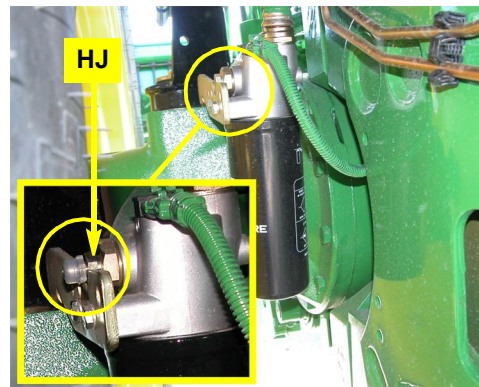


Figure 7-ii with inset: Tank fitting installed - side fitting location

NOTE: In the following hose installation steps, route hoses with other machine plumbing and clear of moving parts. Secure hoses with heavy duty tie straps **HT**. Tighten all hoses, run-tees and steering block fittings when installation is complete.

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

NOTE: In the Figure 8-i left inset and Figure 8-ii, note that the 90° elbow end of the pressure hose **HP** is connected at the test port and the hydraulic block respectively. The Figure 8-i left inset shows a 10 and 20 series install, Figure 8-ii shows a 30 series install. Install your pressure hose accordingly.

Install the pressure, tank and load sense hoses (**HP**, **HQ** and **HR**) between their respective connectors (**HJ** and **HO**) (Figure 8-i with insets) and their fittings (**HB** and **HC**) at the hydraulic steering block (Figure 8-ii with inset).

NOTE: In Figure 8-i, the left inset shows the 10 and 20 series pressure connection (step 4a). The right inset shows the 6030 and 7030 series load sense connections (step 6d). The Figure 8-ii inset shows the steering hoses connected: you will install the steering connections and hoses in the next steps.

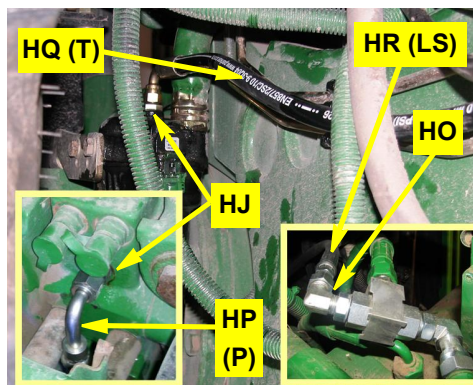


Figure 8-i with insets: Tank, pressure (left inset) and load sense (right inset) hoses at connections

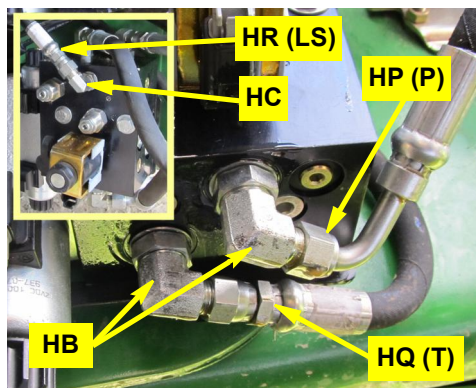


Figure 8-ii with inset: Tank, pressure and load sense (inset) hoses connected at steering block

9. Install the steering fittings.

NOTE: Leave run-tees loose to allow for alignment when attaching hoses. Plastic caps placed on the open ends of the fittings will prevent excessive leakage prior to hose installation.

Locate the two steering hose/steel line connections under the right side of the cab (the front two - Figure 9 and left inset). Disconnect the hoses and install run-tees **HK** then reconnect the machine's steering hoses to the open 'T' end of the run-tees (Figure 9 - right inset).

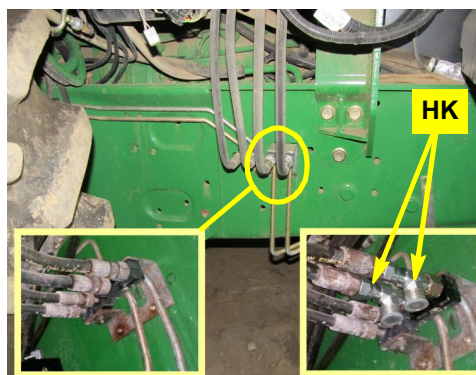


Figure 9 with insets: Run-tees installed at steering hose/steering line connections

10. Install the steering hoses.

Install steering hoses **HS** between the open stems of run-tees **HK** and adapters **HH** in the **A** and **B** ports of the hydraulic steering block (Figure 10).

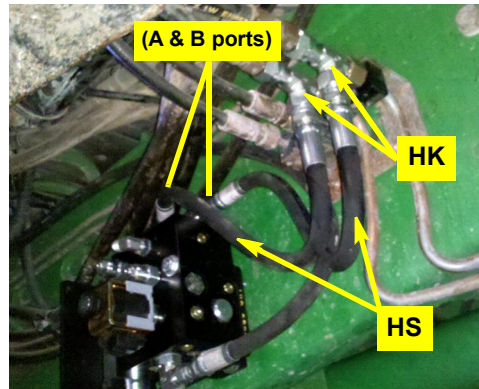


Figure 10: Steering hoses installed

11. 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 machine and make certain that it is safe to operate.
- b. Rotate the steering wheel from one extreme to the other and back.
- c. Start the machine and check hydraulic connections for any leaks.

Installation - Wheel Angle Sensor

⚠ 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 **WE** (nuts) and **WD** (bolts - not visible), attach the WAS wire connector **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 **WA** sides (Figure 1a).

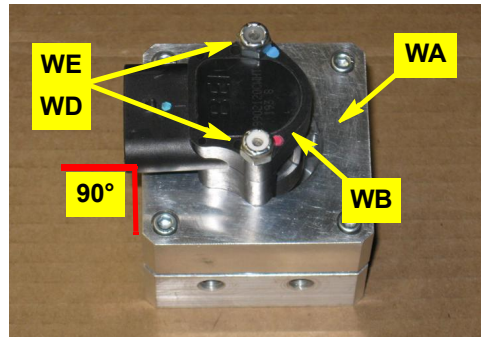


Figure 1a: Prepared WAS housing/connector

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

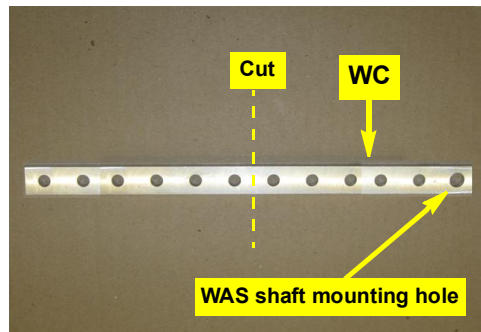


Figure 1b: WAS arm preparation

- c. Using hardware **WF** (screw) and **WE** (nut), attach the WAS arm **WC** to the WAS assembly (Figure 1c inset). Mount the arm in the same direction to the WAS wire connector **WB** (Figure 1c with inset).

NOTE:

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

- d. Cut threaded rod **WG** to 3¾" long (Figure 1d-i) then screw swivel rod ends **WI** onto the cut rod to achieve a center-to-center stud measurement of 5" (Figure 1d-ii). Leave **WH** loose until you complete linkage adjustment at step 2f.

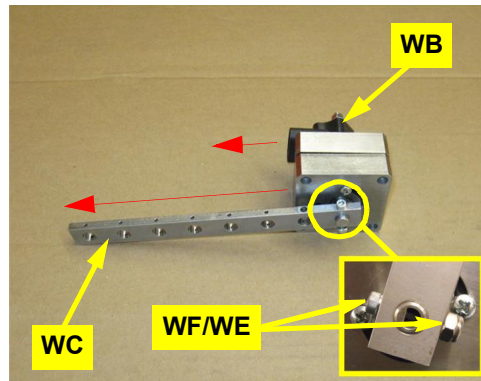


Figure 1c with inset: WAS arm installed

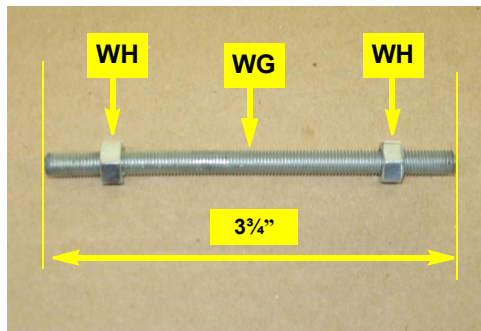


Figure 1d-i: Threaded link rod preparation

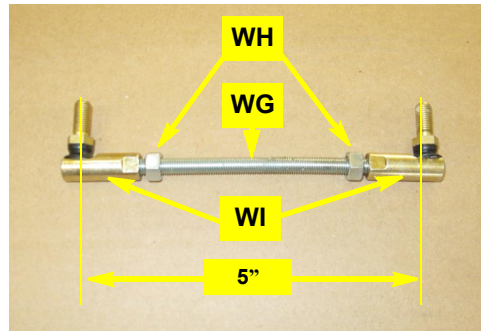


Figure 1d-ii: Assembled threaded link rod

2. Mount the wheel angle sensor.

NOTE: Figures in this section show prototype brackets. Install your brackets as described.

You will install the WAS angle sensor assembly between the front axle and the steering linkage on either the left side (Figure 2 - top) or right side (Figure 2 - bottom) of the machine. Locate the ring of bolts where the front axle splits (at the 'diff' housing). You will install the WAS assembly on this side.

NOTE: The following figures show a WAS installation on the left side of the tractor. If you are mounting your WAS assembly on the right side, simply mirror the instructions accordingly.

- a. Remove the second bolt below the steering cylinder on the rear of the front axle (Figure 2a and left inset). Using that bolt, install WAS bracket **WK** (Figure 2a - right inset).
- b. Using hardware **WJ** install the WAS assembly from step 1 on bracket **WK** (use the top holes of **WK**). Have the wire connector **WB** on the bottom, pointing outward. Connector arm **WC**'s working arc will be toward the rear of the machine (Figure 2b).
- c. Install link rod bracket mounting clamp **WN** on the left tie rod, against the track adjustment locknut. Install the clamp with its screw head toward the front and its two flanges downward. Using hardware **WM**, attach link rod bracket **WL**—link mounting hole rearward—to clamp **WN** (Figure 2c).

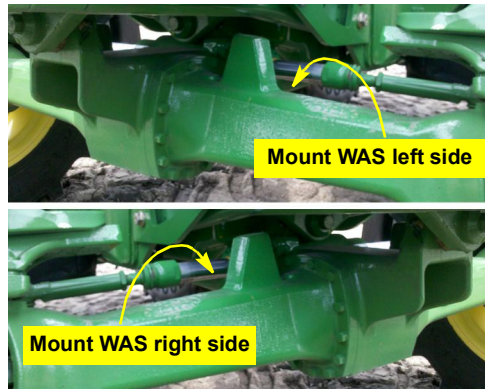


Figure 2: WAS assembly mounting left or right mounting locations between

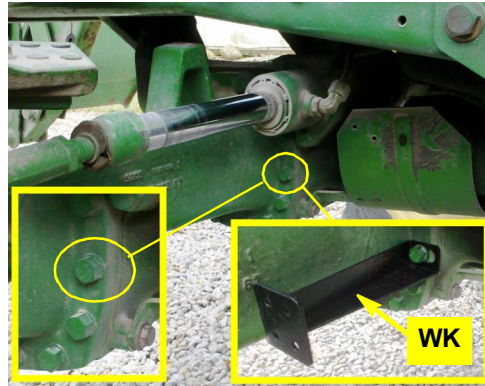


Figure 2a: WAS bracket installed

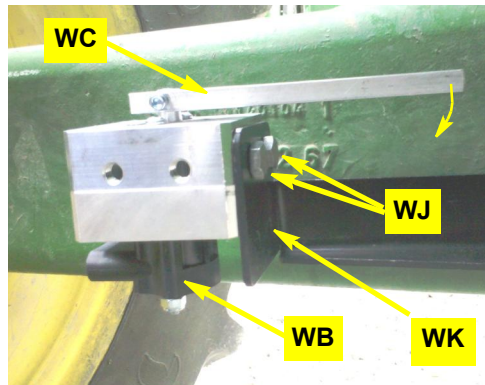


Figure 2b: WAS assembly installed

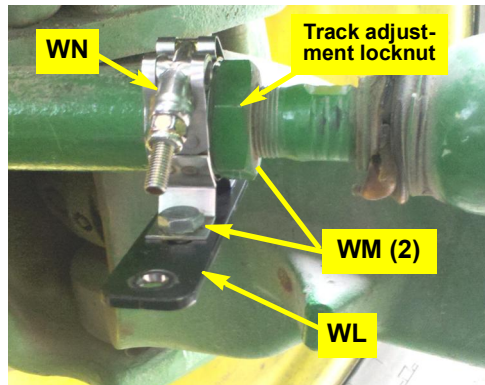


Figure 2c: WAS link rod bracket mounting clamp installed

2. **Mount the wheel angle sensor (continued).**

- d. Using remaining hardware **WH**, install the link rod assembly from step 1 between the last hole in connector arm **WC** and bracket **WL**. Set the swivel stud downward into **WC** and upward into **WL** (Figure 2d). Leave swivel nuts **WH** loose.

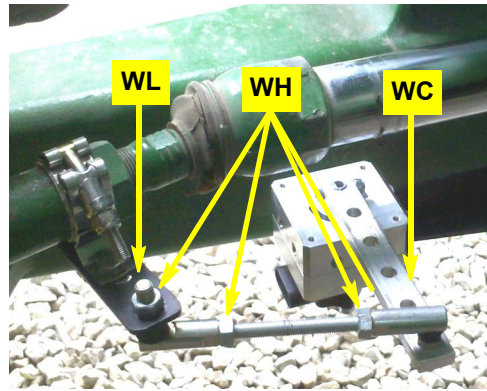


Figure 2d: WAS assembly mounting left or right mounting locations between

- e. With all hardware **WH** loose, slowly turn the wheels full left lock (Figure 2e-i) then full right lock (Figure 2e-ii). Check that the linkage moves freely without binding and adjust the linkage as necessary.



Figure 2e-i: Left lock



Figure 2e-ii: Right lock

- f. When the linkage does move freely and without binding, tighten hardware **WH** on the rod and the swivels (Figure 2d).

Installation - Steering Wheel Switch (SWS 1)

This SWS installation section—SWS 1—is applicable to ‘30’ series machines—models 6230 to 7530. For the ‘10’ and ‘20’ series machines—models 6110 to 7520—see SWS 2 on page 18.

1. Prepare the switch bracket.

Prepare switch bracket SC as detailed (Figure 1):

- Cut 2½” off, measured from the end opposite the pre-drilled end
- Put a 90° bend 1” from the pre-drilled end
- Cut the corners off the pre-drilled end and file them smooth

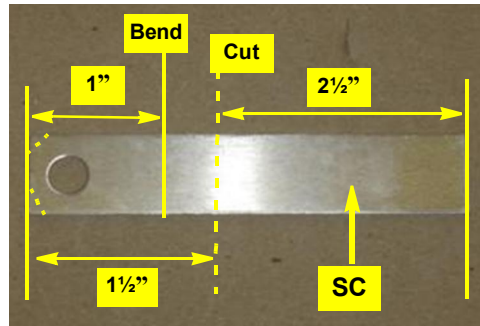


Figure 1: Switch bracket preparation (not to scale). See finished bracket in Figure 3.

2. Remove the steering wheel and control box.

- a. Remove the steering wheel center medallion cap and the steering wheel retaining nut and washer (Figure 2a insets). Following the manufacturer’s recommended procedure, remove the steering wheel (Figure 2a).

NOTE:

Consult your equipment dealer if you are unsure of the correct procedure for removing the steering wheel.

- b. Unfasten (unclip) the turn signal and wiper switch box cover and partially remove (you can leave it connected).



Figure 2a: Steering wheel removed



Figure 2b: Switch box cover removed

3. Prepare and install the magnets, install the switch bracket.

- a. Cut the magnets SA in half and using the two-part epoxy SB, stick two halves together to make two thick magnets.
- b. Using the epoxy, attach the prepared switch bracket SC square to the steering shaft between the shaft’s upper bearing housing and the left Allen screw. Attach the bracket with its short side toward the steering shaft (Figure 3).
- c. Using the epoxy, attach the magnets to the steering shaft 180° apart, below the snap ring and centered on the hole in the switch bracket (Figure 3).

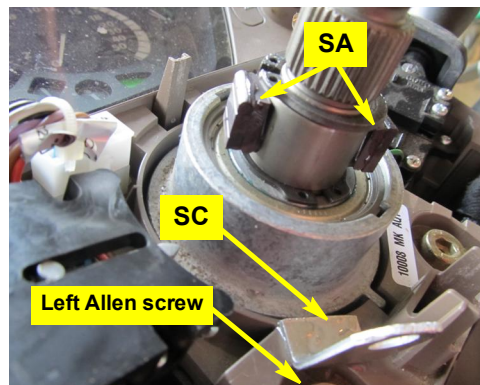


Figure 3: Installed switch bracket and switch

4. **Install the switch.**

Install switch **SD** in bracket **SC** and use the switch nuts to set the sensor face to 1/8" to 1/4" from the magnets. Feed **SD**'s cable/connector down the steering column (Figure 4).

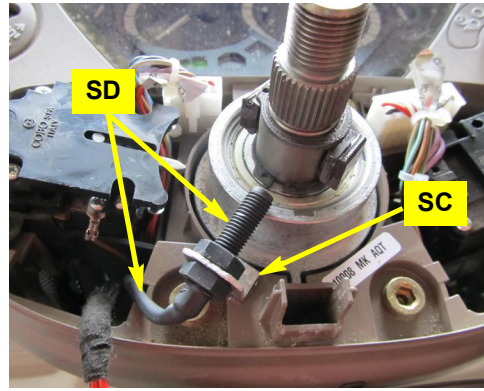


Figure 4: Switch installed in bracket, cable fed down column

Installation - Steering Wheel Switch (SWS 2)

This SWS installation section—SWS 2—is applicable to ‘10’ and ‘20’ series machines—models 6110 to 7520. For the ‘30’ series machines—models 6230 to 7530—see SWS 1 on page 16.

NOTE:

For this installation you will need to partially or wholly dismantle the multi-section steering column console (the console sections are in two sets - the upper and lower set). You need to dismantle the console partially (the upper set only) to access the switch and magnet installation area.

- a. Remove the top fascia of the upper console set (the screws come up from below - Figure 1a, left image). Remove the inner switch cover/housing (Figure 1a, upper right image) and release the bottom section of the upper console set (Figure 1a, lower right image).



Figure 1a: Dismantling the upper console set

- b. Lift and hold up the bottom section of the upper console set (Figure 1b-i) to gain (minimum) access to the top section of the lower console set (Figure 1b-i) and the installation area in front of and below the tilt lever handle (Figure 1b-ii).

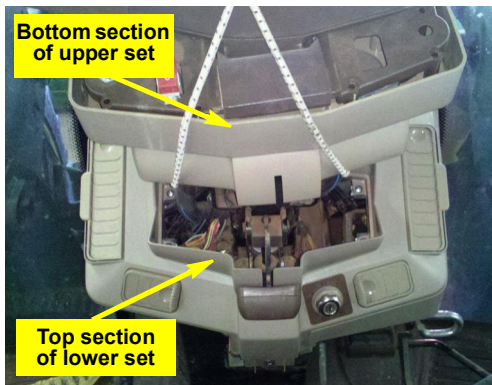


Figure 1b-i: Bottom section of console upper set lifted

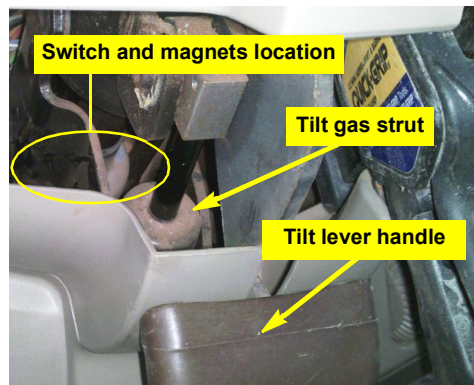


Figure 1b-ii: Switch and magnet installation area (top section of lower console set not yet released and lifted - see Figure 1c)

NOTE:

To improve access to the installation area, release and lift the top section of the lower set (step c following).

- c. Remove all the screws holding the top section of the lower set and lift that up to improve access to the installation area (Figure 1c and inset).

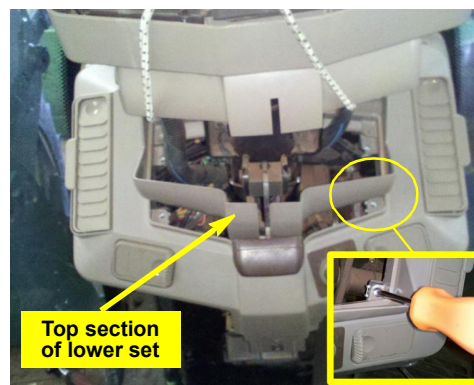


Figure 1c: Top section of the lower console set released and lifted

5. **Install the magnets.**

Locate the hole on the left side of the steering column frame (you will mount the steering wheel switch **SD** here) and mark the steering column through the hole (Figure 2, left inset).

Working in and beyond the space either side of the tilt gas strut, use the two-part epoxy **SB** to attach the magnets **SA**—180° apart—to the steering shaft. Attach the magnets vertically and centered on the switch hole in the column frame (Figure 2, right inset - you will install the switch in the next step).

6. **Install the switch.**

Install switch **SD** in the hole in the side of the steering column mount and use the switch nuts to set the sensor face to 1/8" to 1/4" from the magnets (Figure 3).

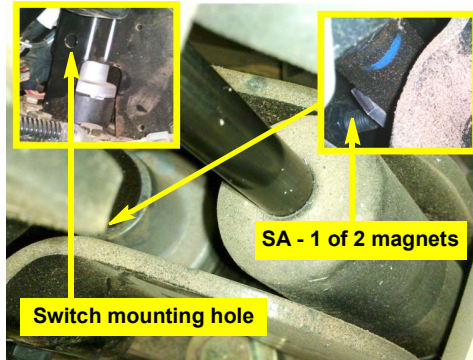


Figure 2 with insets: Installed magnets

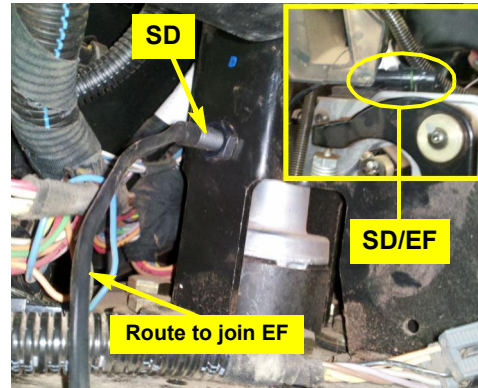


Figure 3: Installed and adjusted switch

- a. Release the front section of the lower console set (Figure 4a, top and bottom images).
- b. Remove the forward, top section of the lower console set (in front of the windshield air vents - Figure 4b, top and bottom images).



Figure 4a: Releasing the front section of lower console set



Figure 4b: Removing forward, top section of lower console set (top image) and section removed (bottom image).

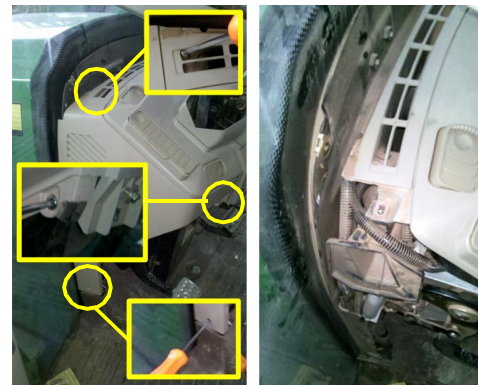


Figure 4c: Removing main section of the lower set (left image with insets) and section removed (right image).

Appendix - Hydraulic Circuits

