

Automated Steering Kit Installation Guide

Kit: EDX-MF6400, P/N 911-2027-000

Fits Massey Ferguson and AGCO
Tractor Models:

Massey Ferguson

6465 7465
6475 7475
6480 7480
6485 7485
6490 7490
6495 7495
 7497
 7499

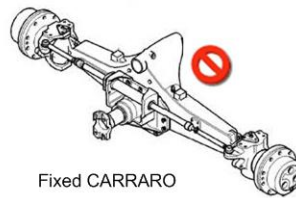
AGCO

RT-100/RT-100A
RT-120/RT-120A
RT-135/RT-140A
RT-150/RT-155A

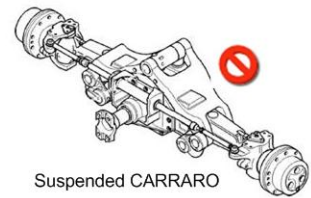


Note 1: This installation guide is not applicable to machines that have the fixed or suspended CARRARO front axles (see figure at right). If you are unsure of your axle type contact your local dealer.

Note 2: If your machine has an implement (like a front loader bucket) that uses the auxiliary hydraulic ports, you will need to obtain parts that are not supplied with this kit. See Note before items HQ thru HT on page 4 and step 3 in the hydraulic installation section on page 9.




Fixed CARRARO



Suspended CARRARO

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 manuals for your machine and other implements.

If you have 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 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.

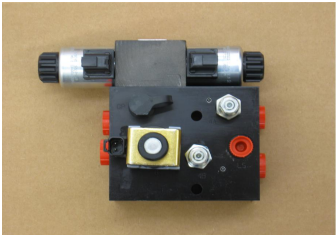


Before attempting to install any of the components, park the machine on a clean level floor with adequate clearance to work all around.

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 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, HC, and HD				
HB	760-2079-000	2	Adapter, hyd - #8maleJIC x #8maleORB (P and T ports on hydraulic steering block)	
HC	760-2058-000	1	Adapter, hyd 90 elbow - #6maleJIC x #6maleORB (LS port on hydraulic steering block)	

Kit Contents - Steering Hydraulics *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HD	760-2061-000	2	Adapter, hyd - 90 elbow #6maleJIC x #8maleORB (A and B ports on hydraulic steering block)	
HE	640-0122-000	1	Hydraulic steering block mount	
Bag H2 contains HF				
HF	675-2006-000	2	Bolt - 3/8NC x 3-3/4" Gr5 ZP	
	678-1054	2	Washer, narrow flat - 3/8" ZP	
	676-1035	2	Nut, nylock - 3/8NC ZP (Mount hydraulic steering block HA on HE)	
Bag H4 contains HJ and HK				
HJ	760-2028	2	Adapter, hyd run-tee - #18 LEO (Pressure and tank ports - see HL)	
HK	760-2013	2	Adapter, hyd run-tee - #12 LEO (Steering lines - see HM)	
Bag H5 contains HL, HM, HN, HO and HP				
HL	760-2021	2	Adapter, hyd - #12maleJIC x #18femLEOswivel (Install with pressure and tank run-tees HJ)	
HM	760-2072	2	Adapter, hyd - #8maleJIC x #12femLEOswivel (Install with steering run-tees HK - see also HN)	
HN	760-2078	2	Adapter, hyd 90 elbow - #8maleJIC x #8femJIC (Install, if required, with HM)	
HO	760-2051	1	Adapter, hyd - #6maleJIC x #10femLEOswivel (Load sense port - see also HP)	
HP	760-2055	1	Adapter, hyd 90 elbow - #6maleJIC x #6femJICswivel (Install with HO in load sense port - unless load sense shuttle valve used, see Note following)	

Kit Contents - Steering Hydraulics *(continued)*






REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
<p><i>Note: Items HQ thru HT are not supplied in this kit. Obtain them through your Outback dealer if your machine is already using the auxiliary hydraulic ports. See step 3. "Install the pressure, tank and load sense fittings." on page 9.</i></p>				
HQ	760-0002	1	Assembly, hydraulic load sense shuttle valve - #6femORB	
HR	760-2056	1	Adapter, hyd - #6maleJIC x #6maleORB	
HS	760-2058	1	Adapter, hyd 90 elbow - #6maleJIC x #6maleORB	
HT	760-2041	1	Adapter, hyd - #6maleORB x #6femJIC swivel	
HU	760-1168	2	Hose, hyd - 1/2" x 34", #8femJIC swivel x #12femJIC 90 elbow swivel (Pressure and tank hoses)	
HV	760-1063	1	Hose, hyd - 1/4" x 39", #6femJICswivel x #6femJIC 90 elbow swivel (Load sense hose)	
HW	760-1167	2	Hose, hyd - 3/8" x 158", #6femJIC swivel x #8femJIC swivel (Steering hoses)	
HX	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

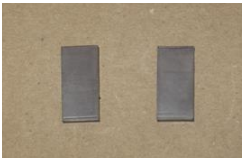




REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
Bag 710-0099-000 contains WA to WJ				
WA	720-0045-000#	1	WAS assembly	
WB	750-5002-000	1	Sensor, dual output, BEI	
WC	602-1087-000	1	Connector arm, steering	
WD	675-1191-000	2	Screw, mach, 8-32 x 3" PPH ZP	
WE	676-1054-000	4	Nut, nylock - 8/32NC ZP	
WF	675-1150-000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

Kit Contents - Wheel Angle Sensor *(continued)*

WK	640-0088-000	1	WAS assembly mounting bracket	
WL	640-0070-000	1	WAS rod mounting bracket (Mount with WM)	
Bag W3 contains WM, WN, and WO				
WM	675-0107-000#	2	Clamp, 1-1/2" polypropylene, EDX	
WN	675-2005	2	Bolt - 3/8NC x 3-1/4" Gr5 ZP	
	678-1054	2	Washer, narrow flat - 3/8" ZP	
	676-1035	2	Nut, nylock - 3/8NC ZP (Mount WM and WL)	
WO	678-1092-000	1	Washer, flat - 5/8"ID x 1"OD x 3/16" thk (Install behind WK)	

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 (Steering) 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 (Only one magnet is required for this installation)	
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	
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.

1. Prepare the hydraulic steering block.

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

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

- Install straight adapter fittings **HB** into the **P** and **T** ports.
- Install elbow adapter fitting **HC** into the **LS** port.
- Install elbow adapter fittings **HD** into the **A** and **B** steering ports.

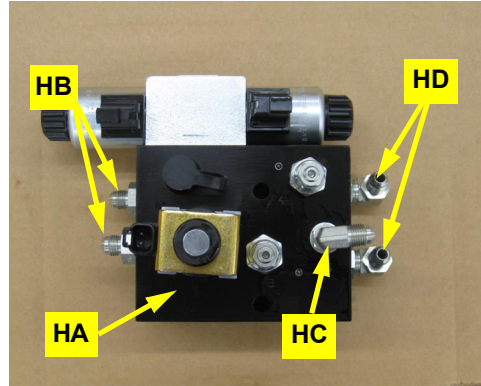


Figure 1: Prepared steering block

2. Mount the hydraulic steering block.

NOTE: The hydraulic steering block mounting bracket shown in Figure 2a is a prototype bracket. Use your supplied bracket which is slightly different.

- a. Locate the two bolts on top of the valve stack at the rear of the tractor. Remove the bolts and use them to install hydraulic steering block mounting bracket **HE**. Install the bracket with its longer end toward the tractor (Figure 2a).

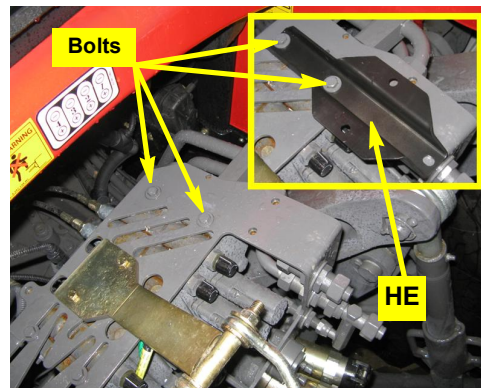


Figure 2a with inset: Steering block mounting location and (inset) installed mounting bracket

- b. Using hardware **HF**, install the prepared hydraulic steering block **HA** on bracket **HE**. Mount **HA** with its solenoids to the right (so steering ports A and B rearward - Figure 2b).

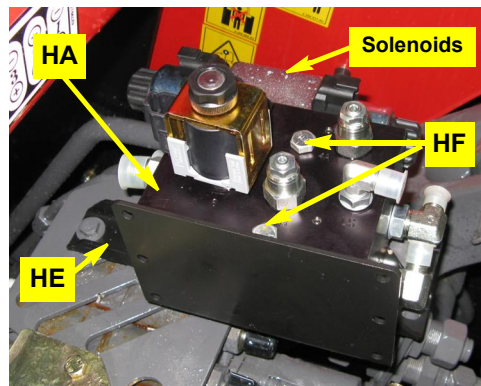


Figure 2b: Installed steering block

3. **Install the pressure, tank and load sense fittings.**

- a. Locate the marked **P**, **T** and **LS** ports of the auxiliary hydraulics near the valve stack, below your hydraulic steering block installation (Figure 3a inset).

NOTE: *The auxiliary hydraulic ports may or may not be in use. If they are capped (not in use), follow steps b and c. If they have hoses connected (in use), follow the boxed steps d, e and f having obtained parts HQ to HT (see Note above HQ in the hydraulics kit table on page 4). After completing step 3c (or 3f) continue at step 4.*

- b. **Auxiliary hydraulics not in use:** Remove the caps (and the **T/LS** bleed cross-over chamber if fitted - Figure 3a inset) from the pressure, tank, and load sense ports. Install run-tees **HJ** in the pressure and tank ports and adapter fitting **HO** in the load sense port. Install the removed **P** and **T** caps onto the open 'T' ends of the run-tees **HJ** (Figure 3a).
- c. Install adapters **HL** on the stems of run-tees **HJ** and adapter **HP** on **HO** in the **LS** port (Figure 3b).

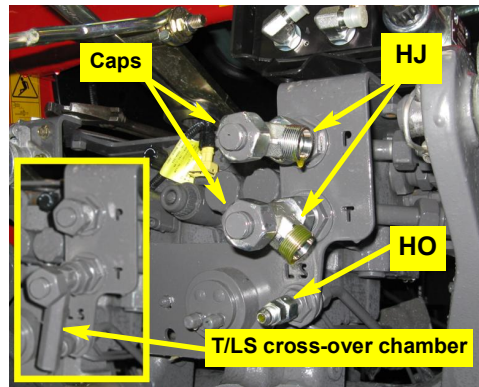


Figure 3a with inset: Pressure and tank run-tees and load sense adapter installed

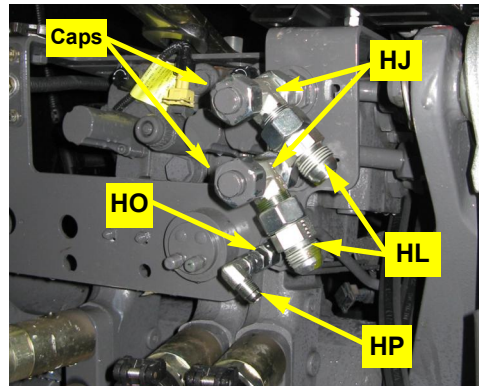


Figure 3b: Pressure, tank and second load sense adapters installed

- d. **Auxiliary hydraulics in use (see Note after 3a above):** Install adapters in the load sense valve **HQ** as follows (Figure 3c):

- **HR** and **HS** in the 'T' ports (to hydraulic steering block and LS function).
- **HT** in the stem port (source).

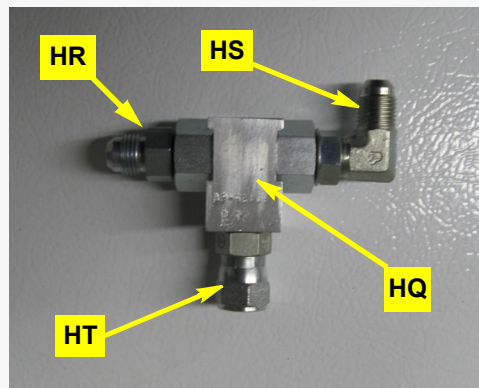


Figure 3c: Prepared load sense shuttle valve

- e. Disconnect the hoses at the **P**, **T** and **LS** ports. Connect run-tees **HJ** and adapters **HL** to the **P** and **T** ports (not shown). Connect adapter **HO** to the **LS** port (Figure 3d - note adapter **HP** not used).
- f. Connect the existing pressure and tank hoses to the open 'T' ends of the run-tees (not shown). Connect the load sense valve's adapter **HT** to adapter **HO**. Connect the existing load sense hose to elbow adapter **HS** in the load sense valve (Figure 3d - note, you will connect load sense hose **HV** in the next section).

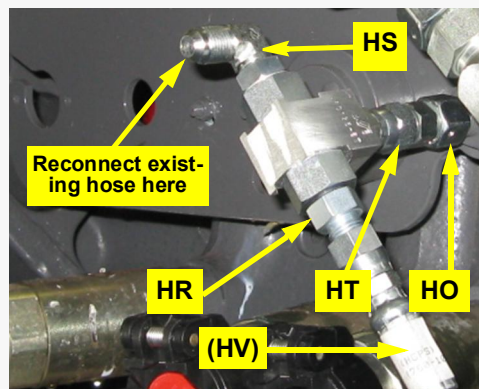


Figure 3d: Load sense shuttle valve connected to auxiliary LS port

4. **Install the pressure, tank and load sense hoses.**
 - a. Install the pressure and tank hoses **HU** between fittings **HL** installed in step 3c (or 3e) and adapters **HB** in the **P** and **T** ports on the hydraulic steering block (Figure 4 inset).
 - b. Install the load sense hose **HV** between fitting **HP** installed in step 3c (or adapter **HR** in the load sense valve - Figure 3d) and adapter **HC** in the load sense port on the hydraulic steering block (Figure 4).

NOTE: All hoses should be routed with other tractor plumbing free from entanglement and secured with the provided heavy tie straps **HX**.

5. **Install steering output fittings.**
 - a. Locate the left and right steering lines at the steering cylinder (Figures 5a-i and 5a-ii).

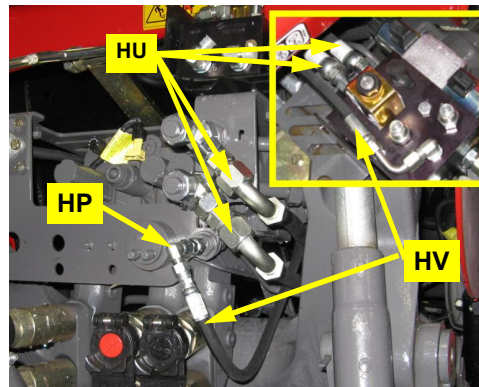


Figure 4 with inset: Installed pressure, tank and load sense hoses

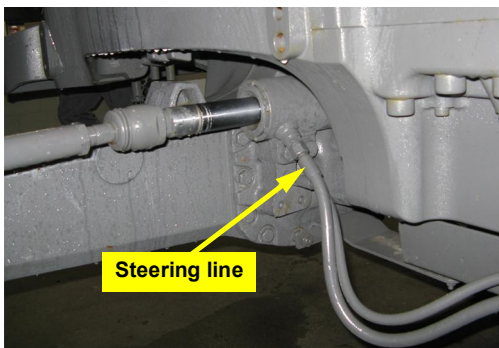


Figure 5a-i: Steering line, left side

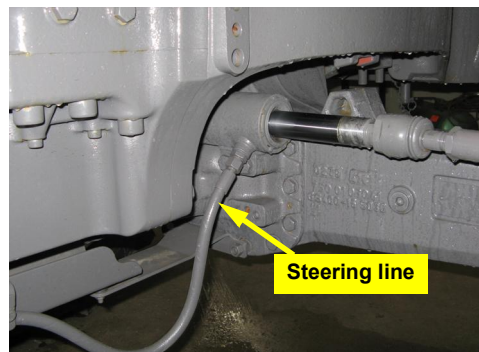


Figure 5a-ii: Steering line, right side

NOTE: At step b, reconnect the tractor's steering line to either the stem or the open 'T' end of the installed run-tee—whichever requires the least bending of the tractor's steering line. Then connect adapter **HM** to either the stem or the 'T' end of the run-tee accordingly.

- b. Install the run-tees **HK** at the left and right steering cylinders. Reconnect the tractor's steering lines and install adapters **HM** on the remaining open end of each run-tee—see Note above (Figures 5b-i and 5b-ii).

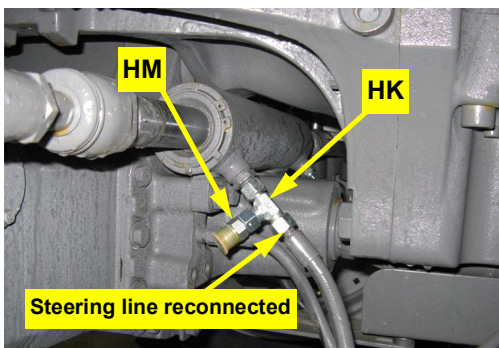


Figure 5b-i: Installed run-tee, left side

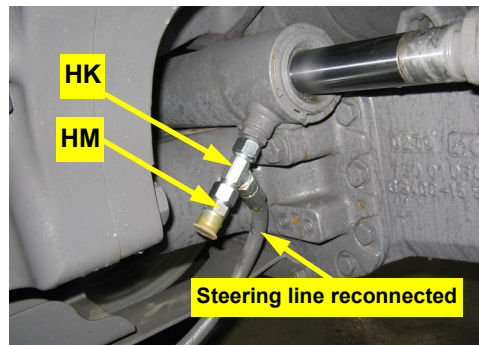


Figure 5b-ii: Installed run-tee and adapter and reconnected steering line, right side

NOTE: Leave the run-tee fittings 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.

6. Install the steering output hoses.

NOTE: At step a, use elbow adapter **HN** with adapter **HM** to improve steering hose alignment (reduce bending) as required.

- a. Connect the steering output hoses **HW** to adapters **HM** (or elbow adapters **HN** if used) on the left and right run-tees installed at step 5 (Figures 6a-i and 6a-ii).

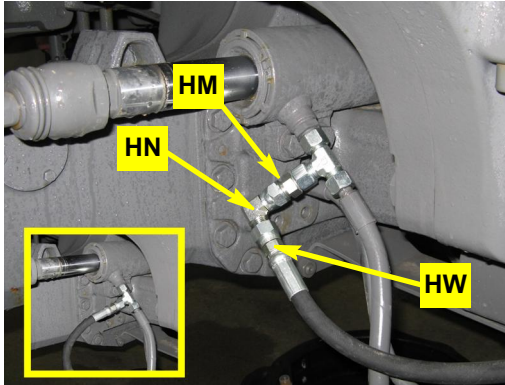


Figure 6a-i: Installed steering output hose, left side—with HN (inset, without HN)

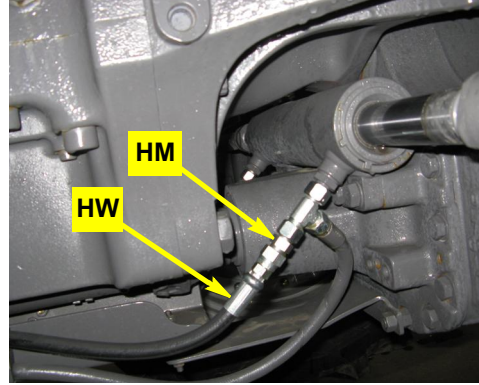


Figure 6a-ii: Installed steering output hose, right side—without HN

- b. Using tie straps **HX** as required, route the steering hoses back with the existing steering lines then up to and under the tractor cab (Figure 6b-i, right side steering hose), out from under the rear of the cab and up to the hydraulic steering block (Figure 6b-ii).

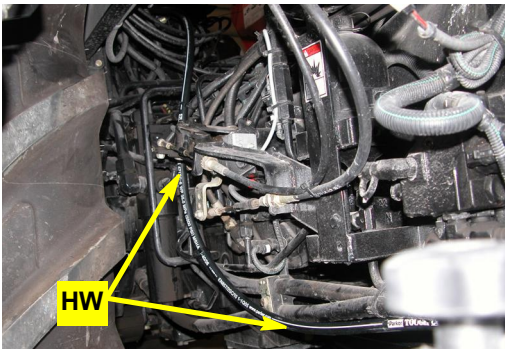


Figure 6b-i: Right side steering hose routed up to and under the cab

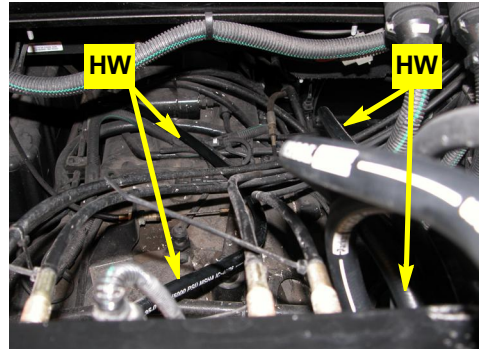


Figure 6b-ii: Steering hoses out from under the cab. Rearward then up to the steering block.

NOTE: All hoses should be routed with other tractor plumbing free from entanglement as well as secured with heavy tie straps **HX**.

- c. Connect the steering hoses **HW** to the elbow adapters **HD** in the **A** and **B** ports on the hydraulic steering block (Figure 6c).

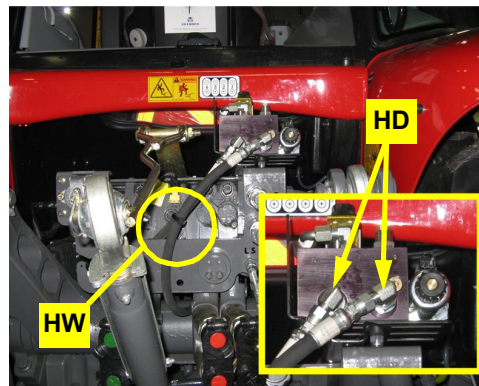


Figure 6c: Installed steering hoses at steering block

7. **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 wire connector (sensor) **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).

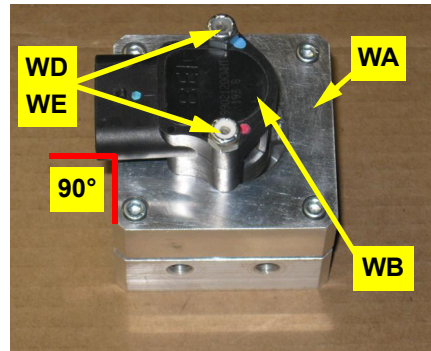


Figure 1a: Mounted WAS wire connector

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

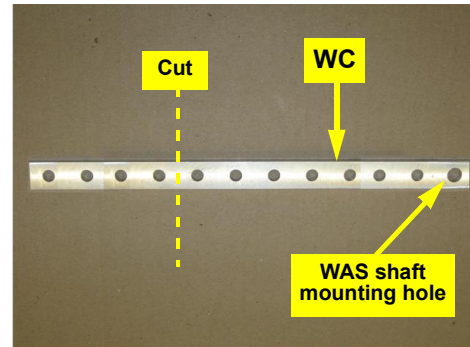


Figure 1b: WAS arm preparation

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

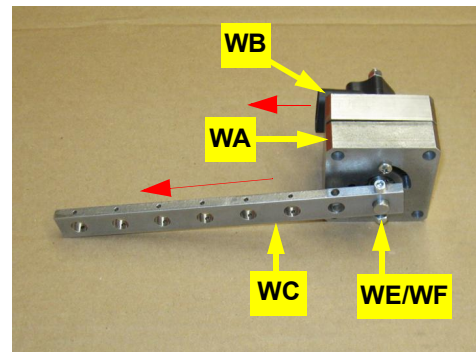


Figure 1c: Attached WAS arm

NOTE:

Before cutting the rod **WG** at step 1d, screw the provided lock 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.

- d. Cut the provided threaded rod **WG** 5 1/4" long (Figure 1d-i) then screw the lock nuts **WH** and swivel rod ends **WI** onto the cut threaded rod to achieve a center-to-center stud measurement of 6 1/2" (Figure 1d-ii). Leave **WH** loose until you complete linkage adjustment at step 2c.

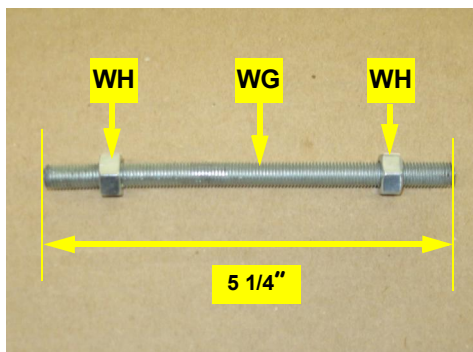


Figure 1d-i: Cut threaded rod with lock nuts

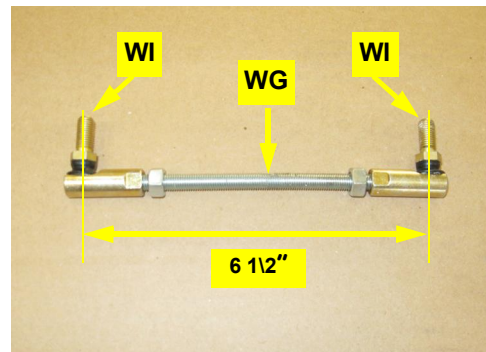


Figure 1d-ii: Assembled threaded rod

2. **Mount the wheel angle sensor.**

a. Locate the front axle differential housing on the tractor. Remove the middle vertical differential bolt on the right side of the axle (Figure 2a). Using that bolt, attach bracket **WK** to the axle (Figure 2a inset). Place washer **WO** between the differential housing and the bracket **WK**. Align the bracket parallel to the axle.

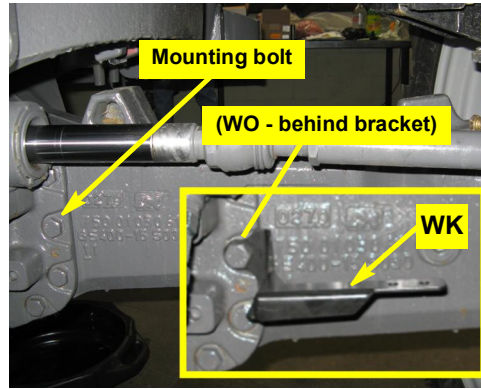


Figure 2a with inset: Differential bolt location and (inset) WAS assembly bracket installed

b. Using hardware **WN**, attach the plastic clamp **WM** and the bracket **WL** to the tie rod with **WL**'s linkage hole at the bottom (Figure 2b). Set the center of the bracket $9\frac{1}{4}$ " from the center of the tie rod end (Figure 2b).

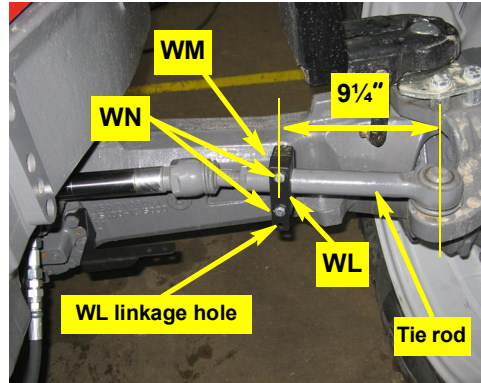


Figure 2b: Installed WAS clamp and bracket

c. Using hardware **WJ** attach the WAS assembly to the bottom face of bracket **WK**. Face the wire connector **WB** toward the center of the tractor (Figure 2c).

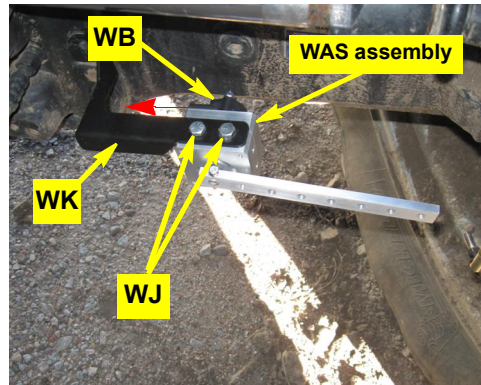


Figure 2c: Installed WAS assembly

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

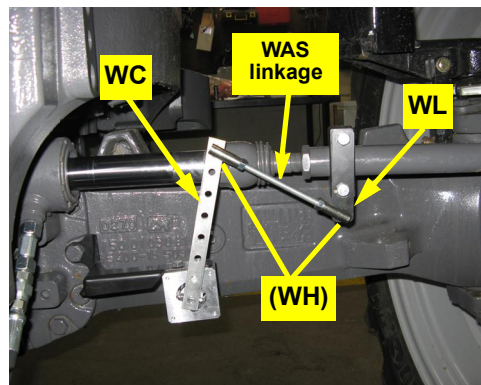


Figure 2d: Installed WAS linkage

2. **Mount the wheel angle sensor (*continued*).**
 - e. With all hardware **WH** loose, slowly turn the wheels full left lock then full right lock (Figures 2e-i and 2e-ii - note, you will install the WAS cable later). 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-i: Installed WAS - full left lock



Figure 2e-ii: Installed WAS - full right lock

Installation - Steering Wheel Switch (SWS)

1. Install the steering wheel switch.

- a. Locate the bottom steering console panel and remove it (Figure 1a).

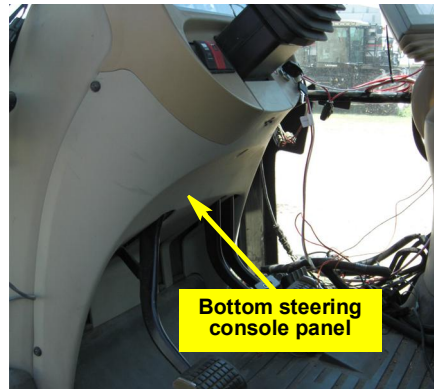


Figure 1a: Console panel location

- b. Locate the steering shaft shield and flange (Figure 1b with inset).



Figure 1b with inset: Console panel removed. Steering shaft shield between pedal mounts

- c. Drill a 3/8" hole in the switch/sensor bracket SC at the opposite end from the pre-drilled 5/16" hole. Put a 90° bend in the end of the bracket with the 3/8" hole (Figure 1c).

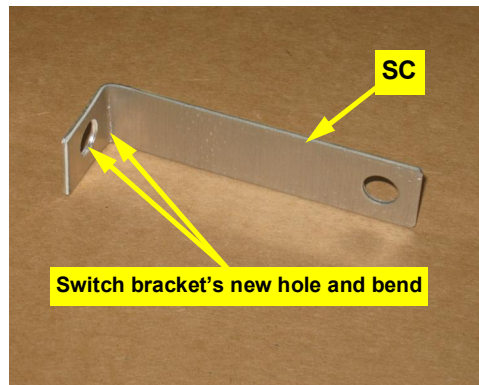


Figure 1c: Switch bracket with new hole and bend

- d. Remove the bottom right steering shaft shield flange bolt. Mount bracket SC on the bolt (Figure 1d) and twist and bend it to align squarely with the shaft shield (Figure 1d, left inset). Using the bracket as a template, mark the shield then drill a 1/2" hole in the shield (Figure 1d, right inset - the hole center will be approximately 2 3/4" from the base of the shield)

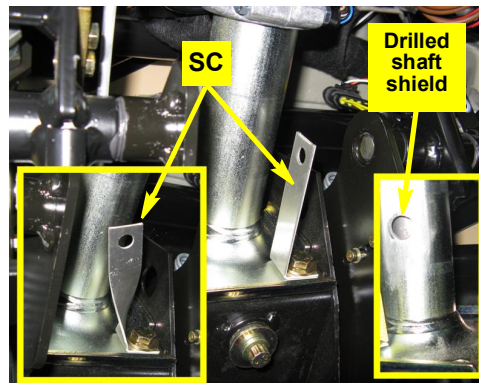


Figure 1d: Shield flange stud and drilled hole

1. **Install the steering wheel switch (continued).**

- e. Cut one magnet **SA** in half then trim each half into shape to pass through the 1/2" hole (keep the magnet as big as possible, round for example).

Using the two-part epoxy **SB**, attach one half of the magnet to the inner steering shaft. Turn the shaft 180° and attach the other half of the magnet to the steering shaft. Realign bracket **SC** with the magnet hole and adjust as necessary (Figure 1e).

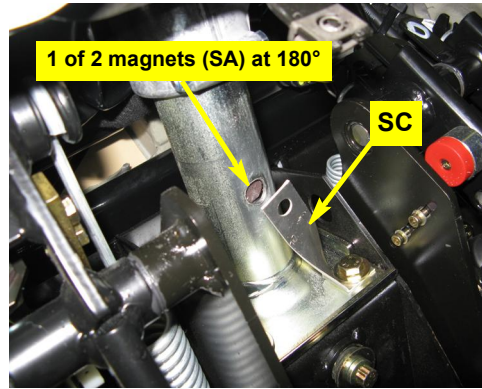


Figure 1e: Installed magnet halves

- f. Install switch **SD** in bracket **SC** and adjust the sensor face to 1/8" to 1/4" from the magnets (Figure 1f).

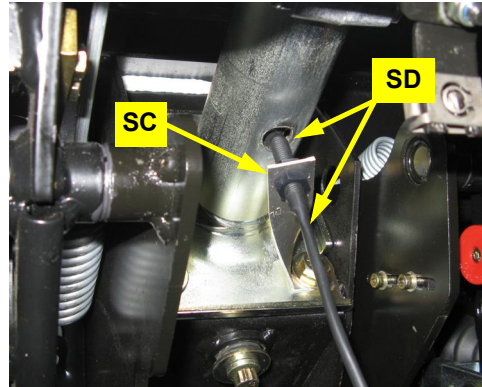


Figure 1f: Installed switch/sensor assembly

- g. Route sensor **SD**'s cable up over the pedal mounts to the right.
- h. Refit the bottom steering console panel.

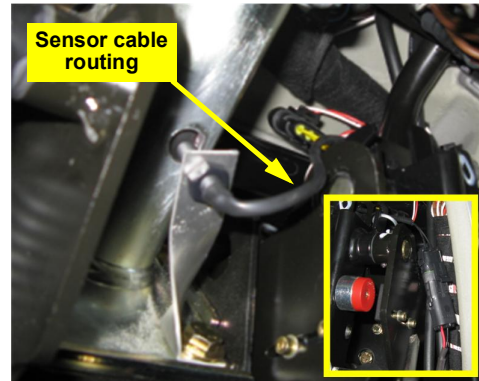


Figure 1f with inset: Switch cable routed over pedal mounts.

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