

# Automated Steering Kit Installation Guide

*Kit: EDX-CMX, P/N 911-2003-000*

## Fits Case MX Magnum Tractor Models:

180	210*
200	230*
220	255*
240	285*
270	

(\* Prior to SN# JAZ126070)



## 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 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.

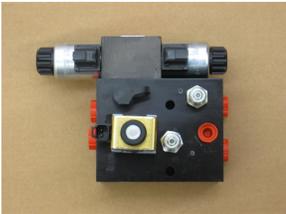
Before attempting to install any of the components, park the machine on a clean level floor with adequate clearance to work all around.

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	760-0021-000	1	Assy, hyd valve block - 35L/Proportional  (Hydraulic steering block)	
<b>Bag H1 contains HB, HC, HD, and HE</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  (P and T ports on hydraulic steering block)	
HD	760-2060	2	Adapter, hyd - #6maleJIC x #8maleORB  (A and B ports on hydraulic steering block)	

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

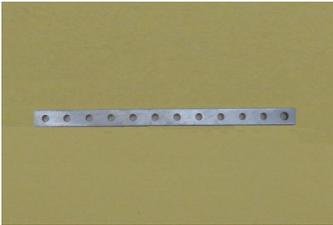
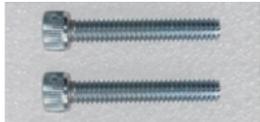
REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HE	760-2055	1	Adapter, hyd 90 elbow - #6maleJIC x #6femJIC	
HF	640-0092-000	1	Hyd block mnt, CMX/AP780	
<b>Bag H2 contains HG</b>				
HG	675-2006-000	2	Bolt - 3/8NC x 3-3/4" Gr5 ZP	
	678-1054	2	Washer, narrow flat - 3/4"OD x 13/32"ID x 1/16" thk ZP	
	676-1035	2	Nut, nylock - 3/8NC ZP	
<b>Bag H3 contains HK</b>				
HK	760-2069	4	Adapter, hyd run tee - #8ORFF	
<b>Bag H4 contains HL, HM, HN, and HO</b>				
HL	760-0002	1	Hyd load shuttle - #6femORB	
HM	760-2048	1	Adapter, hyd - #6maleORFF x #6maleORB	
HN	760-2040	1	Adapter, hyd 90 elbow - #6maleORB x #6femORFFswiv	

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

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HO	760-2056	1	Adapter, hyd - #6maleJIC x #6maleORB	
HP	760-1017	2	Hose, hyd - 3/8" x 52", #6femJICswiv x #8femORFFswiv90EL	
HQ	760-1018	2	Hose, hyd - 3/8" x 45", #6femJICswiv x #8femORFFswiv90EL	
HR	760-1019	1	Hose, hyd - 1/4" x 42", #6femJIC x #6femJIC swiv, both ends	
HS	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.

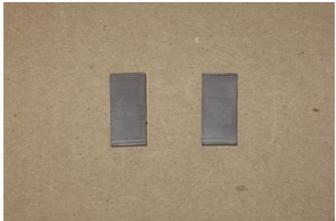
REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
<b>Bag 710-0099-000 contains WA to WJ</b>				
WA	720-0045-000#	1	WAS assembly	
WB	750-5002-000	1	Sensor, dual output, BEI	
WC	602-1087-000	1	Connector arm, steering, long	
WD	675-1191-000	2	Screw, mach, 8-32 x 3" PPH ZP	
WE	676-1054-000	4	Nut, nylock - 8/32NC 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"	

**Kit Contents - Wheel Angle Sensor (continued)**

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
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	 (bolts WAS assy to mounting bracket WK)
	678-1077-000	2	Washer, lock 5/16, ZP	
WK	640-0070-000	1	WAS rod mounting bracket	
WL	640-0072-000	1	WAS assy mounting bracket	
<b>Bag W3 contains WM and WN</b>				
WM	675-0107-000#	2	Clamp, 1-1/2" polypropylene, EDX	
WN	675-2030-000	2	Bolt - 3/8NC x 3-1/2" 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	

## 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	

# 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 adapter fitting **HB** into the **LS** port.
- Install adapter fittings **HC** into the **P** and **T** ports.
- Install adapter fittings **HD** into the **A** and **B** ports
- Install adapter fitting **HE** onto adapter fitting **HC** on the **P** port.

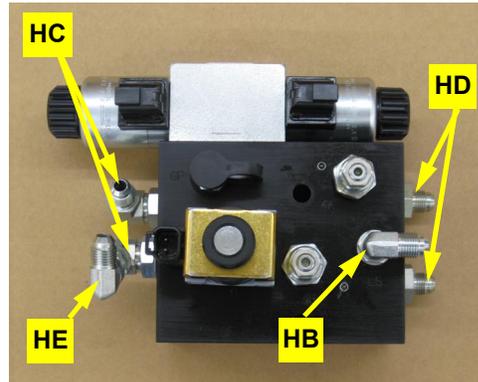


Figure 1: Prepared hydraulic block

### 2. Install the hydraulic block mounting bracket.

The hydraulic steering block will be mounted to the tractor frame on the left side, below the cab, and beside the fuel tank.

- Locate and remove the lower of the two bolts securing the step mounting bracket to the tractor frame (Figure 2a).
- Using this bolt, secure the hydraulic mounting bracket **HF** to the tractor frame (Figure 2b).



Figure 2a: Removing lower step mounting bracket bolt

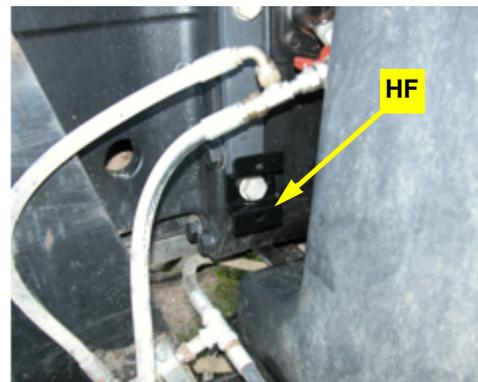


Figure 2b: Installed hydraulic block mounting bracket

**NOTE:** The hydraulic steering block will be mounted later to allow work space during steering hose installation.

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

- a. Locate the tractor steering orbital in front of the cab, just below the windshield. The two lines coming out of the left side of the steering orbital are the steering output lines and are stamped **R** and **L** on the casting. Disconnect the steel line fittings from the steering orbital (Figure 3a).

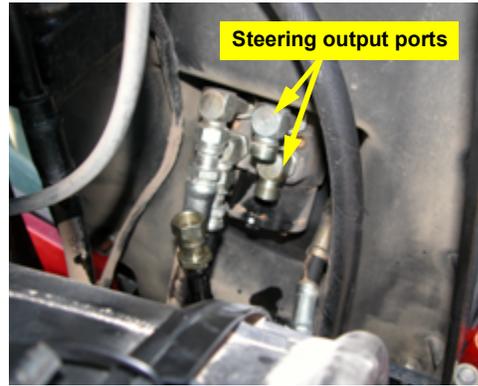


Figure 3a: Steering output ports, steel line fittings removed

- b. Install the run-tee fittings **HK**. Reconnect the steel line fittings (Figure 3b).

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



Figure 3b: Installed run-tee fittings and re-connected steel line fitting

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

- a. Install the steering output hoses **HP** onto the branches of the run-tee fittings **HK** installed at step 3b (Figures 4a L and R and 4b).
- b. Route the hoses down to the hydraulic steering block as shown and connect to the **A** and **B** ports (Figure 4b). The ends of the hoses with the large o-ring flat face elbows attach to the run-tees and the hose ends with the smaller JIC fitting connect to the block.
- c. Make sure hoses are secure and routed for problem-free operation. Securely tighten all connections.

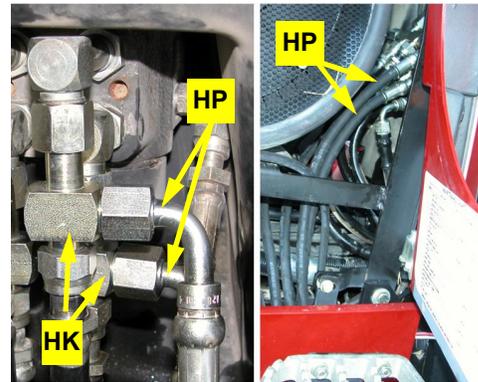


Figure 4a (L and R): Installed steering output hoses



Figure 4b: Steering output hoses connected to the hydraulic block

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

- a. On the tractor steering orbital, the top right line is the tank return port and the bottom right line is the pressure supply port. These ports are stamped **P** and **T** respectively on the orbital casting. Remove the hoses from these two ports.
- b. Install run-tee fittings **HK** provided (Figure 5). 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.

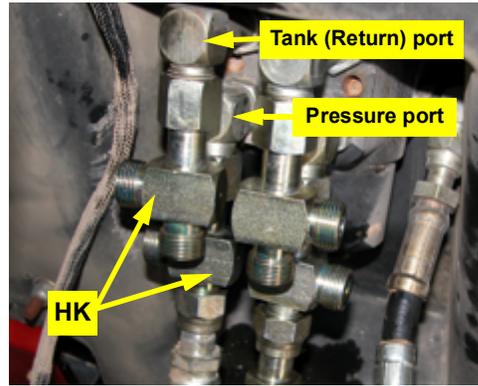


Figure 5: Installed run-tee fittings at orbital P and T ports

6. **Install the load sense shuttle and fittings.**

- a. Prepare the load sense shuttle **HL** with fittings **HM**, **HN** and **HO** (Figure 6a).

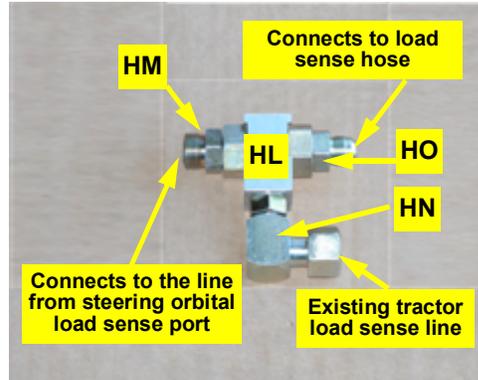


Figure 6a: Prepared load sense shuttle

- b. Locate the small load sense hydraulic line on the left side of the steering orbital. Disconnect the junction of the load sense hose where it makes an elbow transition (Figure 6b).

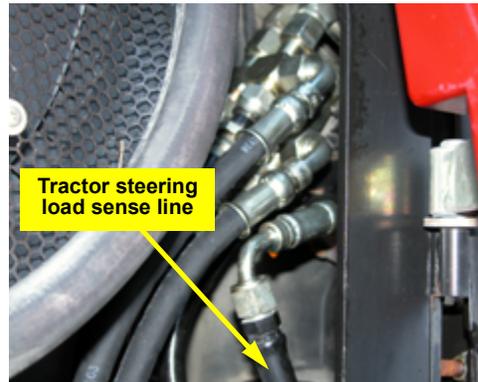


Figure 6b: Load sense line - to be disconnected

- c. Connect the hose going back to the steering orbital to the end of the load sense shuttle **HL** with the o-ring face adapter **HM** (Figure 6c).

- d. Attach the tractor load sense line to the o-ring face female elbow **HN** in the center position of the shuttle (Figure 6c).

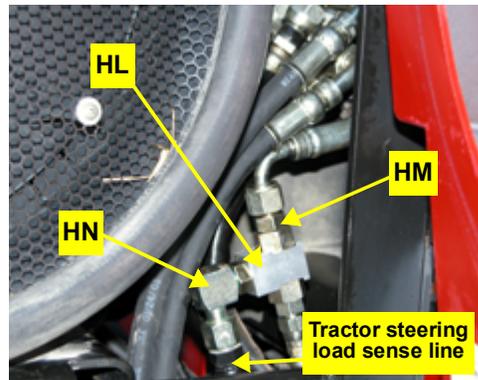


Figure 6c: Installed load sense shuttle - load sense line reconnected

7. **Install the load sense hose.**

Connect the load sense hose **HR** to adapter fitting **HO** on the load sense shuttle installed at step 6 (Figure 7). Route the hose down to the hydraulic steering block and connect to the adapter fitting **HB** in the **LS** port on the block (Figure 8a).

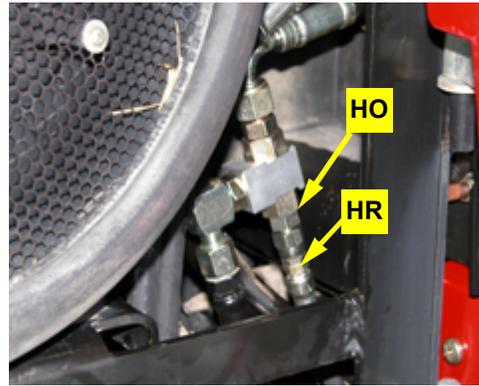


Figure 7: Connected load sense hose

8. **Mount the hydraulic steering block.**

- a. Using hardware **HG** mount the hydraulic block to bracket **HF** (Figure 8a).

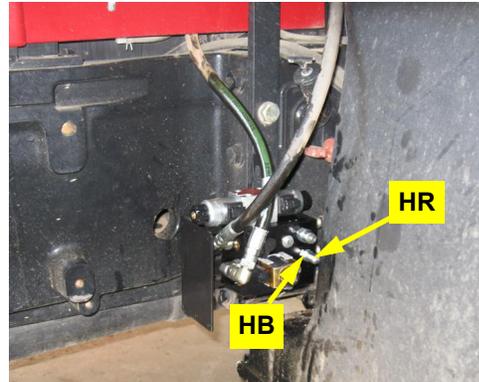


Figure 8a: Mounted hydraulic block. LS hose connected. (P & T hoses also shown connected - see step 9c)

9. **Install pressure and tank hoses.**

- a. Connect the pressure and tank hoses **HQ** to the branches of the run-tee fittings **HK** installed at step 5b (Figure 9a).

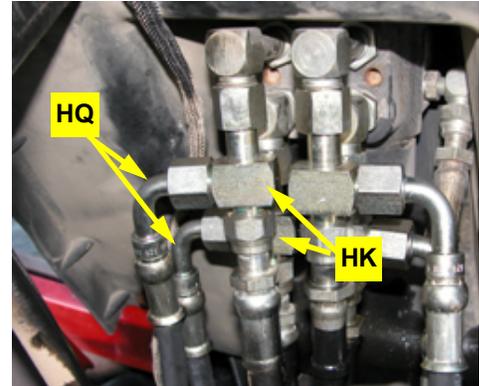


Figure 9a: Connected pressure tank hoses

9. **Install pressure and tank hoses (continued).**

- b. Route the **T** and **P** hoses down to the hydraulic steering block (Figure 9b). The ends of the hoses with the large o-ring flat face elbows attach to the run-tees (at the orbital) and the hose ends with the smaller straight fittings connect to the hydraulic steering block.

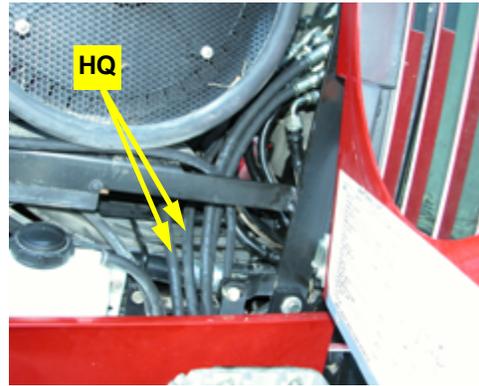


Figure 9b: Routed tank and pressure hoses

- c. Connect the hoses **HQ** from the **P** and **T** ports on the orbital to their respective **P** and **T** ports on the hydraulic steering block. Connect the **T** hose to adapter fitting **HC** and the **P** hose to adapter fitting combination **HC/HE** (Figure 9c).

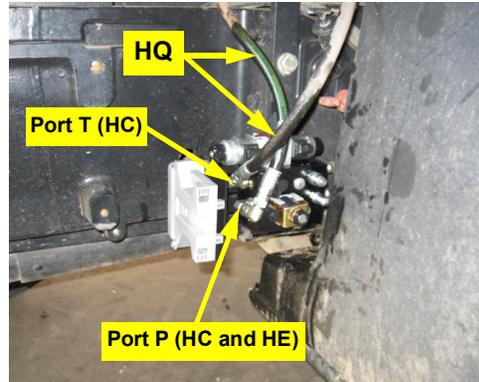


Figure 9c: Connected tank and pressure hoses

10. **Verify operation.**

**⚠ WARNING:** *During tests of the hydraulic response 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).

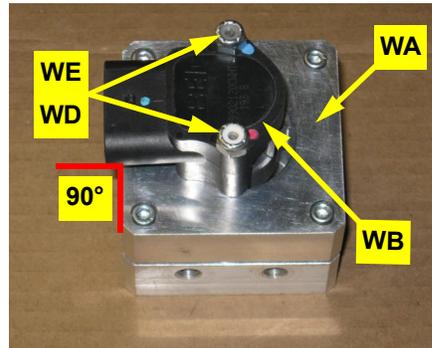


Figure 1a: Mounted WAS wire connector

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

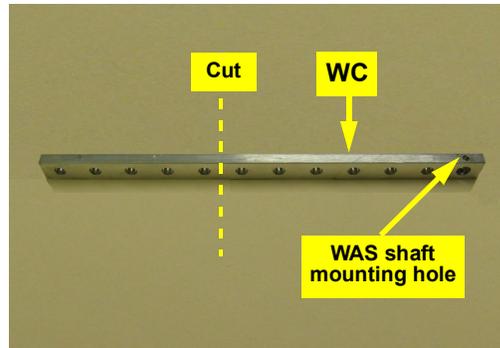


Figure 1b: WAS arm preparation

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

## NOTE:

*Before you cut the rod at step 1d, 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 the provided threaded rod **WG** 2 7/8" 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 4 1/8" (Figure 1d-ii). Leave **WH** loose until you complete linkage adjustment at step 2f.

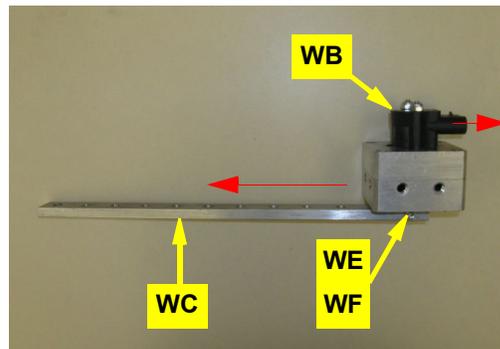


Figure 1c: Attached WAS arm

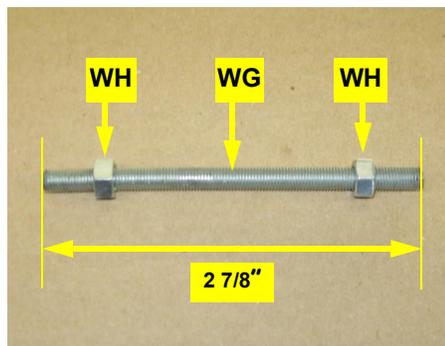


Figure 1d-i: Cut threaded rod

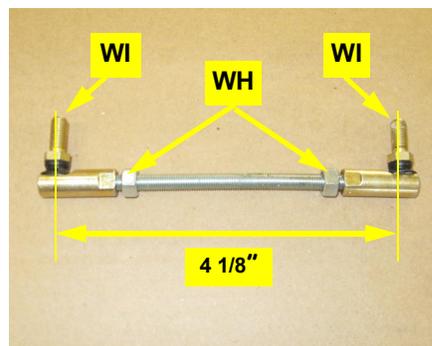


Figure 1d-ii: Assembled threaded rod

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

- a. Locate the tie rod on the left hand side of the steering axle (Figure 2a).
- b. Attach plastic clamps **WM** and bracket **WK** to the

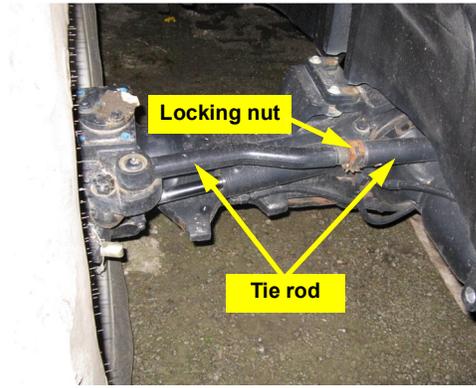


Figure 2a: Tie rod and locking nut location

tie rod with hardware **WN** next to the locking nut (Figure 2b).

- c. Locate the front axle differential cover bolts on the back of the axle. Loosen the bolt indicated in Figure 2c-i just enough to slide the bracket **WL** behind the bolt (Figure 2c-ii).

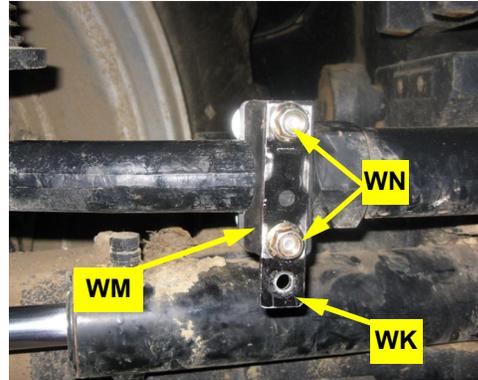


Figure 2b: Installed WAS clamp and bracket

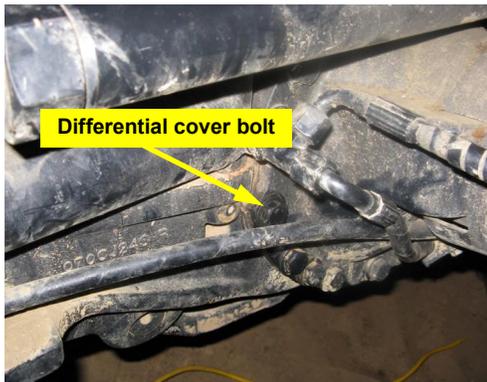


Figure 2c-i: Differential cover bolt to loosen

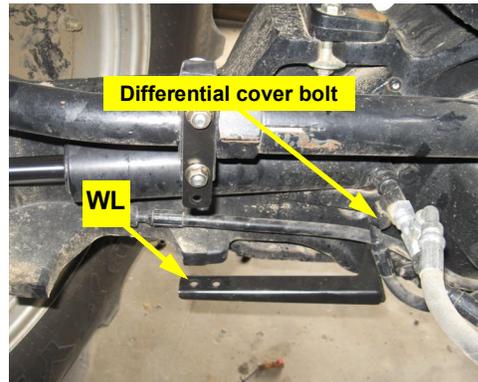


Figure 2c-ii: Installed WAS mounting bracket

- d. Attach the assembled WAS from steps 1a and 1b to bracket **WL** using hardware **WJ** (under the bracket, not shown) with the WAS connector facing the center of the machine. The top of the WAS assembly should be approximately 1" from the bottom of the steering cylinder (Figure 2d).

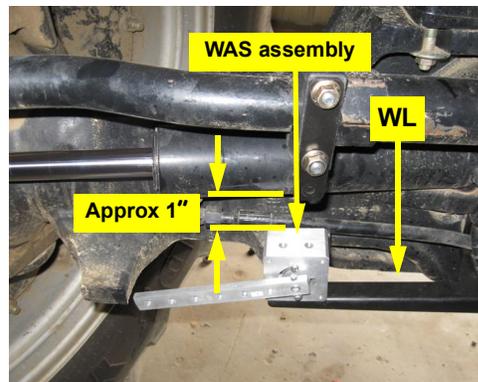


Figure 2d: Installed WAS assembly

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

- e. Using the remaining hardware **WH**, install the assembled WAS linkage from step 1d between the rod bracket **WK** 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 2e).
- f. With all hardware **WH** loose, slowly turn the wheels full left lock then full right lock (Figures 2f-i and 2f-ii). Check that the linkage moves freely without binding and adjust the linkage if necessary.
- g. When the linkage does move freely and without binding, tighten hardware **WH** on the rod and the swivels.

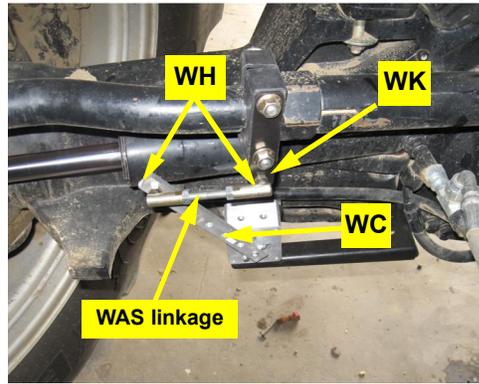


Figure 2e: Installed linkage



Figure 2f-i: Installed WAS - full left lock



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

# Installation - Steering Wheel Switch (SWS)

## 1. Install the steering wheel switch.

- a. Locate the steering shaft under the steering console near the cab floor. The shaft is surrounded with a metal shield (Figure 1a).

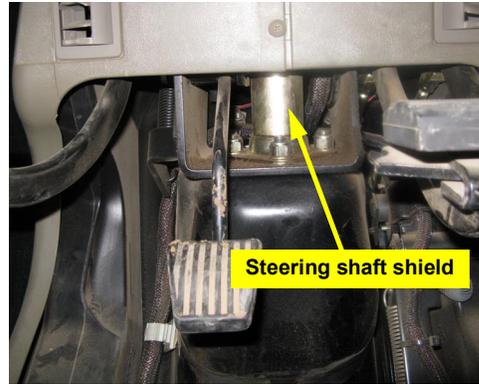


Figure 1a: Shielded steering shaft

- b. Drill a 3/8" hole in the sensor bracket **SC** at the opposite end from the sensor hole. Put a 90° bend in the end just drilled to 3/8" (Figure 1b).

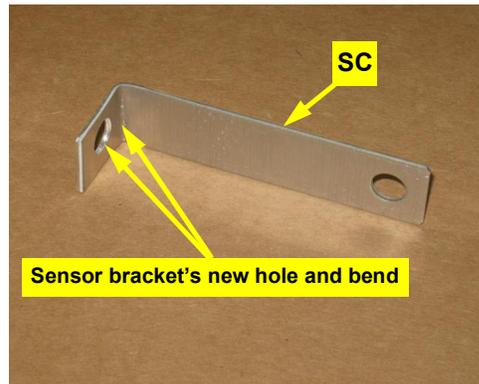


Figure 1b: Newly drilled/bent sensor bracket

- c. Remove the bottom steering shaft shield flange nut. Using the bent sensor arm as a template, drill a 1/2" hole in the steering shaft shield (Figure 1c).

Cut the magnet **SA** in half. 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.

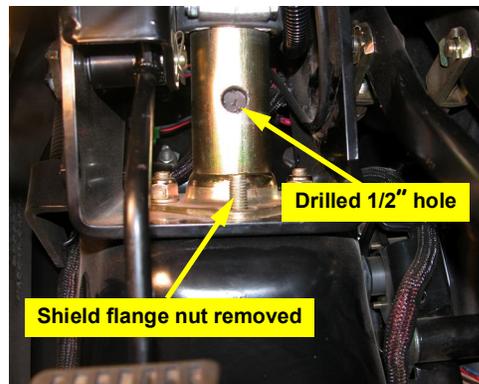


Figure 1c: Drilled shaft shield and installed magnets

- d. Attach sensor **SD** to the bracket **SC**. Fasten the sensor arm to the steering shaft shield flange with the nut removed at step 1c (Figure 1d).

- e. Align the sensor **SD** with the magnets and adjust the sensor face to 1/4" to 1/2" from the magnets (Figure 1d).

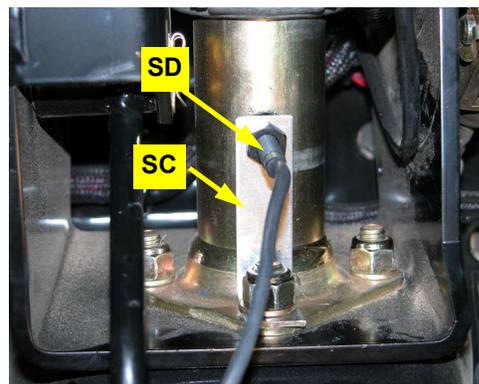


Figure 1d: Installed sensor arm

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