

# Automated Steering Kit Installation Guide

Kit: EDX-AP05AS, P/N 911-2022-000

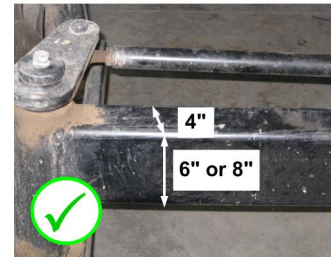
## Fits Apache Sprayer Models:

AS850    AS710  
AS1000    AS1010  
AS1200    AS1210


(See **Note** below about front axle types)



**NOTE:** This installation kit is applicable to Apache sprayer models that have a light (4 x 6) or a heavy (4 x 8) fixed front axle. The kit is not applicable to models with an adjustable front axle. If you are unsure about your machine compatibility, contact your local dealer before continuing this installation.



## 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 on the next page. 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.

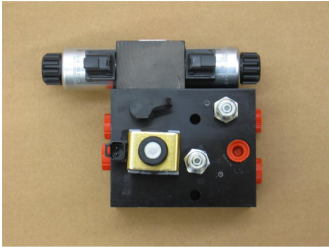


Before attempting to install any of the components, park the machine on a clean level floor with adequate clearance to work all around.

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 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	Assembly, hyd valve block - 15L\proportional  (Hydraulic steering block)	
<b>Bag H1 contains HB, HC and HD</b>				
HB	760-2061-000	2	Adapter, hyd 90 elbow - #6maleJIC x #8maleORB  (A and B ports on hydraulic steering block)	
HC	760-2060-000	2	Adapter, hyd - #6maleJIC x #8maleORB  (P and T ports on hydraulic steering block)	

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

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HD	760-2045-000	1	Adapter, hyd - #6maleORB plug  (LS port on hydraulic steering block)	
HE	640-0005-000	1	Hydraulic steering block mounting bracket	
<b>Bag H2 contains HF</b>				
HF	675-2006-000	2	Bolt - 3/8NC x 3-3/4" Gr5, ZP	
	678-1054-000	2	Washer, flat - 3/8 ZP	
	676-1035-000	2	Nut, nylock - 3/8NC ZP  (Mount hydraulic steering block on HE)	
<b>Bag H4 contains HJ, HK, HL, HM</b>				
HJ	760-2054	2	Adapter, hyd run-tee - #6JIC  (Steering lines)	
HK	760-2016	1	Adapter, hyd run-tee - #12JIC  (Pressure line)	
HL	760-2077	1	Adapter, hyd run-tee - #8JIC  (Tank line)	
HM	760-2012	1	Adapter, hyd - #12femJIC x #8maleJIC  (Pressure line)	

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

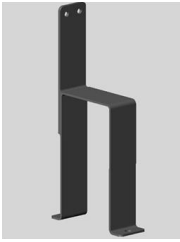
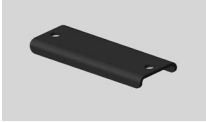


REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HN	760-1099	2	Hose, hyd - 3/8" x 66", #6femJIC swivel x #8femJIC 90 swivel  (P and T hoses)	
HO	760-1038	2	Hose, hyd - 1/4" x 40", #6femJICswivel both ends  (Steering hoses)	
HP	677-2001	20	Tie strap, 11" heavy duty	

## 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	
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	1	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 (Attach WAS assembly to WK)	

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

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
WK	640-0108-000	1	WAS assembly upper mounting bracket  (Use with WL and WM)	
WL	640-0109-000	1	WAS assembly lower mounting bracket  (Use with WK and WM)	
<b>Bag W3 contains WM</b>				
WM	675-2047	2	Bolt - 3/8NC x 1-1/2" Gr5 ZP	
	675-2030	2	Bolt - 3/8NC x 3-1/2" Gr5 ZP	
	678-1054	2	Washer, flat - 3/8" ZP	
	676-1035	2	Nut, nylock - 3/8NC ZP	
			(Attach WK to WL - light or heavy fixed axle)	
WN	640-0110	1	WAS rod link bracket	

## 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  (Only one 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/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.

### 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 as follows (Figure 1):

- **HB** in the **A** and **B** ports
- **HC** in the **P** and **T** ports
- **HD** in the **LS** port

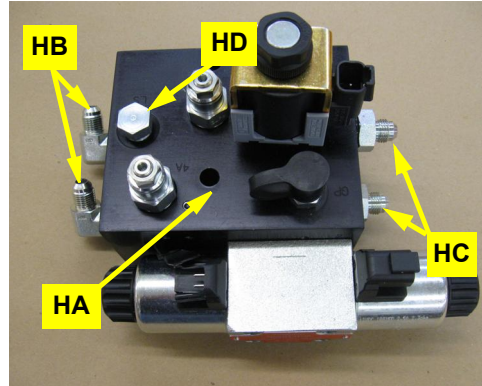


Figure 1: Prepared hydraulic block

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

Locate the left front tie-down bracket and remove its lower bolt. Using this bolt, attach hydraulic steering block mounting bracket **HE** to the frame (and tie-down bracket). Install the bracket with its block mounting holes vertical (Figure 2).

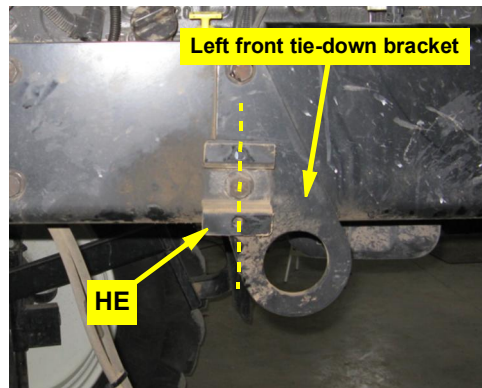


Figure 2: Installed steering block mounting bracket

### 3. Install the hydraulic steering block.

Using hardware **HF**, attach hydraulic steering block **HA** to bracket **HE** (Figure 3).

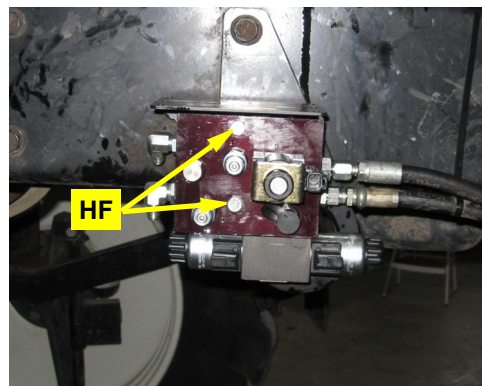


Figure 3: Installed steering block (you will install the hoses at step 5c)



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

Locate the pressure and tank hoses at the hydraulic junction block under the tractor near the left side of the frame (Figure 4-i). Disconnect the two hoses and install the run-tees **HK** and **HL** (the smaller) onto the pressure and tank ports respectively.

**NOTE:** Leave run-tees loose to allow for alignment when attaching hoses.

Reconnect the tractor's pressure and tank hoses to the open 'T' ends of their respective run-tees (Figure 4-ii).

**NOTE:** The tank line may be located higher on the junction block, above the cooler line (Figure 4-i inset).

Plastic caps placed on the open ends of the fittings will prevent excessive leakage prior to hose installation.

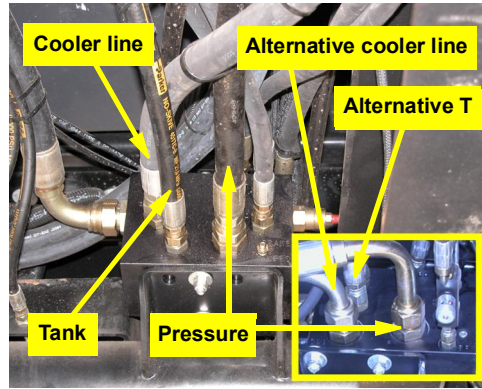


Figure 4-i with inset: Pressure and tank lines at hydraulic junction block (with alternatives)

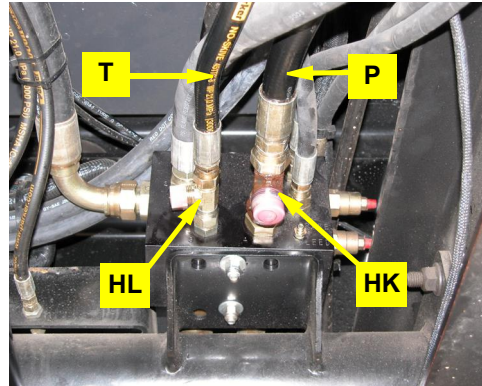


Figure 4-ii: Installed run-tees and reconnected tractor's tank and pressure hoses

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

- a. Install reducer fitting **HM** on the open stem of the **P** run-tee **HK**. Connect pressure and tank hoses **HN** to the run-tees (to adapter **HM** for the pressure hose) (Figure 5a-i).

**NOTE:** After fitting the run-tee **HK** in the pressure port, you may have to connect the tractor's pressure hose to the stem of the run-tee, not the open 'T' end (loosen the pressure hose at the pump end if necessary). In this case, connect pressure hose reducer **HM** (and **HN**) to the open 'T' of **HK** (Figure 5a-ii).

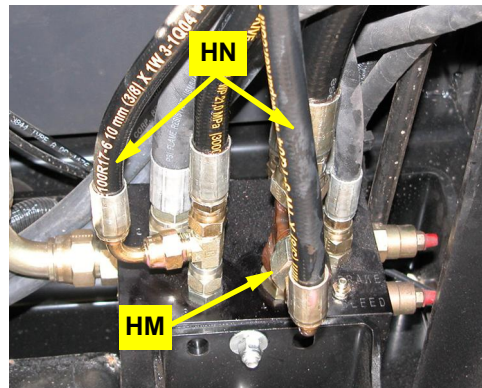


Figure 5a-i: Installed T and P hoses (and P hose adapter)

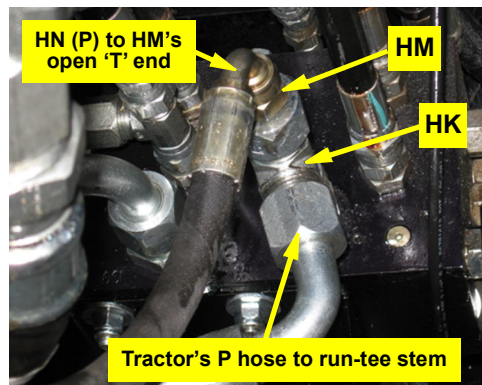


Figure 5a-ii: Alternative pressure line connections

5. **Install the pressure and tank hoses (continued).**

- b. Route hoses **HN** down to the hydraulic steering block installed at step 3. Route the hoses inside the tractor frame along with other plumbing and clear of moving parts (Figure 5b).

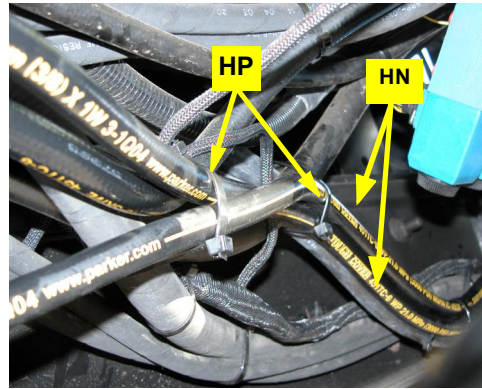


Figure 5b: Pressure and tank hoses routed to steering block

- c. Connect the pressure and tank hoses **HN** to adapter fittings **HC** in the **P** and **T** ports on the hydraulic steering block (Figure 5c).

**NOTE:**

Secure routed hoses in place with the provided heavy tie straps **HP**. Securely tighten all hose fittings and connections (including the tractor's pressure hose at the pump if loosened).

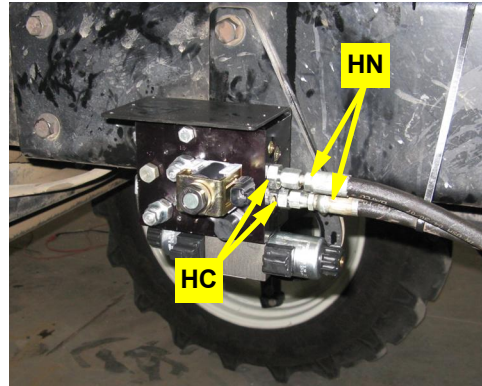


Figure 5c: Pressure and tank hoses connected at steering block

6. **Install the steering output fittings.**

**NOTE:**

If your tractor model steering does not use a tie rod, follow step 6a. If your steering does use a tie rod, follow steps 6b and 6c.

Plastic caps placed on the open ends of the fittings will prevent excessive leakage prior to hose installation.

- a. **No tie rod:** Locate the two steering lines on the left side of the tractor frame near the front axle (Figure 6a). Install run-tees **HJ** where the steering line fittings are attached to the frame and reconnect the tractor's steering hoses to the open 'T' ends of **HJ** (Figure 6a inset).
- b. **With tie rod:** Locate the two 'outer' steering lines outside (under) the tractor frame on the left side of the tractor near the front axle (Figure 6b and inset). Locate the 'inner' steering lines inside the tractor frame directly above the outer steering lines (Figure 6b inset). Disconnect the inner steering lines.

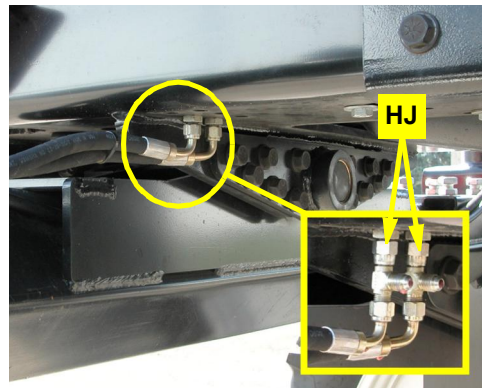


Figure 6a with inset: Steering lines. Run-tees installed, steering hoses reconnected (inset).

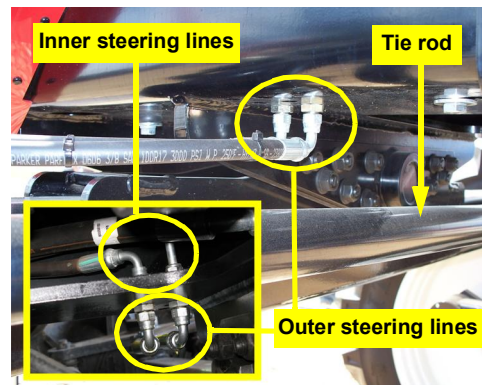


Figure 6b with inset: Outer and inner steering lines (tie rod steering only)

6. **Install the steering output fittings (continued).**

- c. **With tie rod (continued):** Install run-tees **HJ** at the inner steering line fittings. Reconnect the tractor's steering hoses to the open 'T' ends of **HJ** (Figure 6c).

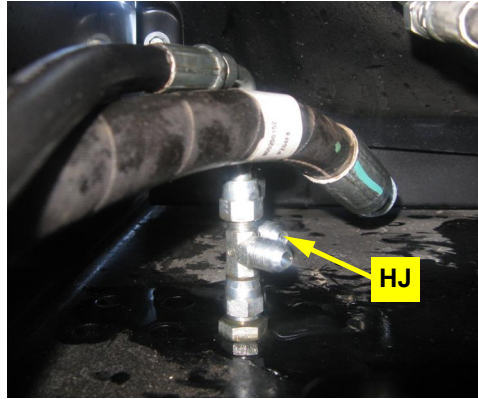


Figure 6c: Steering run-tees installed, tractor's steering hoses reconnected

7. **Install the steering output hoses.**

- a. Connect steering hoses **HO** to the open stems of the run-tees **HJ** (Figure 7a with inset) and route them inside the tractor frame to the hydraulic steering block.

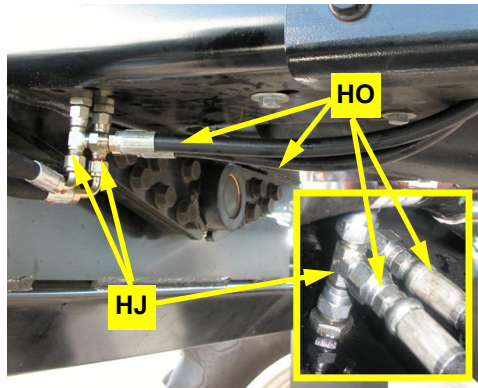


Figure 7a with inset: Steering hoses connected at run-tees (with tie rod, inset)

- b. Connect steering hoses **HO** to adapter fittings **HB** in the **A** and **B** ports of the hydraulic steering block (Figure 7b).

**NOTE:** *To ensure problem-free operation, secure routed hoses in place with the provided heavy tie straps **HP**. Securely tighten all hose fittings and connections.*

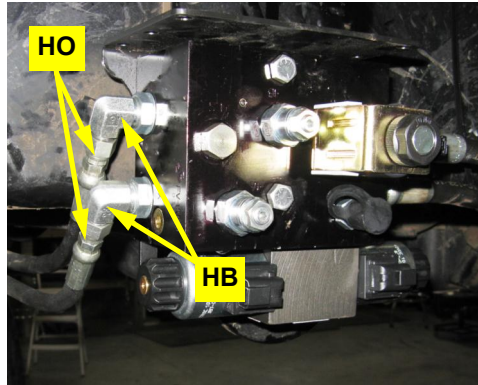


Figure 7b: Steering hoses connected at steering block

## 8. 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. Start the machine 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 **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).

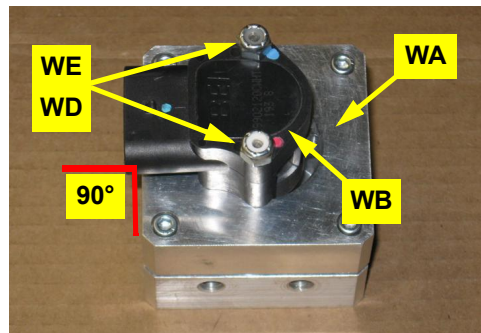


Figure 1a: Prepared WAS housing/connector

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

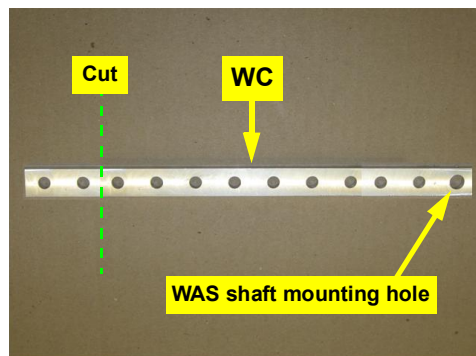


Figure 1b: WAS arm preparation

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

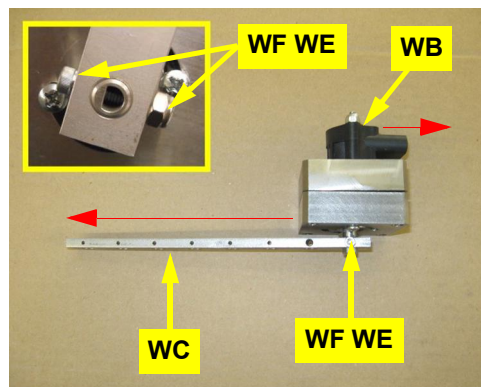


Figure 1c with inset: WAS arm installed

- d. Screw two of hardware **WH** and rod swivels **WI** onto the threaded rod to achieve a center-to-center stud measurement of 13 1/4" (Figure 1d). Leave **WH** loose until you complete linkage adjustment at step 2e.

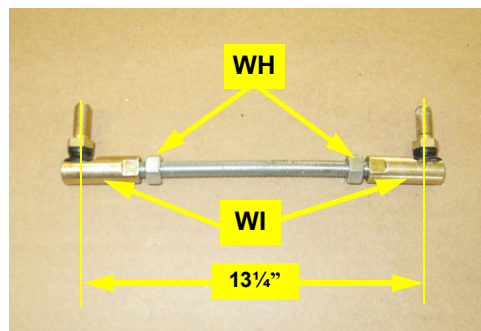


Figure 1d: Assembled threaded rod

## 2. Mount the wheel angle sensor.

### NOTE:

The figures in this section show prototype brackets and fittings. Install your fittings and brackets as described.

- a. Using hardware **WM** (long or short bolts) attach brackets **WK** and **WL** to the left side of the front axle as follows (Figure 2a with inset - heavy [4 x 8] axle installation shown):

- Set **WK** on top of the axle with its vertical extension at the front.
- Set the centerline of the bracket assembly  $12\frac{1}{2}$ " from the center of the steering king pin.

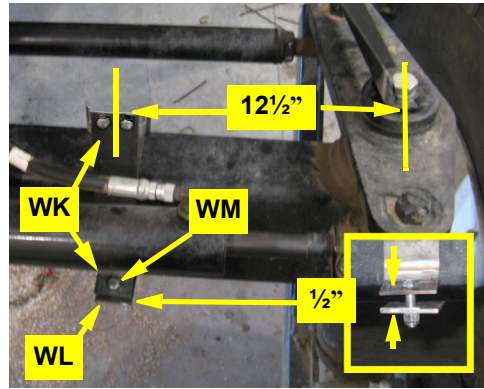


Figure 2a with inset: WAS assembly mounting bracket location and (inset) brackets gap

- b. Using hardware **WJ** (not visible), attach the prepared WAS assembly to the rear face of bracket **WK**. Mount the assembly with WAS arm **WC** uppermost and facing inward and the wire connector of **WB** facing outward (Figure 2b).

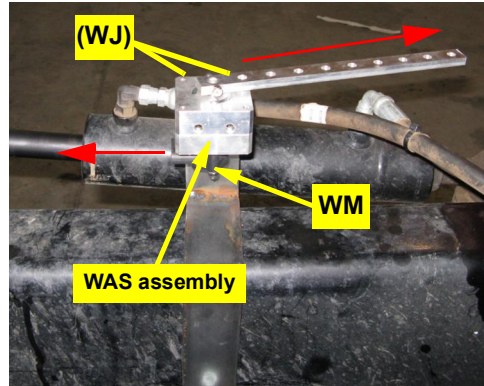


Figure 2b: Installed WAS assembly

- c. Remove the left side king pin bolt and use it to install rod link bracket **WN** (Figure 2c with inset).

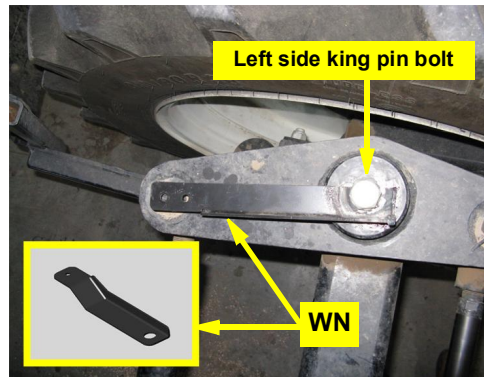


Figure 2c with inset: WAS rod link bracket installed

- d. Using hardware **WH** install the assembled WAS rod link from step 1 between the last hole in WAS arm **WC** and bracket **WN**. Set the swivel studs downward at both ends (Figure 2d). Leave swivel nuts **WH** loose.

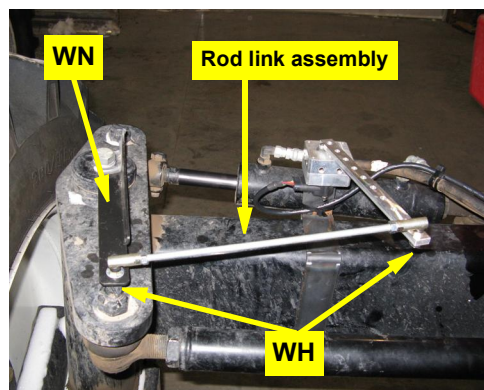


Figure 2d: Installed WAS rod link bracket. (You will connect the WAS cable at step 2d in the ECU installation section.)

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



Figure 2e-i: Full left lock

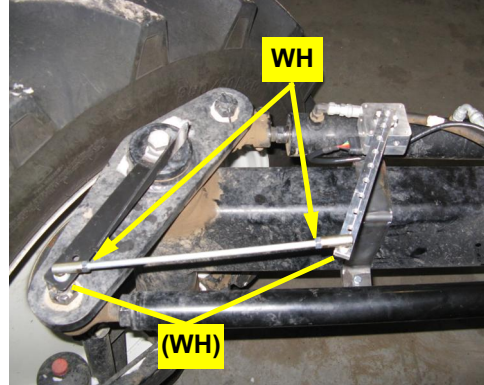


Figure 2e-ii: Full right lock

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

# Installation - Steering Wheel Switch (SWS)

## 1. Install the steering wheel switch.

- a. Remove the four screws holding the two halves of the steering column lower trim to expose the steering shaft cover (Figure 1a with inset).

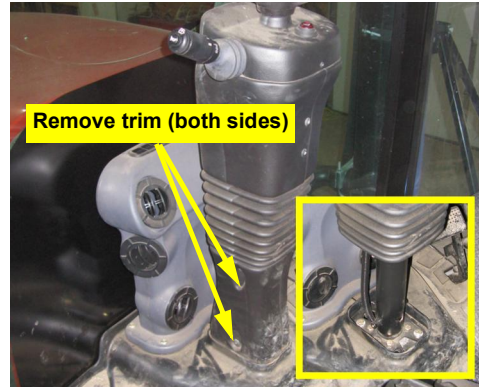


Figure 1a with inset: Lower trim removed, steering shaft cover exposed (inset)

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

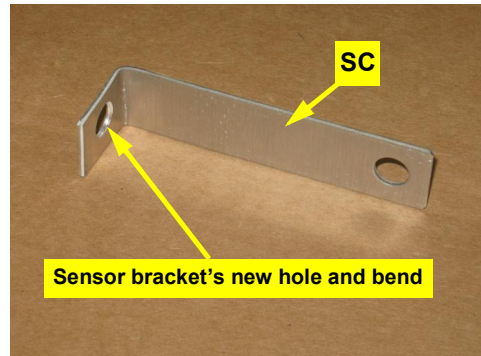


Figure 1b: Drilled and bent sensor bracket

- c. Remove the left inner shaft cover/orbital bolt (Figure 1c, left inset). Mount drilled and bent SC on the bolt and, with it tightened in place, use SC as a template to mark the steering shaft cover in the center of the pre-drilled sensor hole (Figure 1c).

Remove bracket SC and drill the pilot hole out to 1/2" (Figure 1c, right inset).

- d. 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 steering shaft. Turn the shaft 180° and attach the other half of the magnet.

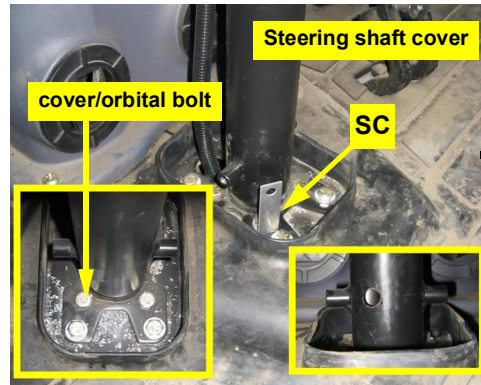


Figure 1c with insets: Using switch bracket as a template. Drilled shaft cover (right inset)

### NOTE:

*You do not use the second supplied magnet on this installation.*

- e. Attach sensor SD to sensor bracket SC. Install the sensor/bracket assembly using the removed cover/orbital bolt (Figure 1d).
- f. Align sensor SD with the magnets SA (not visible) and adjust the sensor face to 1/8" to 1/4" away from the magnets. Route SD's cable out through the front of the molded floor mat (Figure 1d).
- g. Refit the lower trim.

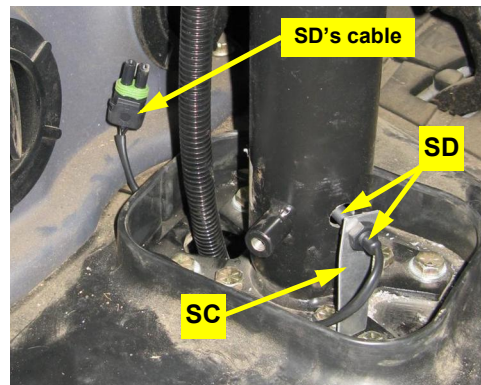


Figure 1d: Installed sensor bracket and sensor

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