Automated Steering Kit Installation Guide

Kit: EDX-VD6, P/N 911-2039-000

Fits Versatile Tractor Models:

836	**936**
846	**946**
856	**956**
876	**976**

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.

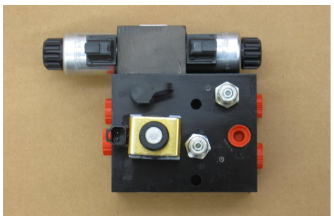
Before attempting to install any of the components, park the machine on a clean level floor with adequate clearance to work all around.

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

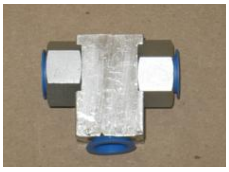
Unpack the hydraulics installation kit and identify the required parts as shown. Kit items are A, B, C etc. with an H (Hydraulic) prefix.

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HA	760-0021-000	1	Assembly, hyd valve block - 35L\proportional (Hydraulic steering block)	
Bag H1 contains HB, HC and HD				
HB	760-2079-000	2	Adapter, hyd - #8maleJIC x #8maleORB (P [pressure] and T [tank] ports on hydraulic steering block)	
HC	760-2060-000	2	Adapter, hyd - #6maleJIC x #8maleORB (A and B steering ports on hydraulic steering block)	
HD	760-2058	1	Adapter, hyd 90 elbow - #6maleJIC x #6maleORB (LS port on hydraulic steering block)	

Kit Contents - Steering Hydraulics *(continued)*

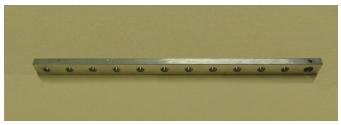
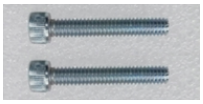
REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HE	640-0011	1	Hydraulic steering block mounting bracket	
Bag H2 contains HF				
HF	675-2006-000	2	Bolt - 3/8NC x 3-3/4" Gr5, ZP	
	678-1054-000	2	Washer, flat - 3/8 ZP	
	676-1035-000	2	Nut, nylock - 3/8NC ZP	
			(Mount HA on HE)	
Bag H3 contains HG				
HG	675-2007	2	Bolt, 3/8NC x 3/4" Gr5 ZP	
	676-1035	2	Nut, nylock - 3/8NC ZP	
			(Mount HE on machine)	
Bag H5 contains HK, HL, HM, HN and HO				
HK	760-2016	1	Adapter, hyd run-tee - #12JIC	
			(Pressure line)	
HL	760-2027	1	Adapter, hyd run-tee - #16JIC	
			(Tank line)	
HM	760-2012	1	Adapter, hyd - #12femJIC x 8maleJIC	
			(Pressure line - use with HK)	
HN	760-2026	1	Adapter, hyd - #16femJIC x 8maleJIC	
			(Tank line - use with HL)	
HO	760-2077	2	Adapter, hyd run-tee - #8JIC	
			(Steering lines)	

Kit Contents - Steering Hydraulics *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
Bag H6 contains HP, HQ, HR, HS and HT				
HP	760-0002	1	Assembly, hyd static load sense valve	
HQ	760-2041	1	Adapter, hyd - #6maleORB x 6femJIC (Function port of HP - with HR)	
HR	760-2029	1	Adapter, hyd - #4femJIC x 6maleJIC (Function port of HP with HQ - connect to valve stack)	
HS	760-2037	1	Adapter, hyd 90 elbow - #4maleJIC x 6maleORB (Source port of HP - connect machine's LS line)	
HT	760-2058	1	Adapter, hyd 90 elbow - #6maleJIC x 6maleORB (To hydraulic steering block - connect HW)	
HU	760-1122	2	Hose, hyd - 3/8" x 45", #8femJIC swivel x #8femJIC 90 swivel (Pressure and tank hoses)	
HV	760-1115	1	Hose, hyd - 3/8" x 57", #6femJIC swivel x #8femJIC 90 swivel (Steering hose - to head end of steering cylinder)	
HW	760-1117	1	Hose, hyd - 3/8" x 44", #6femJIC swivel x #8femJIC 90 swivel (Steering hose - to rod end of steering cylinder)	
HX	760-1012	1	Hose, hyd - 1/4" x 48", #6femJIC swivel both ends (Load sense hose)	
HY	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.

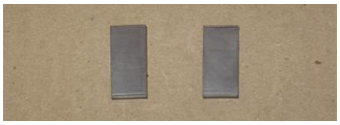
REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
Bag 710-0099-000 contains WA to WJ				
WA	720-0045-000#	1	WAS assembly	
WB	750-5002-000	1	Sensor, dual output, BEI	
WC	602-1087-000	1	Connector arm, steering	
WD	675-1191-000	2	Screw, mach, 8-32 x 3", PPH ZP	
WE	676-1054-000	4	Nut, nylock 8-32NC, ZP	
WF	675-1150-000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

Kit Contents - Wheel Angle Sensor *(continued)*

WK	640-0147-000	1	WAS assembly mounting bracket	
WL	640-0076-000	1	WAS link rod bracket	
Bag W3 contains WM and WN				
WM	675-2066-000	1	Bolt, 16-2.0 x 50mm, Gr8.8, ZP (Attach WK - with machine's nut)	
WN	675-2065-000 678-1081-000 676-1079-000	2 2 2	Bolt, 7/16" x 1-1/2", Gr5, ZP Washer, flat - 7/16" ZP Nut, 7/16" - 14, Gr5, ZP (Attach WL)	

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 as follows (Figure 1):

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

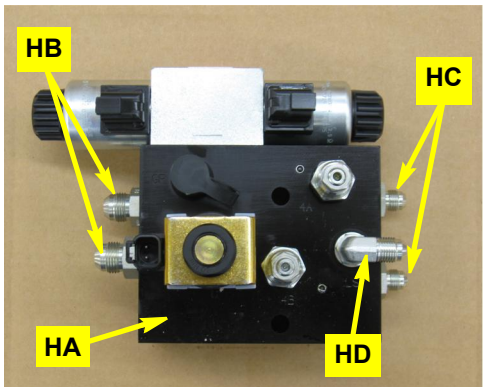


Figure 1: Prepared hydraulic block

2. Install the steering block mounting bracket.

Using hydraulic steering block bracket **HE** as a template mark the inner face of the left rear fender (Figure 2) 8” from the bottom of the fender (Figure 2 left inset - outer face view) and just back from the fender’s front edge. Drill two 7/16” holes and, using hardware **HG**, attach bracket **HE** (Figure 2, right inset).

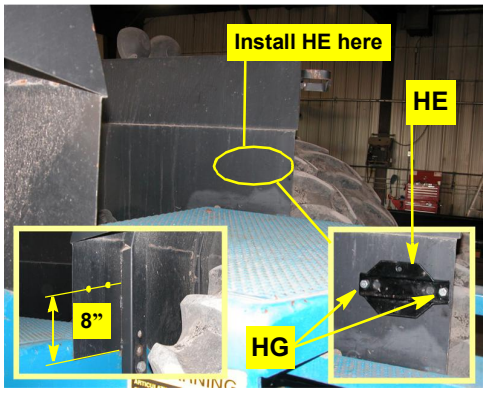


Figure 2 with insets: Steering block mounting bracket location and installation

3. Install the hydraulic steering block.

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

- Mount **HA** with its L/R solenoids upward (so with the **P** and **T** ports rearward)

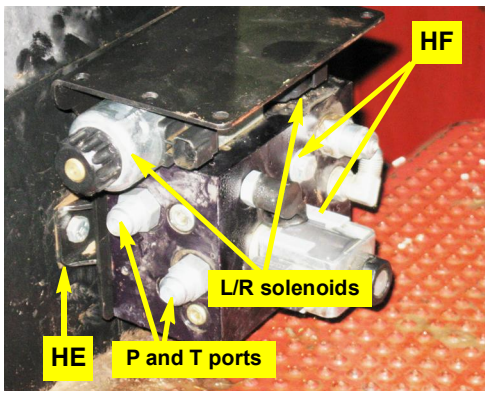


Figure 3: Steering block installed

4. Install the pressure, tank and load sense fittings.

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

a. Prepare the load sense valve **HP** as follows:

- Adapter **HQ** in the function port, then adapter **HR** in adapter **HQ**
- Adapter **HS** in source port
- Adapter **HT** in the load sense port

b. Locate the pressure, tank and load sense connections on the bottom of the hydraulic valve stack located under the tractor on the left side near the rear axle (Figure 4b with inset).

c. Disconnect the load sense line then connect the assembled load sense valve **HP** to the valve stack using fitting **HR** (Figure 4c inset). Connect the machine's load sense hose to the load sense valve at fitting **HS** (Figure 4c).

d. Disconnect the pressure and tank hoses and install run-tees **HK** and **HL** to the pressure and tank ports on the valve stack respectively. The tank port is the larger of the two (#16). Reconnect the machine's pressure and tank hose to the open 'T' ends of the two run-tees (Figure 4c with inset).

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

NOTE: *Route all hoses with other machine plumbing free from entanglement and secured with heavy tie straps **HY**.*

a. Using reducer fittings **HM** and **HN** on the stems of run-tees **HK** (**P**) and **HL** (**T**) respectively (Figure 5a-i inset), install pressure and tank hoses **HU** between their respective run-tees (Figure 5a-i) and fittings **HB** in the **P** and **T** ports of the hydraulic steering block (Figure 5a-ii).

Install load sense hose **HX** between fitting **HS** in the load sense valve and fitting **HD** in the **LS** port of the steering block (Figures 5a-i and 5a-ii).

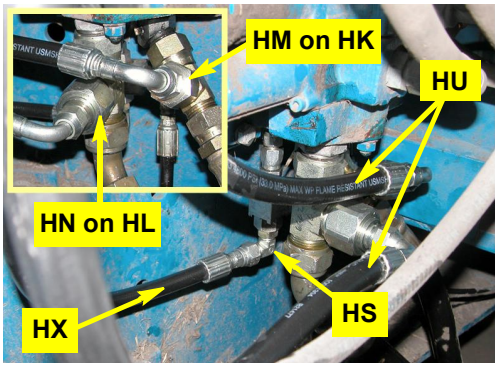


Figure 5a-i: Pressure, tank and load sense hoses connected at valve stack

b. Securely tighten all hose fittings and connections.

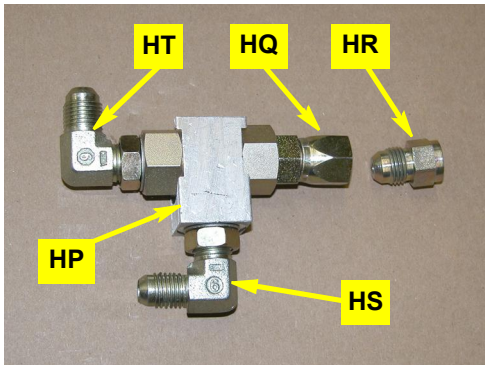


Figure 4a: Prepared load sense valve

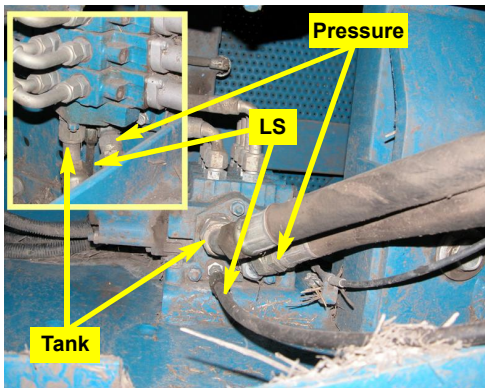


Figure 4b with inset: Pressure, tank and load sense connections at valve stack

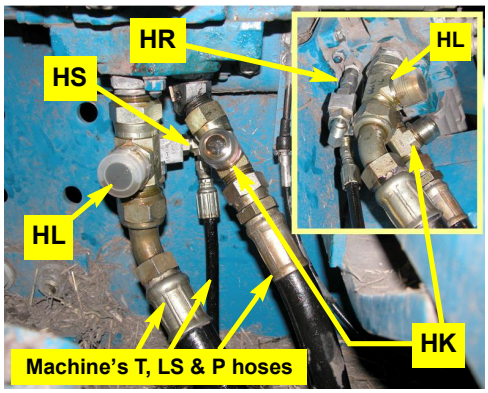


Figure 4c: Load sense valve and run-tees installed, machine's hoses reconnected

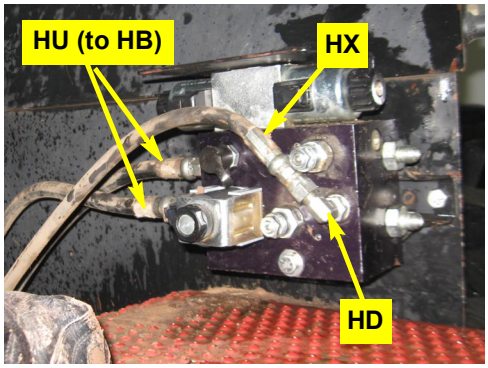


Figure 5a-ii: Pressure, tank and load sense hoses installed at steering block

6. Install the steering output fittings.

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

Locate the steering lines at the head and rod ends of the left steering cylinder at the center of the machine (Figure 6, top). Disconnect the machine's steering hoses and install run-tees **HO**. Reconnect the machine's steering hoses to the open 'T' end of each run-tee (Figure 6, bottom).

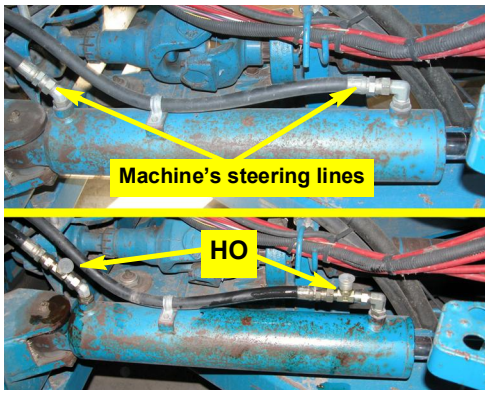


Figure 6: Steering hoses (top), run-tees installed and machine's hoses reconnected (bottom)

7. Install the steering output hoses.

a. Connect steering hoses **HV** (the longer) and **HW** to the stem of the run-tees at the head and rod ends of the steering cylinder respectively (Figure 7a).

Route the hoses, with other plumbing and clear of moving parts back and up to the hydraulic steering block. Use ties **HY** as necessary.

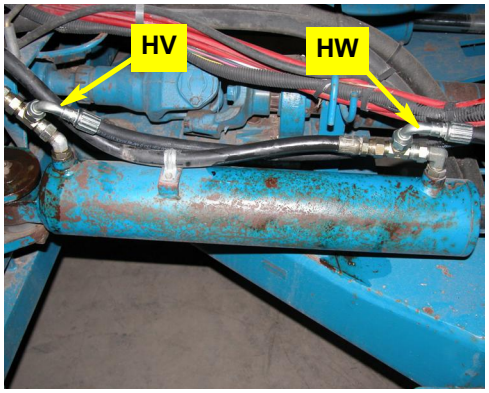


Figure 7a: Steering hoses connected at steering cylinders

b. Connect the hoses **HV** and **HW** to adapter fittings **HC** in the **A** and **B** ports of the hydraulic steering block (Figure 7b).

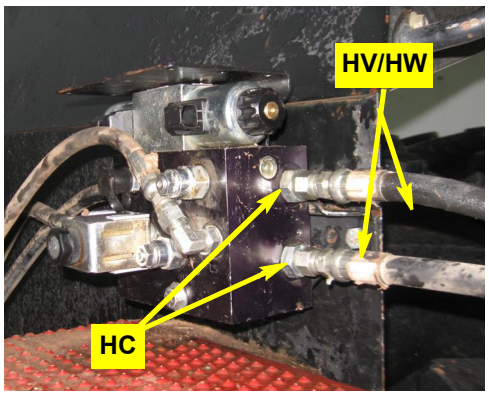


Figure 7b: Steering hoses connected to steering block

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

⚠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), attach the WAS wire connector **WB** to the WAS housing **WA**. Install the bolts up through the bottom of the housing. Mount **WB** with its right edge in line with the right front corner of **WA** (Figure 1a).

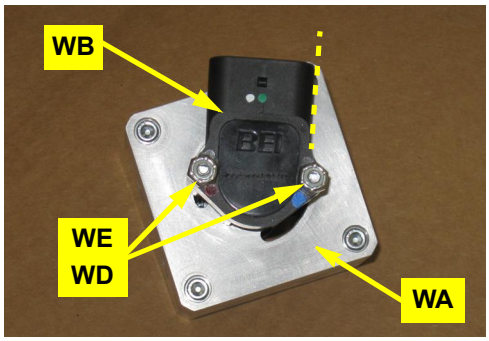


Figure 1a: Prepared WAS housing\connector

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

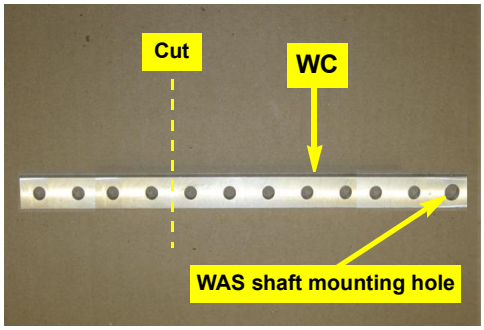


Figure 1b: WAS arm preparation

c. Using hardware **WF** (screw) and **WE** (nut), attach the WAS arm **WC** to the WAS assembly. Mount the arm in the same direction as 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.*

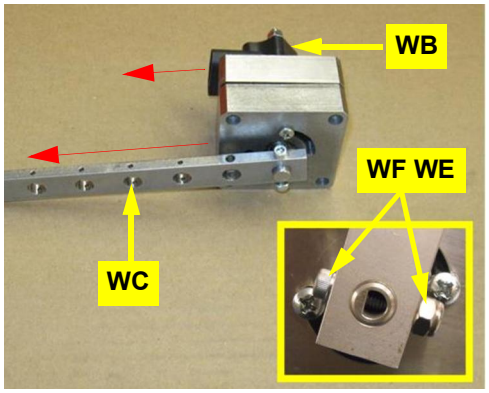


Figure 1c with inset: WAS arm installed

d. Cut threaded rod **WG** to 6½" long (Figure 1d-i) then screw swivel rod ends **WI** onto the cut rod to achieve a center-to-center stud measurement of 7¾" (Figure 1d-ii). Leave **WH** loose until you complete linkage adjustment at step 2f.

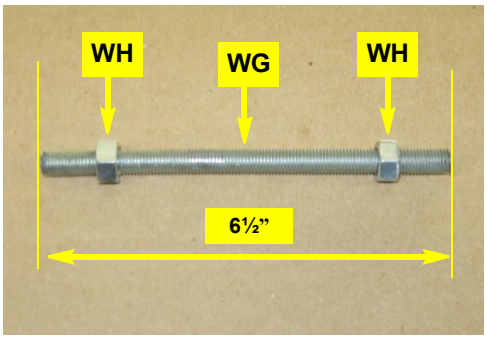


Figure 1d-i: Threaded link rod preparation

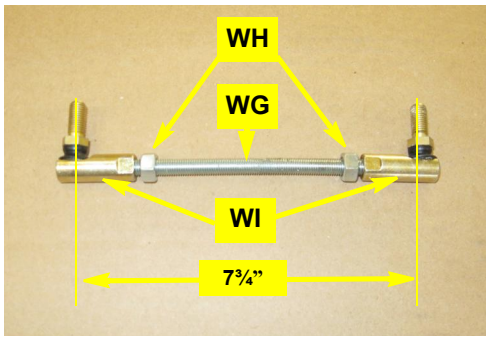


Figure 1d-ii: Assembled threaded link rod

2. Mount the wheel angle sensor.

NOTE: *Figures in this section show a prototype WAS assembly mounting bracket. Install your supplied bracket (WK) as described.*

a. Locate and remove the fuel tank's top mounting bolt on the right side of the rear of the front section of the machine (Figure 2a, top inset). Retain the nut. Using hardware **WM** with the machine's nut, install WAS bracket **WK** (Figure 2a, bottom inset) with its long arm inward and parallel to the ground (Figure 2a).

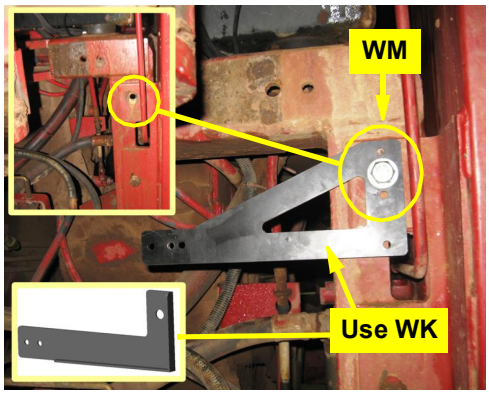


Figure 2a with insets: Installed WAS mounting bracket (prototype bracket shown installed)

b. Locate the two outer (leftmost) holes in the bottom of the articulation coupling (Figure 2b) and, using hardware **WN** (Figure 2b, bottom left inset), install link rod bracket **WL**, its long arm pointing inward (Figure 2b, top right inset).

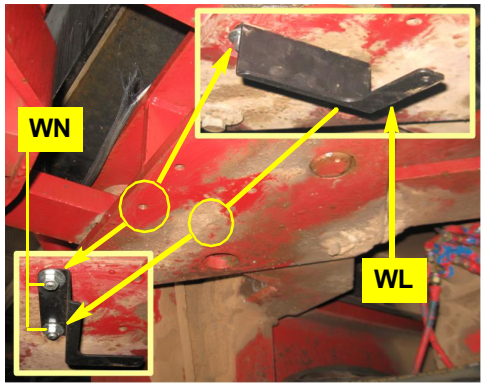


Figure 2b with insets: WAS link rod bracket installed

c. Using hardware **WJ** (not visible), mount the WAS assembly from step 1 on the rear face of bracket **WK.** Mount the WAS assembly with its arm **WC** on top and, like wire connector **WB**, pointing outward (Figure 2c).

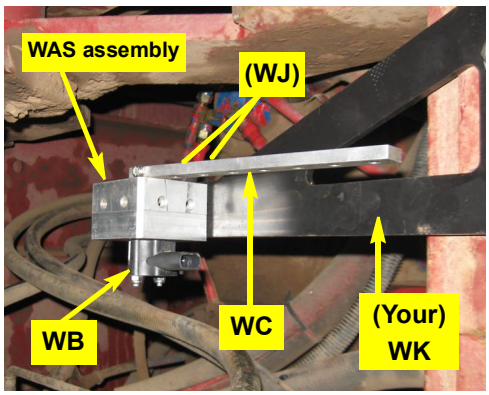


Figure 2c: Installed WAS assembly

d. Using hardware **WH,** install the link rod assembly from step 1 between the last hole in WAS arm **WC** and bracket **WL**. Set the swivel stud downward into **WC** and upward into **WL** (Figure 2d - leave swivel nuts **WH** loose until you complete linkage adjustment at step 2f.).

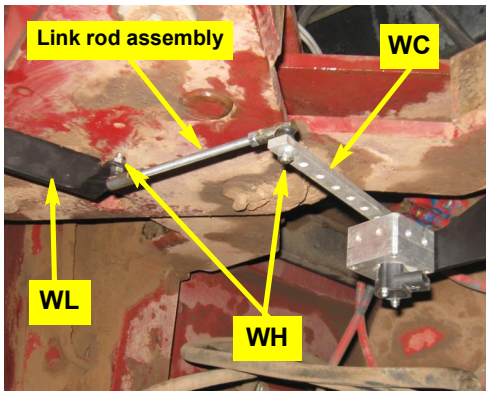


Figure 2d: Installed WAS link rod assembly

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

e. With all hardware **WH** loose, slowly turn the machine 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. Note, you will connect the wheel angle sensor cable later.)

Figure 2e-i: Full left lock

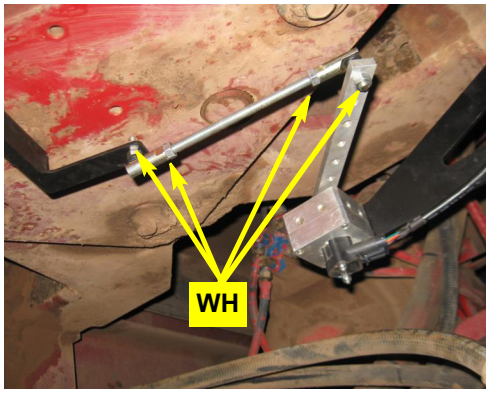


Figure 2e-ii: Full right lock

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

1. Prepare the switch/sensor bracket.

Drill a 7/16” hole in switch bracket **SC** ½” from the opposite end to the pre-drilled switch hole. Put a 90° bend in the bracket 1¼” from the newly-drilled end. Put a 45° (approx) bend in the opposite direction to the first bend, 1” from the pre-drilled end (Figure 1 with inset - not to scale).

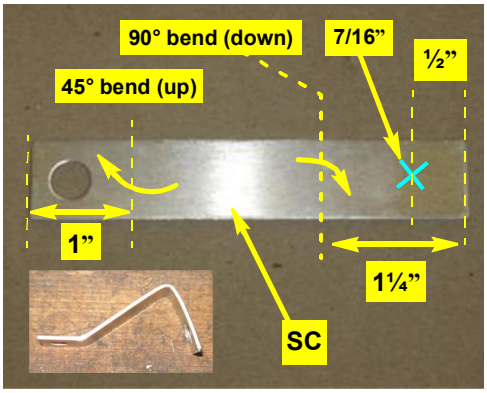


Figure 1 with inset: Drilled/bent switch bracket

2. Access the steering shaft.

Access the steering shaft in the control and cabling compartment inside the firewall by removing the top section of the steering console (release the hook and loop fixing on the left side - Figure 2 with inset).

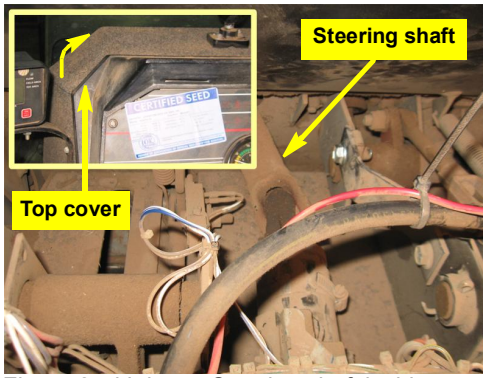


Figure 2 with inset: Steering shaft inside control/cabling compartment

3. Install the switch bracket, magnets and switch.

a. Using the forward bolt of the brace bracket to the right of the steering shaft universal joint, mount prepared switch bracket **SC** (Figure 3a and right inset).

Clean two magnet-sized areas on the steering shaft below the lower universal yoke, 180° apart and in line with the bracket’s switch/sensor hole.

Using the two-part epoxy **SB**, attach magnets **SA** 180° apart on the steering shaft. Set a short edge of each magnet against the shaft yoke (Figure 3a, left inset - you will install the switch/sensor at the next step).

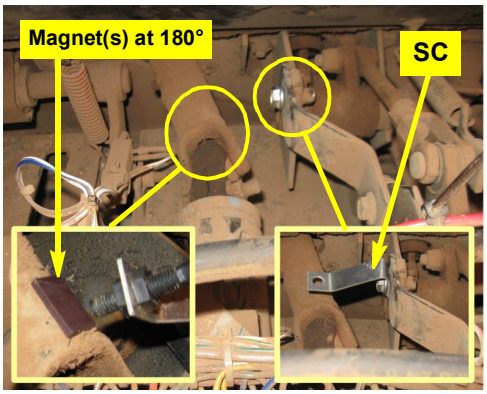


Figure 3a with insets: Installed switch bracket and magnets (install switch/sensor at next step)

b. Install switch/sensor **SD** in bracket **SC** and adjust the bends in **SC** to align **SD** with the magnets. Adjust the sensor face to 1/8” to 1/4” away from the magnets.

c. Route **SD**’s cable down and out through the clutch pedal aperture.

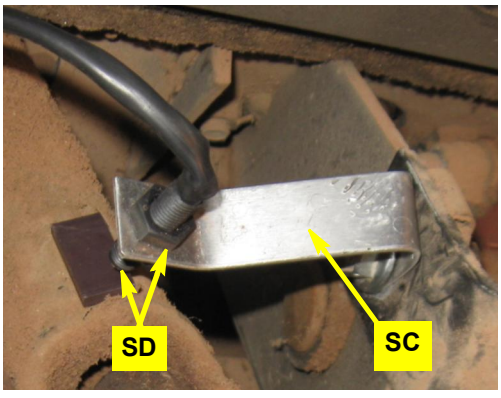


Figure 3b: Installed switch/sensor

Appendix - Hydraulic Circuits