Automated Steering Kit Installation Guide

Kit: EDX-AC8103, P/N 911-2055-000

Fits Ag-Chem TerraGator Models:

6103	**8103**	**9103**
	8104	
	8144	

Note: *The wheel angle sensor (WAS) installation for 3-wheel models is different from that for 4-wheel models. The guide provides separate installation instructions—WAS I for 3-wheel models (pages 12/13), WAS II for 4-wheel models (pages 14/15).*

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 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 starting 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.

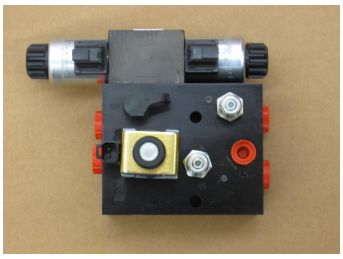
Before attempting to install any of the components, park the machine on a clean level floor with adequate clearance to work all around.

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.

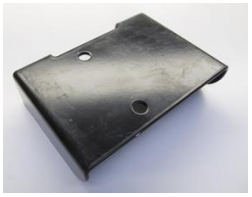
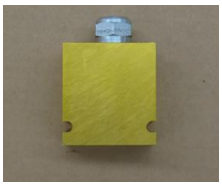
To prevent hydraulic system contamination, it is essential to thoroughly clean hydraulic system fittings and hose connections prior to disconnecting or removing. Use a degreasing solvent spray cleaner such as a brake cleaner to prevent hydraulic system contamination. Note that o-rings used on ORB and 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 and HC				
HB	760-2061	4	Adapter, hyd 90 elbow - #6maleJIC x #8maleORB (HA's P [pressure], T [tank] and A and B [steering] ports)	
HC	760-2058	1	Adapter, hyd 90 elbow - #6maleJIC x #6maleORB (HA's LS [load sense] port)	

Kit Contents - Steering Hydraulics *(continued)*

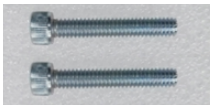
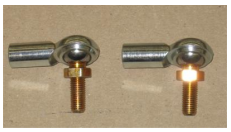
REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HD	640-0043	1	Hydraulic steering block mounting bracket (Mount HA)	
Bag H2 contains HE				
HE	675-2006-000 678-1054 676-1035	2 2 2	Bolt - 3/8NC x 3-3/4" Gr5, ZP Washer, flat - 3/8 ZP Nut, nylock - 3/8NC ZP (Mount HA onto HD)	
Bag H4 contains HI and HJ				
HI	760-2077	4	Adapter, hyd run-tee - #8JIC (Pressure, tank, and steering lines at orbital)	
HJ	760-2076-000	2	Adapter, hyd 45 elbow - #8maleJIC x #8femJIC swivel	
HK	760-0009	1	Assembly, hyd dynamic load sense valve	
Bag H5 contains HL, HM and HN				
HL	760-2036	1	Adapter, hyd - #6maleORB x #4maleJIC (Source port in HK)	
HM	760-2056	1	Adapter, hyd - #6maleORB x #6maleJIC (Function port in HK, HP connects)	
HN	760-2082	1	Adapter, hyd 90 elbow - #4maleORB x #6maleJIC (LS port in HK, HQ connects)	

Kit Contents - Steering Hydraulics *(continued)*

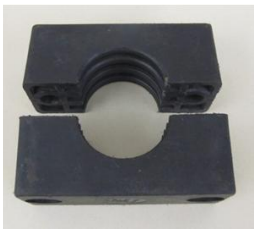
REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HO	760-1190	4	Hose, hyd - 3/8" x 112", #6femJIC x #8femJIC 90 (Pressure, tank and steering hoses)	
HP	760-1350-000	1	Hose, hyd - 1/4" x 16", #6femJIC x #4femJIC (Jumper hose - orbital to HM in HK)	
HQ	760-1277	1	Hose, hyd - 1/4" x 90", #6femJIC both ends (Load sense hose - HN in HK to steering block)	
HR	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 (‘Wire connector’)	
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 WL [3-wheel] and WM [4-wheel])	 

Kit Contents - Wheel Angle Sensor *(continued)*

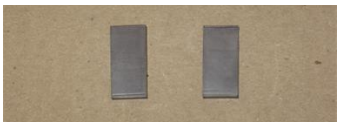
REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
WK	640-0167-000	1	WAS assembly mounting bracket 1 (6103, 8103 and 9013 [3-wheel] models - mount on WQ using WS; mounts WL using WS)	
WL	640-0168-000	1	WAS assembly mounting bracket 2 (6103, 8103 and 9013 [3-wheel] models - mount on WK using WS; mounts WA using WJ)	
WM	640-0165-000	1	WAS assembly mounting bracket (8104 and 8144 [4-wheel] models - mount WA using WJ)	
WN	640-0166-000	1	WAS link rod bracket (8104 and 8144 [4-wheel] models - mount on WO using WP)	
Bag W3 contains WO, WP, WQ, WR and WS				
WO	675-0178-000	1	Clamp, 2" polypropylene (8104 and 8144 [4-wheel] models - mount WN using WP)	
WP	675-2006 678-1054 676-1035	2 2 2	Bolt - 3/8NC x 3-3/4" Gr5, ZP Washer, narrow flat - 3/8, ZP Nut, nylock - 3/8NC, ZP (8104 and 8144 [4-wheel] models - mount WN on WO)	
WQ	675-0175-000	1	Clamp, 2.06"-2.37" TBOLT, SS (6103, 8103 and 9013 [3-wheel] models - mount on steering cylinder; mounts WK/WL)	

Kit Contents - Wheel Angle Sensor *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
Bag W3 contains WO, WP, WQ, WR and WS *(continued)*				
WR	675-0132-000	1	Clamp, 1.62"-1.87" TBOLT, SS (6103, 8103 and 9013 [3-wheel] models - mount on tie rod end; link rod connects)	
WS	675-2019 678-1053 676-1040	4 4 4	Bolt - 1/4NC x 1/2" Gr5, ZP Washer, flat - 1/4, ZP Nut - 1/4NC, Gr5, ZP (6103, 8103 and 9013 [3-wheel] models - attach WK to WQ and WL to 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 (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 (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.

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 (Figure 1):

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

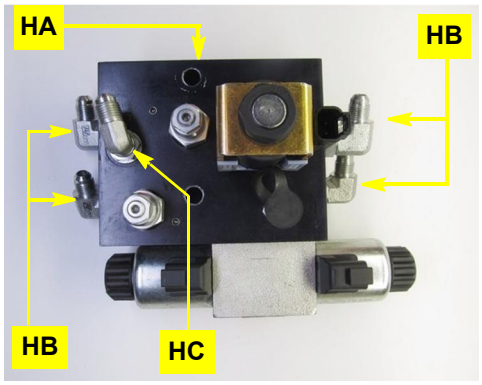


Figure 1: Prepared hydraulic block

2. Install the steering block mounting bracket.

On the left side of the machine, to the rear of the front fender, locate the two bolts attaching the fuel tank support to the frame rail (Figure 2). Using these two bolts, mount bracket **HD** open side down (Figure 2 inset).

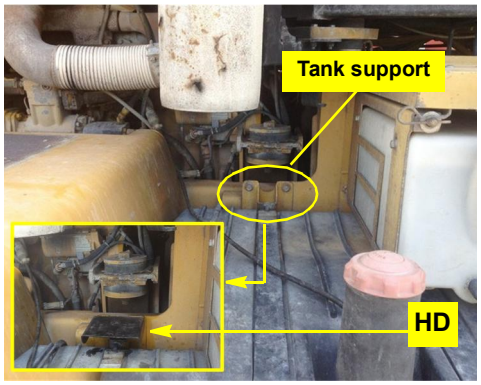


Figure 2 with inset: Installed steering block mounting bracket

3. Install the hydraulic steering block.

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

- Mount **HA** on **HD** with its left and right solenoids outward (so with its A and B steering ports toward the front)

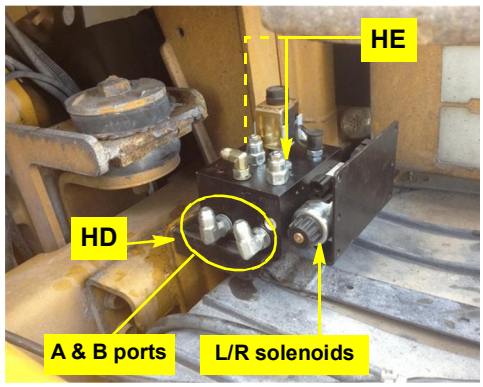


Figure 3: Installed steering block

4. Install tank and pressure run-tees and hoses at the orbital.

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

Locate the tank (upper) and pressure (lower) ports/connections on the right side (of the machine) at the orbital.

Disconnect the machine's tank hose, install run-tee **HI** (stem outward) and reconnect the machine's hose to the open 'T' end of **HI**. Connect the elbow end of hose **HO** to the stem of **HI** (Figure 4-i).

Repeat the tank line procedure for the pressure line (Figure 4-ii).

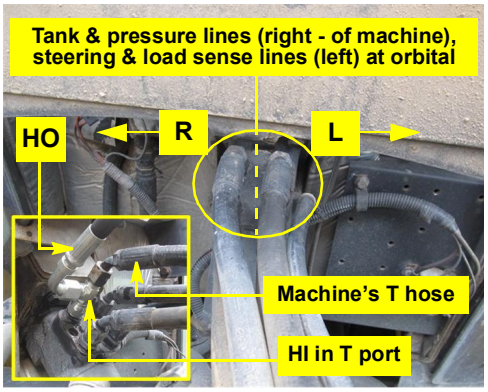


Figure 4-i: Run-tee and connections at T port, machine's tank hose reconnected

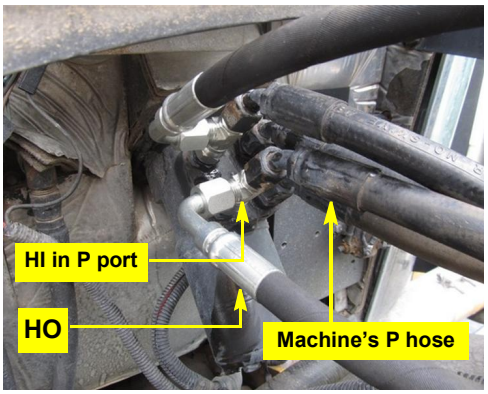


Figure 4-ii: Run-tee and connections at P port, machine's pressure hose reconnected

5. Install steering run-tees and hoses at the orbital.

Locate the steering ports/connections on the left side (of the machine) at the orbital.

Disconnect the machine's steering hoses, install run-tees **HI** (upper, stem outward; lower, stem downward) and reconnect the machine's steering hoses to each open 'T' end of **HI**. Connect the elbow end of hoses **HO** to each stem of **HI** (Figure 5).

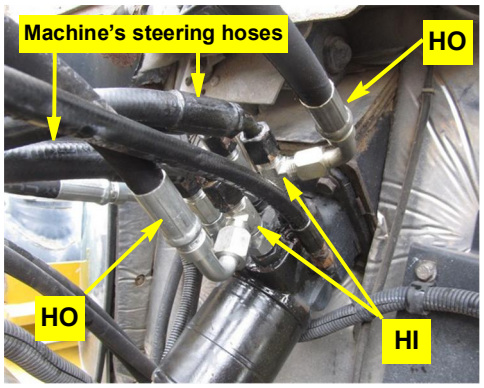


Figure 5: Run-tees and connections at steering ports, machine's steering hoses reconnected

6. Prepare the load sense valve.

Assemble load sense valve **HK** as follows (Figure 6):

- Adapter fitting **HM** in the function port (jumper hose **HP** connects)
- Adapter fitting **HN** in the **LS** port (**HQ** to hydraulic block connects)
- Adapter fitting **HL** in the source port (machine's load sense hose connects)

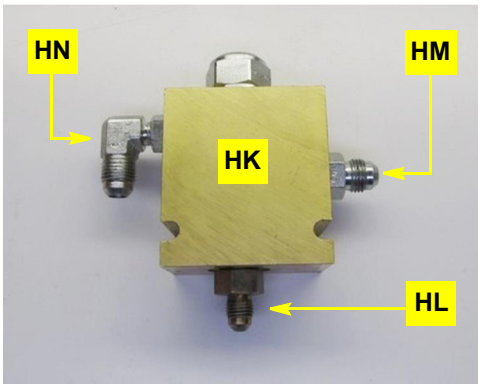


Figure 6: Prepared load sense valve

7. Install the load sense valve and jumper hose, connect load sense hose.

a. Disconnect the machine's load sense hose from the left side of the orbital (Figure 7a and top inset). Connect load sense jumper hose **HP** (Figure 7a bottom inset).

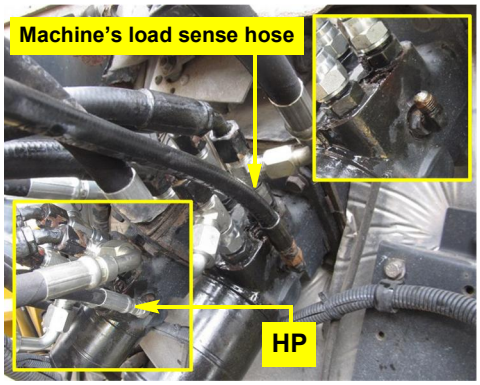


Figure 7a with insets: Load sense jumper hose connected at orbital

b. Install the load sense valve **HK** connecting (Figure 7b):

- The machine's load sense line to **HL**
- The jumper hose **HP** to **HM**
- Load sense hose **HQ** to **HN**

Secure **HK** with a heavy tie strap **HR** (not shown).

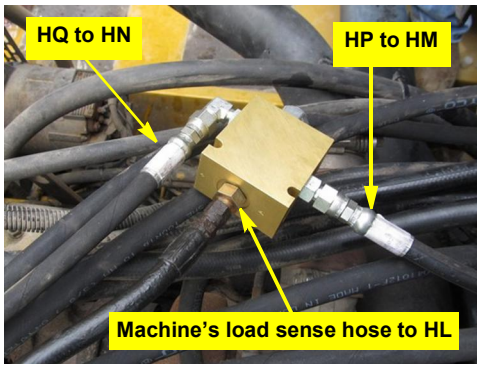


Figure 7b: Load sense valve installation and connections. Secure valve with tie strap (not shown)

c. Route all the hoses forward over the engine, down in front of the air cooling pipe and back to the hydraulic steering block (Figure 7c).

NOTE: *Securely tighten all hose fittings and connections when hose installation is complete.*

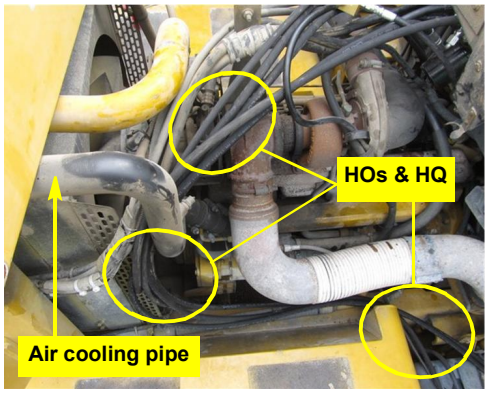


Figure 7c: Hoses routed to steering block (not visible)

8. Connect the steering, load sense, tank and pressure hoses to the hydraulic steering block.

At the hydraulic steering block (Figure 8) connect:

- Tank, pressure and steering hoses **HO** to adapters **HB**
- Load sense hose **HQ** to adapter **HC**

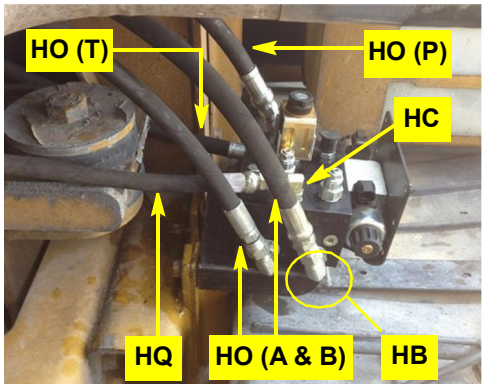


Figure 8: Steering, load sense, pressure and tank hoses connected at steering block

9. 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.

Installation - Wheel Angle Sensor I (3-Wheel 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 hardware **WE** (nuts) and **WD** (screws - not visible), attach the WAS wire connector **WB** to the WAS housing **WA**. Install the bolts up through the bottom of the housing. Align the left edge of **WB** with the center of a corner of **WA** (Figure 1a).

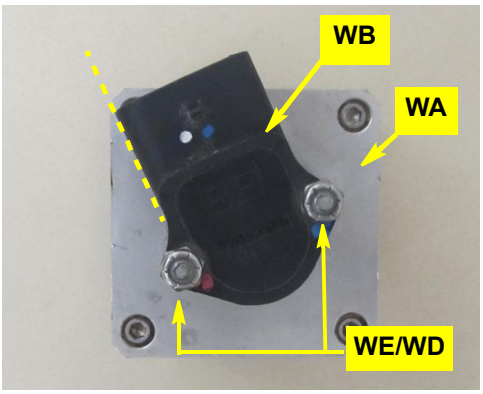


Figure 1a: Prepared WAS housing\connector

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

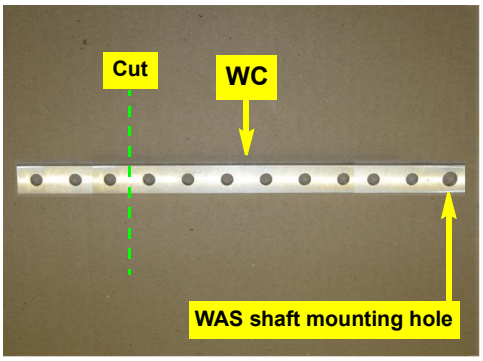


Figure 1b: WAS arm preparation

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).

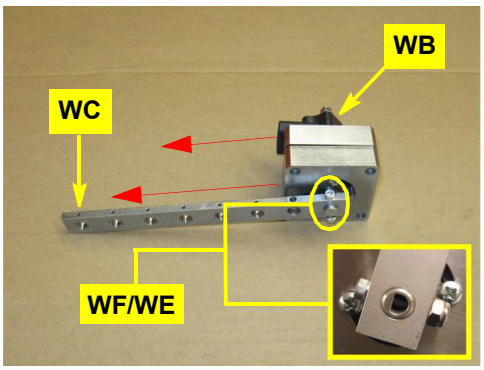


Figure 1c with inset: WAS arm installed

d. Screw swivel rod ends **WI** onto threaded rod **WG** to achieve a center-to-center stud measurement of 13-3/8″ (Figure 1d - not to scale). Leave **WH** loose until you complete linkage adjustment at step 2f.

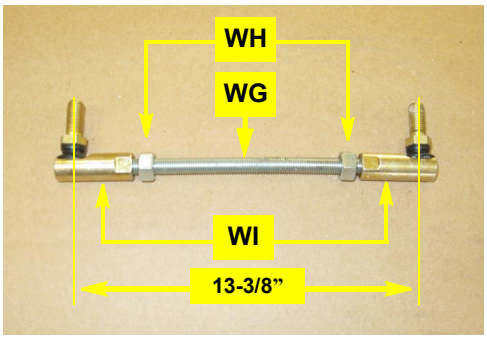


Figure 1d: Assembled threaded link rod

2. Mount the wheel angle sensor.

NOTE: *Figures in this section show prototype brackets. They differ slightly from the brackets in your kit but are installed the same way.*

a. Mount clamp **WQ** on the right steering cylinder at the piston rod end. Mount the clamp (Figure 2a and insets):

- With its two mounting flanges inward and vertical
- Inside the steering cylinder hose fitting
- With its forward edge 1-1/2″ from the rear face of the cylinder cap

Using hardware **WS**, mount the open side of bracket **WK** on clamp **WQ** (Figure 2a bottom inset).

b. Using hardware **WS** mount bracket **WL**—like a forward pointing 'L'—on **WK** (Figure 2b).

Using hardware **WJ**, mount the WAS assembly—arm downward and rearward—on bracket **WL** (Figure 2b).

c. Mount clamp **WR** on the left side steering tie rod end. Mount the clamp (Figure 2c with inset):

- With its two mounting flanges inward and at approximately 30° to the ground
- With its forward edge 1-7/8″ from the rear face of the tie rod end locknut

d. Using hardware **WH**, install the link rod assembly from step 1—swivel studs downward—between the last hole in WAS arm **WC** and the lower flange of clamp **WR**. Leave **WH** loose (Figure 2d-i).

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

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

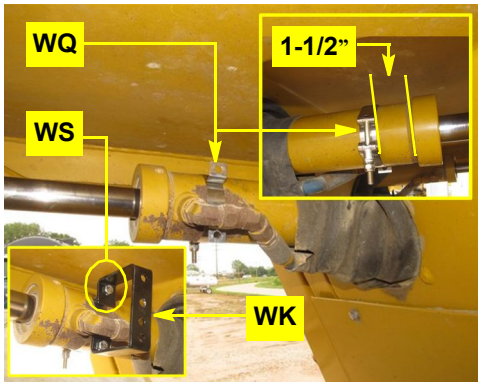


Figure 2a: WAS mounting clamp and (first) bracket installed

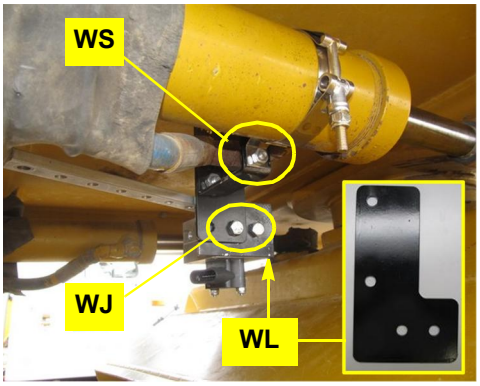


Figure 2b: WAS bracket (second) and WAS assembly installed

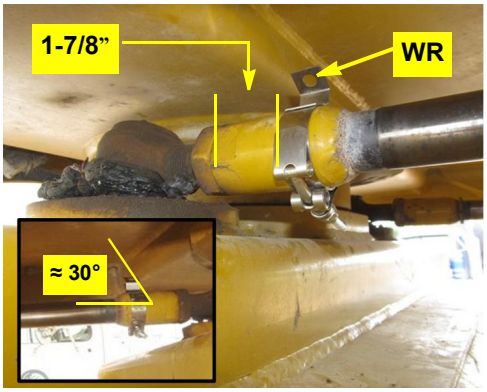


Figure 2c: WAS link rod mounting bracket (clamp) installed

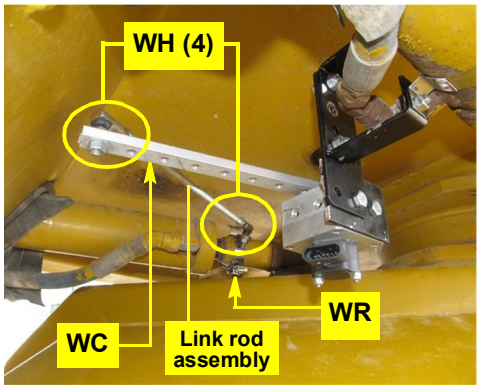


Figure 2d-i: Full left lock


Figure 2d-ii: Full right lock

Installation - Wheel Angle Sensor II (4-Wheel 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 hardware **WE** (nuts) and **WD** (screws - not visible), attach the WAS wire connector **WB** to the WAS housing **WA**. Install the bolts up through the bottom of the housing. Align the right edge of **WB** with the center of a corner of **WA** (Figure 1a).

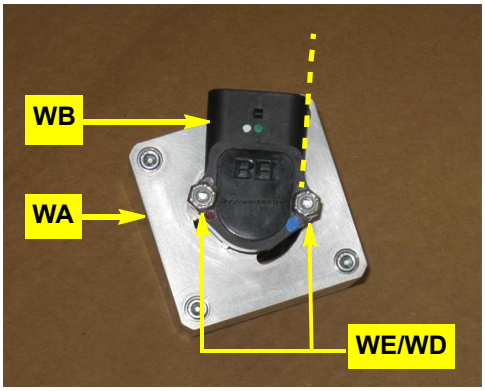


Figure 1a: Prepared WAS housing\connector

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

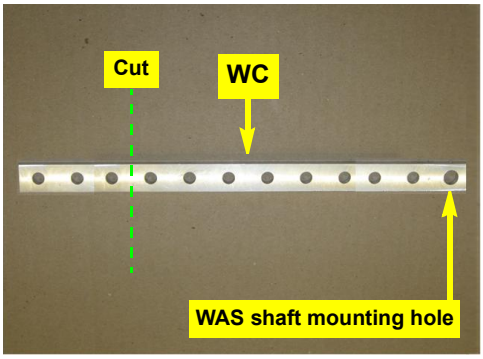


Figure 1b: WAS arm preparation

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.*

d. Cut threaded rod **WG** to 5-1/4″ long (Figure 1d-i - not to scale) then screw swivel rod ends **WI** onto the cut rod to achieve a center-to-center stud measurement of 6-1/2″ (Figure 1d-ii - not to scale). Leave **WH** loose until you complete linkage adjustment at step 2f.

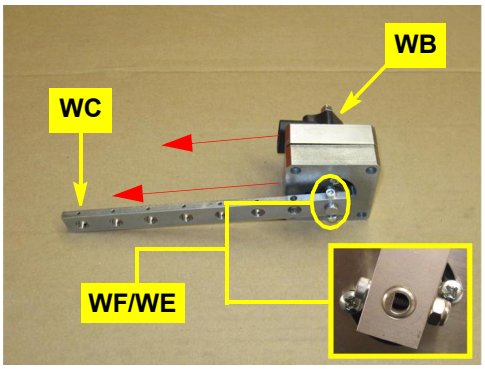


Figure 1c with inset: WAS arm installed

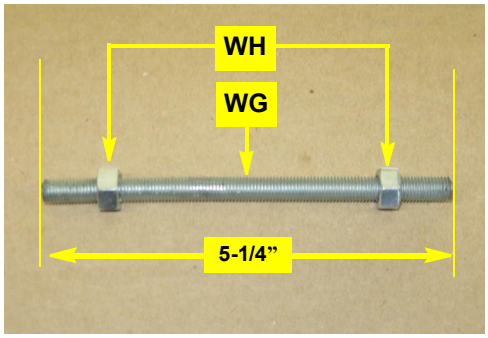


Figure 1d-i: Threaded link rod preparation

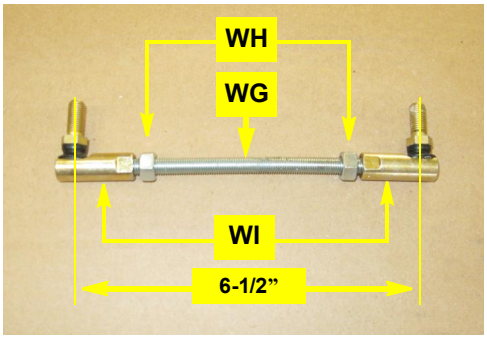


Figure 1d-ii: Assembled threaded link rod

2. Mount the wheel angle sensor.

NOTE: *Figures in this section show prototype brackets. They differ slightly from the brackets in your kit but are installed the same way.*

a. Mount WAS assembly bracket **WM** behind the right side shock absorber lower nut. Set the bracket with its two WAS assembly mounting holes downward and rearward (Figure 2a).

Using hardware **WJ**, mount the WAS assembly—arm downward and inward—on bracket **WM** (Figure 2a).

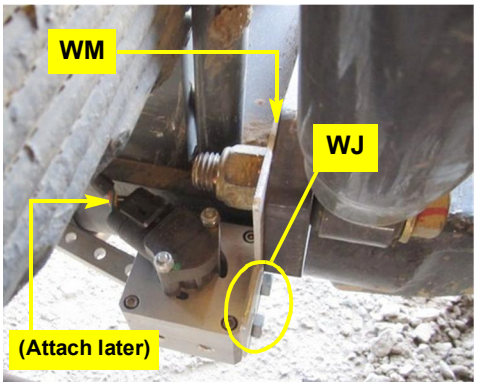


Figure 2a: WAS mounting bracket installed

NOTE: *Figure 2a shows the WAS cable already connected. You will connect your cable later.*

b. Using hardware **WP** mount the rod link bracket/clamp assembly **WN/WO** as follows (Figure 2b):

- Link bracket **WN** on top, link stud hole rearward
- Clamp **WO** parallel to the ground with its outer face 3″ from the center of the tie rod end clamp

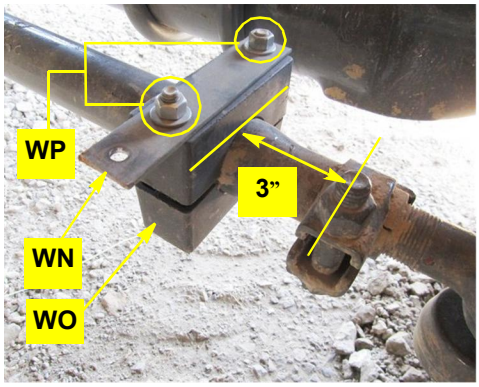


Figure 2b: WAS link rod mounting bracket installed

c. Using hardware **WH**, install the link rod assembly from step 1 between the last hole in WAS arm **WC** and bracket **WN**. Set the swivel studs upward into **WC** and **WN** (Figure 2c). Leave **WH** loose.

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

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

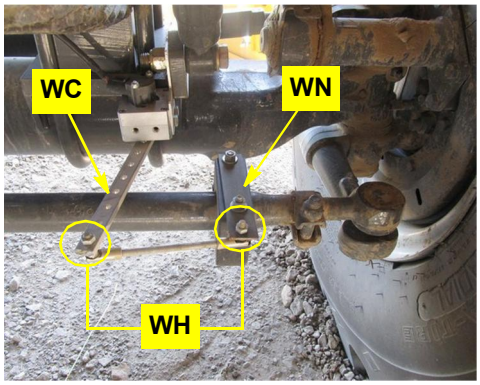


Figure 2c: WAS assembly installed

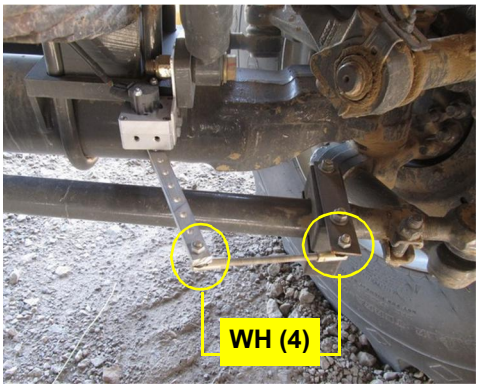


Figure 2d-i: Full left lock


Figure 2d-ii: Full right lock

Installation - Steering Wheel Switch (SWS)

1. Prepare the switch bracket.

Prepare the steering wheel switch bracket **SC** as follows (Figure 1 - not to scale):

- Cut an offset 1/2″ deep slot in the opposite end from the pre-drilled hole
- Cut the slot 3/16″ from one edge of the bracket, 1/8″ from the other edge (Figure 1 inset)
- Put a 90°, downward bend in the bracket 1-1/4″ from the slotted end
- Put a slight clockwise twist (approx 22°) toward the thicker (3/16″) side of the slot

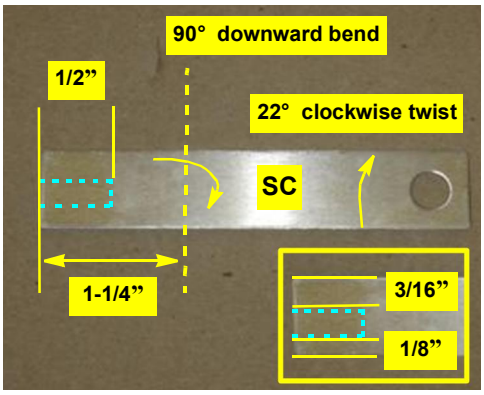


Figure 1 with inset: Prepared steering wheel switch bracket (not to scale)

2. Install the switch bracket, switch and magnets.

NOTE: *Figures 2a to 2c show an Allen bolt holding the sensor bracket SC. Your machine may have a hex head bolt in this location (Figure 2a left inset).*

a. Locate and loosen the bolt to the right of the tilt gas strut on the metal steering column frame (Figure 2a). Slide the prepared steering wheel switch bracket **SC** under the bolt's washer and tighten the bolt (Figure 2a insets). Adjust the bend and twist so that the switch hole aligns with the steering shaft.

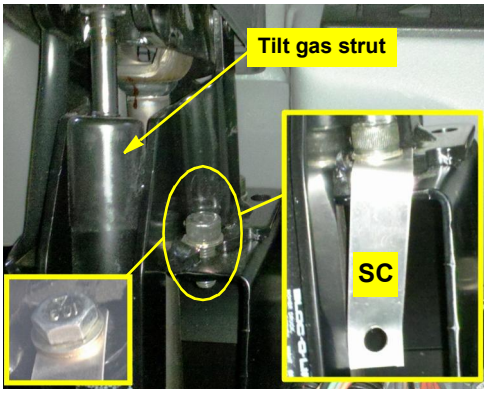


Figure 2a with inset: Installed switch bracket

b. Install switch **SD** in bracket **SC** (Figure 2b)

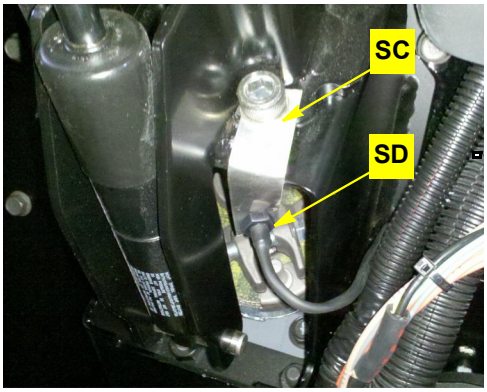


Figure 2b: Installed switch

c. Using the two-part epoxy **SB** attach the magnets **SA** 180° apart on the steering shaft. Align the center of the magnets with the tip of the switch sensor (Figure 2c).

d. Adjust the switch so that the sensor face is 1/8″ to 1/4″ from the magnets.

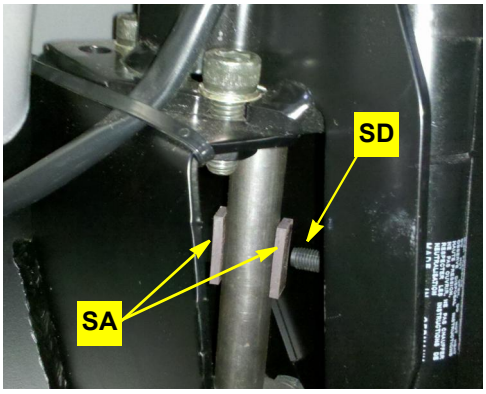


Figure 2c: Installed magnets

Appendix - Hydraulic Circuits