# Automated Steering Kit Installation Guide

***Kit: EDX-NH9082-A, P/N 911-2012-000***

## Fits Buhler Versatile and New Holland Tractor Models:

| | | | |
|---|---|---|---|
| **2270** | **9280** | **9282** | **9184** |
| **2290** | **9480** | **9482** | **9384** |
| **2310** | **9680** | **9682** | **9484** |
| **2335** | **9880** | **9882** | **9684** |
| **2360** | | | **9884** |
| **2375** | | | |
| **2425** | | | |


### Read and Follow Safety Messages

- In these instructions, you will see the heading WARNING and the safety alert symbol ⚠. They indicate a hazardous situation that, if not avoided, could result in death or serious injury. The safety messages provide information to identify a hazard associated with potential injury.
- Before installing, operating, or performing maintenance or service on any part of the system:
  - Read and understand this installation guide and all of the safety information.
  - Read and understand the Automated Steering System User Guide.
- Do not allow anyone to operate without instruction.
- Keep these instructions and all related safety information with the manuals for your machine and other implements.

If you have questions or need assistance, contact your local dealer or distributor.

### Overview

A series of equipment specific kits has been developed to work in conjunction with your automated steering system. For the machine models listed above, these kits contain the components for:

- the steering hydraulics
- the wheel angle sensor (WAS)
- the steering wheel switch (SWS - for steering override)

The items in each kit are detailed in the tables that follow the safety warnings below. After the kit tables there are four step-by-step installation sections, one for each of the kits.

Please read this manual thoroughly before beginning the installation.

**⚠WARNING:**

To avoid serious injury or death during machine operation, install the appropriate kits for your machine make and model.

## Machine Preparation

**⚠WARNING:**

Inspect the machine and perform any needed maintenance (for example, contaminated hydraulic fluid) before installing the automated steering kit. This kit cannot perform as intended on a machine that is not maintained properly. Errors in performance increase the risk of operator and bystander injury or death.

Failure to maintain clean hydraulic fluid and operational hydraulic components can cause loss of directional control resulting in serious injury or death.

To avoid serious injury, wear hand and eye protection and use wood or cardboard when checking for leaks.

Turn off the machine and power off the automated steering controller when installing or performing maintenance.

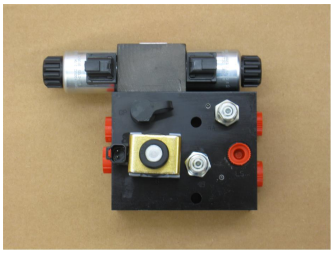
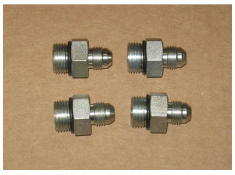
Before attempting to install any of the components, park the machine on a clean level floor with adequate clearance to work all around.

Before you perform any drilling, cutting or fastening, ensure that no other machine components, such as hydraulic hoses or electrical wiring, will be damaged. Failure to follow this warning may cause physical injury and/or damage to the machine.

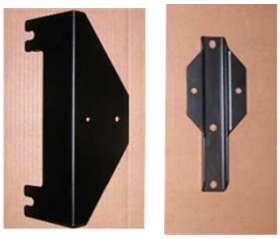
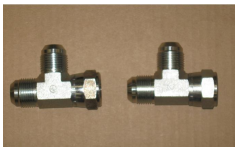
To prevent hydraulic system contamination, it is essential to thoroughly clean hydraulic system fittings and hose connections prior to disconnecting or removing. Use a spray cleaner such as 'Brake Clean' to prevent hydraulic system contamination. Note that o-rings used on ORB and ORFF type fittings, 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

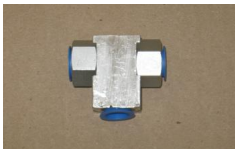
Unpack the hydraulics installation kit and identify the required parts as shown. Kit items are A, B, C etc. with an H (Hydraulic) prefix.

| REF | PART NUMBER | QTY | DESCRIPTION | PHOTOGRAPH |
|---|---|---|---|---|
| HA | 760-0021-000 | 1 | Assy, hyd valve block - 35L/Proportional<br><br>(Hydraulic steering block) |  |
| **Bag H1 contains HB and HC** | | | | |
| HB | 760-2058 | 1 | Adapter, hyd 90 elbow - #6maleJIC x #6maleORB<br><br>(LS port on hydraulic steering block) |  |
| HC | 760-2060 | 4 | Adapter, hyd - #6maleJIC x #8maleORB<br><br>(P, T, A and B ports on hydraulic steering block) |  |

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

| REF | PART NUMBER | QTY | DESCRIPTION | PHOTOGRAPH |
|---|---|---|---|---|
| HD | 640-0024 | 1 | Hyd block mnt, Versatile (left photo) |  |
| HE | 640-0049 | 1 | Hyd block mnt, NH9082-A (right photo) | |
| **Bag H2 contains HF and HG** | | | | |
| HF | 675-2006 | 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 | |
| HG | 675-2003 | 2 | Bolt - 3/8NC x 1" Gr5 ZP |  |
| | 678-1054 | 4 | Washer, narrow flat - 3/4"OD x 13/32"ID x 1/16" thk ZP | |
| | 676-1035 | 2 | Nut, nylock - 3/8NC ZP | |
| **Bag H4 contains HK, HL, HM, and HN** | | | | |
| HK | 760-2027 | 2 | Adapter, hyd run tee - #16JIC |  |
| HL | 760-2026 | 2 | Adapter, hyd - #16femJIC x #8maleJIC |  |
| HM | 760-2006 | 2 | Adapter, hyd run tee - #10JIC |  |
| HN | 760-2007 | 2 | Adapter, hyd 90 elbow - #10maleJIC x #10femJICswiv |  |
| **Bag H5 contains HO, HP, HQ, HR and HS** | | | | |

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

| REF | PART NUMBER | QTY | DESCRIPTION | PHOTOGRAPH |
|---|---|---|---|---|
| HO | 760-0002 | 1 | Hyd load shuttle - #6femORB |  |
| HP | 760-2058 | 1 | Adapter, hyd 90 elbow - #6maleJIC x #6maleORB |  |
| HQ | 760-2036 | 1 | Adapter, hyd - #4maleJIC x #6maleORB |  |
| HR | 760-2042 | 1 | Adapter, hyd 90 elbow - #6maleORB x #6femJICswiv |  |
| HS | 760-2029 | 1 | Adapter, hyd - #4femJIC x #6maleJIC |  |

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

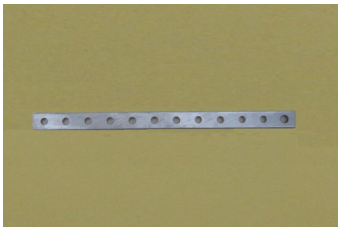
| REF | PART NUMBER | QTY | DESCRIPTION | PHOTOGRAPH |
|---|---|---|---|---|
| HT | 760-1074 | 1 | Hose, hyd - 3/8" x 72", #6femJICswiv x #10femJICswiv |  |
| HU | 760-1075 | 1 | Hose, hyd - 3/8" x 60", #6femJICswiv x #10femJICswiv | |
| HV | 760-1076 | 2 | Hose, hyd - 3/8" x 48", #6femJICswiv x #8femJICswiv |  |

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

| | | | | |
|---|---|---|---|---|
| HW | 760-1077 | 1 | Hose, hyd - 1/4" x 36", #6femJICswivel both ends |  |
| HX | 677-2001 | 20 | Tie strap, 11" heavy duty |  |

## Kit Contents - Wheel Angle Sensor

Unpack the wheel angle sensor kit and identify the required parts as shown. Kit items are A, B, C etc. with a W (Wheel) prefix.

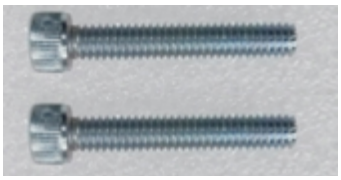
| REF | PART NUMBER | QTY | DESCRIPTION | PHOTOGRAPH |
|---|---|---|---|---|
| **Bag 710-0099-000 contains WA to WJ** | | | | |
| WA | 720-0045-000# | 1 | WAS assembly |  |
| WB | 750-5002-000 | 1 | Sensor, dual output, BEI |  |
| WC | 602-1087-000 | 1 | Connector arm, steering, long |  |

## 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** | | | | |
| WD | 675-1191-000 | 2 | Screw, mach, 8-32 x 3" PPH ZP |  |
| WE | 676-1054-000 | 4 | Nut, nylock - 8/32NC ZP |  |

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

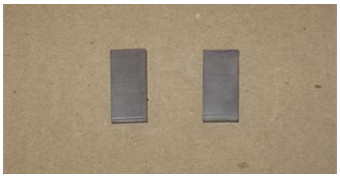
| REF | PART NUMBER | QTY | DESCRIPTION | PHOTOGRAPH |
|---|---|---|---|---|
| WF | 675-1150-000 | 2 | Screw, 8-32 x 1", Allen socket cap, ZP |  |
| WG | 675-2031-000 | 1 | Threaded rod, 5/16-24 x 12" |  |
| WH | 676-1053-000 | 4 | Nut, 5/16-24 standard ZP |  |
| WI | 760-0018-000 | 2 | Rod end swivel with stud, 5/16-24 |  |

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

| | | | | |
|---|---|---|---|---|
| WJ | 675-2010 | 2 | Bolt - 5/16NC x 3/4" Gr5 ZP |  |
| | 678-1077-000 | 2 | Washer, lock 5/16, ZP<br>(bolts WAS assy to mounting bracket WL) |  |
| **Bag W2 contains WK** | | | | |
| WK | 675-2039-000 | 2 | Bolt - M12-1.75 x 20mm, Gr8.8 ZP |  |
| WL | 640-0075-000 | 1 | Bracket, WAS assembly mount |  |
| WM | 640-0076-000 | 1 | Bracket, WAS rod mount |  |

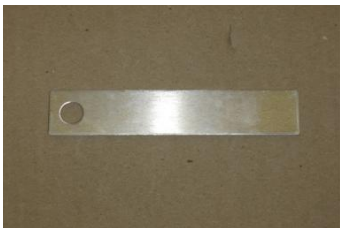
## Kit Contents - Steering Wheel Switch

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 |  |

## 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 |
|---|---|---|---|---|
| SC | 602-1062 | 1 | Bracket, steering wheel switch mounting |  |
| SD | 726-1054<br>or<br>051-0443-10 | 1 | Assy, steering wheel switch |  |
| SE | 677-2002 | 4 | Tie strap, 7" releasable |  |
| SF | 675-1138-000 | 1 | Screw, 8-18 x 3/4" Hex |  |

# 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.*

Remove the plastic plugs and install elbow adapter **HB** in the **LS** port and elbow adapters **HC** in the **P, T, A** and **B** ports (Figure 1).

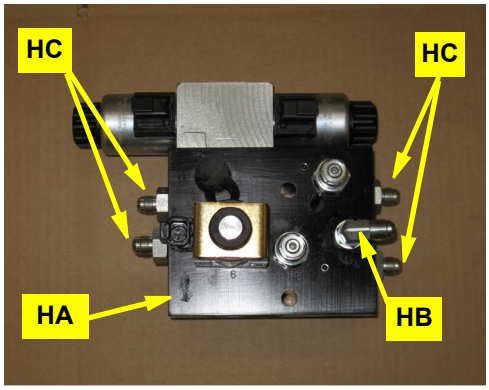



Figure 1: Prepared hydraulic block

**2. Install pressure, tank, and load sense fittings.**

a. Assemble the load sense shuttle **HO** with the provided fittings **HP, HQ, HR** and **HS** (Figure 2a).

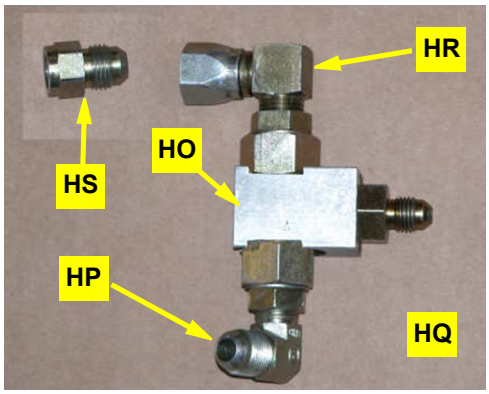



Figure 2a: Assembled load sense shuttle valve

b. If fitted, remove the hose shield at the back of the tractor to access the pressure, tank, and load sense ports on the tractor hydraulics (Figure 2b).

c. Locate the pressure, tank and load sense ports on the right end of the hydraulic valve stack at the rear of the tractor and disconnect them (Figure 2c).


Figure 2b: Hose shield (if fitted)

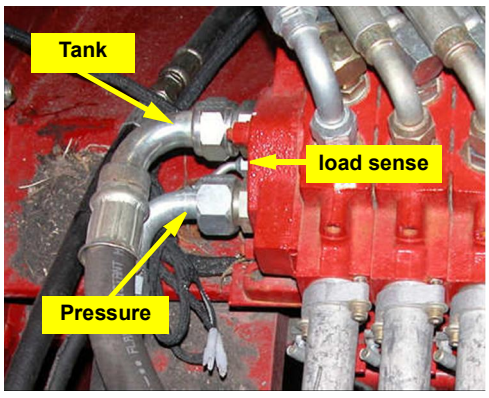



Figure 2c: Pressure, tank and load sense hoses at valve stack

2. **Install pressure, tank, and load sense fittings *(continued).***

d. Install adapter **HS** on the load sense port of the valve stack and connect the adapter **HR** (and the load sense shuttle) to **HS** (Figure 2d).

Connect the existing load sense hose to adapter **HQ** on the load sense shuttle (Figure 2d).

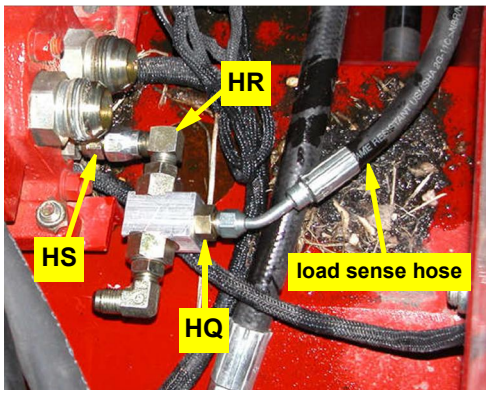



Figure 2d: Assembled load sense shuttle installed at valve stack

e. Connect run tees **HK** to the tank and pressure ports of the hydraulic valve stack and connect the existing pressure and tank hoses to the ends of the run tees (Figure 2e). Install the reducer fittings **HL** onto the branches of the pressure and tank run tees (Figure 2e).

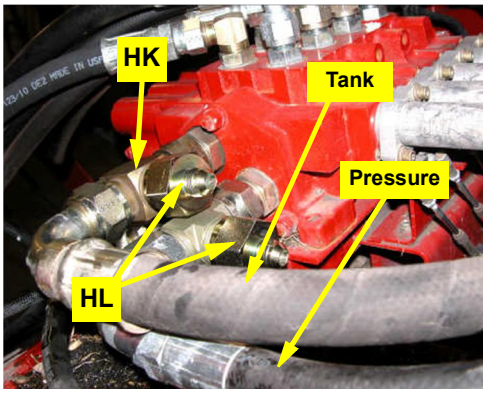



Figure 2e: Existing pressure and tank hoses connected to valve stack run tees

**3. Install pressure, tank, and load sense hoses.**

a. Connect the provided pressure and tank hoses **HV** to the adapters **HL** on the run tees **HK** (Figure 3a)

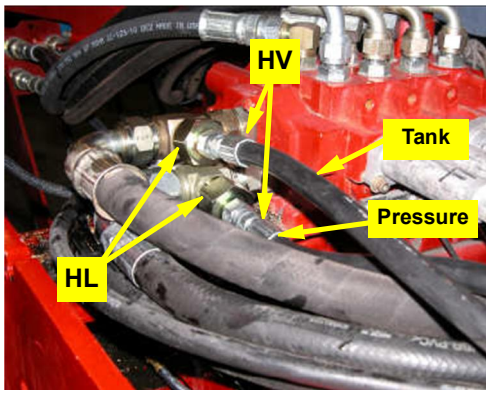



Figure 3a: Provided pressure and tank hoses connected to valve stack run tee adapters

b. Install the provided load sense hose **HW** to the open adapter **HP** at the load sense shuttle (Figure 3b).

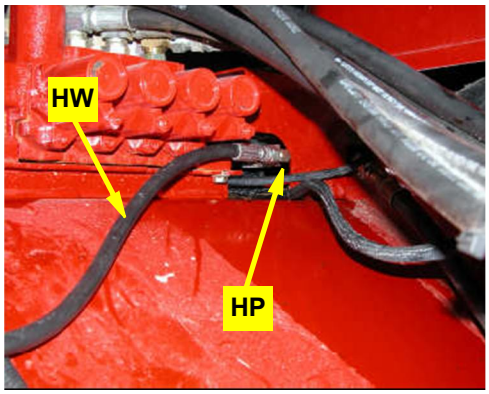



Figure 3b: Provided load sense hose connected to load sense shuttle

NOTE: *If your tractor is equipped with the optional rear weight kit (Figure 4) go to step 4-2. If your tractor is not fitted with the weight kit, continue at step 4-1)*


Figure 4: Rear weight kit

**4-1. Install hydraulic steering block (without rear weight kit).**

a. Attach the hydraulic steering block mounting bracket **HD** (inset Figure 4-1a) to the two mount bolts on the left side of the articulation point (Figure 4-1a).

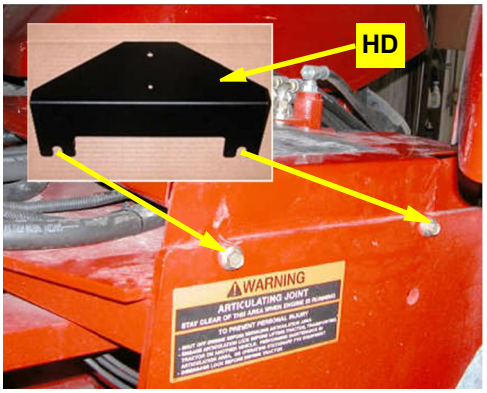



Figure 4-1a: Steering block mounting location

b. Place the slotted side of steering controller bracket **HH** on top of the hydraulic steering block mounting bracket **HD** with the short side facing up and towards the center of the tractor. Using hardware **HF**, attach the hydraulic steering block **HA** to the steering block bracket **HD** (Figure 4-1b).

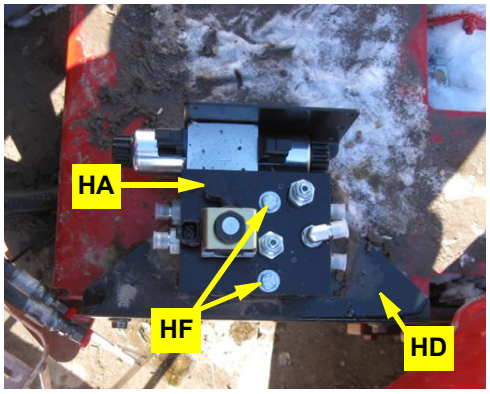



Figure 4-1b: Installed steering block

c. Connect the pressure and tank hoses **HV,** connected to the valve stack in step 3a, and the load sense hose **HW**, connected to the load sense shuttle at step 3b, to the **P, T** and **LS** ports of the hydraulic steering block (Figure 4-1c).

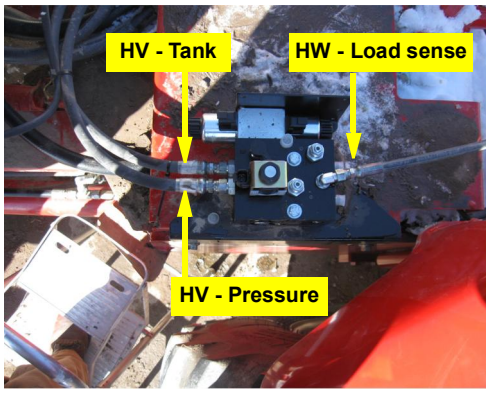



Figure 4-1c: P, T and LS hoses connected to steering block

**4-2. Install hydraulic steering block (with rear weight kit).**

a. Locate the slot (circled Figure 4-2a) in the tractor's hydraulic valve stack forward bracket on the left side of the valve stack.

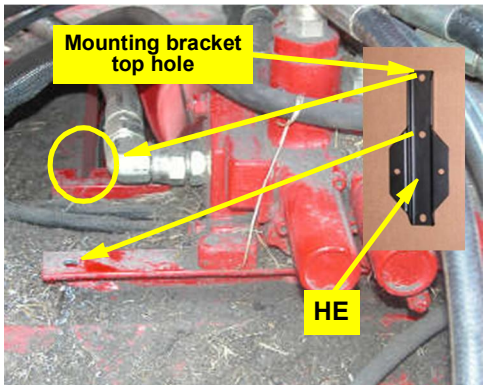


Figure 4-2a: Steering block mounting location

b. Align the top hole in the steering block mounting bracket **HE** (inset Figure 4-2a) with the slot in the valve stack bracket and use the second hole in the mounting bracket **HE** as a template to mark then drill a 7/16″ hole in the rear valve stack bracket. The center-to-center distance between mounting holes must be 5 1/4″ (Figure 4-2b).

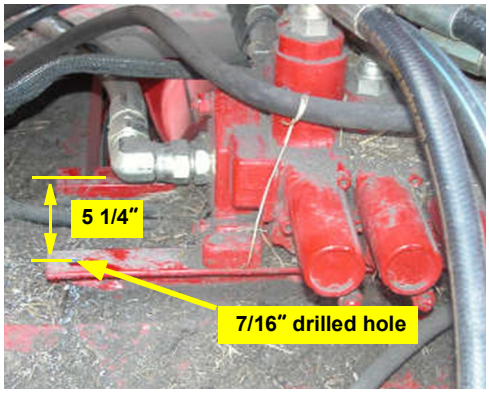


Figure 4-2b: Hole drilled in rear valve stack bracket

c. Using hardware **HG**, install the hydraulic steering block mounting bracket **HE**—with the block mounting flanges facing up—to the forward and rear valve stack brackets.

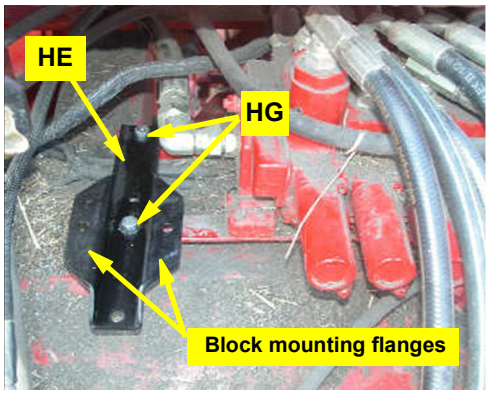


Figure 4-2c: Installed steering block mounting bracket

d. Using hardware **HF**, attach the assembled steering block **HA** to **HE.** Face the **P** and **T** ports rearwards. (Figure 4-2d).

e. Attach pressure and tank hoses **HV** and load sense hose **HW** to the **P**, **T** and **LS** ports of **HA** (Figure 4-2d).

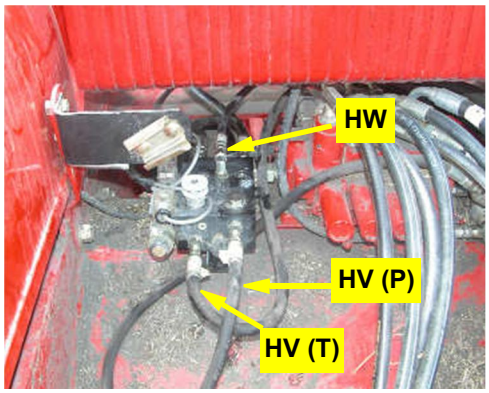


Figure 4-2d: Installed steering block (and steering controller) and P, T and LS hoses

**5. Install the steering output fittings.**

Locate the steering line connectors on the left steering cylinder in the center of the tractor. Install the provided run tees **HM** at the connectors (Figures 5-i and 5-ii).

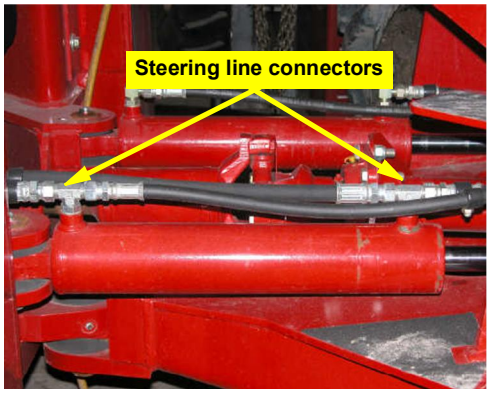



Figure 5-i: Steering line connectors

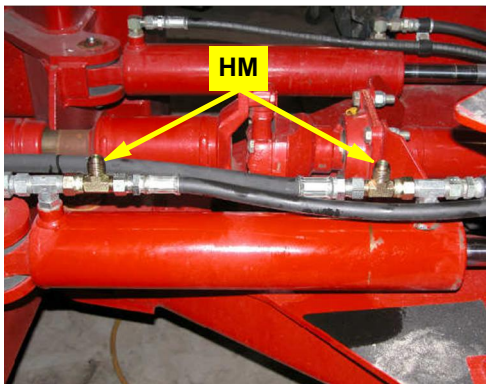



Figure 5-ii: Run tees at left steering cylinder connectors

**6. Install steering output hose.**

a. Install elbow adaptors **HN** (not shown) on the run tees and connect the steering output hoses **HT** and **HU** to the **HN** elbows. **HT** goes to the front run tee (Figure 6a).

NOTE: *Figure 6a shows hoses with 90° elbow end fittings. Hoses HT and HU in your kit have straight end fittings so 90° elbow adapters (HN) are provided.*

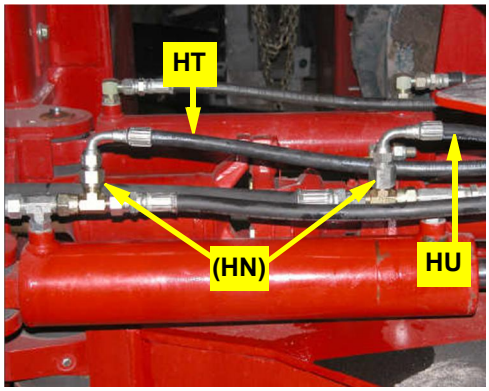



Figure 6a: Steering hoses connected at left steering cylinder (see Note about HN elbows)

b. Route the output hoses back and up to the hydraulic steering block and attach them to the **A** and **B** ports of the steering block (Figure 6b).

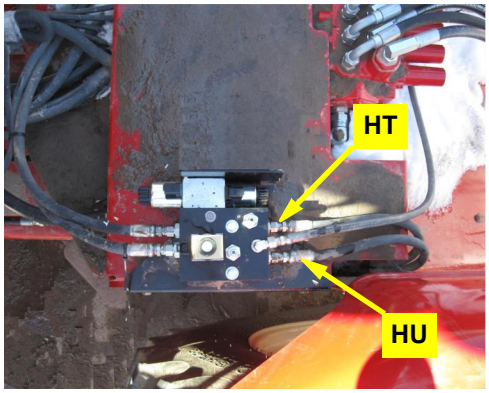



Figure 6b: Steering hoses connected at steering block

**7. Verify operation.**

**⚠WARNING:** *During tests of the hydraulic system, the machine may move unexpectedly. Be prepared for machine movement to avoid injury.*

*Keep others away and stay clear of mechanical steering linkages to prevent serious injury or death from pinch point hazards while manually operating the hydraulic steering circuit.*

a. Tighten all connections and clean up the installation area around the tractor and make certain that it is safe to operate.

b. Start the tractor and check hydraulic connections for any leaks.

c. Rotate the steering wheel from one extreme to the other and back.

# Installation - Wheel Angle Sensor (WAS)

**⚠WARNING:**

Switch off the machine's engine while installing or adjusting the WAS. Keep others away and stay clear of mechanical steering linkages to prevent serious injury or death from pinch point hazards while manually operating the hydraulic steering circuit.

**1. Prepare the wheel angle sensor.**

a. Using the provided hardware **WE** (nuts) and **WD** (bolts - not shown), 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).

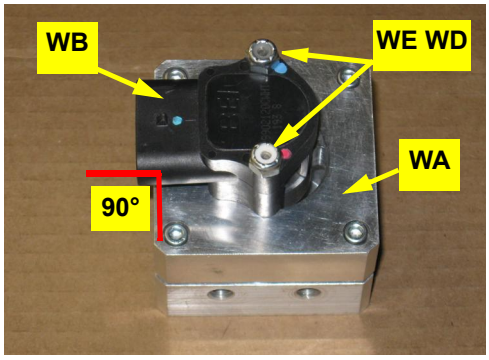


Figure 1a: Prepared WAS housing\connector

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

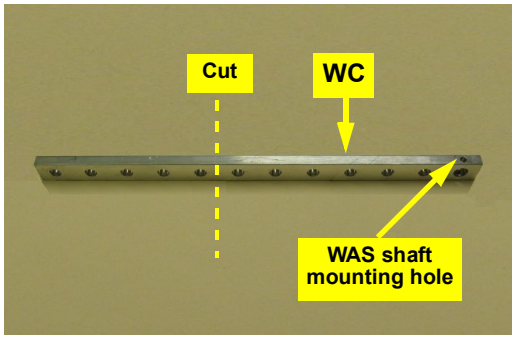


Figure 1b: WAS arm preparation

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

**NOTE:** *Before you cut the rod at step 1d, screw the provided nuts **WH** onto the rod so that they are inside the cut you will make. After you have cut the rod, the nuts can help clean the threads.*

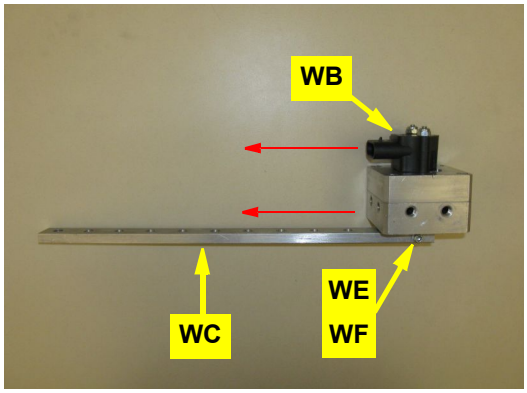


Figure 1c: Attached WAS arm

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

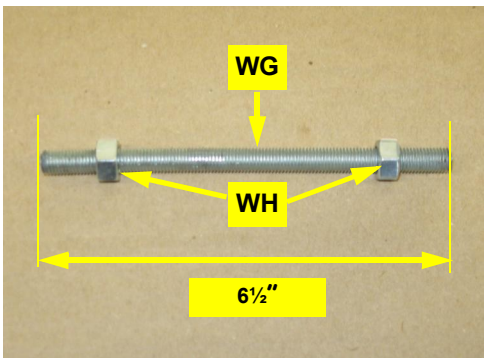


Figure 1d-i: Cut threaded rod

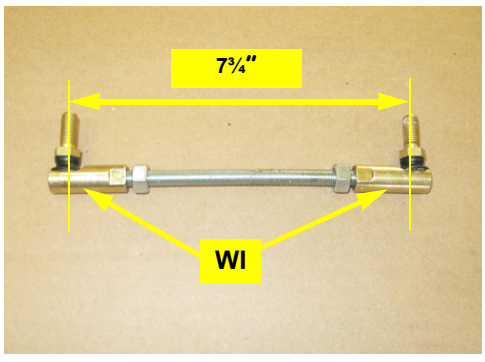


Figure 1d-ii: Assembled threaded rod

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

a. Locate the articulation point near the center of the tractor (Figure 2a).

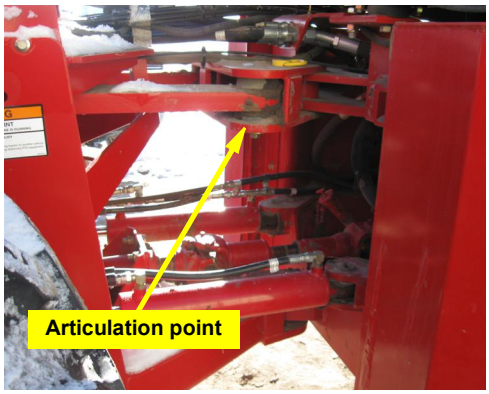



Figure 2a: Tractor articulation point

b. Using hardware **WK** (not shown - see Figure 2f-ii on page 20), attach the WAS rod mount bracket **WM** to the articulation point. Use the threaded holes on the left side of the articulation point (Figure 2b).

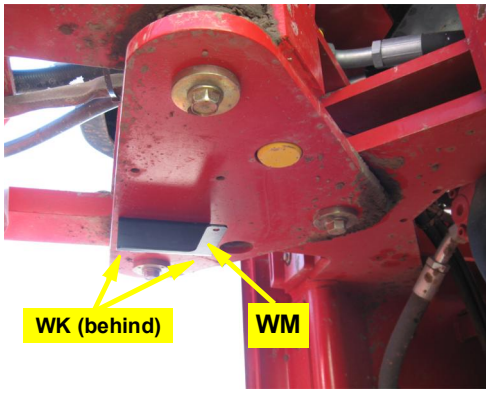



Figure 2b: Installed WAS rod mount bracket

c. Remove the top mounting bolt on the right side of the tractor frame near the articulation point. Using the mounting bolt, install the WAS assembly mounting bracket **WL** on the tractor frame. Ensure the bracket is level at 90° to the frame (Figure 2c).

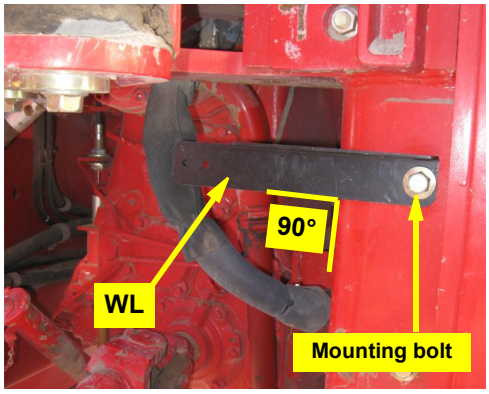



Figure 2c: Installed WAS assembly bracket

d. Using hardware **WJ** (not shown) attach the WAS assembly from steps 1a and 1b to the bracket **WL**. Face the wire connector outwards, away from the tractor (Figure 2d).

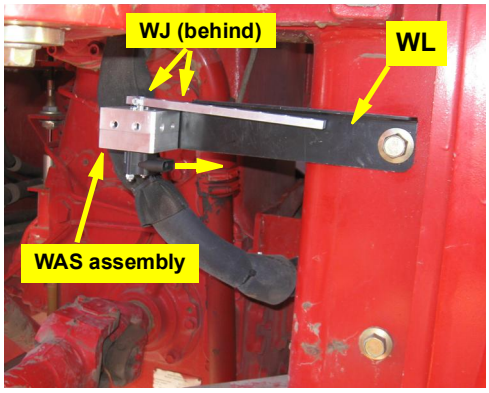



Figure 2d: Installed WAS assembly

**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 **WM** 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).

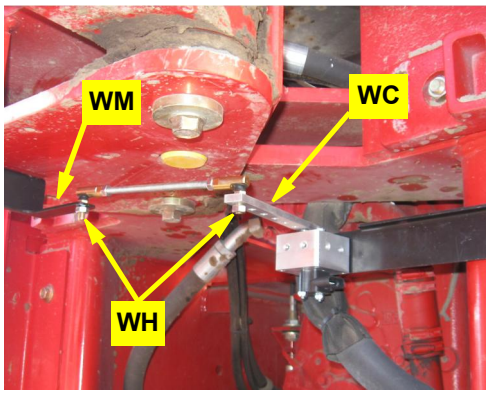


Figure 2e: Installed WAS linkage

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 2f-i: Full left lock

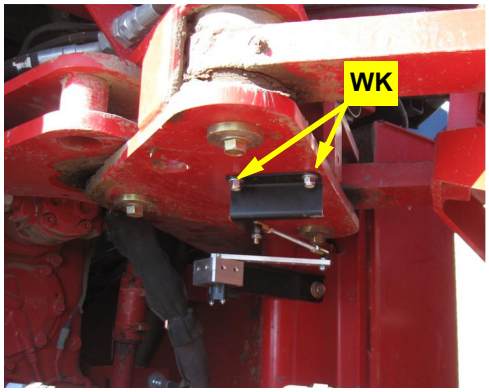


Figure 2f-ii: Full right lock

# Installation - Steering Wheel Switch (SWS)

**1. Install the steering wheel switch.**

a. Locate the steering shaft plastic cover under the steering wheel (Figure 1a). Remove the cover.


Figure 1a: Steering shaft cover

b. Put a 90° bend in the SWS sensor bracket **SC** at the opposite end to the pre-drilled hole (Figure 1b).

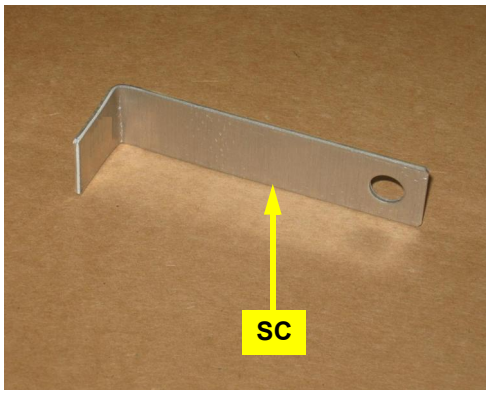



Figure 1b: Newly bent sensor bracket

c. Using self-drilling screw **SF**, attach the sensor bracket **SC** at the top right corner of the steering shaft access hole (Figure 1c).

d. Using epoxy **SB**, attach magnets **SA** to the steering shaft 180° apart and in line with the sensor bracket **SC** (Figure 1c).

e. Install sensor **SD** in bracket **SC**. Set the sensor face to 1/8″ to 1/4″ from the magnets (Figure 1c).

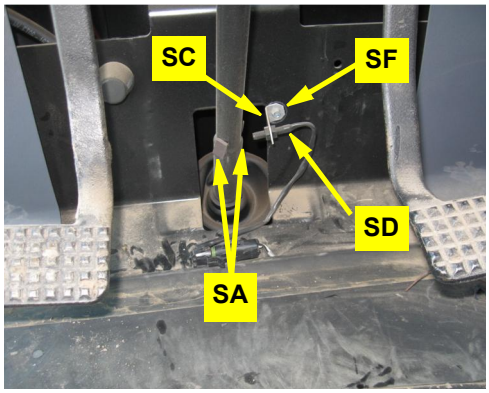



Figure 1c: Installed sensor bracket, magnets and sensor