

Automated Steering Kit Installation Guide


Kit: EDXD-Kubota M7, P/N 913-0002-01

Fits Kubota M7 Models:

M7-131 M7-151 M7-171



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 your automated steering system documentation.
- 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 steering wheel switch (SWS - for steering override)
- the electronic control unit (ECU)

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 three step-by-step installation sections, one for each of the kits.

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	760-0003-000	1	Assembly, hyd valve block - relay (Hydraulic steering block - 'HSB')	
Bag: Fittings, hydraulic - hydraulic steering block - contains HB and HC				
HB	760-2074	4	Adapter, hyd 90 elbow - #8maleJIC x #6maleORB (HA's P [pressure], T [tank] ports and A and B steering ports)	
HC	760-2058	1	Adapter, hyd 90 elbow #6maleJIC x #6maleORB (HA's LS port)	

Kit Contents - Steering Hydraulics *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HD	640-0022	1	Hydraulic steering block mounting bracket (Attach using machine's bolts, see steps; mount HA using HE)	
Bag: Mounting hardware - hydraulic steering block - contains HE				
HE	675-2005-000	2	Bolt - 3/8NC x 3-1/4" Gr5, ZP	
	678-1054-000	2	Washer, flat - 3/8, ZP	
	676-1035-000	2	Nut, nylock - 3/8NC, ZP	
(Mount HA on HD)				
HF	760-0001	1	Assembly, hyd - counterbalance valve, reactive (‘CBV’ - mount on HJ using HL)	
Bag: Fittings, hydraulic - counterbalance valve - contains HG, HH and HI				
HG	760-2080	2	Adapter, hyd 90 elbow - #8maleJIC x #8maleORB (HF's ‘V’ ports)	
HH	760-2079	2	Adapter, hyd - #8maleJIC x #8maleORB (HF's ‘C’ ports - use with HI)	
HI	760-2077	2	Adapter, run tee - #8JIC (Use with HH in HF's ‘C’ ports)	
HJ	607-0014-01	1	Bracket, counterbalance valve (Mount on machine using HK)	
Bag: Mounting hardware - counterbalance valve bracket- contains HK				
HK	513-0072-01	1	Bolt, M20 x 1.5 x 30 Gr8.8, ZP	
	516-0064-01	1	Washer, flat - 3/4", ZP	
(Mount HJ on machine)				

Kit Contents - Steering Hydraulics *(continued)*






REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
Bag: Mounting hardware - counterbalance valve - contains HL				
HL	675-2020	2	Bolt, 1/4NC x 2" Gr5, ZP	
	678-1053	2	Washer, flat - 1/4", ZP	
	676-1034	2	Nut, lock - 1/4NC, ZP	
(Mount HF on HJ)				
Bag: Run tees - pressure and tank lines - contains HM				
HM	760-2025	2	Adapter, hyd run tee - #15LEO (Pressure and tank lines)	
HN	760-0009	1	Dynamic load sense valve (DLSV)	
Bag: Fittings, hydraulic - dynamic load sense valve - contains HO, HP, HQ and HR				
HO	760-2056	1	Adapter, hyd - #6maleJIC x #6maleORB (HN's 'A' port - connect to machine's LS [steel] line using HX)	
HP	760-2082	1	Adapter, hyd - 90 elbow #6maleJIC x #4maleORB (HN's 'PILOT' port - connect to HT)	
HQ	760-2090	1	Adapter, hyd #6maleORB x #4femORFF (HN's 'B' port, use with HR - connect machine's LS hose)	
HR	760-2105	1	Adapter, hyd 90 elbow - #4maleORB x #8maleLEO (Use with HQ in HN's 'B' port)	

Kit Contents - Steering Hydraulics *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
HS	760-1304-000	2	Hose, hyd - 1/2" x 66", #6femJIC x #15femLEO90 (Pressure and tank hoses - HA's P and T ports to run tees in the split P and T lines)	
HT	760-1153	1	Hose, hyd - 1/4" x 69", #6femJIC both ends (Load sense hose - HA's LS port to HN'S PILOT port)	
HU	759-0004-01	2	Hose, hyd - 3/8" x 128", #8femJIC90 x #8femJIC (Steering hoses - HA's A and B steering ports to run tees in HF's 'C' ports)	
HV1	759-0002-01	1	Hose, hyd - 1/2" x 24", M15LEO x #8femJIC	
HV2	759-0003-01	1	Hose, hyd - 1/2" x 18", F15LEO x #8femJIC (Steering hoses - steel lines from orbital to HF's 'V' ports)	
HW1	759-0007-01	1	Hose, hyd - 1/2" x 8", M15LEO x #8femJIC	
HW2	759-0008-01	1	Hose, hyd - 1/2" x 8", F15LEO x #8femJIC (Extension hoses - machine's steering cylinder hoses to run tees in HF's 'C' ports)	
HX	759-0006-01	1	Hose, hyd - 1/4" x 6", 8mLEO x 6femJIC (Machine's LS steel line to HN'S 'A' port)	
HY	677-2001	20	Tie strap, 11" heavy duty	

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 (Attach to steering shaft using SB - one only required for this installation)	
SB	675-0077	1	Epoxy, Hardman 04001 - single double bub (Attach SA to steering shaft)	
SC	602-1062	1	Bracket, steering wheel switch mounting (Mount SD)	
SD	726-1054	1	Steering wheel switch/cable (Mount in SC, connect to EF)	
SE	677-2002	4	Tie strap, 7" releasable	

Kit Contents - Electronic Control Unit

Unpack the electronic control unit kit and identify the required parts as shown. Kit items are A, B, C etc. with an E (Electronic) prefix.

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
EA	051-0377-000#	1	Main cable	
EB	051-0144-000#	1	Valve cable (Connect to HA's solenoids to EA through EC)	
EC	054-0213-000#	1	Adapter cable (Connects EA to EB and EF)	
Note: Items ED and EE not used in this installation				
EF	051-0229-000#	1	SWS cable (Connect to EA through EC)	
EG	051-0364-000#	1	Power cable, 4.5 m (Connects to EA)	
EH	051-0397-000	1	Steering remote engage cable/switch (Connects to EA)	
EI	054-0168-000	1	Three-position power switch and cable (Connects to EA - can mount using EJ)	

Kit Contents - Electronic Control Unit *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
Bag: Power switch bracket and hardware - contains EJ and EK				
EJ	640-0180-000	1	Switch bracket (Mount EI, if applicable/necessary, using EK)	
EK	675-1019-000#	2	Screw, 8-32, 5/16", SS	
	678-1052-000#	2	Washer, split-lock, #8 (Mount EJ if used)	
EL	607-0011-01	1	ECU mounting bracket (Mount using EN)	
EM	806-1046-000#	1	eDrive XD controller (ECU) (Mount on EL using EO)	
Bag: Mounting hardware - ECU bracket and ECU on bracket - contains EN and EO				
EN	513-0002-01	2	Bolt, M8x1.25x40	
	517-0002-01	2	Washer, 8mm, flat, ZP (Mount EL on machine)	
EO	675-2081-000	3	Bolt, M8-08, 35mm, GR 8.8, ZP (Mount EM on EL)	

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 B for a schematic of the hydraulic circuits.

1. Prepare the hydraulic steering block (HSB).

NOTE: Make sure the hydraulic steering block **HA** is clean and dust free.

Remove the plastic plugs from **HA**, install adapter fittings as follows (Figure 1):

- **HB** in the **T**(ank), **P**(ressure), **B** and **A** steering ports.
- **HC** in the **LS** port.

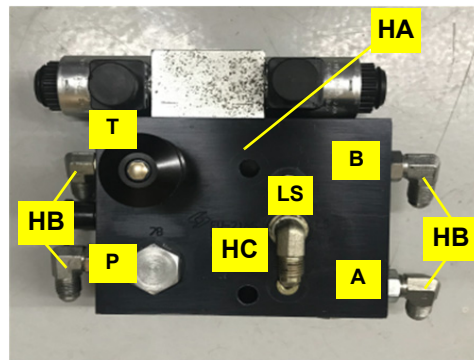


Figure 1: HSB T, P, B, A and LS fittings installed

2. Install the HSB mounting bracket.

Behind the cab, locate the central, fore/aft bar over the valve stack. Of the four bolts near the front of that bar, remove the two toward the front of the machine. Using those bolts, install **HA**'s mounting bracket **HD** (Figure 2 with insets).



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

3. Install the HSB.

Using hardware **HE**, attach **HA** to bracket **HD**. Mount **HA** with its L/R solenoids rearward (so with steering ports A and B to the left - Figure 3).

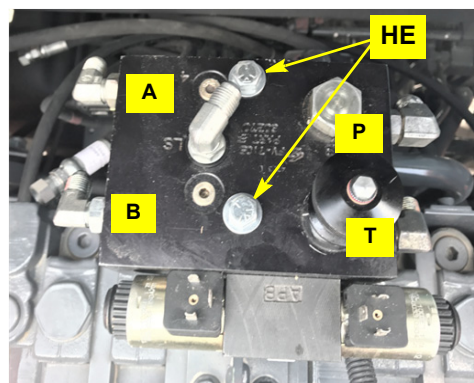


Figure 3: Steering block installed

4. **Prepare and install the dynamic load sense valve (DLSV).**

a. Prepare load sense valve **HN** by installing adapter fittings as follows (Figure 4a):

- **HO** in the source port (A)
- **HQ** in the function port (B)
- **HR** on **HQ**
- **HP** in the load sense port (PILOT [Pt])

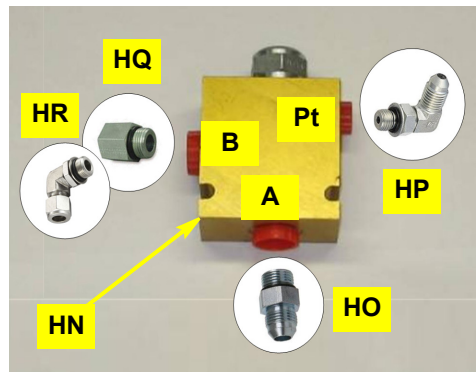


Figure 4a: Load sense valve port fittings

NOTE:

(i) Figure 4b shows where on the machine the connections detailed in steps 4 and 5 are made.

(ii) Figure 4c shows the DLSV and pressure/tank connections relative to each other (it shows work in progress).

(iii) In the following steps, leave connections loose until all connections are made to allow for final positioning of the DLSV.



Figure 4b: DLSV and pressure/tank connections access

b. Locate the machine's load sense (steel) line to (rubber) hose connection under the cab on the right side of the machine, forward of the rear wheel (Figures 4b and 4c): disconnect the line/hose (Figure 4d).

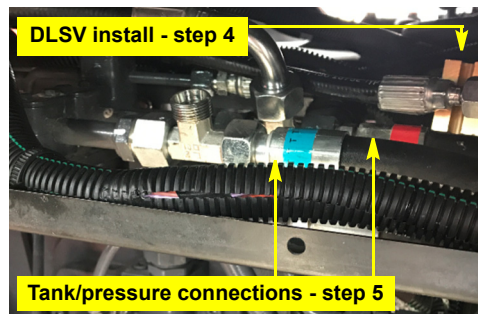


Figure 4c: DLSV, tank/pressure connections area (work in progress)

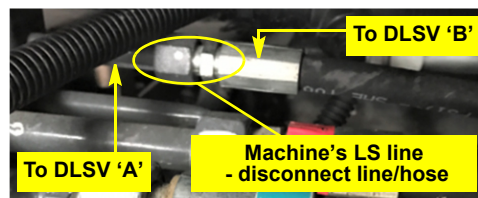


Figure 4d: LS line for DLSV connection

c. Reconnect the hose (it's from the orbitol) to **HR** in **HN**'s 'B' port - Figure 4e).

d. Install short hose **HX** between the disconnected steel line and **HO** in **HN**'s 'A' port (Figure 4e).

e. Connect **HT** from **HA**'s LS port (Figure 4e) to **HP** in **HN**'s 'PILOT' port ('Pt' in Figure 4a).

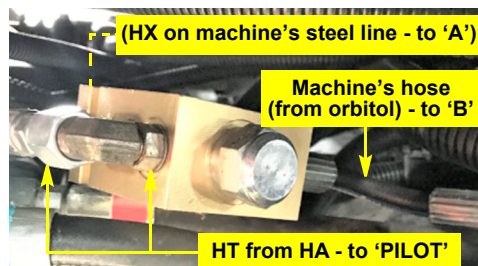


Figure 4e: DLSV connections

5. Install the pressure and tank fittings, connect the hoses.

- a. Locate the pressure and tank (rubber) hose to (steel) line connections under the cab on the right side of the machine, inboard of the right rear wheel. The outer connection (of the two) is the tank line (the hoses should be labeled T and P).
- b. Disconnect the hoses from the lines (Figure 5, top left image) and install run tees **HM** (bottom left image). Connect the tank and pressure hoses **HS** to from the T and P ports of **HA** to their respective run tee branches here (Figure 5, right image).

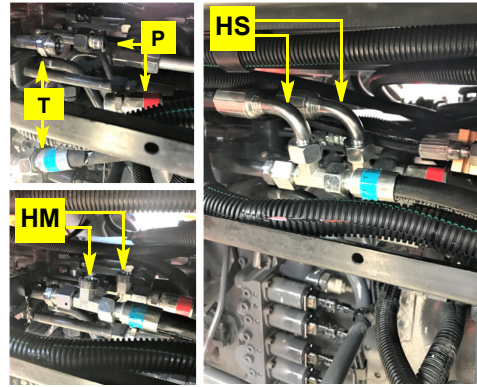


Figure 5: Tank and pressure hoses disconnected; run tees installed; tank and pressure hose connected

6. Connect steering, pressure, tank and load sense hoses at the hydraulic steering block.

When, according to your preferred practice, you have routed the hoses that connect at **HA** (to/from the counterbalance valve, the pressure and tank plumbing, the dynamic load sense valve), connect them to **HA** as follows (Figure 7):

- Pressure and tank hoses **HS** to their **P** and **T** port fittings respectively.
- Steering hoses **HU** to the fittings in the **A** and **B** ports.
- Load sense hose **HT** to the fitting in the **LS** port.

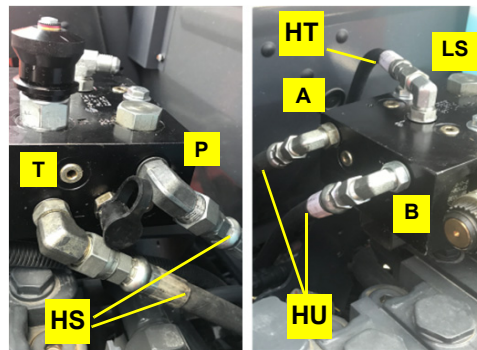


Figure 6: P, T (left image) and steering hose and LS connections (right image) at HSB

7. Prepare, install and connect the counterbalance valve.

NOTE:

*Route all hoses with other machine plumbing free from entanglement and secured with heavy tie straps **HY**. Securely tighten all hose fittings and connections when hose installation is complete.*

- a. Prepare counterbalance valve (CBV) **HF** by installing adapter fittings as follows (Figure 7a):
 - **HG** in the valve's 'V' ports
 - **HH** in the valve's 'C' ports
 - **HI** on adapters **HH**

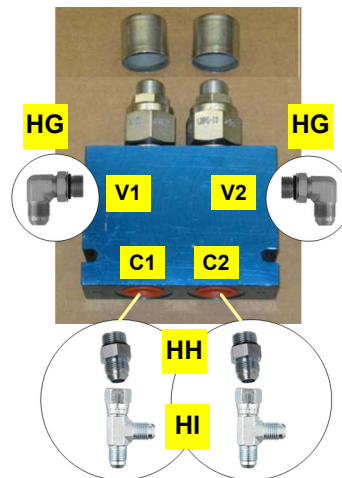


Figure 7a: CBV port fittings

- b. At the front left side of the machine, near the (steel) steering line to (rubber) hose connections (Figure 7c inset, next page), identify the middle ('bossed') hole of three in a vertical line in the machine's chassis (Figure 7b, main and left inset). Using hardware **HK**, attach CBV mounting bracket **HJ** to the machine (Figure 7b, right inset).

NOTE:

Depending on the front axle type, there may or may not be a hydraulic accumulator close to the counterbalance valve installation.

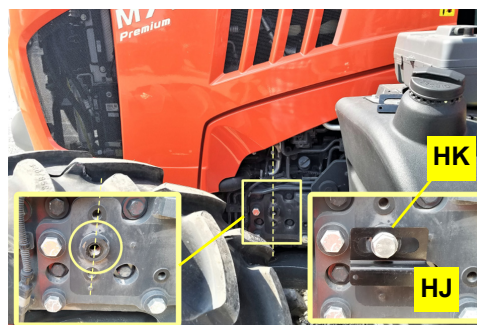


Figure 7b: CBV mounting bracket installation


7. **Prepare, install and connect the counterbalance valve (continued).**

- c. Using hardware **HL**, attach **HF** to its mounting bracket (Figure 7c).
- d. Disconnect the nearby steering hoses from the vertical steering lines from the orbital steering valve (Figure 7c inset).

NOTE: *Do not cross hose connections when installing hoses at the counterbalance valve. The steering hoses connected to the **V1** and **V2** ports will apply pressure to the steering cylinders connected to the **C1** and **C2** ports respectively. For example, if the hose connected (via the steel line) to the **L**(eft) port on the orbital connects with **V1**, then the machine's hose connected to the left steering cylinder must connect to the **C1** port.*

- e. Using short hoses **HW1** and **HW2**, extend the machine's steering hoses to connect them to the open T end of run tees **HI** in the C ports of the CBV (Figure 7c).
- f. Connect hoses **HV1** and **HV2** between the steel steering lines and the elbow fittings **HG** in the V ports of the CBV (HV1 to V1 - Figure 7d).
- g. Connect the steering hoses **HU** to/from the A and B ports of **HA** to the branches of the run tees **HI** in the C ports of the CBV (Figure 7d).

8. **Verify operation.**

 *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, turn the steering wheel lock-to-lock twice, checking for smooth operation, then check all the hydraulic connections for leaks.

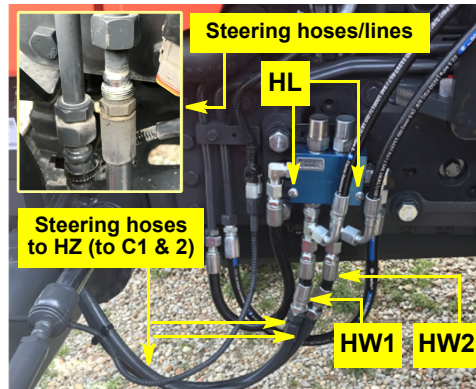


Figure 7c: Steering lines and CBV installed - connections 1

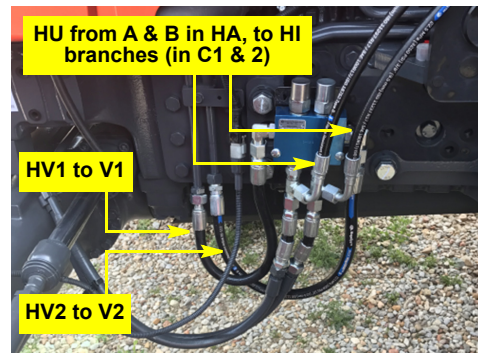


Figure 7d: CBV installed - connections 2

Installation - Steering Wheel Switch (SWS)

1. Prepare the switch/sensor bracket.

Drill a 7/16" hole in the switch/sensor bracket SC 1-3/8" from the undrilled end. Cut 1" from that end. At 3/4" from the other (pre-drilled) end, put a 30° 'up' bend in the bracket. Put a 30° 'down' bend 3/4" from the first bend, then a 90° down bend from the second bend (Figure 1 - not to scale).

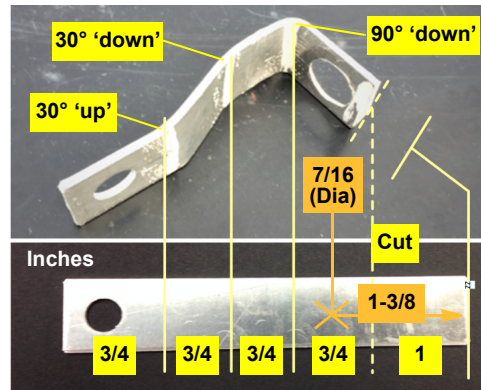


Figure 1: Drill, cut and bend - not to scale

2. Access the steering column.

- a. Remove the screws from the top panel/cover of the steering console (Figure 2a - a). Remove the two now-exposed top screws of the console's front cover (Figure 2a - b1 and b2, screws removed).
- b. Remove the six screws in the console's front cover (Figure 2b).

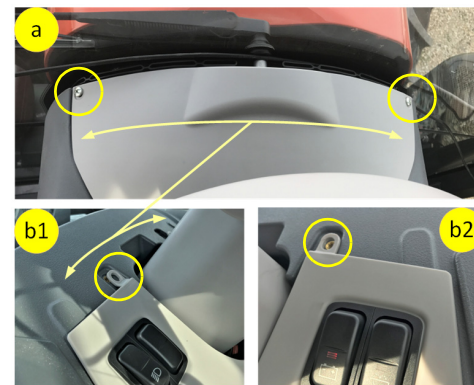


Figure 2a: Steering console cover's top screws/screw locations

3. Install the switch bracket, magnets and switch.

- a. Remove the near left nut from the steering shaft shield flange bolt (Figure 3a - circled main and left inset). Mount SC on the bolt, squarely aligned with the shield (Figure 3a, right inset). Using SC as a template, mark the shield.
- b. Remove the mount bracket then drill a 1/2" hole in the shield (Figure 3b).
- c. 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).
- d. Using the two-part epoxy SB, attach one half of the magnet to the inner steering shaft. Turn the shaft 180° and attach the other half of the magnet to the steering shaft (Figure 3b).
- e. Reinstall bracket SC and align the switch hole with the magnets hole (Figure 3b).



Figure 2b: Console's front cover's six screws

Install switch SD in SC and adjust it so that the sensor face is 1/8" to 1/4" from the magnets (Figure 3b). You will connect SD's cable later.

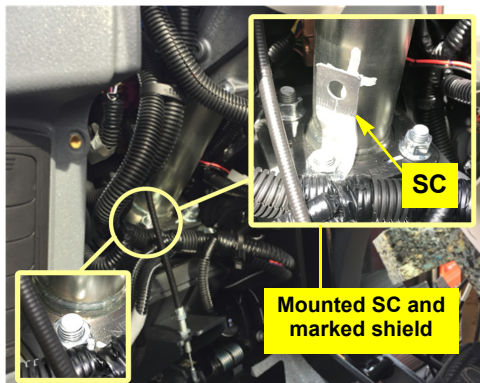


Figure 3a: Determine and mark drilling point

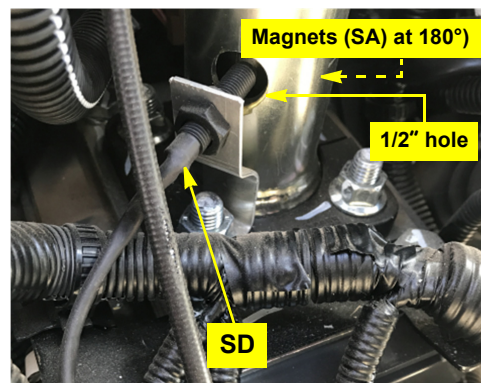


Figure 3b: Install magnets, bracket and sensor

Installation - Electronic Control Unit (ECU) and Cables

See Appendix A for a schematic of the cable connections.

1. Install the ECU mounting bracket and the ECU.

- a. Identify the ECU mounting location behind the operators seat (Figure 1a, top image). Remove the two bolts viewed through the plate.

Using hardware **EN** in the two bolt holes, attach bracket **EL**, its long, vertical side toward the seat (Figure 1a, bottom image).

- b. Using screws **EO**, fasten ECU **EM** on bracket **EL** with its connector to the right (left as viewed) and its logo rearward.

NOTE: Figure 1b shows the ECU attached with temporary hardware; use **EO** supplied.

- c. Connect main cable **EA** to **EM** (Figure 1b, inset).

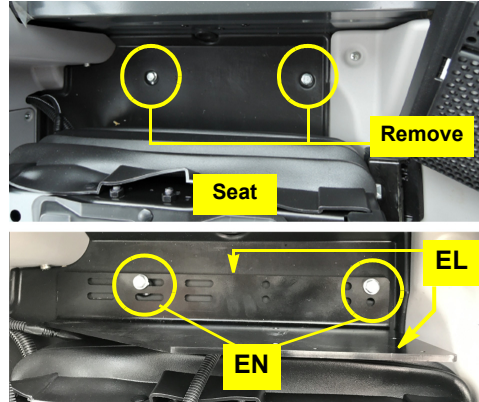


Figure 1a: ECU mounting bracket location and installed

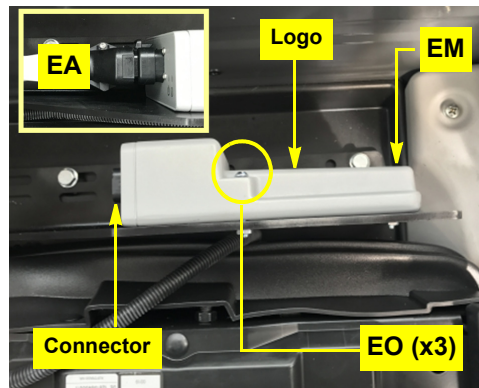


Figure 1b: ECU installed

2. Assemble and install the cables.

On a clean surface, lay out all the cables and become familiar with the connections and where they are to be connected. See Appendix A.

NOTE: See Figure 2a: remove the top rubber grommet up and to the right of the windshield washer reservoir. Pass cables into/out from the cabling/electronics compartment in the cab.

- a. Connect adapter cable **EC** between **EA**'s connector labeled 'VALVES' and valve and SWS cables **EB** and **EF** respectively - see steps 2c and 2d, page 15).

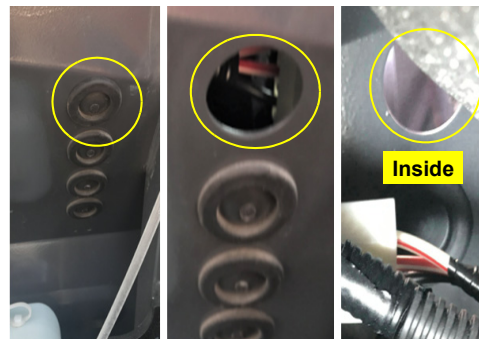


Figure 2a: Cab access - to cabling compartment

- b. Connect **EB**'s left and right connectors to **HA**'s solenoids (Figure 2b).

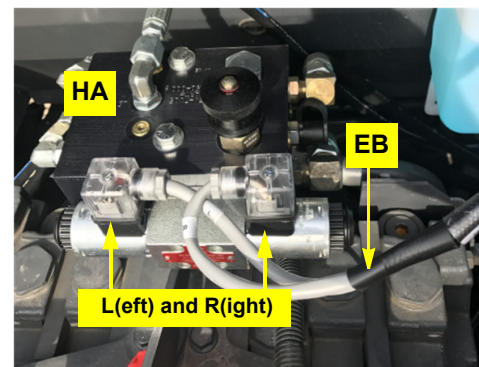


Figure 2b: Solenoid connections

2. **Assemble and install the cables (continued).**

- c. Inside the compartment, route cables from (inside) the base of the cabling compartment to come out by ECU EM behind the seat (Figure 2c).
- d. Route SWS cable EF down the right side of the cab, under the floor mat and connect it to the steering wheel switch/cable SD at the steering column (Figure 2d).
- e. Connect steering remote engage cable/switch EH to EA's cable labeled 'RMT_ENGAGE'.
- f. Attach power switch /cable EI to EA's connector labeled 'PWR_SWITCH'. Some machines are equipped with pop out tabs that you can remove and replace with switch EI. If no tab is available, you can use bracket EJ mounting it in the cab at your preferred location (using hardware EK). Route the cable in the cab so it is clear from any machine operation controls.



Ensure main cable EA is connected to the ECU (step 1c, page 14) and power switch EI is OFF before connecting EA/EG to the battery at step h.

- g. On your terminal (MAX/STX) cabling, locate the connector labeled 'eDriveX' (MAX) or 'EDRIVE' (STX). Connect (either) to EA's connection labeled 'TERMINAL'. Route all cables in the cab so that they are clear of any machine operation controls.
- h. Connect power cable EG between EA's connector labeled 'EXT_PWR' and the machine's 12 V battery and connect it.

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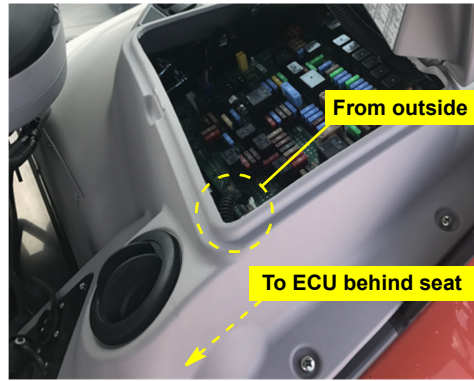


Figure 2c: Routing from cabling compartment

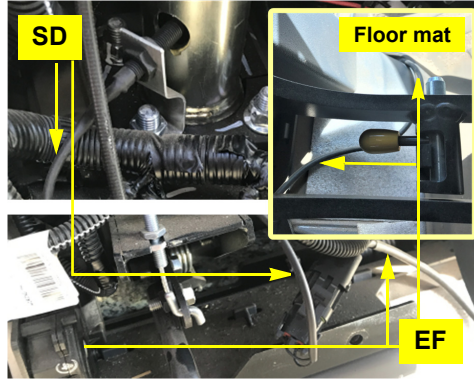
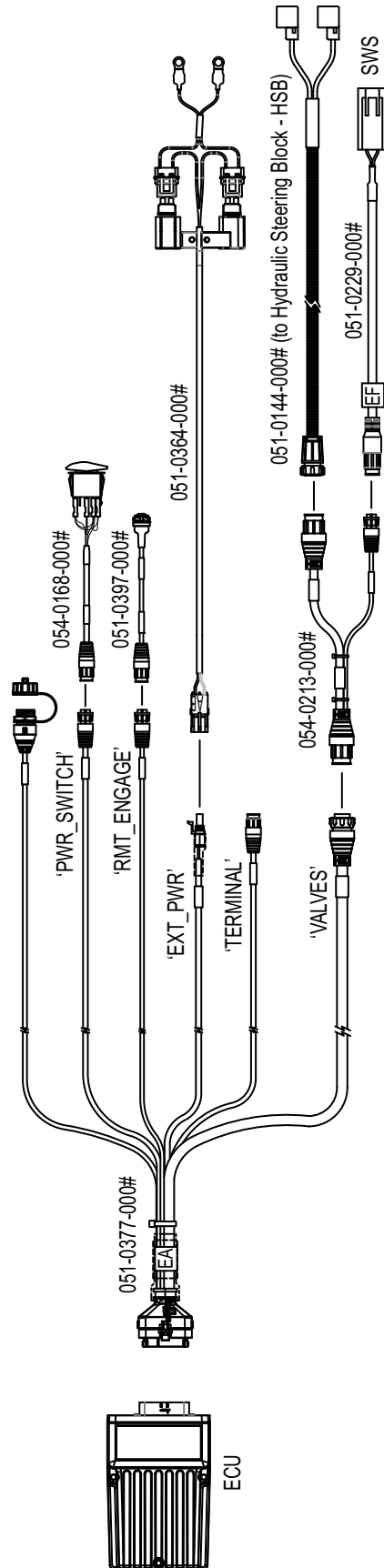


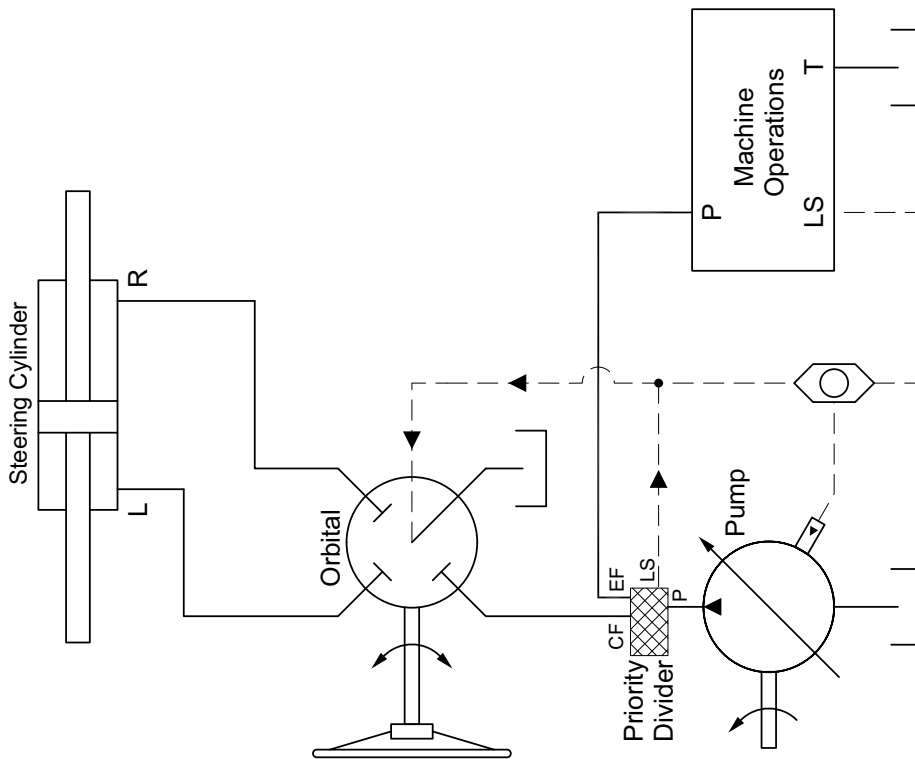
Figure 2d: SWS harness cable to switch cable

Appendix A - ECU Cables and Connections

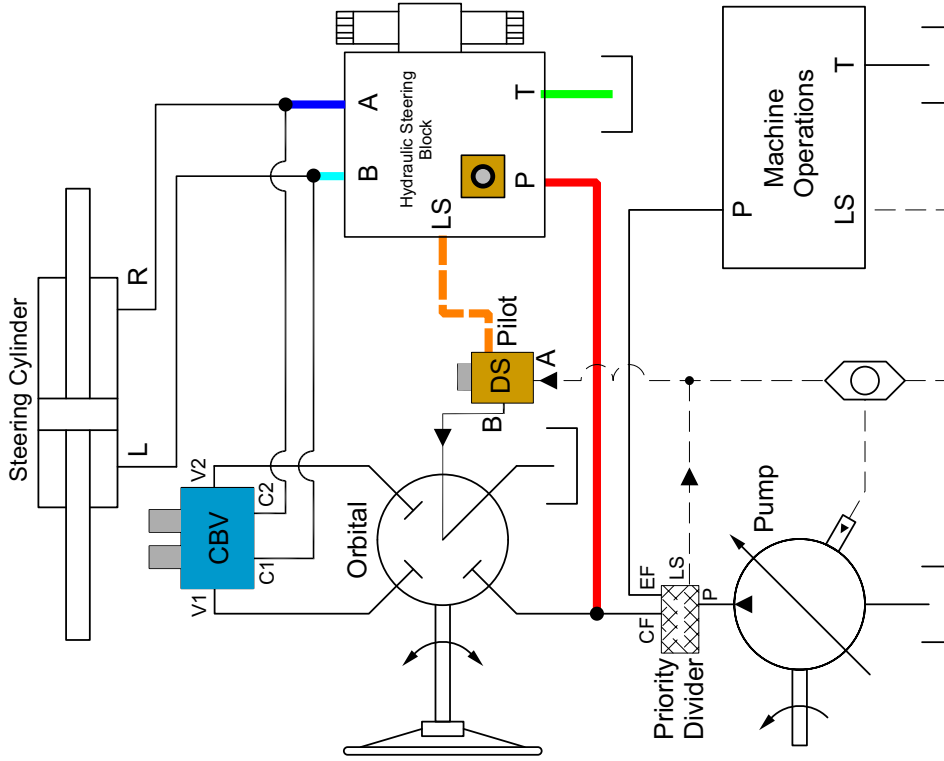


Appendix B - Hydraulic Circuits

Without AutoSteer



With AutoSteer



Legend

- █ Tank
- █ Pressure
- █ B - Steering Line
- █ A - Steering Line
- DS Dynamic Load Sense Shuttle
- CBV Counter Balance Valve