

eDrive VSi Installation Guide

Kit: eDTC / eDX VSi - CATMTT-A/B

P/Ns 911-1012-000 (TC), 911-4008-000 (eDX)

Fits Caterpillar Challenger MT Track Tractor Models:

735	745	755	765	
835	845	855	865	
	745B	755B	765B	
835B	845B	755B	865B	875B



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.
- 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

This is a general guideline for the installation of the VSi electric steering wheel and either eDriveTC or eDriveX. Every effort has been made to verify the following installation procedure. However, due to the manufacturing process outside of Hemisphere GPS' control, the installer may have to adapt this kit to your distinct situation.

The items in the kits are detailed in the table that follows the safety warnings starting below. After the kit tables there are step-by-step installation instructions.

Please read this manual thoroughly before beginning the installation.

WARNING:

The VSi Electric Steering Wheel is designed as a driver aid for precision agriculture applications. At all times the driver is fully responsible for the safe operation of the vehicle. It is not intended for and must not be enabled for use on roadways.

WARNING:

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

Machine Preparation

WARNING:

Inspect the machine and perform any needed maintenance before installing the VSi kit (for example, adjust the steering linkage so that the machine drives straight ahead without manual steering). 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 properly adjusted steering linkage can cause loss of directional control resulting in serious injury or death.

Turn off the machine and power off all components when installing or performing maintenance.

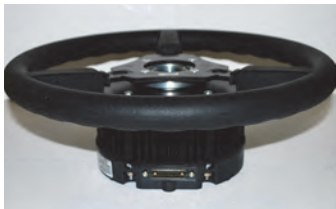
Before attempting to install any of the components:

- Park the machine on a clean level floor
- Ensure adequate clearance to work all around
- Lower all implements and headers to the ground
- Apply the park brake and chock the wheels

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

Kit Contents - eDriveTC and eDriveX

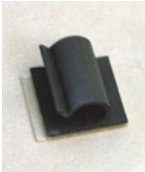
Unpack the supplied kit and identify the required parts as shown. Kit items, which are applicable to both VSi/eDriveTC and VSi/eDriveX installations, are referenced as A, B, C etc. with the item references being used in the step-by-step installation sections of this guide.

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
A	750-8001-000	1	VSi steering wheel	
B		1	Shaft adapter (Use in A)	
C		4	Screw, M5 x 10 flat head socket cap screws (Attach B to A)	

Kit Contents - eDriveTC and eDriveX *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
D		1	Anti-rotation (a/r) bracket (wheel) (Attach to A using E)	
E		2	Bolt, M6 x 14, hex head	
		2	Washer, M6 spring	
		2	Washer, M6 plain	
			(Attach D to A)	
F			Anti-rotation (a/r) bracket assembly (column):	
		1	Anti-rotation bracket (column)	
		1	Anti-rotation clamp	
		2	Bolt, M5 x 35, hex head	
G		2	Bolt, M6 x 14, hex head (Join F [bracket] and D)	
H		1	Special nut, M20 (Attach A to steering shaft - replaces machine's original steering wheel nut)	
I		1	Steering wheel center cover	
J		1	Horn housing ring (Install in I)	

Kit Contents - eDriveTC and eDriveX (continued)

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
K	750-8003-000	1	VSi power cable	
L	750-8002-000	1	VSi junction box	
M		1	Junction box mounting bracket	
N	750-8005-000	1	CAN bus terminator	
O		1	Junction box comms cable clip	

Kit Contents - eDriveTC Only

Unpack the supplied kit and identify the required parts as shown. Only item TC is referenced in the step-by-step installation sections of this guide. For information on the installation of the other items, refer to “Installing the eDriveTC” in Chapter 2 of the **Outback eDrive User Guide**.

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
	051-0166-000	1	CAN-PWR cable (Use 054-0123 to connect to battery)	
	054-0123-000	1	Battery terminal cable (Connect CAN-PWR cable to battery)	
	806-1007-03A	1	eDriveTC ECU	
	054-0044-003	1	TC Power cable	
TC	051-0259-000	1	CAN bus harness - TC	

Kit Contents - eDriveX Only

Unpack the supplied kit and identify the required parts as shown. Kit items, which are applicable to VSi/eDriveX installations only, are referenced as EA, EG, EH etc. (from ECU - see Note after EA) with the item references being used in the step-by-step installation sections of this guide.

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
EA	051-0226-000#	1	Main cable	
Note: Cables EB to EF are not used in this installation				
EG	051-0166-000	1	CAN-PWR cable (Use 054-0123 to connect to battery)	
EH	054-0123-000	1	Battery terminal cable (Connect CAN-PWR cable to battery)	
EI	054-0117-000	1	Power switch	
EJ	640-0091-000	1	ECU (EK) mounting bracket	
EK	806-1031-000	1	eDriveX ECU	

Kit Contents - eDriveX only *(continued)*

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
Bag E1 of 1 contains EL, EM and EN				
EL	675-1197-000	4	Screw, self-drilling, #10-16 x 2-1/2", Hex, ZP (Attach EJ to cab floor - or use EM)	
EM	675-1192-000	4	Screw, self-drilling, #10-16 x 3", Hex, ZP (Attach EJ to cab floor - or use EL)	
EN	675-1188-000	4	Screw, mach, M6 x 12mm, PPH, ZP (Attach EK to EJ)	
EO	051-0316-000	1	CAN bus harness - eDX	
EP	726-1093-000	1	Switch bracket	
EQ	677-2002	20	Tie straps, 11" heavy duty	

VSi Installation Procedure

NOTE: On a clean surface lay out all the components and check them against the “Kit Contents - eDriveTC and eDriveX” table on pages 2 to 4. Become familiar with the components and where they are to be installed before proceeding with the installation (see “Appendix A - eDriveTC VSi Connections” on page 14 or “Appendix B - eDriveX VSi Connections” on page 15).

1. Prepare the VSi electric steering wheel.

- Place the VSi steering wheel **A** on a clean surface with the wheel facing up. Insert shaft adapter **B** into steering wheel **A** (Figure 1a).



At step 1b, tighten the screws to the specified torque only. **DO NOT OVERTIGHTEN - DAMAGE MAY OCCUR.**

- Using the four countersunk screws **C**, secure the shaft adapter **B** in steering wheel **A**. Torque the screws to **6 N·m (53 in-lb)** (Figure 1b).

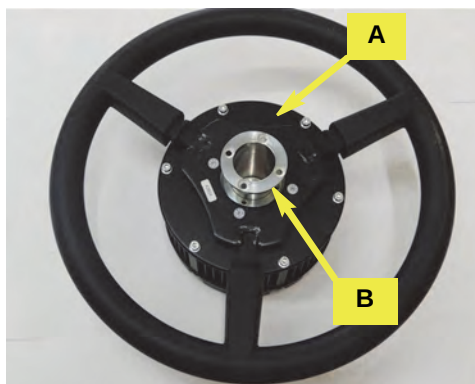


Figure 1a: Installing the shaft adapter

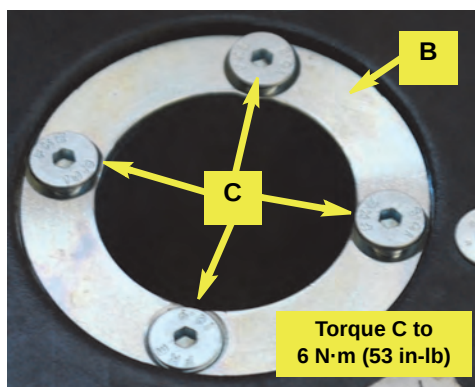


Figure 1b: Securing the shaft adapter

2. Install the anti-rotation bracket (wheel).



When completing this step, ensure that you (i) use only the fasteners provided, (ii) use the washers provided. Tighten the fasteners to the specified torque only at step 5c, page 9. **DO NOT OVERTIGHTEN OR OMIT WASHERS - DAMAGE WILL OCCUR.**

Turn the steering wheel assembly over and set the comms port to your right. Using hardware **E** in the nearest pair of holes, attach the anti-rotation (a/r) bracket **D**—its tabs inward and upward (so with its vertical tabs by the center of the wheel)—to the base of the steering wheel assembly. Do not fully tighten **E** yet.

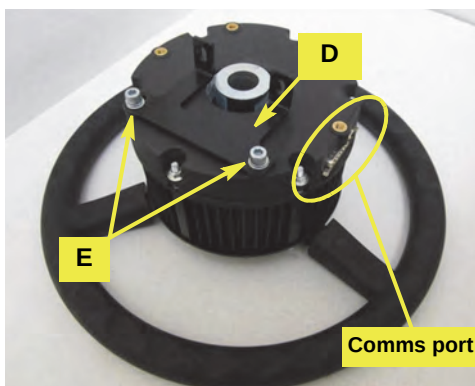


Figure 2: Anti-rotation bracket installed (do not tighten **E** yet). Comms port will be to the right of steering column when a/r bracket is mounted as shown and wheel assembly is installed.

3. Remove the horn switch and steering wheel.

NOTE:

If your machine has a black earth wire connected between the horn button and the steering wheel (and no contact plate), disconnect it and remove it (not shown).

Carefully remove the horn switch from the center of the steering wheel (Figure 3-a). Disconnect the red horn wire then remove the horn contact plate (if fitted - 3-a and 3-b). Remove the steering wheel nut (3-c) and the steering wheel (3-d).

NOTE:

Consult your equipment dealer if you are unsure of the correct procedure for removing the steering wheel. Note also, you will reuse the horn switch but not the horn contact plate or the steering wheel nut.

4. Install the anti-rotation bracket (column).

Remove the four screws holding the steering column upper cover (Figure 4 left inset) and remove it to expose the steering column and shaft (Figure 4 right inset).

Install the column anti-rotation assembly **F** on the exposed steering column. Set the assembly with the clamp on the driver's side and with the top face of the clamp approximately 3 mm below the top of the bevelled portion of the column (Figure 4 and right inset). Secure the assembly in place.

5. Install the VSi steering wheel assembly.

- Apply a small amount of an anti-seize compound (not supplied) to the splines of shaft adapter **B** (Figure 5a top inset). Threading the horn wire up through the wheel assembly, carefully align the adapter splines with those on the steering shaft and slide the steering wheel assembly onto the shaft (Figure 5a). Guide the wheel a/r bracket **D** behind the column a/r bracket **F** (Figure 5a bottom left inset).
- Push bracket **D** firmly up against the base of the steering wheel assembly and, using hardware **G** tighten **F** and **D** together (Figure 5a right inset).



At step 5c, tighten the screws to the specified torque only. **DO NOT OVERTIGHTEN - DAMAGE MAY OCCUR.**

- Tighten hardware **E** in the base of the wheel assembly to **5 N·m (44 in-lb)** (Figure 5a right inset).
- Passing the horn wire through it, use special nut **H**, to secure the steering wheel (Figure 5b).

NOTE:

Torque special nut **H** to the machine manufacturer's specification.



Figures 3-a to 3-d: Removing the horn switch and steering wheel

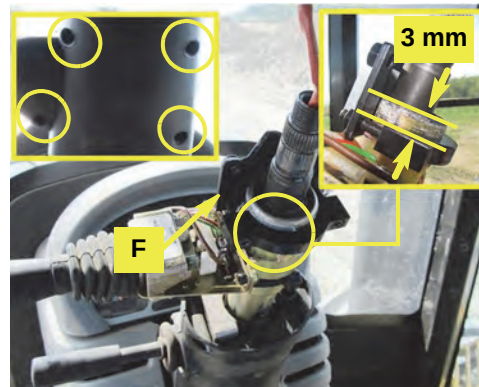


Figure 4 with insets: Column anti-rotation assembly installed

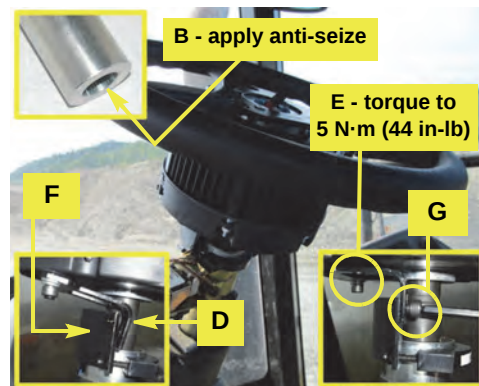


Figure 5a with insets: Securing the a/r bracket

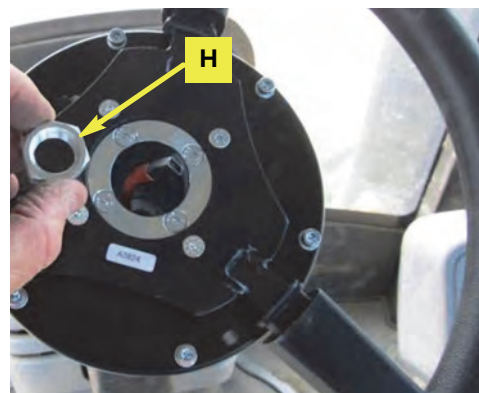


Figure 5b: Securing the steering wheel assembly

6. Prepare and install the center cover and horn button.

- a. Place the steering wheel center cover **I** underside up on a protective surface (Figure 6a-a). Insert the horn housing ring **J** into **I** (6a-b). Turn the cover over and insert the horn switch assembly into **J** (6a-c). Press down on the switch assembly until it clicks into place (6a-d).
- b. Refit the horn contact plate (if originally fitted) and bend its earth tab (or the original earth wire's tab - not shown) to a 45° angle so that when the horn switch/center cover assembly is installed, the tab will be in contact with the top of the steering shaft adapter (Figure 6b). Reconnect the horn wire.
- c. Install the center cover/horn switch assembly in the steering wheel assembly (Figure 6b inset).

7. Modify the steering column cover.

To accommodate the anti-rotation assembly, modify the front section of the steering column cover as follows (Figure 7):

- Trim the raised reinforcing ribs down to the level of the top of the screw bosses. Leave a short length of original height rib where it joins the vertical face of the moulding
- If necessary, cut out a small section at the right end of the inner circle—from the inside edge to the screw boss

8. Install and connect the electric steer junction box.

NOTE: Refer again to either “Appendix A - eDriveTC VSi Connections” on page 14 or “Appendix B - eDriveX VSi Connections” on page 15.

- a. Route the power supply cable **K** from the battery into the cab to where you will mount the junction box **L** at steps 8b and 8c. Ensure the cable will not be a trip hazard. Connect the ring terminals to the battery (not shown).



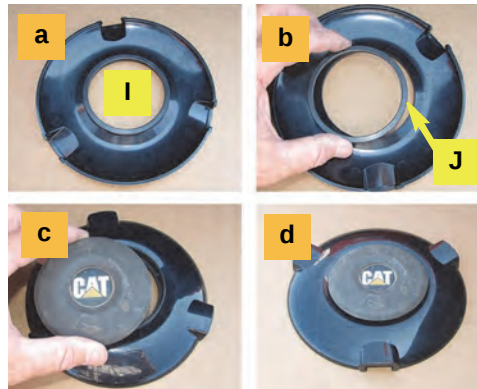
When mounting the junction box in the following steps, ensure that the ON/OFF switch on the junction box is within easy reach of the operator. See Figure 8a. The switch must be OFF when the vehicle is not under field guidance or is on a road.

Ensure that the mounted junction box cannot interfere with movement of the steering column or visibility to the work area. Also keep in mind the location of the steering wheel assembly's comms port.

- b. Mount the electric steer junction box bracket **M** (not shown) on the steering column or windscreen using your preferred method, for example fasteners, double-sided tape, nylon ties (not provided).



If drilling the steering column, ensure nothing inside the column can be damaged.



Figures 6a-a to 6a-d: Preparing the center cover and horn switch



Figure 6b with inset: Adjusting the horn earth tab and installing the center cover

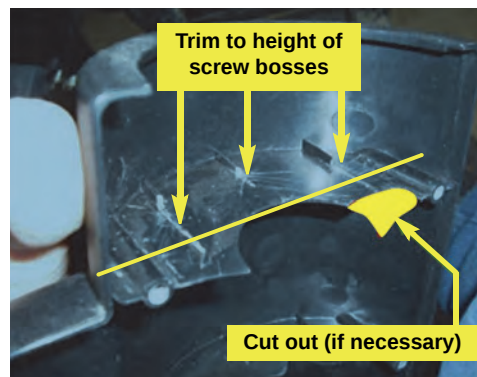


Figure 7: Modifying the column cover (front section)

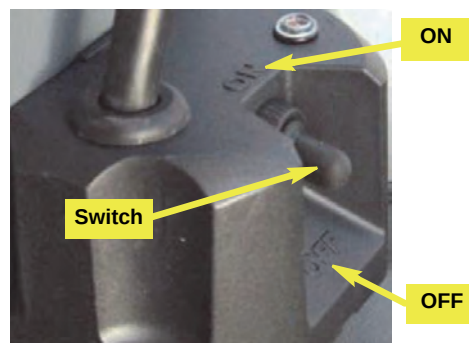


Figure 8a: Junction box ON/OFF switch - within easy reach of the operator

8. **Install and connect the electric steer junction box (continued).**

- c. Clip the junction box **L** into place on its bracket **M** (neither shown) then connect **L**'s 15-pin connector cable to the communications port on the steering wheel assembly (Figure 8b). Use clip **O** suitably (not shown).

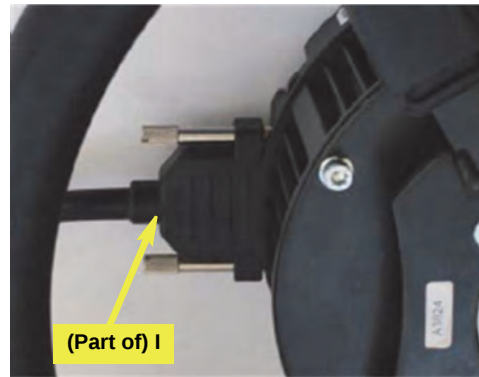


Figure 8b: Junction box comms cable connected to steering wheel assembly

- d. Connect the gray connector of the power cable **K** (routed into the cab at step 8a) to the gray cable from the junction box **L** (Figure 8c).

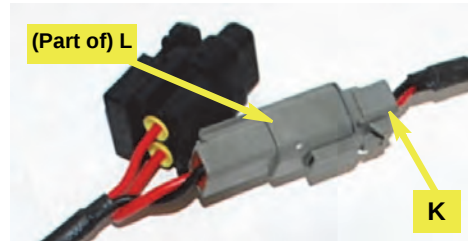


Figure 8c: Power cable to junction box cable

- e. Connect the threaded 5-pin connector on the CAN bus harness **TC** (eDriveTC) or **EO** (eDriveX) to either of the threaded connectors on the junction box **L**. Connect the CAN bus terminator **N** to the other threaded connector on the junction box (Figure 8d).

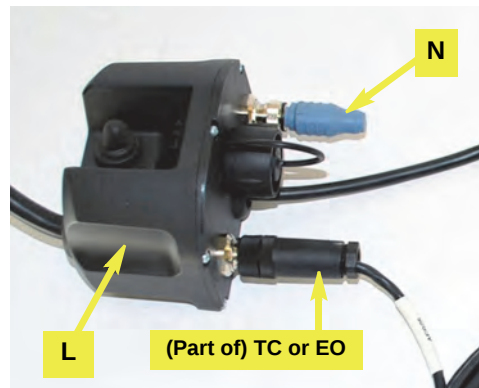


Figure 8d: CAN harness and terminator connected to junction box

- f. **eDriveTC:** Connect the two other connectors on CAN cable **TC** to the 'eDrive TC' (as labelled) and the terminal/receiver (Figure 8e-i).

eDriveX: Connect CAN cable **EO** to the eDriveX main cable's (**EA**) branch cable labelled 'STEERING CONTROLLER' (Figure 8e-ii - you will install **EA** in the next section).



Figure 8e-i: CAN cables to eDriveTC and terminal/receiver



Figure 8e-ii: CAN cable to eDriveX

Installation - Electronic Control Unit (ECU)

NOTE: The high precision guidance capability of eDriveX depends, in part, on the exact installation of the ECU as detailed in this section. For details on installing an eDriveTC, refer to “Installing the eDriveTC” in Chapter 2 of the *Outback eDrive User Guide*.



Before drilling (or using self-drilling screws) in the cab, make sure there is nothing that can be damaged by the drilling or any self-drilling screws used to secure the ECU mounting bracket. Secure anything that could be damaged away from where the screws come through. See Figure 1 for an example of a pre-drilling check; it shows an under-floor cabling compartment.

1. Install the ECU.

NOTE: Although measurements provide a good guide, ensure that when installed, the bracket will be perpendicular to the front of the machine (that is, parallel to the machine’s fore/aft centerline). Also, use a small level to set the bracket as level as possible - see step following.

- a. Position bracket **EJ** in the front right corner of the cab floor with its front and rear one-inch tabs $2\frac{1}{4}$ " and $4\frac{1}{4}$ " from the right side door respectively, and its front edge $5\frac{3}{4}$ " from the front pillar (Figure 1a).

NOTE: At the next step do not overtighten the self-drilling screws. Overtightening could cause the fastener to fail.

- b. Using hardware **EL** or **EM** (depending on the floor thickness - see warning above) fasten the bracket to the cab floor (Figure 1a). Use a small level (not shown) to check the level of the bracket. Adjust accordingly.
- c. Using hardware **EN**, attach ECU **EK**—its cable connectors rearward—to the inside face of bracket **EJ** (Figure 1b with inset).



Figure 1: Example pre-drilling check

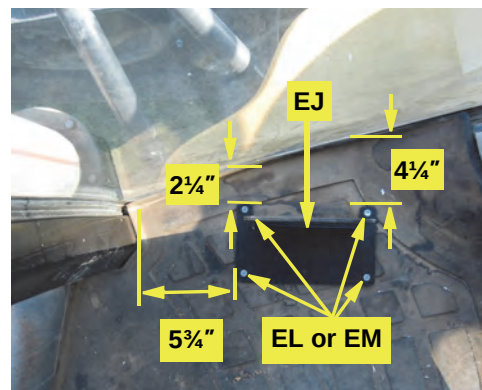


Figure 1a: ECU bracket installation

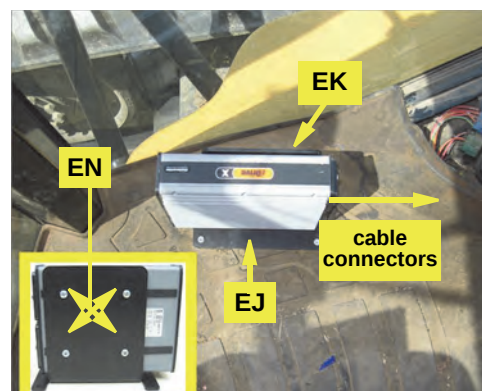


Figure 1b (with inset): Installed ECU

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 placed. See “Appendix B - eDriveX VSi Connections” on page 15. Use cable ties **EQ** as required.

- a. Connect main cable **EA** to ECU **EK** using an Allen wrench to secure the cable. The **EA** connector will only fit the ECU socket that is in line with the power and communications indicators at the opposite end of the ECU - the lower socket in this installation (Figure 2, and inset).
- b. Routing cables suitably, attach cable **EA**'s connector labeled ‘STEERING CONTROLLER’ to cable **EO** connected to the VSi junction box **I** (see step 8, page 11).
- c. Attach power switch **EI** to **EA**'s connector labeled ‘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 **EP** mounting it in the cab at the operator's preferred location.

NOTE: Set the switch to **OFF** before connecting **EA** to the battery at step e below.

- d. Connect CAN-PWR cable **EG** to **EA**'s open connection labeled ‘TERMINAL/RECEIVER’. Route the cable in the cab so that it is clear of any machine operation controls. Connect the opposite end of cable **EG** to the guidance terminal.

⚠ WARNING:

Ensure you have connected main cable **EA** to the ECU (step 2a above) and reconnected **EA**'s power cable (after routing in/out of the cab) before you connect to the machine's battery at the next step.

- e. Connect **EA**'s power cable to the machine's 12V battery and connect it.

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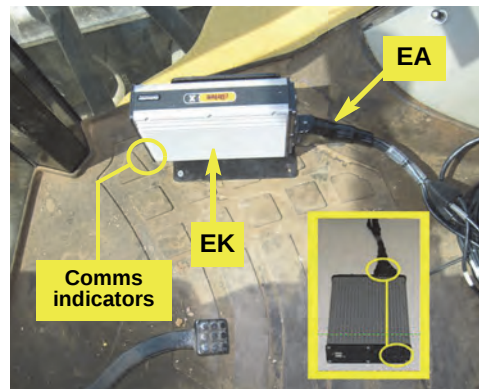
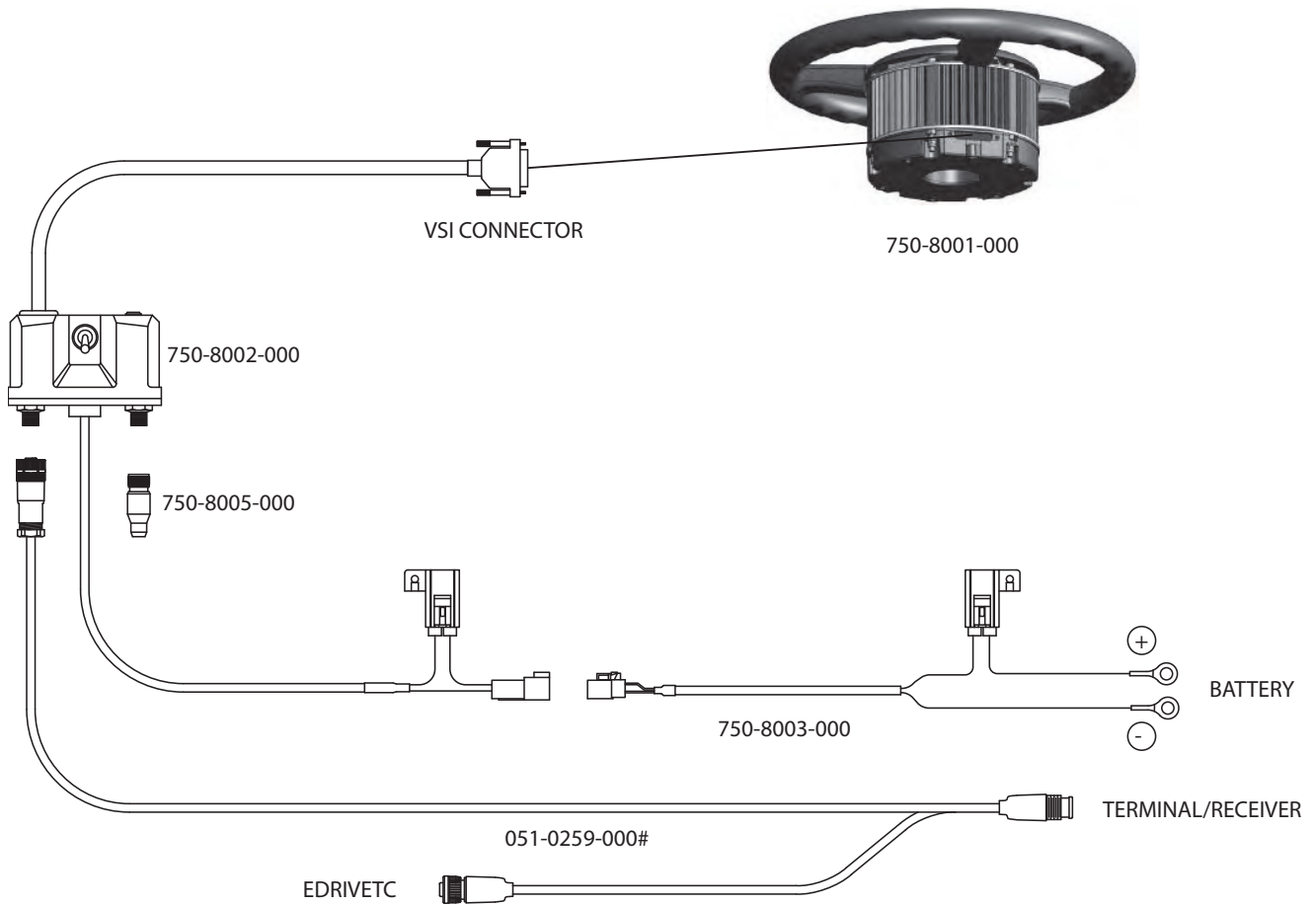


Figure 2 with inset: Main cable connected to ECU

Appendix A - eDriveTC VSi Connections



Appendix B - eDriveX VSi Connections

