

eDrive VSi Installation Guide

Kit: eDTC / eDX VSi - CATMTT-C

P/Ns 911-1027-000 (TC), 911-4024-000 (eDX)

Fits Caterpillar Challenger MT 700/800 C Series Track Tractor Models:

	745	755	765
835	845	855	865



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.

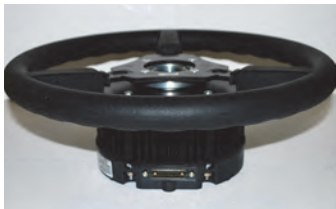
Before attempting to install any of the components:

- 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

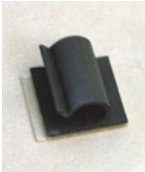
Unpack the supplied kit and identify the required parts as shown. Kit items, which are applicable to both VSi/eDriveTC and VSi/eDriveX installations, are referenced as A, B, C etc. with the item references being used in the step-by-step installation sections of this guide.

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 (Attach to A using E; attach to steering column using E and F)	
E		4	Bolt, M6 x 14, hex head	
		4	Washer, M6 spring	
		4	Washer, M6 plain	
			(Attach D to A and to F)	
F		2	Stand-offs (Mount D using E)	
G		1	Special nut, M18 (Attach A to steering shaft - replaces machine's original steering wheel nut)	
H		1	Steering wheel center cover	
I		1	Horn housing ring (Install in H)	

Kit Contents - eDriveTC and eDriveX (continued)

REF	PART NUMBER	QTY	DESCRIPTION	PHOTOGRAPH
J	750-8003-000	1	VSi power cable	
K	750-8002-000	1	VSi junction box	
L		1	Junction box K mounting bracket	
M	750-8005-000	1	CAN bus terminator	
N		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 051-0166 to battery)	
	806-1007-03A	1	ECU, eDriveTC	
	054-0044-003	1	Power cable, eDriveTC	
TC	051-0259-000	1	CAN bus harness, eDriveTC	

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: Items EB to EF are not used in this installation				
EG	054-0117-000	1	Power switch (Use EGa to mount if necessary)	
EGa	726-1093-000	1	Switch bracket (Mount EG, if necessary)	
EH	051-0166-000	1	CAN-PWR cable (Use EI to connect to battery)	
EI	054-0123-000	1	Battery terminal cable (Connect EH cable to battery)	
EJ	640-0091-000	1	ECU (EK) mounting bracket	
EK	806-1031-000	1	ECU, eDriveX	

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, eDriveX	
EP	677-2002	20	Tie straps, 7" releasable	

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).

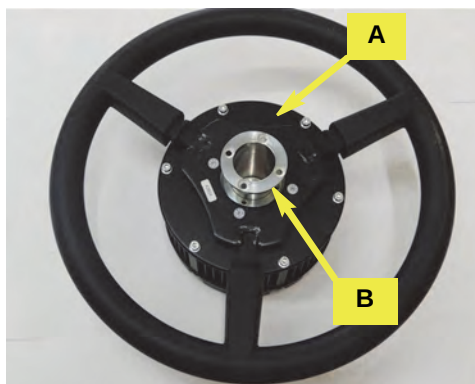


Figure 1a: Installing the shaft adapter

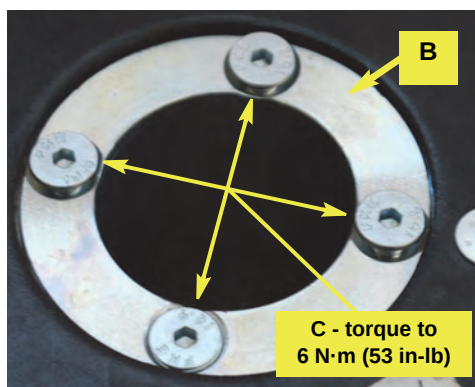


Figure 1b: Securing the shaft adapter

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



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

Turn the steering wheel assembly over and set the comms port toward you. Using hardware **E** through the two individual tabs (pointing inward) attach bracket **D** to the right side of the base of the steering wheel assembly. Do not fully tighten **E** yet.

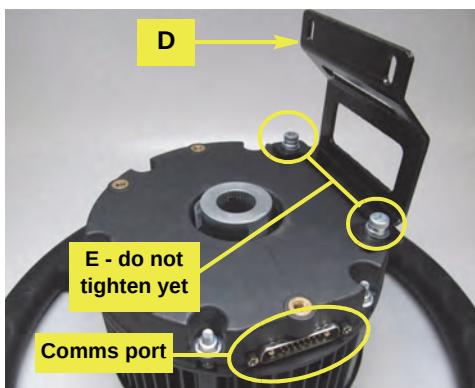


Figure 2: Anti-rotation bracket installed (do not tighten **E** yet). Comms port will be to the right of steering column when a/r bracket is mounted as shown and wheel assembly is installed.

3. Remove the horn switch and steering wheel.

Carefully remove the horn switch from the center of the steering wheel (Figure 3-a and inset). Disconnect the red horn wire and remove the horn switch and its spring. Remove the horn contact plate (3-b), 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 and horn contact plate but not the steering wheel nut.

4. Prepare the steering column.

Remove the four screws holding the steering column upper covers (Figure 4-a) and remove them to expose the steering column and shaft (4-b).

Remove one of the bolts in the combination switches mounting plate (4-c inset) and replace it with a stand-off **F**. With the first stand-off fully tightened, install the second one (4-c).

Place the rear (driver's side) cover over the stand-offs, measure/mark the stand-off locations then drill two clearance holes for the stand-offs (4-d inset). Refit and secure the column covers (4-d).

5. Install the VSi steering wheel assembly.

NOTE: In Figures 5a and 5b, the column covers have not been refitted. Install your steering wheel assembly and secure your anti-rotation bracket as described and shown, but with the column covers already refitted.

- Apply a small amount of an anti-seize compound (not supplied) to the splines of shaft adapter **B** (Figure 5a top left inset). Thread the horn wire up through the wheel assembly, then carefully align the adapter splines with those on the steering shaft and slide the steering wheel assembly onto the shaft (Figure 5a). Guide bracket **D** over the column cover and protruding stand-offs **F** and loosely attach it using hardware **E**.

Passing the horn wire through it, use special nut **G**, to secure the steering wheel (Figure 5a top right inset).

NOTE: Torque special nut **G** to the machine manufacturer's specification.



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

- Tighten hardware **E**—in the base of the wheel assembly first, then in the stand-offs **F**—to 5 N·m (44 in-lb) (Figure 5b).



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

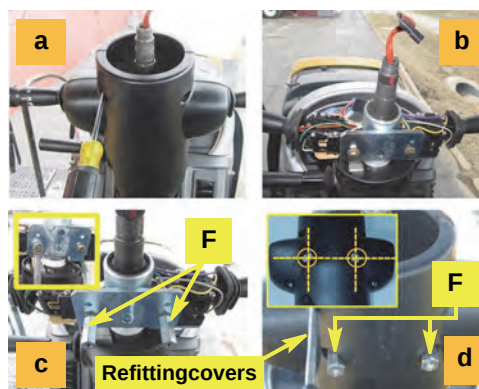


Figure 4 with insets: Column preparation

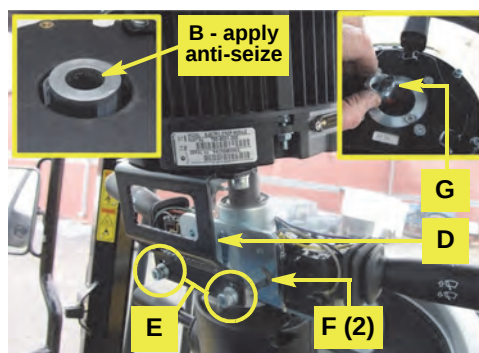


Figure 5a with insets: Installing the steering wheel assembly (refitted column covers not shown - see Figure 4-d and NOTE before step 5a)

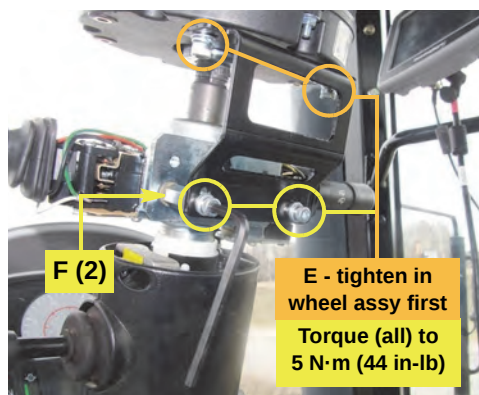
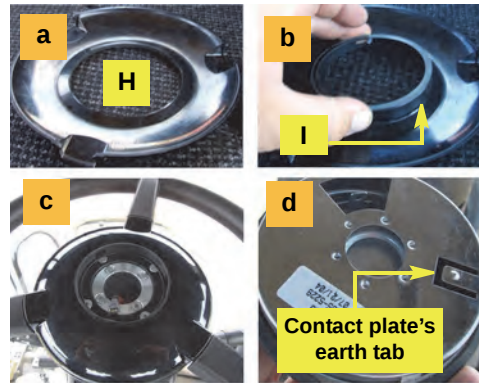


Figure 5b: Securing the anti-rotation bracket (refitted column covers not shown - see Figure 4-d and NOTE before step 5a)

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

- a. Place the steering wheel center cover **H** face down on a protective surface (Figure 6a-a). Insert the horn housing ring **I** into **H** (6a-b) then install the cover on the steering wheel (6a-c).

Bend the horn contact plate's earth tab down (to about 45°) so that when the horn switch/contact plate is installed, the tab will be in contact with the top of steering shaft adapter **B** (6a-d).



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

- b. Reconnect the horn wire to the horn switch and press the switch assembly down into the horn housing ring **I** until it clicks into place (Figure 6b and inset).

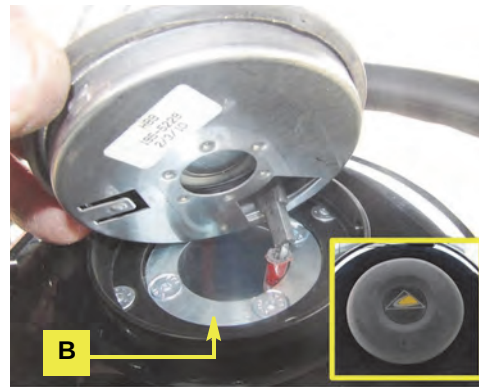


Figure 6b with inset: Installing the horn switch

7. **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 **J** from the battery into the cab to where you will mount the junction box **K** at steps 7b and 7c. 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 junction box **K** is within easy reach of the operator. See Figure 7a. 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 **L** (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.

- c. Clip the junction box **K** into place on its bracket **L** (neither shown) then connect **K**'s 15-pin connector cable to the communications port on the steering wheel assembly (Figure 7b). Use clip **N** suitably (not shown).

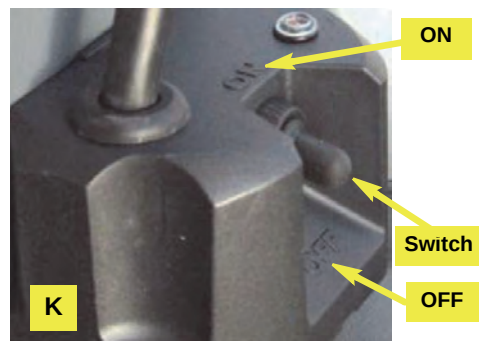


Figure 7a: Junction box ON/OFF switch - within easy reach of the operator

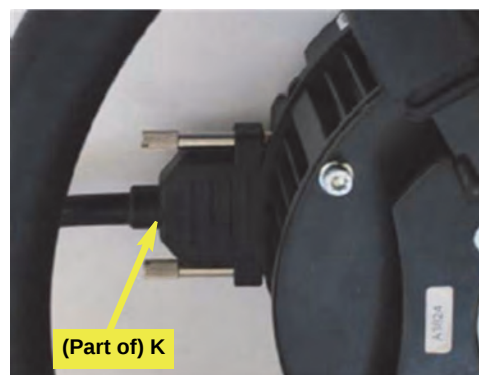


Figure 7b: Junction box comms cable connected to steering wheel assembly

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

- d. Connect the gray connector of the power cable **J** (routed into the cab at step 7a) to the gray cable from the junction box **K** (Figure 7c).

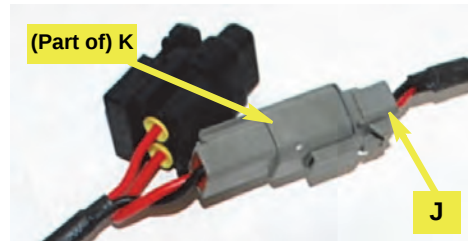


Figure 7c: Power cable to junction box cable

- 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 **K**. Connect the CAN bus terminator **M** to the other threaded connector on the junction box (Figure 7d).

- f. **eDriveTC:** Connect the two other connectors on CAN cable **TC** to the 'eDrive TC' (as labeled) and the terminal/receiver (Figure 7e-i).

eDriveX: Connect CAN cable **EO** to the eDriveX main cable's (**EA**) branch cable labeled 'STEERING CONTROLLER' (Figure 7e-ii—you will install **EA** in the next section).

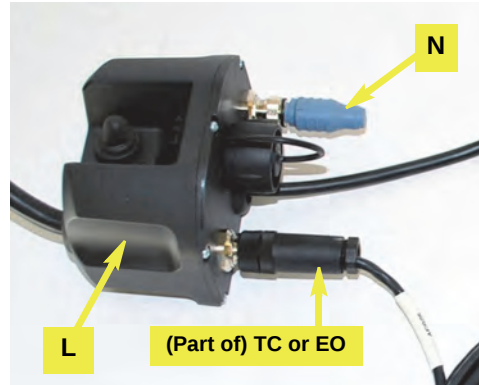


Figure 7d: CAN harness and terminator connected to junction box



Figure 7e-i: CAN cables to eDriveTC and terminal/receiver



Figure 7e-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 (Figure 1a):

- Its front and rear one-inch tabs $2\frac{1}{4}"$ and $4\frac{1}{4}"$ from the right side door respectively
- Its front edge $5\frac{3}{4}"$ from the front pillar

NOTE:

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

- b. Using self-drilling screws **EL** or **EM** (depending on the floor thickness - see warning above) fasten **EJ** to the cab floor (Figure 1a). Use a small level (not shown) to check the level of the bracket. Adjust accordingly.
- c. Using screws **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

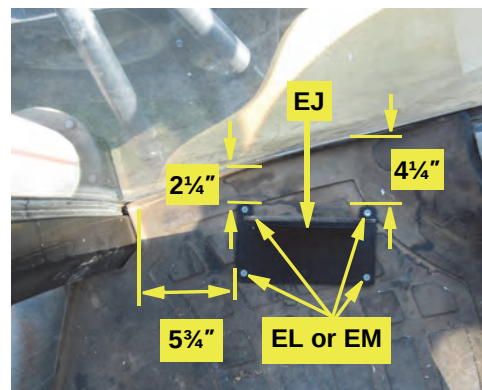


Figure 1a: ECU bracket installation

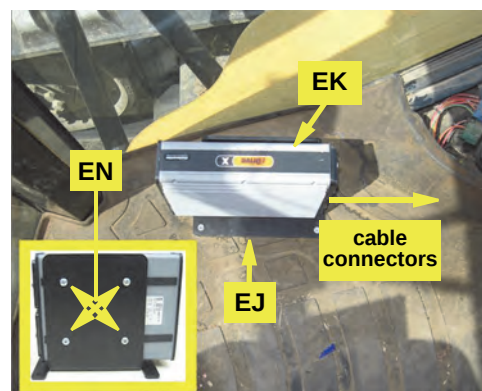


Figure 1b (with inset): Installed ECU

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 **EP** 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 **EK** (see **eDriveX** step 7f, page 11).
- c. Attach power switch **EG** to **EA**’s connector labeled ‘SWITCH’. Some machines are equipped with pop out tabs that you can remove and replace with switch **EG**. If no tab is available, you can use bracket **EGa** mounting it in the cab at the operator’s preferred location.

NOTE:

*Set switch **EG** to OFF before connecting **EA** to the battery at step f below.*

- d. Install CAN-PWR cable **EH** between **EA**’s open connection labeled ‘TERMINAL/RECEIVER’ and the guidance terminal. Route the cable in the cab so that it is clear of any machine operation controls.
- e. Install battery terminal cable **EI** between **EH**’s remaining connector and the machine’s 12V battery.

⚠ 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.*

- f. Route **EA**’s power cable to the machine’s 12V battery and connect it.

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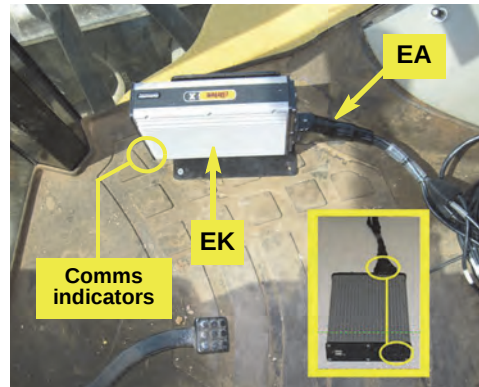
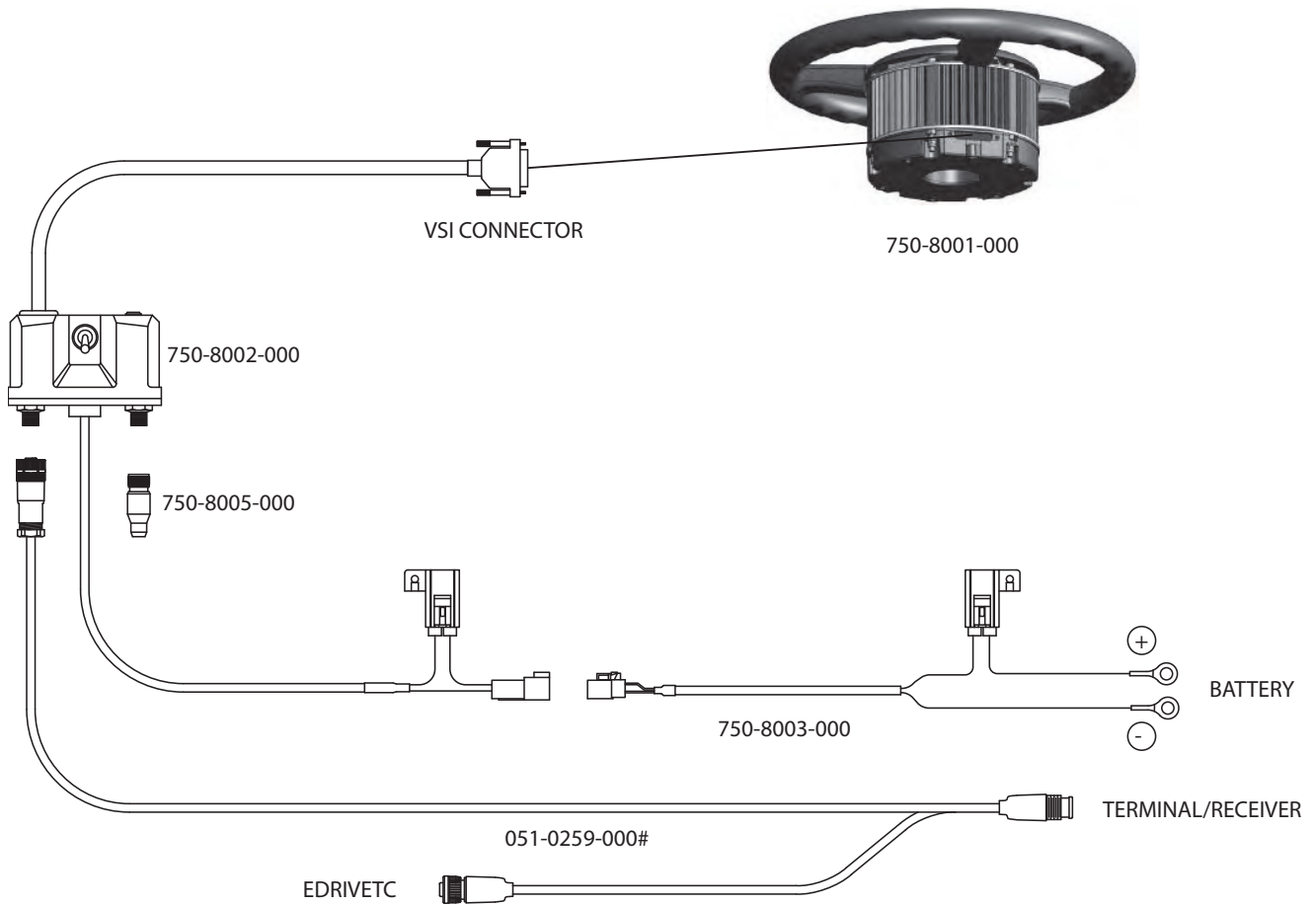


Figure 2 with inset: Main cable connected to ECU

Appendix A - eDriveTC VSi Connections



Appendix B - eDriveX VSi Connections

