INSTALLATION INSTRUCTIONS

Autopilot™ Automated Steering System

Kubota ▪ GX Series

(Excluding the Power Crawler)

Version 5.00
Revision A
October 2012
Part number 54035-117-E05

Trimble

Legal Notices

Agriculture Business Area

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Reorient or relocate the receiving antenna.
– Increase the separation between the equipment and the receiver.
– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
– Consult the dealer or an experienced radio/TV technician for help.
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c/o Menlo Worldwide Logistics
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5521 DZ Eersel, NL

Safety Information

Always follow the instructions that accompany a Warning or Caution. The information they provide is intended to minimize the risk of personal injury and/or damage to property. In particular, observe safety instructions that are presented in the following format:

WARNING – This alert warns of a potential hazard, which, if not avoided, can cause severe injury.

CAUTION – This alert warns of a hazard or unsafe practice which, if not avoided, can cause injury or damage.

Note – *An absence of specific alerts does not mean that there are no safety risks involved.*

Warnings

WARNING – When you are working on the vehicle's hydraulic systems, vehicle attachments that are suspended can drop. If you are working around the vehicle, you could suffer serious injury if an attachment dropped on you. To avoid this risk, lower all vehicle attachments to the ground before you begin work.

WARNING – If someone else attempts to drive the vehicle while you are working on or under it, you can suffer serious or fatal injuries. To avoid this possibility, install a lockout box on the battery terminal to prevent the battery from being reconnected, remove the key from the vehicle's ignition switch, and attach a "Do not operate" tag in the cab.

WARNING – Agricultural chemicals can pose serious health risks. If the vehicle has been used to apply agricultural chemicals, steam clean the vehicle to remove any chemical residue from the areas of the vehicle where you will be working.

WARNING – Vehicle cabs can be quite high in the air. To avoid potentially serious injury through falling from this height, always use the steps and handrails, and face the vehicle, when you enter or exit it.

Cautions

CAUTION – When the vehicle has been running, parts of the vehicle, including the engine and exhaust, can become extremely hot and can cause serious burns. To avoid burns, allow hot machine parts to cool before you begin working on them.

CAUTION – The system installation may bring you into contact with chemical substances, such as oil, which can cause poisoning. Wash your hands thoroughly after you finish working on the system.

CAUTION – Battery posts, terminals, and related accessories contain lead and lead compounds, which can cause serious illness. To avoid ingesting lead, wash your hands thoroughly after touching the battery.

CAUTION – Always wear protective equipment appropriate to the job conditions and the nature of the vehicle. This includes wearing protective glasses when you use pressurized air or water, and correct protective welder's clothing when welding. Avoid wearing loose clothing or jewelry that can catch on machine parts or tools.

CAUTION – Parts of the vehicle may be under pressure. To avoid injury from pressurized parts, relieve all pressure in oil, air, and water systems before you disconnect any lines, fittings, or related items. To avoid being sprayed by pressurized liquids, hold a rag over fill caps, breathers, or hose connections when you remove them. Do not use your bare hands to check for hydraulic leaks. Use a board or cardboard instead.

CAUTION – Do not direct pressurized water at:
- electronic or electrical components or connectors
- bearings
- hydraulic seals
- fuel injection pumps
- any other sensitive parts or components



Set the hose pressure as low as practicable, and spray at a 45° to 90° angle. Keep the nozzle of the power washer away from the machine at the distance recommended by the manufacturer.

CAUTION – To prevent damage to the system, make sure that no wires or hoses interfere with or catch on any mechanical linkages, or contact any machine parts that get hot.

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CHAPTER 1

Introduction

In this chapter:

- Technical assistance
- Manual system upgrade to Autopilot
- Required components
- Autopilot hardware organization: As shipped
- Preparing the vehicle for installation

This manual describes how to install the Trimble® Autopilot™ automated steering system.

Even if you have used another GNSS (Global Navigation Satellite System), such as the United States' GPS (Global Positioning System), before, spend some time reading this manual to learn about the special features of this product. If you are not familiar with GNSS, go to the Trimble website (www.trimble.com) for an interactive look at Trimble and GNSS.

Technical assistance

If you have a problem and cannot find the information you need in the product documentation, contact Trimble technical support:

1. Go to the Trimble website (www.trimble.com).
2. Click the Support & Training link at the top of the screen, select Support and then select Support A–Z list of products.
3. Scroll to the bottom of the list.
4. Click the submit an inquiry link. A form appears.
5. Complete the form and then click Send.

Manual system upgrade to Autopilot

CFX-750 display and FmX integrated display

Retain	Remove
CFX-750™ display: P/N 94000-xx	
Power cable CFX-750 display: P/N 77282	
FmX® integrated display: P/N 93100-xx	
Power cable FmX display: P/N 66694	
Antenna for display: P/N 60600-02 (DGPS) or 77038-00 (OmniStar/RTK)	
Antenna to receiver cable: P/N 50449	
Basic cable (both displays): P/N 67258	

Required components

Kits required	Special tools
Platform kit: P/N 54035-117	Drill
Hydraulic hose kit: P/N 89959	5/16'' drill bit
	3/8-16 tap
	2" hole saw

Antenna mounting kits

Kits required
Antenna V plate mount and AG-372 receiver magnetic mount: P/N 62388-01 (includes magnets for quick release of the receiver – see Chapter 4, Antenna/Receiver Installation).

Accessory kit

Accessory options
Remote engage switch assembly – standard Euro: P/N 57227-10
Remote engage switch assembly – full Euro: P/N 57227-20
Remote engage foot pedal: P/N 57259

Autopilot hardware organization: As shipped

Hardware	Component	See...
Platform kit: P/N 54035-117	Hydraulic valve	Chapter 2
	Hydraulic manifold	
	Transducer flow switch	
	Manual override cable	
	Hydraulic brackets and bolt kits	
	Hydraulic valve cable	
	Autosense™ steering device and cabling	Chapter 3
	Autosense mounting bracket and hardware	
	Power switch	Chapter 6
	Bolt kit controller	Chapter 8
Hydraulic hose kit: P/N 89959	Hydraulic hoses	Chapter 2
	Hydraulic adaptors	
Roof bracket kit: P/N 53676	Roof brackets	Chapter 4
	Bolt kit, roof bracket	
GNSS receiver	GNSS receiver	Chapter 4
	GNSS antenna	
	GNSS receiver power/data cable	
	RTK radio, cable, and radio antenna	
Display	CFX-750 display	Chapter 5
	FmX integrated display	
	Display cable	
	Mounting bracket	
Common parts	Controller	Chapter 8
	Controller mounting bracket	
	Cable kit: Main wiring harness Power bus auxiliary wiring harness Sonalert alarm	

Preparing the vehicle for installation

Note – *The left and right sides of the vehicle are referenced while standing behind the unit, facing the normal direction of travel.*

1. Park the vehicle on a hard, level surface. Block the front and rear wheels.
2. Align the steering straight ahead. On an articulated vehicle, install the articulation locks.
3. Remove all dirt and debris from the areas of the vehicle where the Autopilot system will be installed.
4. Open all kit boxes and check the contents of the box against the packing list/s. Lay all of the parts out on a clean workbench

CHAPTER 2

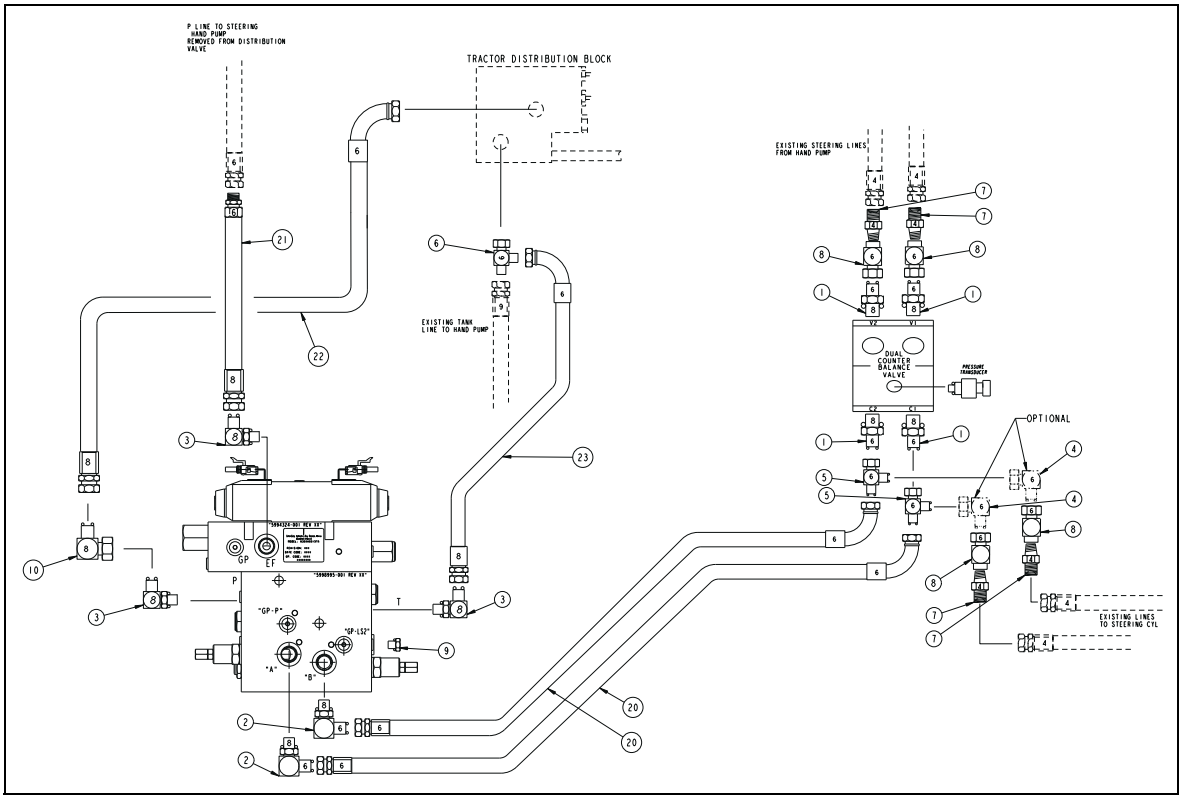
Hydraulic Control Valve Installation

In this chapter:

- Hydraulic control valve components
- Prepare the Autopilot manifold, sandwich block, and control valve
- Checking the hydraulics

This chapter describes how to install the hydraulic control valve and hoses.

Hydraulic control valve components



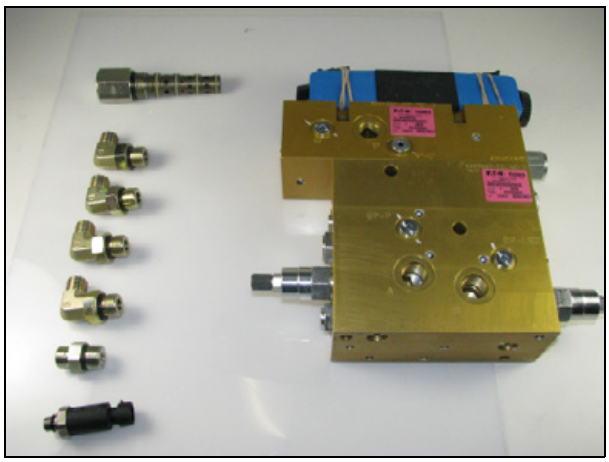
Item	Description	P/N
1	Fitting (4)	6-8 FSOLO
2	Fitting (2)	6-8 CSOLO
3	Fitting (3)	8 CSOLO
4	Fitting (2)	6 C60LO
5	Fitting (2)	6 R6LO
6	Fitting	6 R6MK4
7	Fitting (4)	4-4FMK4S

Item	Description	P/N
8	Fitting (4)	6G6L-S
9	Fitting (4)	4HP50N
10	Fitting (4)	8 C60LO
20	24” hose (2)	451TCJSJ9-06-06-06-24
21	24” hose (2)	451TCJSD9-08-06-06-24
22	24” hose (2)	451TCJSB2-08-06-06-24
23	24” hose (2)	451TCJSB2-08-06-06-24

Prepare the Autopilot manifold, sandwich block, and control valve

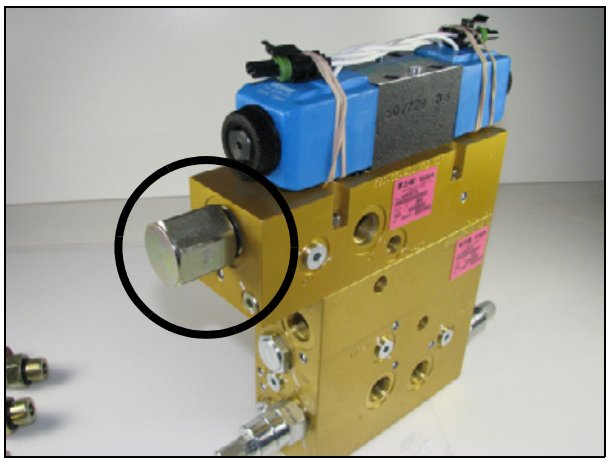
Step 1

On a clean work surface gather the Autopilot manifold and all of the fittings that will be attached to the manifold.



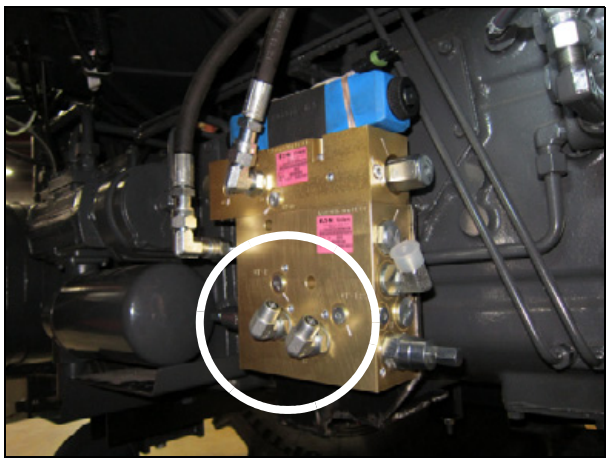
Step 2

Insert the provided PFRD cartridge labeled **PFRD-12-U-0-000-110-00** into the port shown on the Autopilot manifold.



Step 3

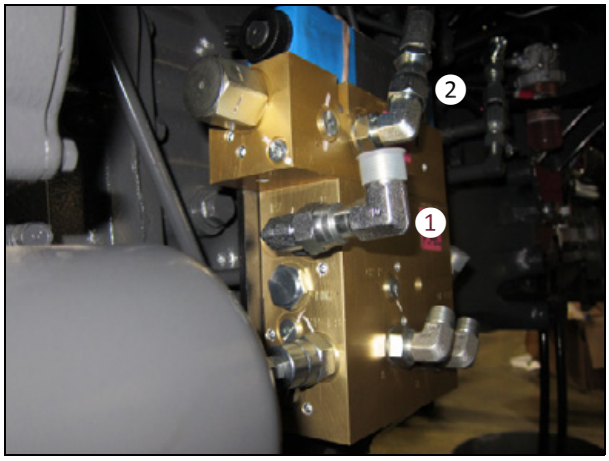
Insert the provided -8ORB-6ORS 90° fittings into the A and B ports of the manifold. Orient the fittings approximately as shown.



Step 4

Insert the provided -8ORB-8ORS 90° fittings into the P (1) and EF (2)ports of the Autopilot manifold. Orient the fittings approximately as shown.

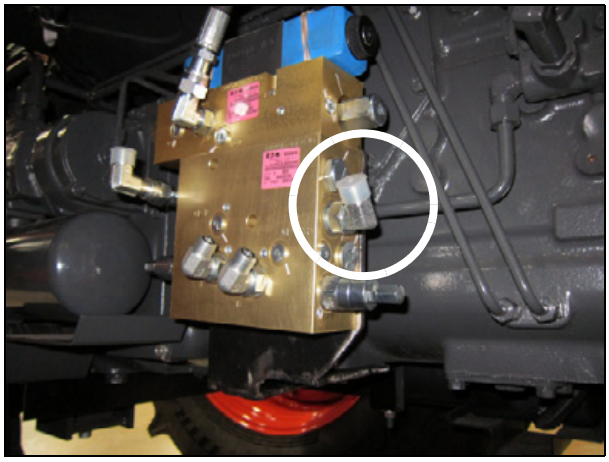
Install the provided -8 ORS swivel 90° fitting on the previously installed fitting on the P port of the manifold.



Step 5

Insert the provided -8ORB-8ORS 90° fittings into the T port of the manifold.

Orient the fittings approximately as shown.



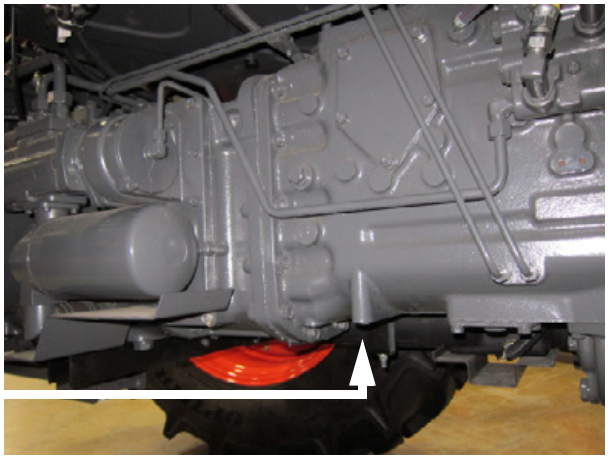
Step 6

The Autopilot manifold will be located along the side of the machine under the cab behind the stairs.



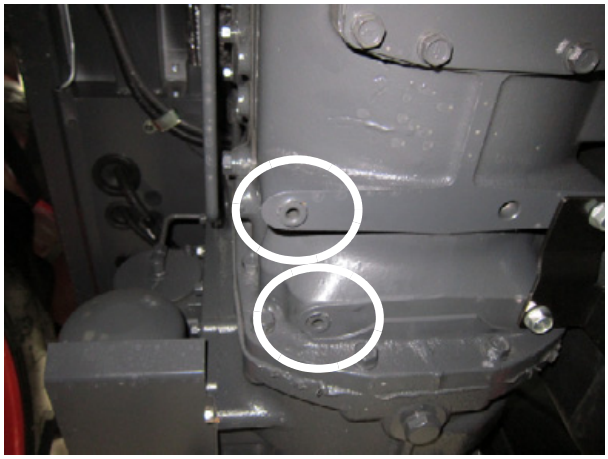
Step 7

Install the manifold bracket using the bolts on the bottom of the machine.



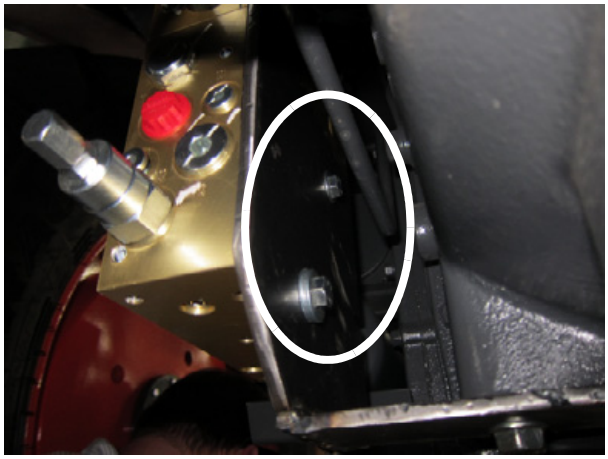
Step 8

Remove the plastic plugs in the holes shown so that you can install the manifold bracket.



Step 9

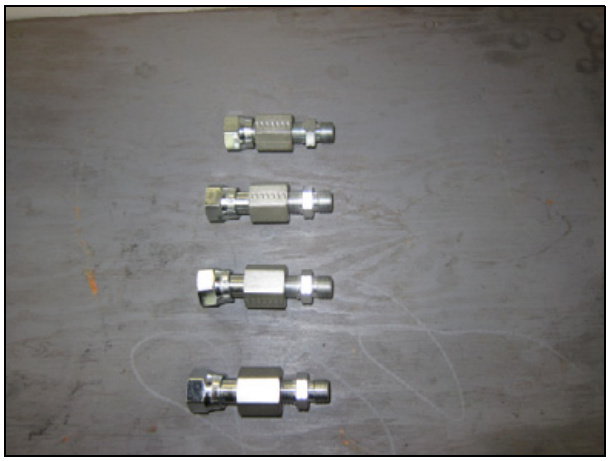
Use the provided 3/8" bolts to attach the manifold to the manifold bracket.



Preparing the Dual Counter Balance Valve (DCBV)

Step 1

Assemble the adapter fittings (items 8 and 9 in Hydraulic control valve components, page 8. Use anti-seize or thread sealant to fit them together.



Step 2

Insert the -8ORB-6ORS fittings into the V1 and V2 ports.



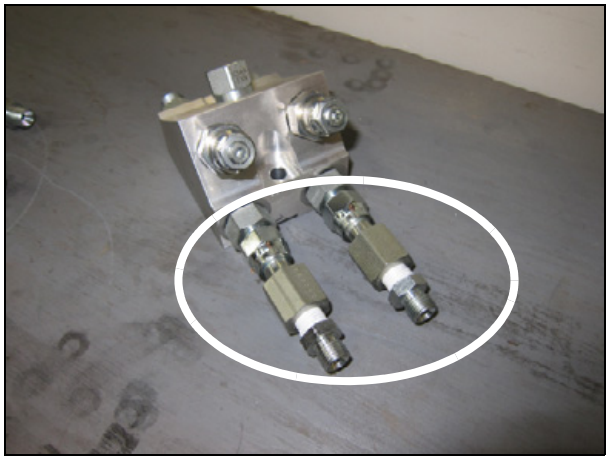
Step 3

Insert the -8ORB-6ORS fittings into the C1 and C2 ports.



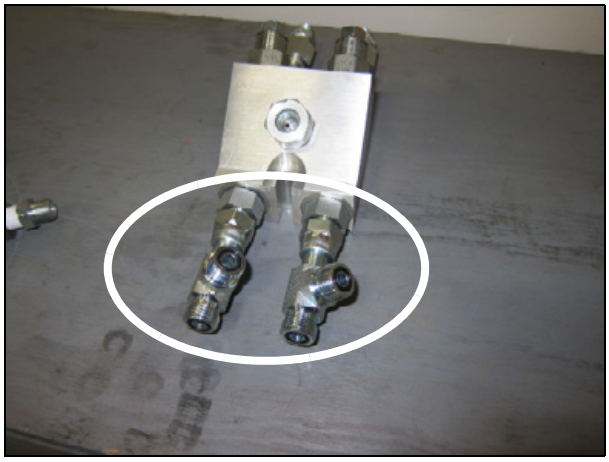
Step 4

Attach the adapter fittings to the straight fittings in the V1 and V2 ports.



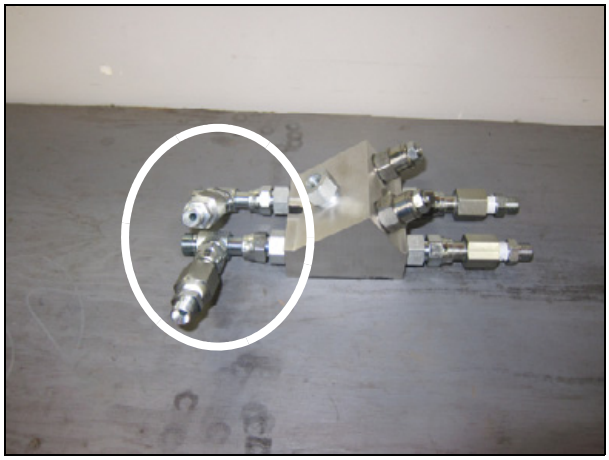
Step 5

Attach the run tee fittings to the C1 and C2 straight fittings.



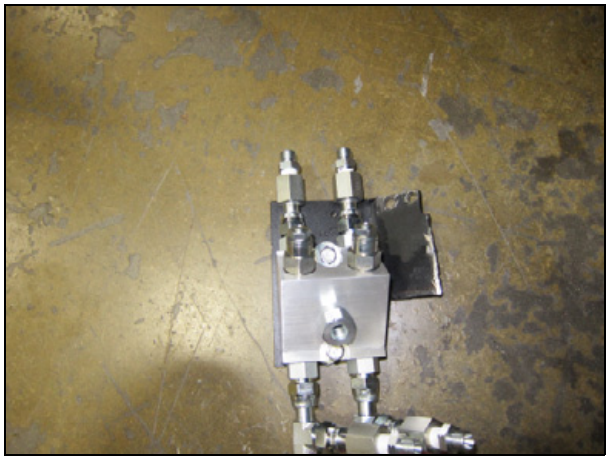
Step 6

Attach an adapter fitting to a branch of each run tee fitting on the C1 and C2 ports.



Step 7

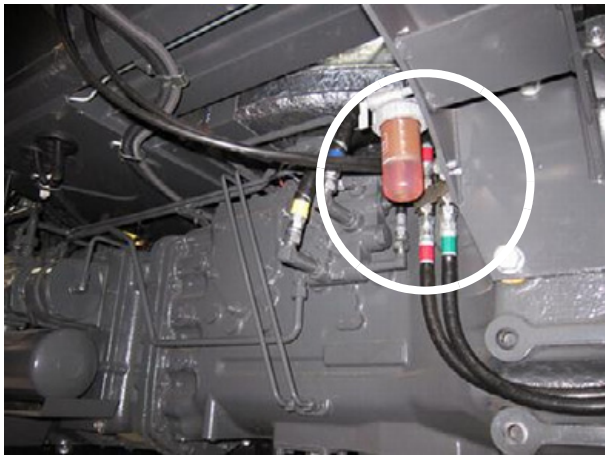
Use the provided ¼" hardware to attach the DCBV and fittings to the DCBV bracket.



Attaching the DCBV to the machine

Step 1

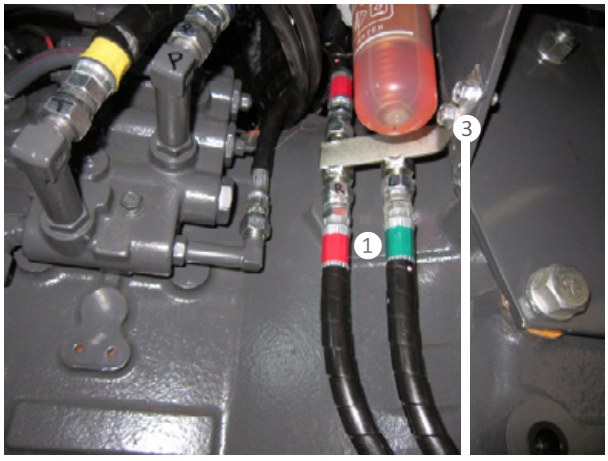
To install the DCBV, you must disconnect the existing steering lines and then remove the existing coupler.

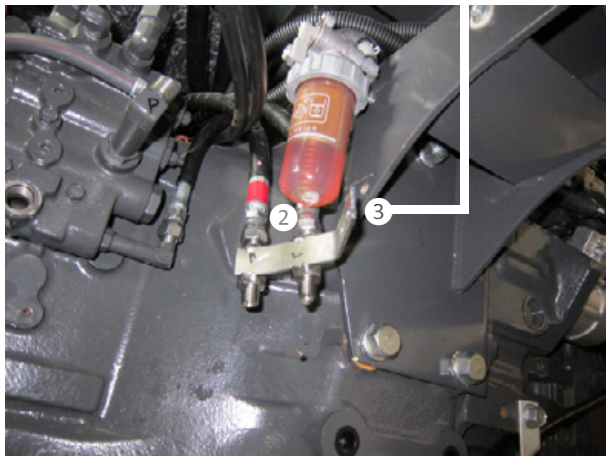


Disconnect the lower red and green labeled lines from the coupler ❶.

Disconnect the upper red and green labeled lines from the coupler ❷.

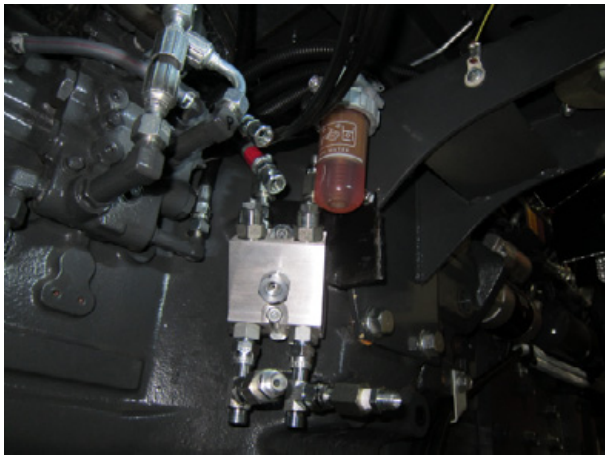
Remove the two coupler mounting bolts ❸.





Step 2

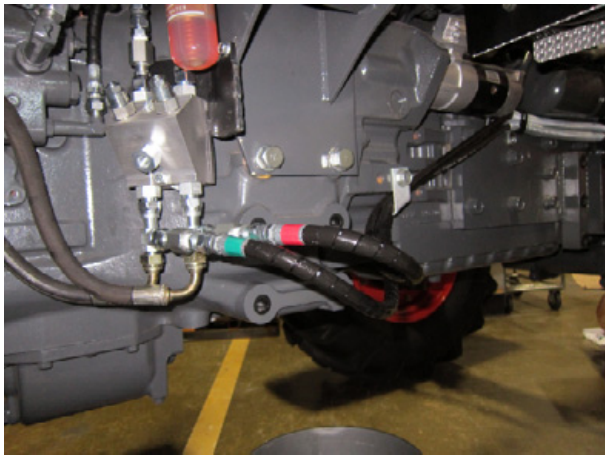
Attach the DCBV to the machine in this location using the two mounting bolts previously removed.



Step 3

Connect the upper red line to the DCBV V2 port.

Connect the upper green line to the DCBV V1 port.



Step 4

Connect the 90° end of the A line to the DCBV C1 port. Route the line to the A port of the Autopilot manifold.

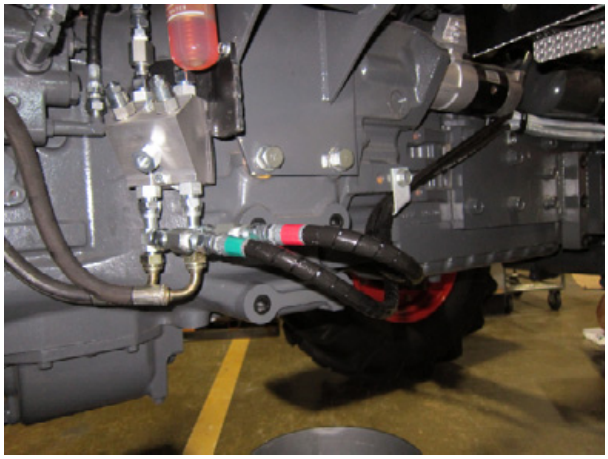
Connect the 90° end of the B line to the DCBV C2 port. Route the line to the B port of the Autopilot manifold.



Step 5

Connect the lower red line to the DCBV C2 port.

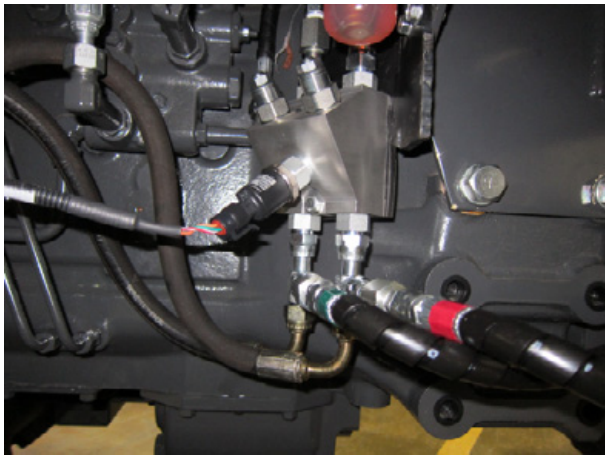
Connect the lower green line to the DCBV C1 port.



Step 6

Attach the manual override pressure transducer to the port on the DCBV.

Connect the wires on the pressure transducer and route them to the NavController II harness inside the machine.

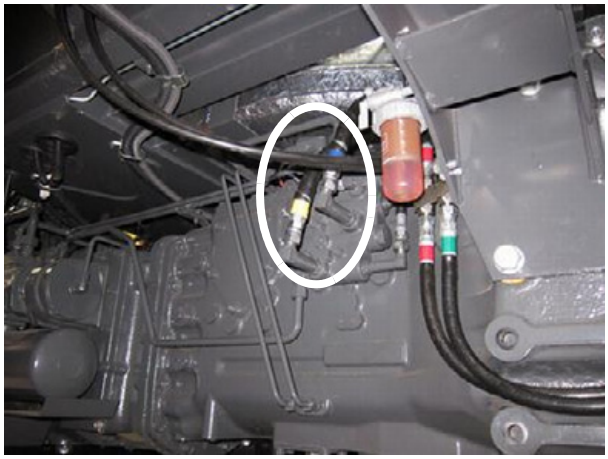


Connecting the hydraulic lines

This section describes how to connect the hydraulic lines to the Autopilot manifold and to the machine.

Step 1

Locate the pressure and tank lines on the machine—these are identified as the blue pressure line and the yellow tank line.



Step 2

Disconnect the blue pressure line from the machine.



Step 3

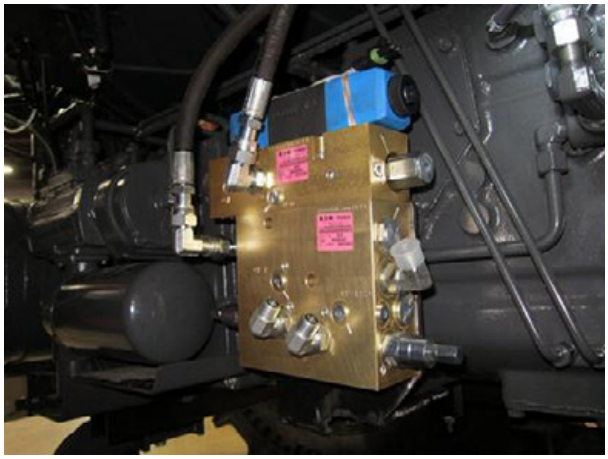
Connect the male end of the EF line to the hose that was removed from the pressure port on the machine.

Route the hose to the Autopilot manifold EF port.



Step 4

Connect the female end of the EF line to the 90° fitting on the EF port of the Autopilot manifold.



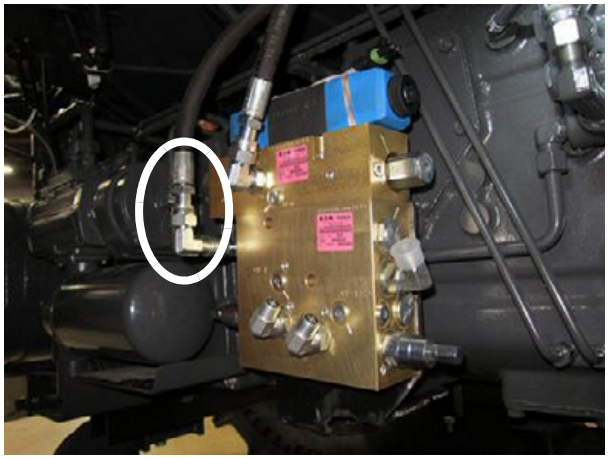
Step 5

Connect the 90° end of the P line to the P port on the machine. Route the line to the P port on the Autopilot manifold.



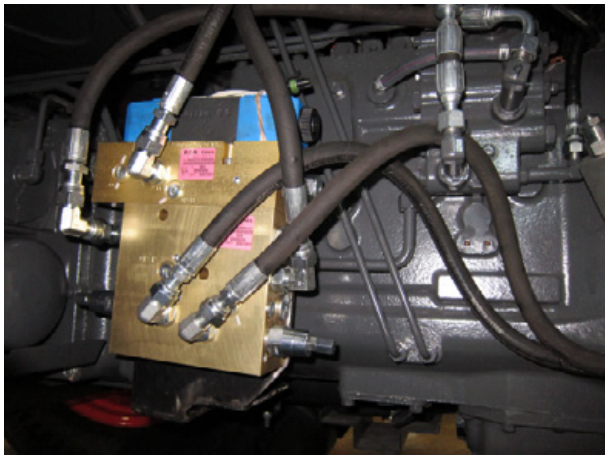
Step 6

Connect the straight end of the P line to the swivel 90° fitting on the P port of the Autopilot manifold.



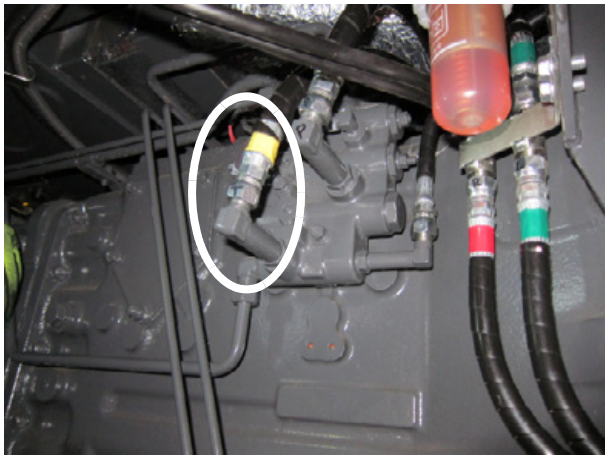
Step 7

Connect the straight ends of the A and B lines (previously attached to the DCBV), to the fitting and to the A and B ports of the Autopilot manifold.



Step 8

Disconnect the existing yellow tank hose from the tank port on the machine.



Step 9

Install the provided run tee fitting and then reinstall the yellow tank hose to the end of the run tee fitting.



Step 10

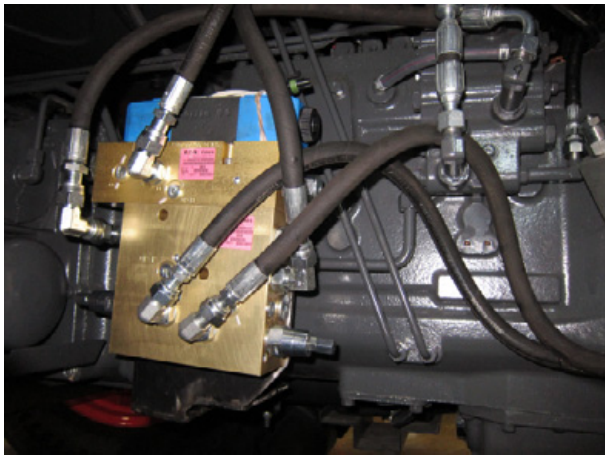
Connect the 90° end of the T line to the branch of the run tee fitting on the T port of the machine.

Route the T hose to the Autopilot manifold T port.



Step 11

Connect the T line to the T port of the Autopilot manifold.



Step 12

Connect the valve cabling to the Autopilot manifold valve and then route the cable to the harness on the NavController II.



Checking the hydraulics

1. Make sure that all the hydraulic connections are tight.
2. Check the oil level in the hydraulic tank. If necessary, top it up.
3. Check for hydraulic leaks. Connect the battery and then start the machine. Once you complete the leak check, disconnect the battery.

CHAPTER 3

Autosense Steering Device Installation

In this chapter:

- Autosense steering device components
- Installing the Autosense device
- Preparing the harness: P/N 54602 Rev C

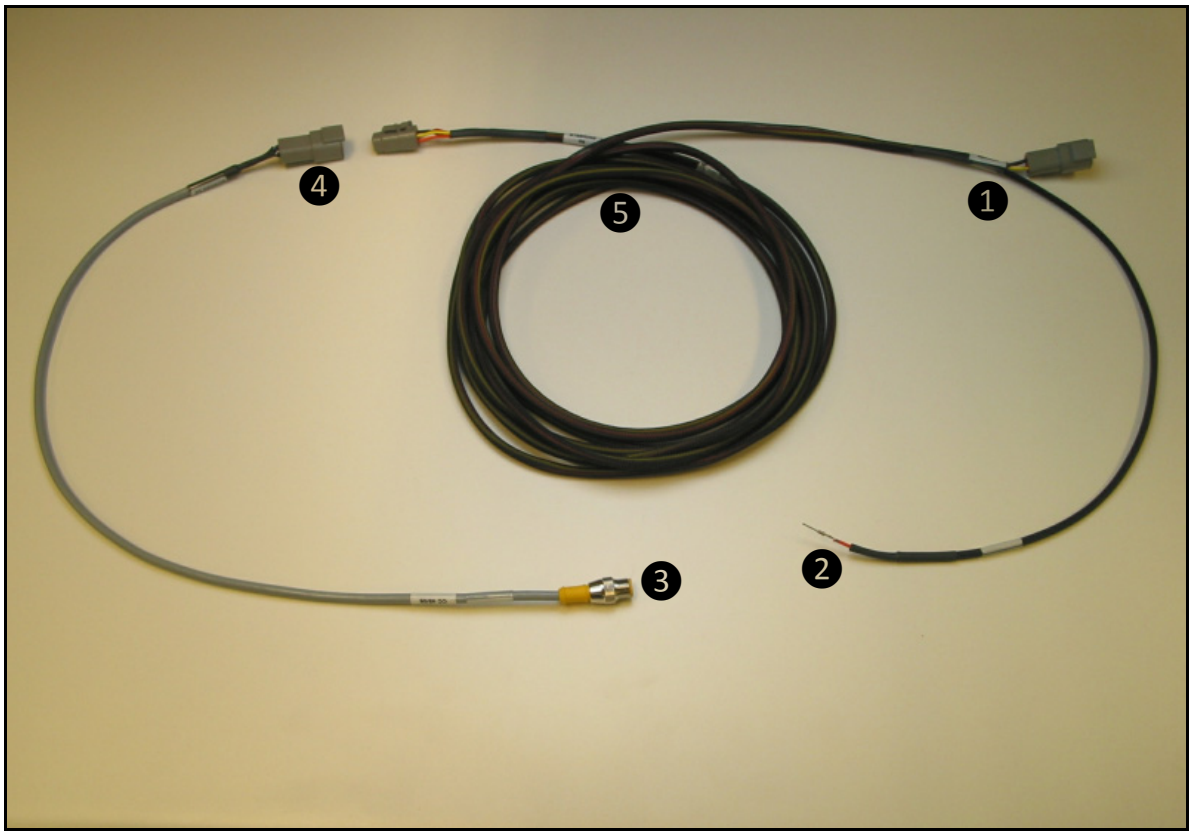
This chapter describes how to install the Autosense™ steering device. If the required mounting location is not accessible, chose a different place. To ensure proper function, the Autosense device must be located where it is free of obstructions and can rotate with the wheels when they turn.

On articulated vehicles, mount the Autosense device on the opposite side of the pivot point to the Autopilot controller.

Mount the device base down or base up so that it maintains a level orientation. Do not mount it on its side. An angle of up to 10° in any direction is acceptable.

To avoid stretching the cable, leave adequate length on the service loop.

Autosense steering device components



Item	Description	P/N
❶	P-6 connector	
❷	Power connector	
❸	Autosense connector	
❹	Jumper cable	57560
❺	Autosense steering cable	57885

Installing the Autosense device

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

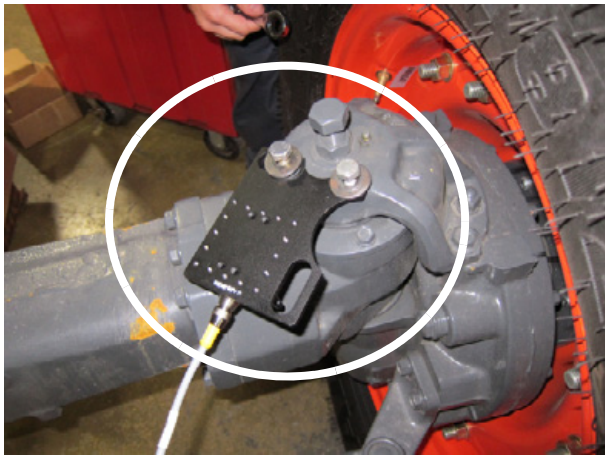
Step 1

The Autosense sensor will be installed at the right front of the machine.



Step 2

Attach the sensor to the sensor mounting bracket and then attach the mounting bracket to the machine using the provided m10 bolts.



Step 3

If the machine has a fender, mount the sensor so that it sits under the bracket.

In all other installations, mount the sensor with the label upward. If you do this, you must modify the sensor through the machine configuration menu in Autopilot toolbox software or on the FMX display.



Step 4

Connect the cabling to the sensor and then route the cabling to the NavController II harness.

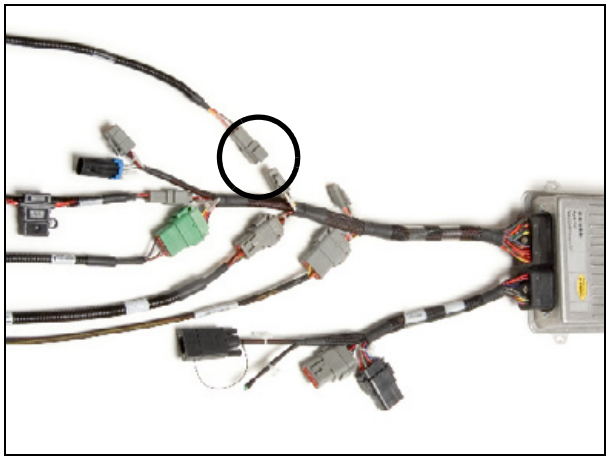
Make sure that the cabling is not pinched or pulled and does not contact any moving components as the wheels are steered full left to full right.



Step 5

Plug the steering sensor cable to P-6 on the Autopilot controller main wiring harness.

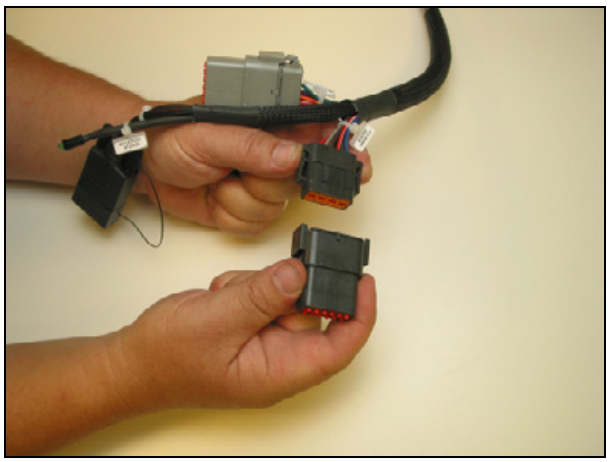
The P6 connector is labeled **Steering Sensor**.



Preparing the harness: P/N 54602 Rev C

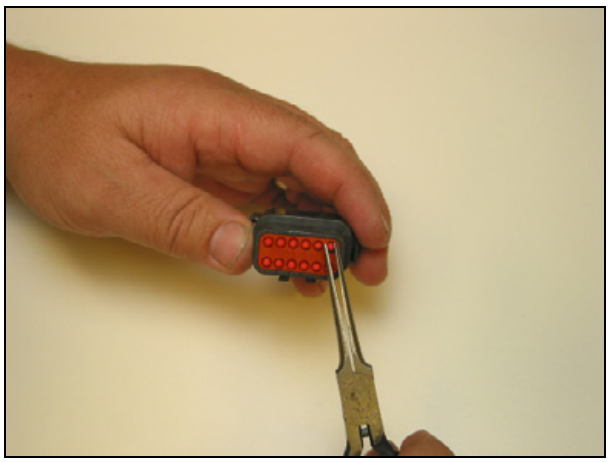
Step 1

Remove the black Deutsch DTM receptacle from the P-13 sensors leg of the auxiliary harness. See Chapter 8, Controller Installation.



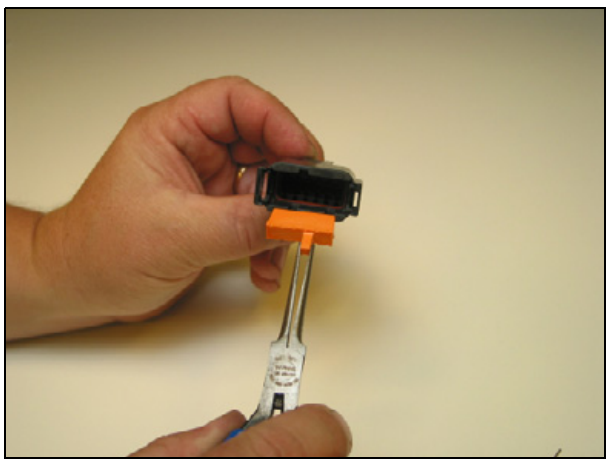
Step 2

Remove the plug from cavity number 1.



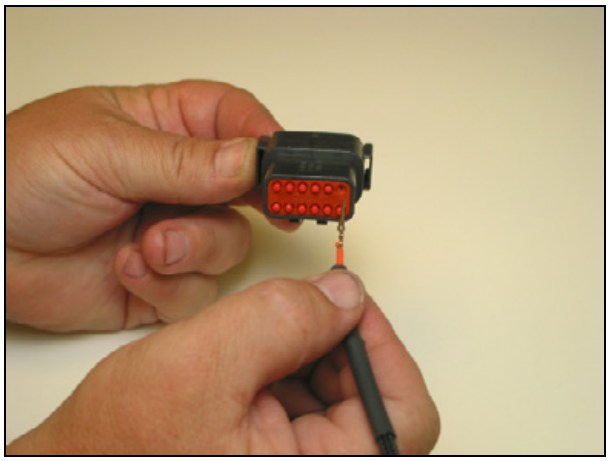
Step 3

Remove the wedge from the connector.



Step 4

Insert the DTM pin labeled “Cavity 1” into the connector.

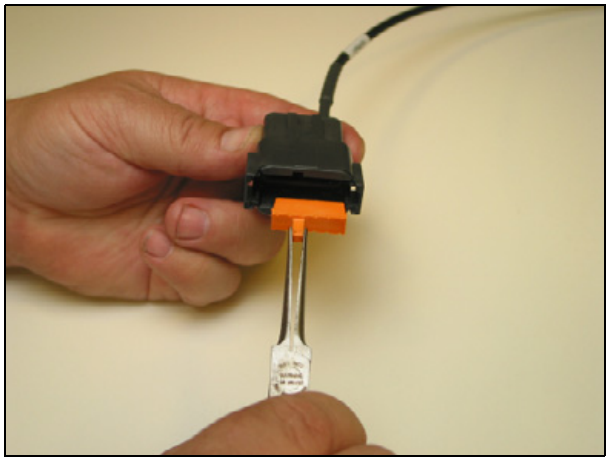


Step 5

Pull back on the wire to seat the pin. Replace the wedge in the connector.

Step 6

Plug the assembled Deutsch receptacle into the P-13 sensors leg of the AutoPilot controller auxiliary harness. See Chapter 8, Controller Installation.



CHAPTER 4

Antenna/Receiver Installation

In this chapter:

- Antenna and receiver installation options
- AG-372 receiver with AgGPS 450/900 radio module (if equipped) components
- Installing the AG-372 GPS receiver with AgGPS 450/900 radio module (if equipped)
- Installing an AG-372 receiver with magnetic feet
- AgGPS 542 receiver components
- AgGPS 542 receiver components
- Installing the AgGPS 542receiver

This chapter describes how to install the required receiver and antenna, and radio module (if used).

To install the antenna for a CFX-750 or FmX display, see Chapter 5, Display Installation.

Antenna and receiver installation options

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

Standard 4" x 6" plates are provided in most kits. You can use the VHB mounting method to attach either a 4" x 6" plate or a V plate.

- **VHB mount** – Attach a 4" x 6" plate or a V plate directly to the roof with VHB (Very High Bond) adhesive for magnetic mounting. See page 31.
- **Magnetic mounting** – Magnetic mounting for quick release is available for both VHB and spar type mounting.

Possible mounting methods

GNSS receiver	VHB mounted plate	VHB V mounted plate
FmX integrated display; CFX-750 display	✓	✓
AG-372 receiver	✘	✓
AgGPS 542 receiver	✓	✓

Notes:

- *For quick release magnetic mounting with an AgGPS 262/AG-372 receiver, order the kit listed in Antenna mounting kits, page 4 and bolt the V plate to the spar.*
- *For WAAS, EGNOS, OmniSTAR VBS, Beacon, and DGPS applications, place either of the plates in a firm location using the VHB.*

Attaching the plate with VHB adhesive

Standard 4" x 6" plates are provided in most kits. You can use the VHB mounting method to attach either a 4" x 6" plate or a V plate.

- **RTK, OmniSTAR, DGPS, GLONASS applications** – To use this method for high accuracy, the surface must be rigid and free of “oil panning”.
- **WAAS, EGNOS, OmniSTAR VBS, Beacon applications** – Use a 4" x 6" plate for simplified installation in applications where high accuracy is not critical.

Step 1

Clean the antenna location on the roof of the cab with a light solvent to remove oil and dust. Apply force to the roof to find a firm location.

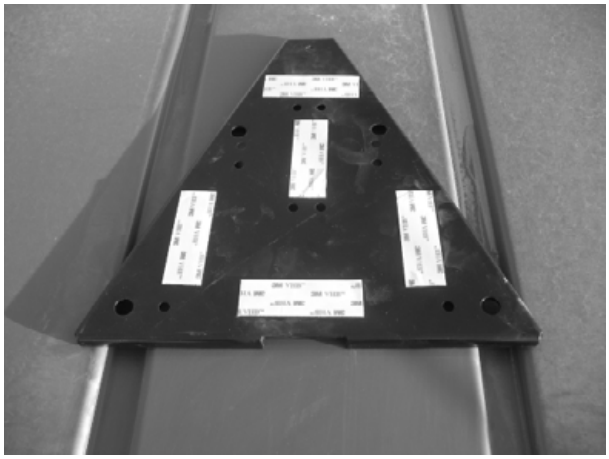


Step 2

V plate only

Remove the backing from one side of the VHB strips provided and then apply the strips to the plate.

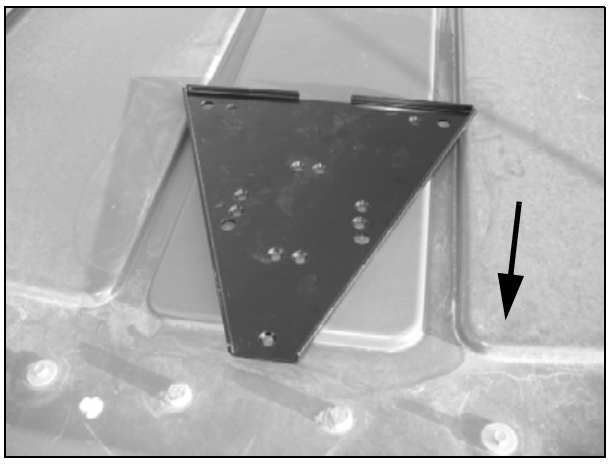
Note – *The VHB strips are pre-applied to the 4" x 6" plate.*



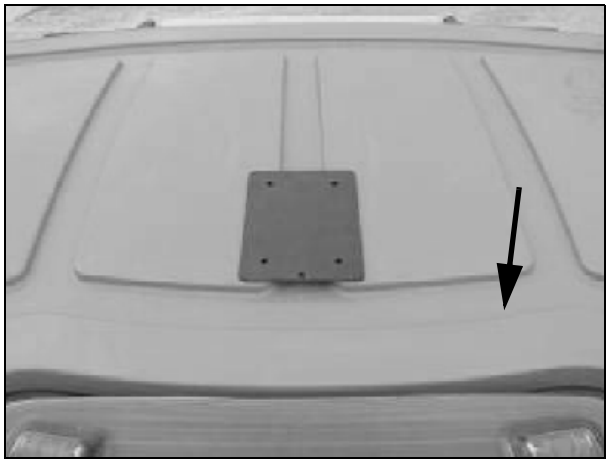
Step 3

Remove the backing from the other side of the VHB strips and then apply the plate to the cab roof. The narrow end of the plate points forward. Ensure that the VHB strips make even contact with the surface. Apply pressure and then leave for approximately 30 minutes to adhere.

Note – *The arrow points to the front of the vehicle.*



V plate



4" x 6" plate

At the front center of the operator's cab roof.



5" x 5" plate

Step 4

Place the GPS antenna and magnet on top of the metal plate in the front center of cab roof.



Step 5

Attach the coax cable (P/N 50449) to the antenna.

Route the opposite end of the cable to the lower right rear corner of the operator's cab near the Autopilot manifold.



Step 6

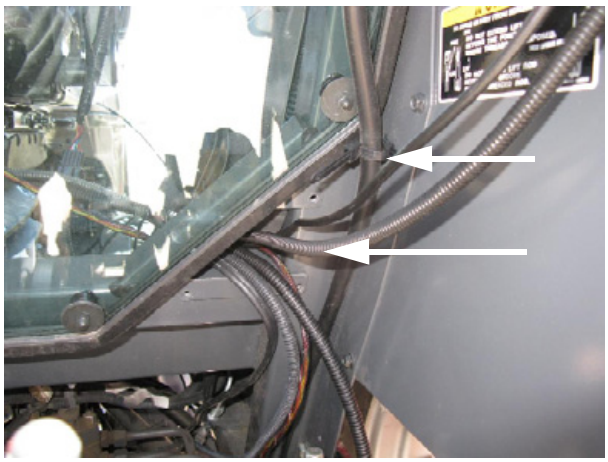
Place the radio antenna and magnet on the right rear corner of the cab roof.

Route the attached coax cable to the lower right rear corner of the operator's cab near the AutoPilot manifold.

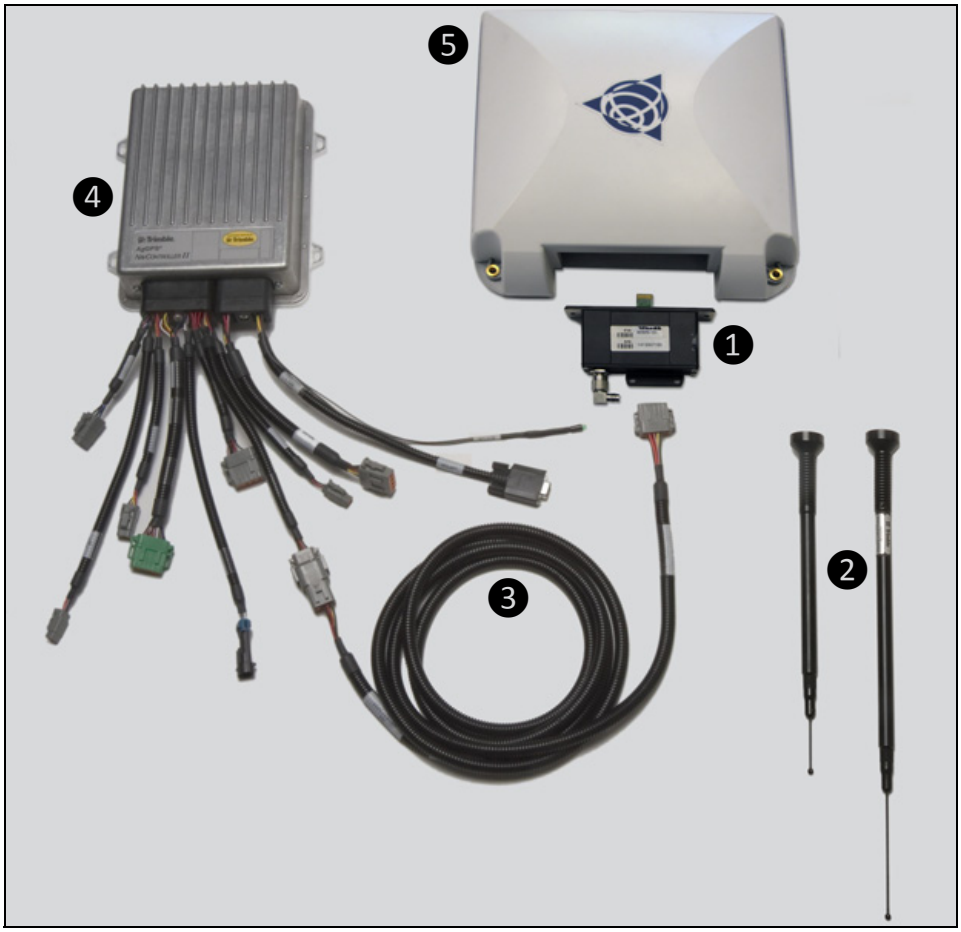


Step 7

Route the GPS and radio antenna coax cables though the access panel in the rear right corner of the cab.



AG-372 receiver with *Ag*GPS 450/900 radio module (if equipped) components



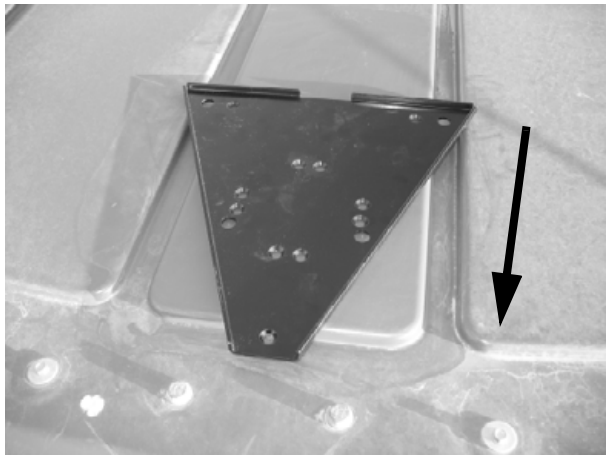
Item	Description	Trimble part number
❶	*Ag*GPS 450 or 900 radio (if equipped)	
❷	Radio antenna cable and magnetic mount	
❸	*Ag*GPS 450 or 900 radio antenna	
❹	Antenna/receiver cable	54608
❺	*Ag*GPS Autopilot controller	

Installing the AG-372 GPS receiver with AgGPS 450/900 radio module (if equipped)

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

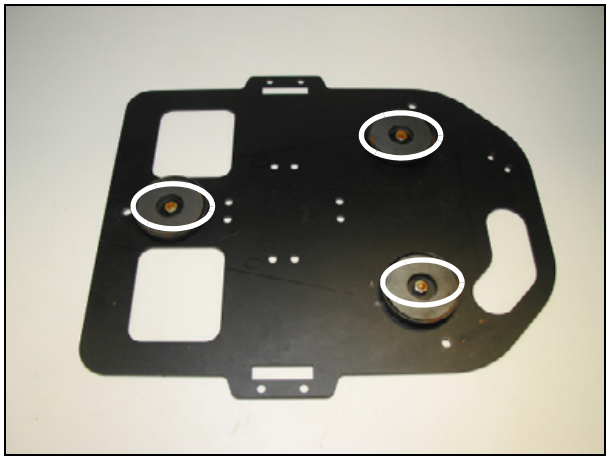
V plate

Use VHB to attach the receiver plate to the cab roof. Make sure that the plate is centered and square to the axle of the tractor.



Mounting plate

Attach the three provided magnets to the plate with the ¼" flathead screws and hardware provided.



Underside of plate

Permanent installation

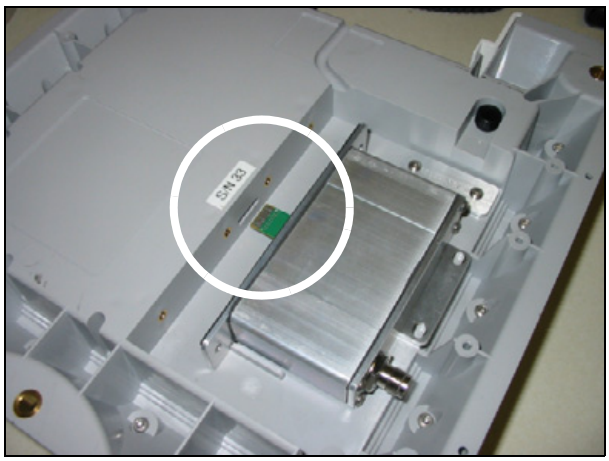
Step 1

Remove the blanking plate and set it aside.



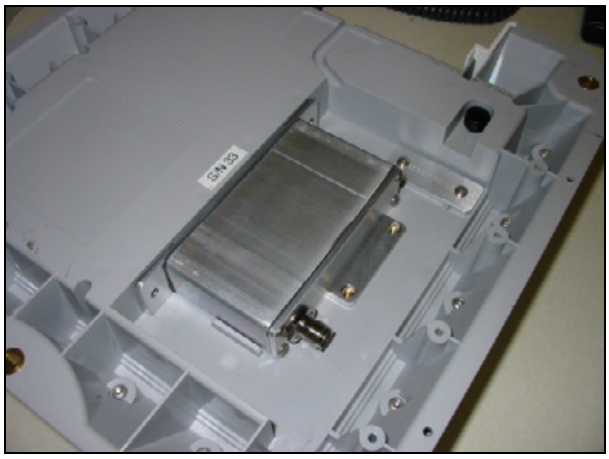
Step 2

Place the integrated radio inside the AG-372 receiver. Ensure that the circuit board is aligned with the slot in the vertical wall of the receiver.



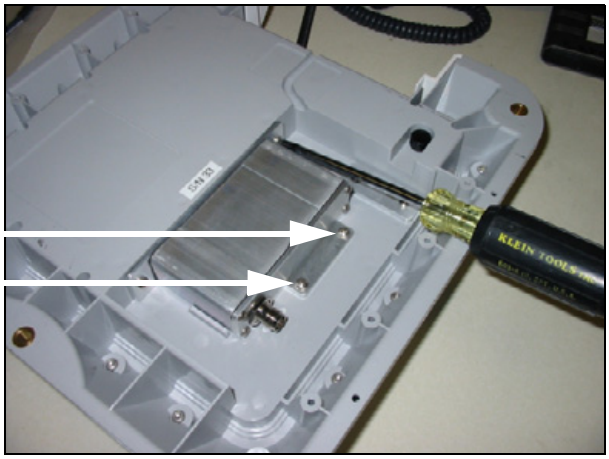
Step 3

Slide the integrated radio back so that it is flush with the vertical wall of the receiver.



Step 4

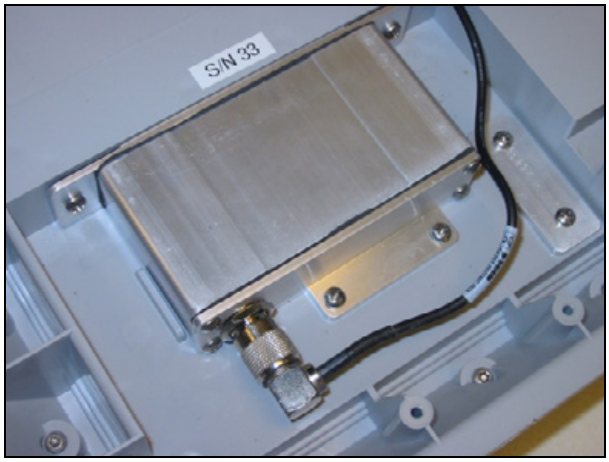
Use a #1 or #2 Phillips screwdriver and the supplied screws to install the integrated radio. First insert and tighten the two screws on the horizontal wall (arrowed), and then insert the remaining screws.



Step 5

Install the supplied antenna cable.

Notes: *The housing can accommodate a cable diameter of up to ¼".*

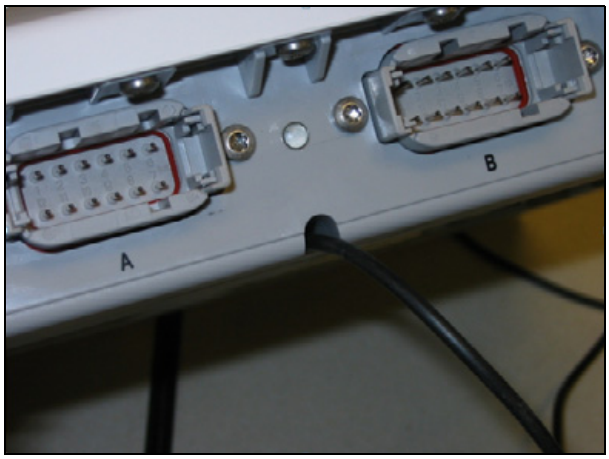


Step 6

Route the cable through the cable channel and then insert the cable cover.

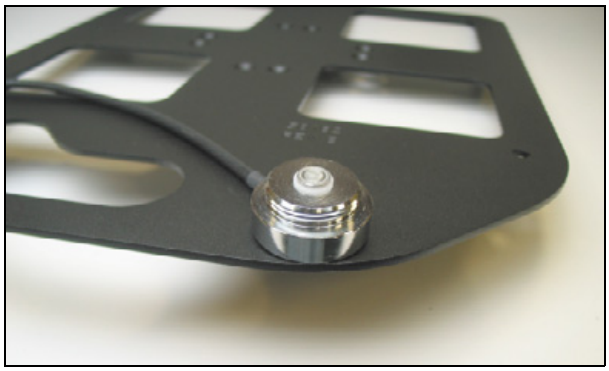


This image shows the unit with the cable routed through the channel.



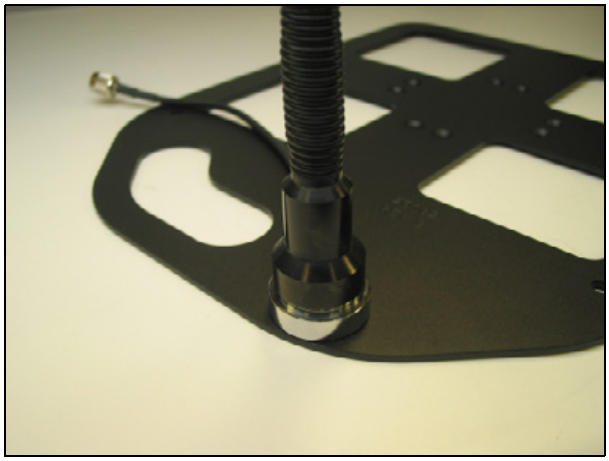
Step 7

Attach the antenna base to the rear of the plate with the two flathead screws provided.



Step 8

Attach the radio antenna to the antenna base.



Step 9

Position the receiver and radio on the mounting plate with the connector ports facing the radio antenna. Align the three bolt holes with the receiver, radio, and mounting plate.



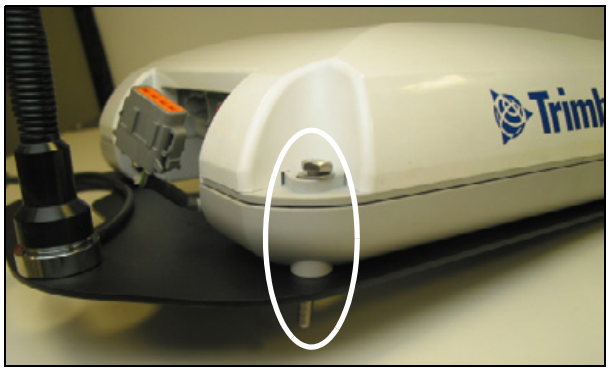
Step 10

Insert the nylon bushings provided.



Step 11

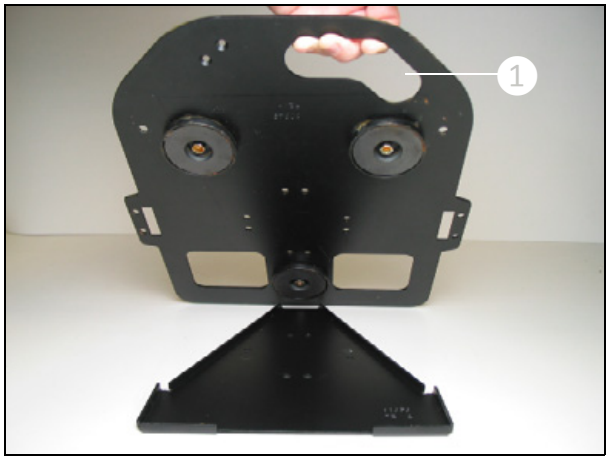
Insert the bolts through the receiver, radio, and mounting bracket. Place nuts on the bolt ends and then tighten them.



Step 12

Magnet method?

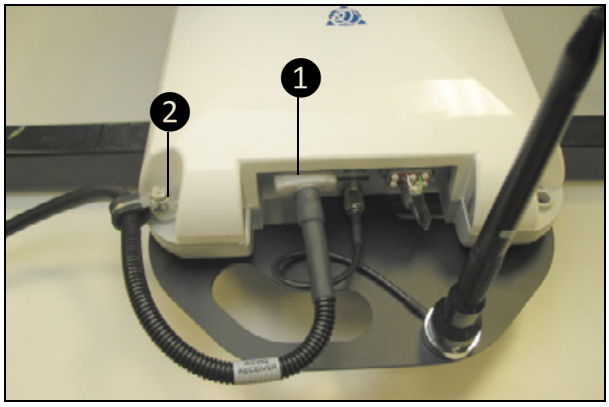
Place the receiver on the roof by aligning the magnets with the V plate. Ensure that the handle ❶ is toward the back of the vehicle.



Step 13

Connect the cable from the cab controller into port A ❶ of the receiver. Bolt the cable clamp ❷ to the left side of the receiver.

Route the cable into the cab and into the controller.



Installing an AG-372 receiver with magnetic feet

⚠ **WARNING –** To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

Use this option only when all other options are unavailable. It requires a firm surface for mounting to avoid vertical vibration and is not an easily repeatable location when moving receivers. Many cabs do not offer roof bolts; you may need to drill or to construct a firm location.

Step 1

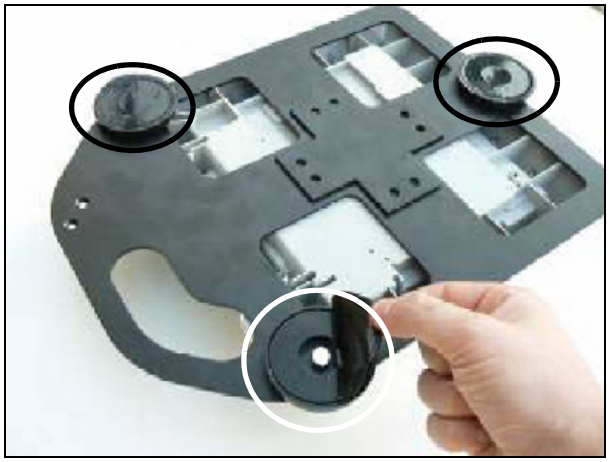
Attach the magnets to the receiver mounting plate and then mount the receiver using the three ¼" bolts.

Place the nuts on the receiver side.



Step 2

Turn the mounting plate upside down. Stick the covers onto the magnets as shown.

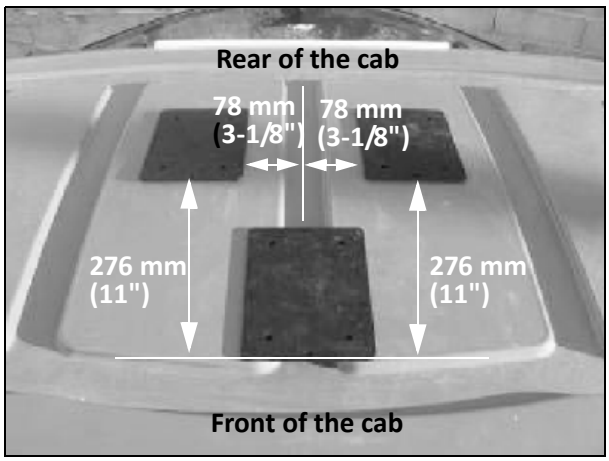


Step 3

Clean the antenna location on the roof of the cab with a light solvent to remove oil and dust.

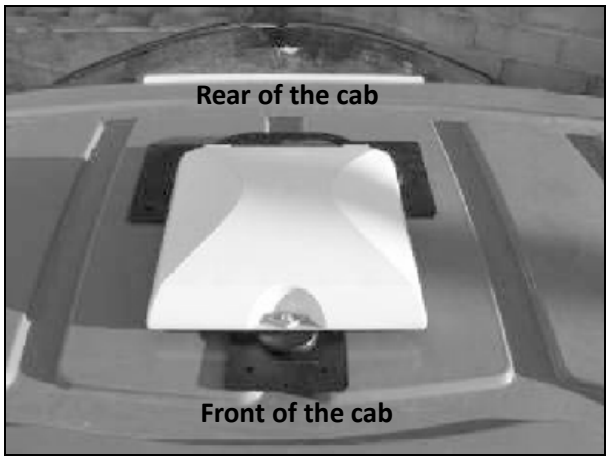
Remove the backing from the VHB strips and then apply the plates to the cab roof.

Attach the three mounting plates so that the receiver is as firm as possible.



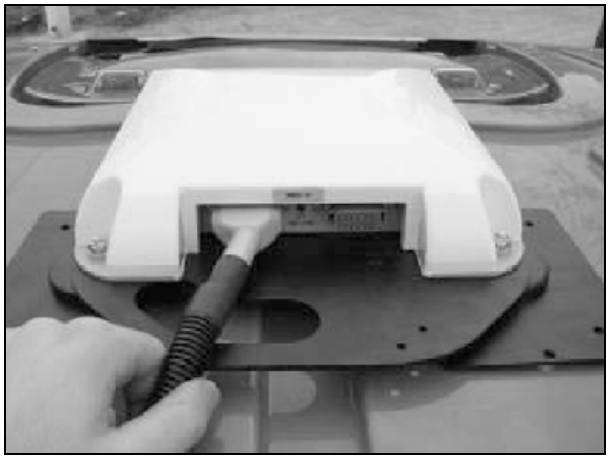
Step 4

Stick the antenna magnetic mounts at the center of the mounting plates.

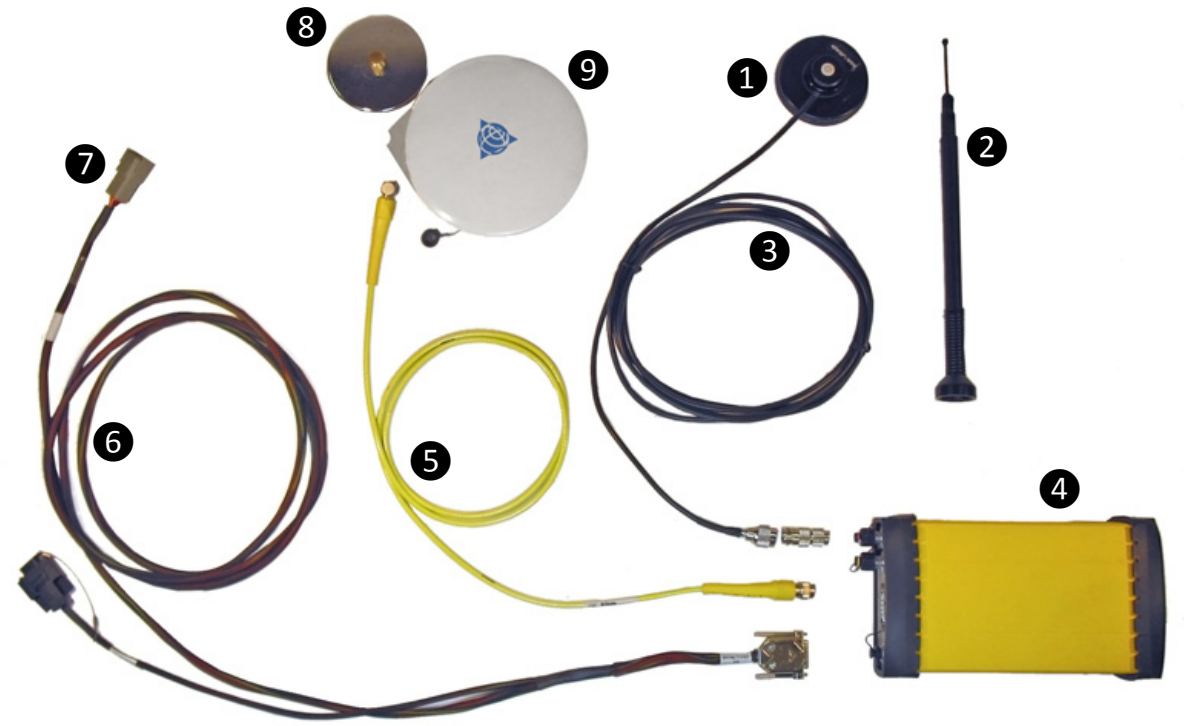


Step 5

Connect the antenna cable to port A of the GPS receiver and then route the cable toward the NavController II harness.



*Ag*GPS 542 receiver components



Item	Description	Trimble part number
❶	Radio antenna magnetic base	
❷	Radio antenna	
❸	Radio antenna cable	
❹	*Ag*GPS 542 GPS receiver	
❺	Antenna cable	
❻	Receiver cable	62037
❼	To controller “P3 GPS”	
❽	Antenna magnetic mount	
❾	*Ag*GPS 542 antenna	

Installing the AgGPS 542receiver

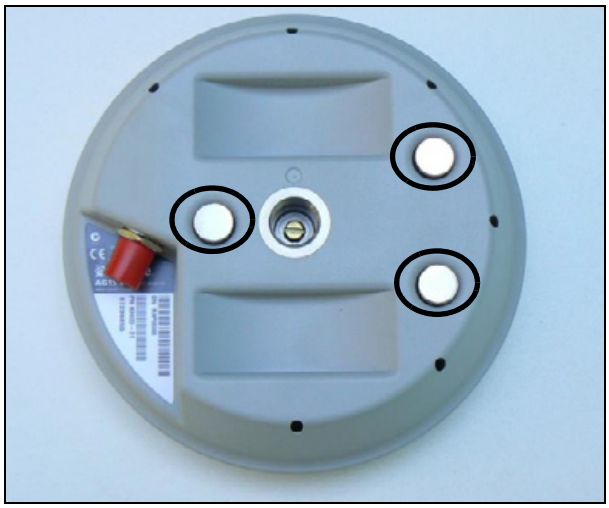
WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

Step 1

Attach the large magnet with a $^{5}/_{8}$" stud to the GPS antenna.



If the antenna has magnets built in, skip this step.



Step 2

GLONASS,RTK, OmniSTAR, DGPS applications

For repeatable positioning, place the antenna against the lip at the narrow end of the V plate.



Step 3

Attach the antenna/receiver cable to the antenna and then route the cable into the cab through the rubber grommet at the base of the rear window. Secure the cable along the way.



Step 4

Mount the receiver in a convenient location in the cab. Route the antenna cable to the receiver and then connect it.

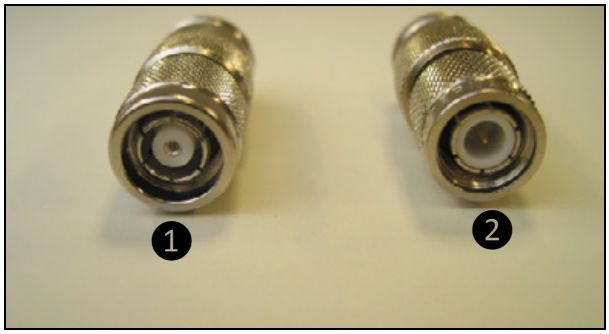


Step 5

Identify the correct adaptor for the radio connection:

❶ Reverse polarity TNC-to-N for 900 MHz radios

❷ Normal polarity TNC-to-N for 400 MHz radios



Step 6

Attach the adaptor to the radio port.



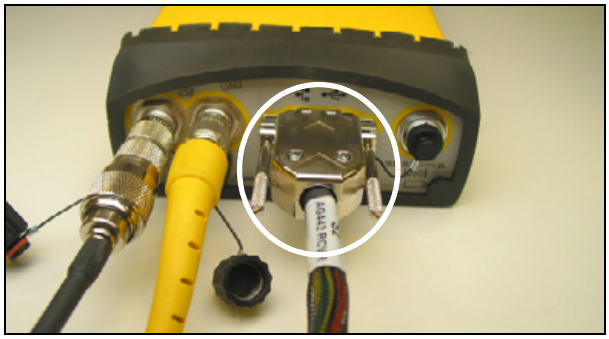
Step 7

Connect the radio antenna cable to the radio port adaptor.



Step 8

Connect the controller cable to the 26-pin connector of the receiver. Controller cable connections will be completed in Chapter 8, Controller Installation.



Step 9

Connect the radio antenna to the magnetic antenna base.



Step 10

Attach the magnetic radio antenna base to the rear of the V plate on the roof. If the cable does not reach the V plate, use the 4" x 6" plate with the VHB provided to relocate the antenna.



CHAPTER 5

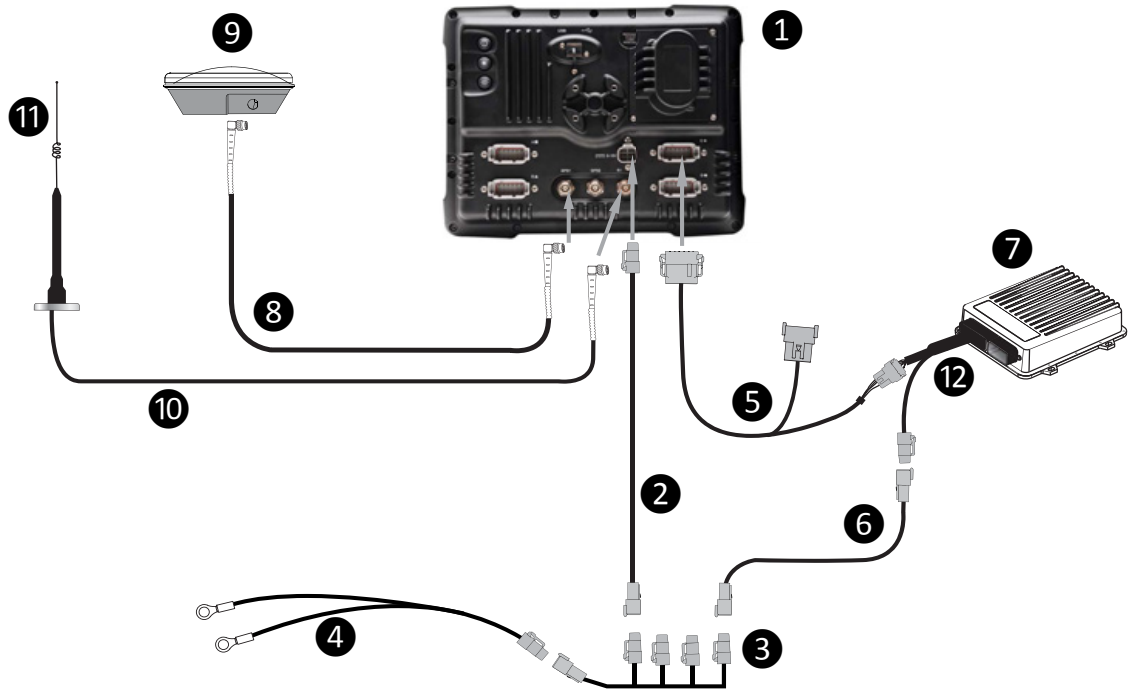
Display Installation

In this chapter:

- FmX integrated display components
- CFX-750 display components
- Preparing the FmX integrated display
- Installing the FmX integrated display
- Preparing the CFX-750 display
- Installing the CFX-750 display
- CFX-750 display: Installing the wiring harness
- FmX integrated display and CFX-750 display: Connecting accessory options
- CFX-750 and FmX displays: Installing the GNSS antenna and plate
- CFX-750 and FmX displays: Installing the RTK radio antenna

This chapter describes how to install and connect the FmX integrated display or the CFX-750 display in the vehicle.

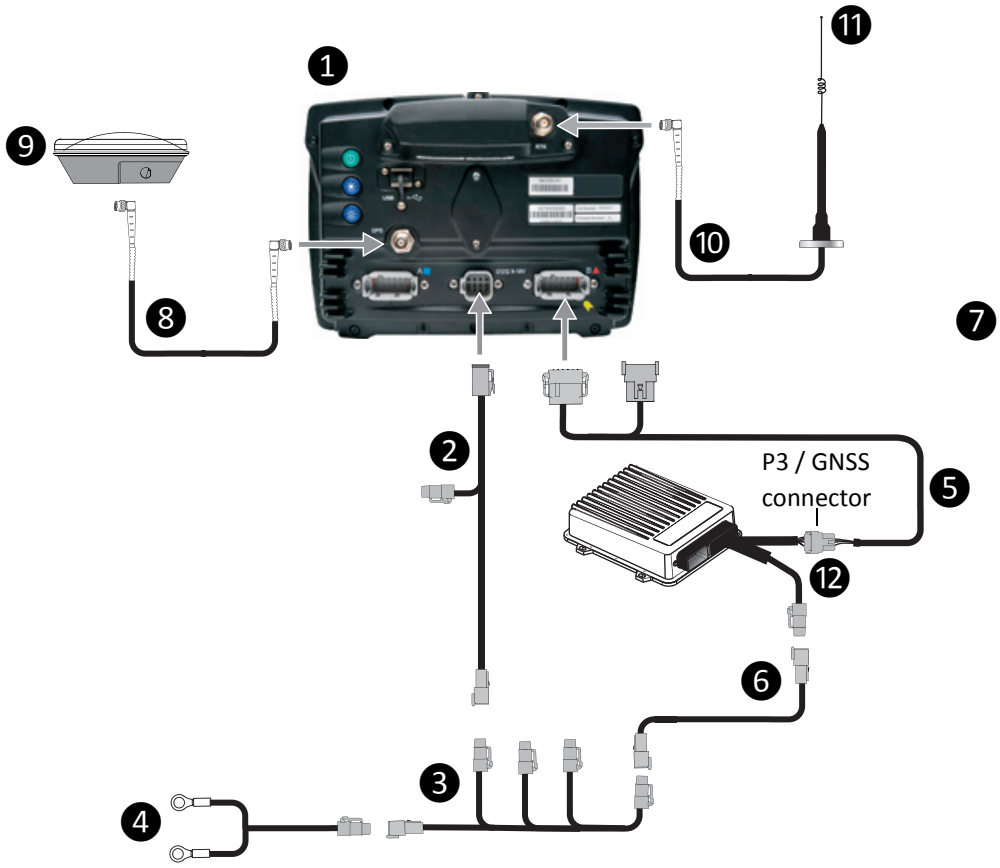
FmX integrated display components



⚠ **CAUTION –** Connecting the Port Replicator on the FmX to NavController II cable ❺ to the P4 or P12 connector of the NavController II harness ⓬ will result in damage to the FmX / FM-1000 integrated display, and will void the warranty.

Item	Description	Trimble part number
❶	FmX integrated display	93100-02
❷	FmX power cable	66694
❸	FmX power cable with relay and switch (power bus)	67259
❹	Basic power cable	67258
❺	FmX to NavController II cable with port replicator	75741
❻	2 pin DTM to 2 pin DT power adaptor	67095
❼	NavController II	55563-00
❽	8 m GNSS TNC/TNC RT angle cable	50449
❾	AG25 GNSS antenna	77038-00
❿	NMO to TNC 20ft antenna cable and base	72122
⓫	900 MHz radio antenna kit	22882-10
⓬	Main NavController II cable	54601

CFX-750 display components



CAUTION – Connecting the Port Replicator on the FmX to NavController II cable ❺ to the P4 or P12 connector of the NavController II harness ⓬ will result in damage to the FmX / FM-1000 integrated display, and will void the warranty.

Item	Description	Trimble part number
❶	CFX-750 display ***Note –*** *RTK password required.*	93100-02
❷	CFX-750 power cable	66694
❸	CFX-750 power cable with relay and switch (power bus)	67259
❹	Basic power cable	67258
❺	FmX to NavController II cable with port replicator	75741
❻	2 pin DTM to 2 pin DT power adaptor	67095
❼	NavController II	55563-00
❽	8 m GNSS TNC/TNC RT angle cable	50449
❾	AG25 GNSS antenna	77038-00
❿	NMO to TNC 20ft antenna cable and base	72122
⓫	900 MHz radio antenna kit	22882-10
⓬	Main NavController II cable	54601

Preparing the FmX integrated display

Step 1

Locate the FmX integrated display, the RAM mount, and the RAM mount clamp.



Step 2

Use the provided metric hardware to attach the RAM mount to the rear of the display.



Step 3

Attach the RAM mount to the rear of the display.



Installing the FmX integrated display

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

Step 1

Decide where you will mount the display in the vehicle cab and then use the provided bolts to attach the bar mount to the rail. Attach the free end of the RAM mount to the bar mount and then tighten the clamp on the RAM mount so that the display is secure.

Step 2

Bolt the supplied swivel mount ball and clamp to the right side door hand rail.



Step 3

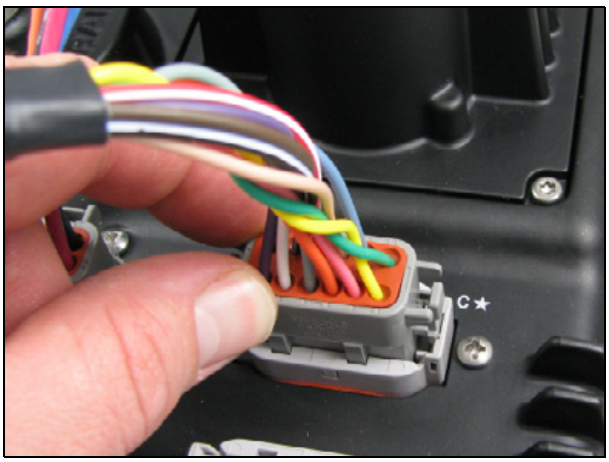
Attach the assembled FmX display to the clamp and then tighten the attachments.



Step 4

Connect the cable to the C port of the FmX integrated display.

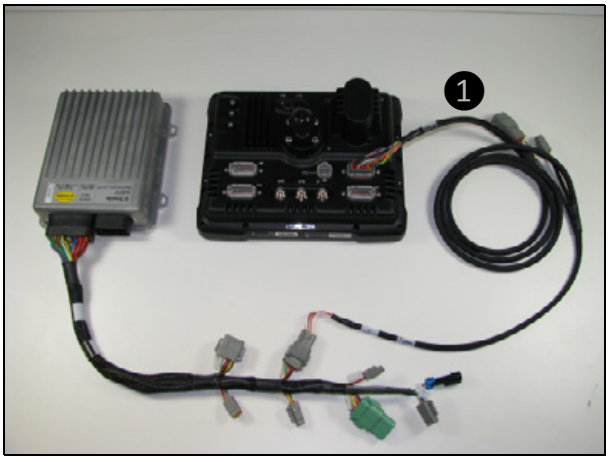
To connect power to the FmX integrated display, see Chapter 6, Power Harness Installation.



FmX integrated display: Installing the wiring harness

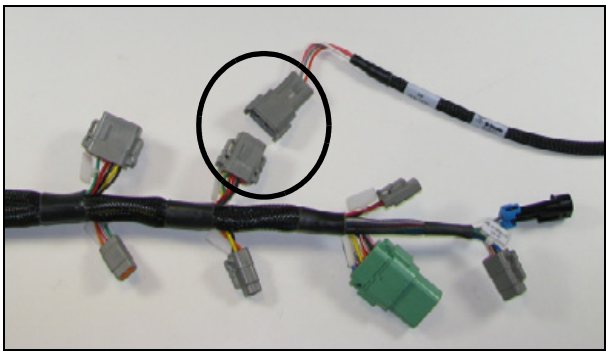
Step 1

Locate the cable that connects the FmX integrated display to the NavController II ❶.



Step 2

Connect the cable to the P3 connector on the NavController II main harness, and then route the cable from the NavController II to the mounting location on the FmX integrated display.



Preparing the CFX-750 display

Step 1

Locate the CFX-750 display, the RAM mount, and the RAM mount clamp.



Step 2

Use the provided metric hardware to attach the RAM mount to the rear of the display.



Step 3

Attach the RAM mount to the rear of the display.



Installing the CFX-750 display

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

Step 1

Decide where you will mount the display in the vehicle cab and then use the provided bolts to attach the bar mount to the rail.

Attach the free end of the RAM mount to the bar mount and then tighten the clamp on the RAM mount so that the display is secure.

Step 2

Connect the cable to the B port of the CFX-750 display.

To connect power to the CFX-750 display, see Chapter 6, Power Harness Installation.



CFX-750 display: Installing the wiring harness

Step 1

Locate the cable that connects the CFX-750 display to the NavController II.

Step 2

Connect the cable to the P3 connector on the NavController II main harness and then route the cable from the NavController II to the mounting location on the CFX-750 display.



FmX integrated display and CFX-750 display: Connecting accessory options

Note – *Unless otherwise stated, "the display" applies to FmX integrated display or the CFX-750 display.*

AgCam

The AgCam and AgCam cable are accessory items that you can purchase separately from the display. The FmX integrated display allows for up to four video inputs; the CFX-750 display allows up to two.

Step 1

Locate the AgCam and AgCam cable.

Step 2

Mount the AgCam in a secure location and then route the cable towards the display.



FmX display



CFX-750 display

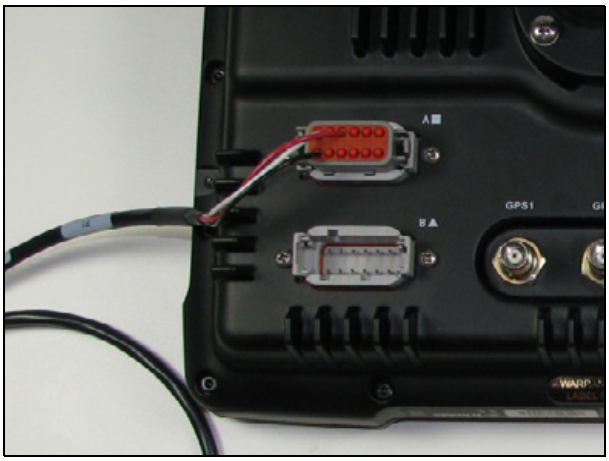
Step 3

Connect the AgCam cable to the display adaptor cable.



Step 4

Connect the display to AgCam adaptor cable to one of the open 12 pin connectors on the back of the display.



CFX-750 and FmX displays: Installing the GNSS antenna and plate

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

Note – *The V plate antenna bracket is available on the Autopilot price list. See* *Antenna mounting kits, page 4**.*

Attaching the antenna with VHB adhesive

Standard 4" x 6" plates are provided in most kits. You can use Very High Bond (VHB) to attach either a 4" x 6" plate or a V plate.

- **GLONASS, RTK, OmniSTAR, DGPS applications** – To use this method for high accuracy, the surface must be rigid and free of “oil panning”. For RTK or OmniSTAR HP corrections, the spar method is recommended. The V plate provides repeatable positioning of the antenna.
- **WAAS, EGNOS, OmniSTAR VBS, Beacon applications** – Use a 4" x 6" plate for simplified installation in applications where high accuracy is not critical.

Step 1

Clean the antenna location on the roof of the cab with a light solvent to remove oil and dust.

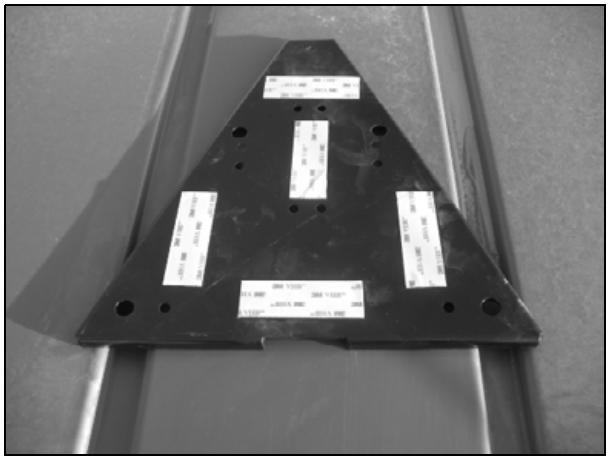


Step 2

V plate only

Remove the backing from one side of the VHB strips provided and then apply the strips to the plate.

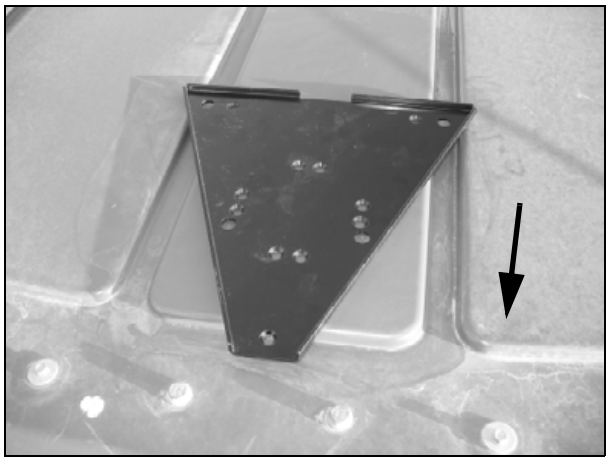
Note – *The VHB strips are pre-applied to the 4" x 6" plate.*



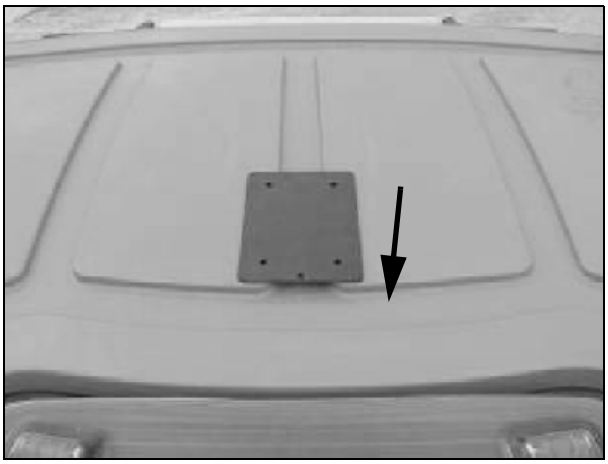
Step 3

Remove the backing from the other side of the VHB strips and then apply the plate to the cab roof. The narrow end points forward. Ensure that the VHB strips make even contact with the surface. Apply pressure and then leave for approximately 30 minutes to adhere.

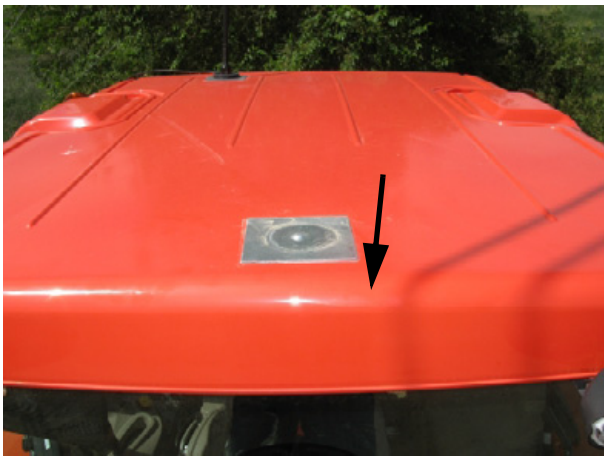
Note – *The arrow in this figure points to the front of the vehicle.*



V plate



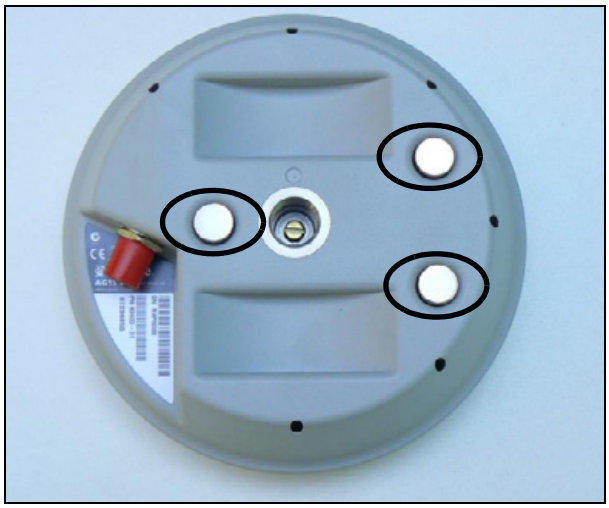
4" x 6" plate



5" x 5" plate

Step 4

If the antenna has magnets built in, omit this step.



Otherwise, attach the large magnet with a $^{5}/_{8}$" stud to the GNSS antenna.



Step 5

RTK, OmniSTAR, DGPS, GLONASS applications

For repeatable positioning, place the antenna against the lip at the narrow end of the V plate.



Step 6

Attach the antenna to the center of the 5" x 5" plate.

For best performance, make sure that you center the plate side-to-side on the cab.



WAAS, EGNOS, VBS, Beacon applications

Attach the antenna to the center of the 4" x 6" plate.



Step 7

Both models

Attach the antenna/receiver cable to the antenna and then route the cable into the cab through the rubber grommet at the base of the rear window. Secure the cable along the way.



CFX-750 and FmX displays: Installing the RTK radio antenna

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

Step 1

Connect the radio antenna to the magnetic antenna base



Step 2

Attach the magnetic radio antenna base to the rear of the V plate on the roof. If the cable does not reach the V plate, use the 4" x 6" plate with the VHB provided to relocate the antenna.



Step 3

Route cable from the vehicle roof into the cab, and connect the radio cable to the display.

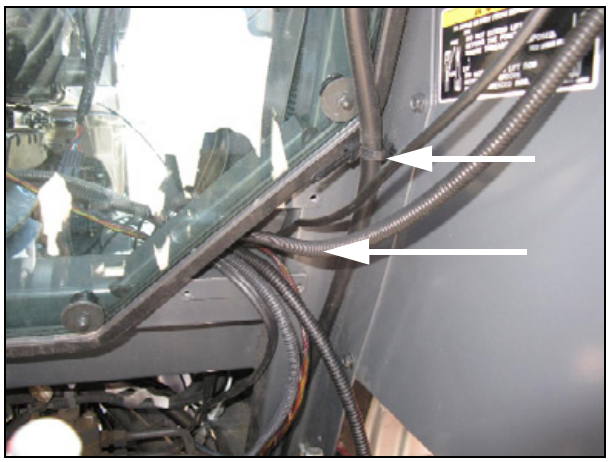
If you do not use the V plate, use a standard 5x5 VHB plate to mount the radio antenna.



5" x 5" VHB plate

Step 4

Route the cable from the vehicle roof into the cab, and connect the radio cable to the display.



CHAPTER 6

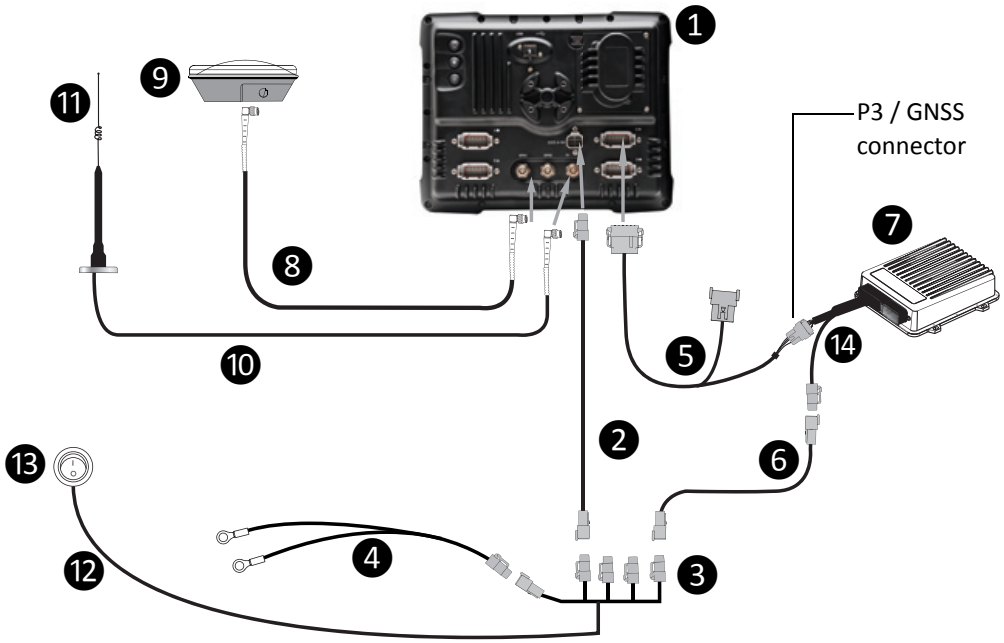
Power Harness Installation

In this chapter:

- FmX integrated display components
- FmX integrated display componentsCFX-750 display components
- Installing the power harness for the display
- Configuring the power bus options for the display

This chapter describes how to install the power harness in the vehicle.

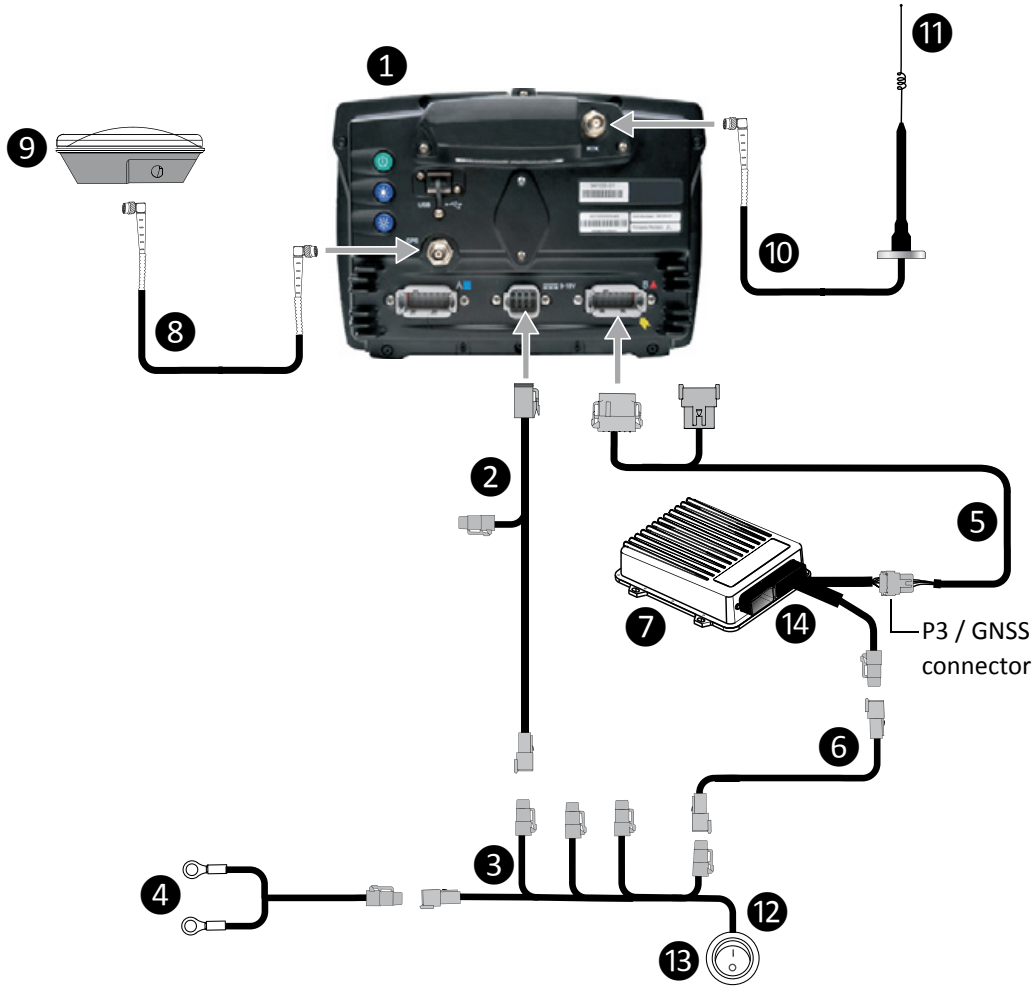
FmX integrated display components



⚠ **CAUTION –** Connecting the Port Replicator on the FmX to NavController II cable ❺ to the P4 or P12 connector of the NavController II harness ⓬ will result in damage to the FmX / FM-1000 integrated display, and will void the warranty.

Item	Description	Trimble part number
❶	FmX integrated display	93100-02
❷	FmX power cable	66694
❸	FmX power cable with relay and switch (power bus)	67259
❹	Basic power cable	67258
❺	FmX to NavController II cable with port replicator	75741
❻	2 pin DTM to 2 pin DT power adaptor	67095
❼	NavController II	55563-00
❽	8 m GNSS TNC/TNC RT angle cable	50449
❾	AG25 GNSS antenna	77038-00
❿	NMO to TNC 20ft antenna cable and base	72122
⓫	900 MHz radio antenna kit	22882-10
⓬	External switch cable included with kit	Part of P/N 67259
⓭	Switch	67095
⓮	NavController II harness	54601

CFX-750 display components



⚠ **CAUTION –** Connecting the Port Replicator on the FmX to NavController II cable ❺ to the P4 or P12 connector of the NavController II harness ⓬ will result in damage to the FmX / FM-1000 integrated display, and will void the warranty.

Item	Description	Trimble part number
❶	CFX-750 display ***Note –*** *RTK password required.*	93100-02
❷	CFX-750 power cable	66694
❸	CFX-750 power cable with relay and switch (power bus)	67259
❹	Basic power cable	67258
❺	FmX to NavController II cable with port replicator	75741
❻	2 pin DTM to 2 pin DT power adaptor	67095
❼	NavController II	55563-00
❽	8 m GNSS TNC/TNC RT angle cable	50449
❾	AG25 GNSS antenna	77038-00

Item	Description	Trimble part number
⑩	NMO to TNC 20ft antenna cable and base	72122
⑪	900 MHz radio antenna kit	22882-10
⑫	External switch cable included with kit	Part of P/N 67259
⑬	External switch included with kit	Part of P/N 67259
⑭	Main NavController II cable	54601

Installing the power harness for the display

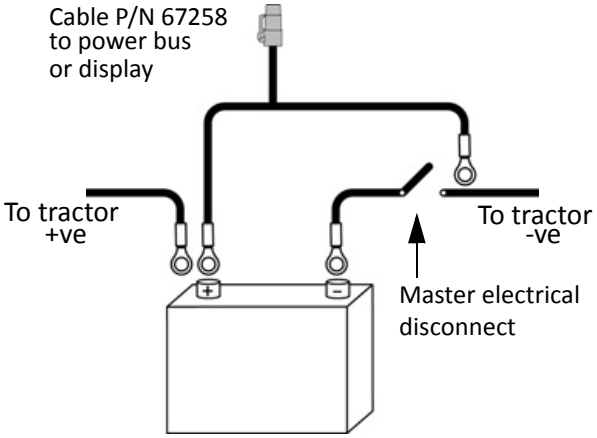
WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

Step 1

Connect the power cable (P/N 67258) to the battery. Route the opposite end of the cable to the right rear of tractor near the Autopilot manifold and then into the cab.



CAUTION – If the vehicle has a master electrical disconnect, make sure that the basic power cable (P/N 67258), is not directly attached to the battery terminal that is disconnected by the master switch - the negative pole in this example.
Attach this terminal side just past the main disconnect so that it is as close as possible to the battery but still gets disconnected.
Failure to do so can result in damage to the display.



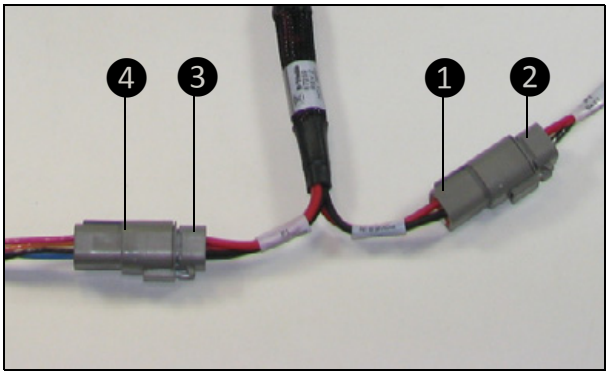
Step 2

Route the power cable (P/N 67258) into the cab through the cable access and then attach it to the R1 connector of the display's power cable (P/N 66694).



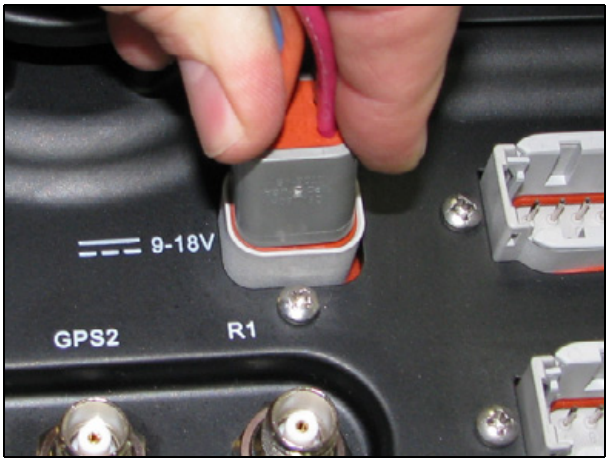
Step 3

Locate and connect the 4-pin Deutsch DTP receptacle on the power bus ❶ to the 4-pin Deutsch DTP plug ❷ on the basic power cable and then remove the protective cap from the 4-pin Deutsch DTP plug ❸ on the power bus and connect the plug to the 4-pin Deutsch DTP receptacle ❹ on the display power adaptor.



Step 4

Route the display power adaptor to the display mounting location and then connect it to the display.



FmX display



CFX-750 display

Configuring the power bus options for the display

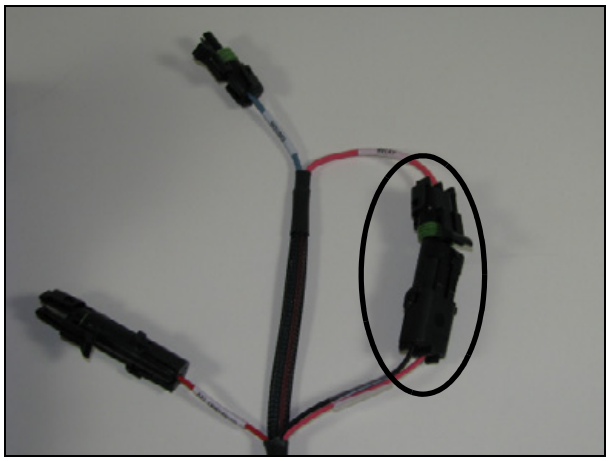
WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

When you use the power bus cable, use one of the following configuration methods to turn on the Autopilot system:

- Display power button is used to turn on the Autopilot system
- External switch is used to turn on the Autopilot system
- Ignition is used to turn on the Autopilot system

Display power button is used to turn on the Autopilot system

Connect the 2 pin connectors labeled R2 and P2 on the power bus.

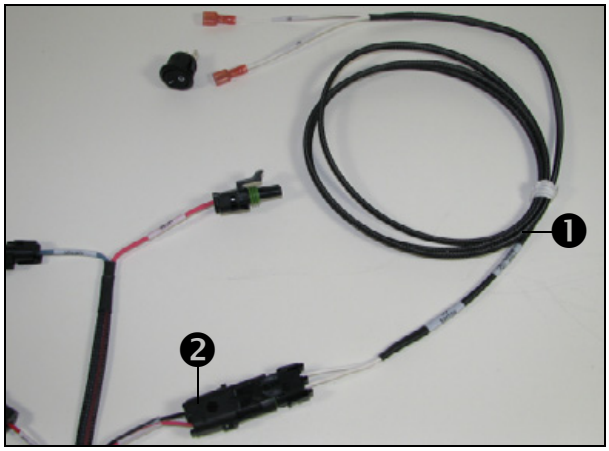


External switch is used to turn on the Autopilot system

Step 1

Connect the cable labeled R7 switch ❶ (included with the power bus) to connector labeled P2 on the power bus ❷ and then route the cable labeled R7 to a switch location.

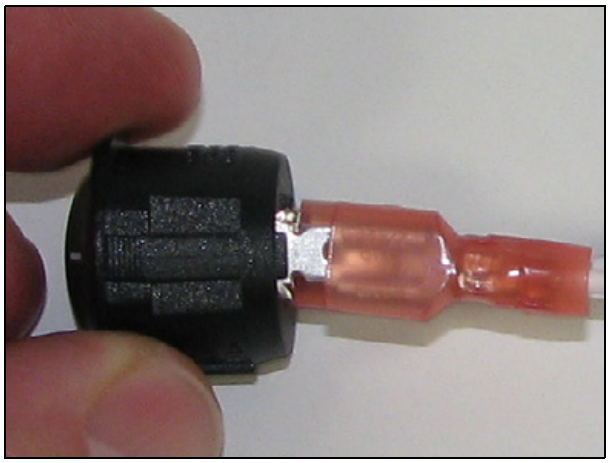
Note – *To install the switch provided, drill a ¾" hole.*



Step 2

Connect the cable labeled R7 to the switch pins.

Note – *Polarity is not important.*

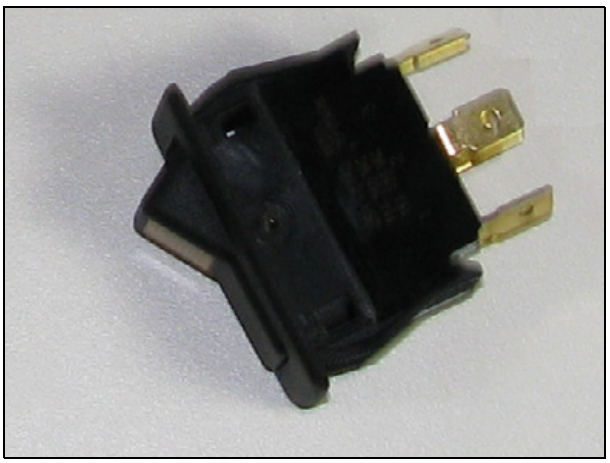


Installing the optional illuminated full or standard Euro switch

Step 1

Find an available knockout location on the vehicle console.

Note – *An alternative location is required for the switch provided.*

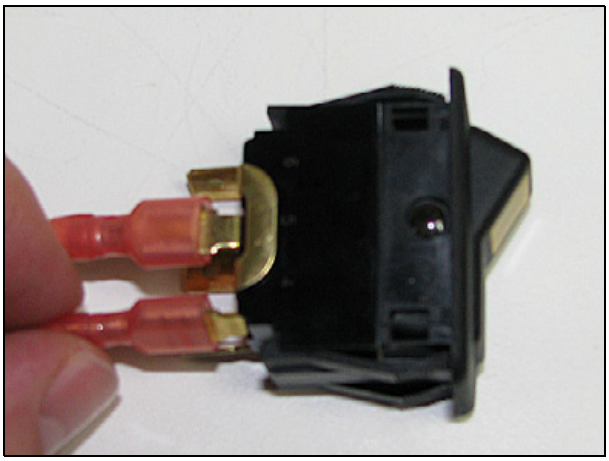


Step 2

Route the cable labeled R7 to the switch location and then connect the cable to the illuminated switch.

Connect the wire labelled S1 to pin 5 on the switch and then connect the wire labelled S2 to pin 4 on the switch.

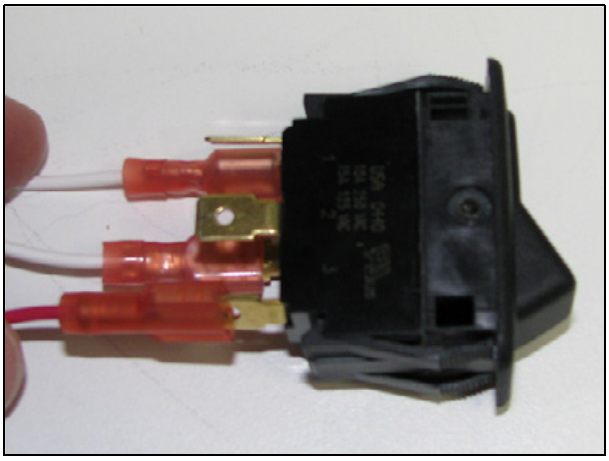
Note – *Polarity **is** important.*



Step 3

Connect a separate wire to pin 3 on the switch using a spade connector. Route the wire and then connect it to the vehicle switched power.

Note – *This additional wire is required to allow the switch to illuminate.*

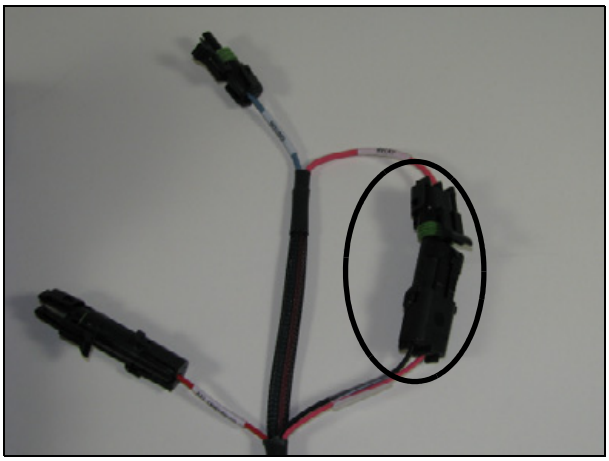


Ignition is used to turn on the Autopilot system

Note – *For more information on how to use the ignition sensing option, see the FmX Integrated Display User Guide.*

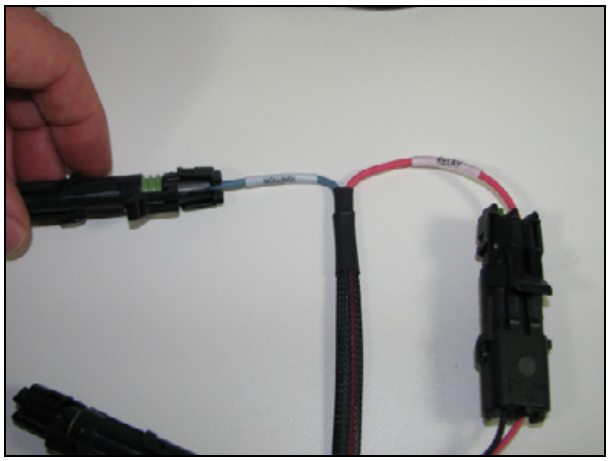
Step 1

Connect the 2-pin connectors labeled R2 and P2 on the power bus.



Step 2

Connect the cable labeled R8 Ignition (included with the power bus) to connector P3 Ignition on the power bus.

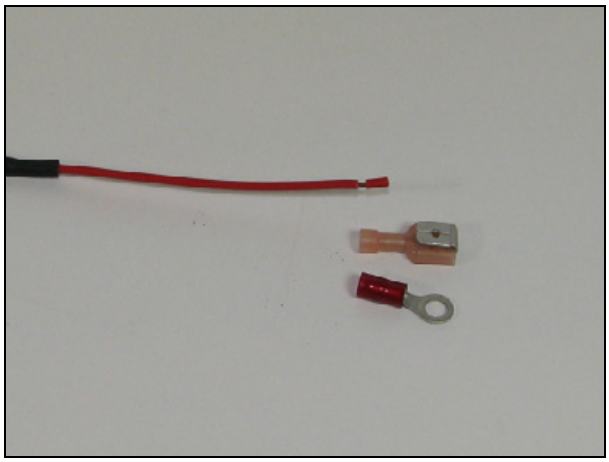


Step 3

Route the cable to the vehicles ignition.

Step 4

Connect the red ignition sense wire to the vehicle ignition using the spade or ring terminal provided.



CHAPTER 7

Remote Engage Switch Installation

In this chapter:

- Remote engage switch components: Rocker switch
- Remote engage switch components: Foot switch
- Preparing the remote engage cable
- Using the remote engage switch

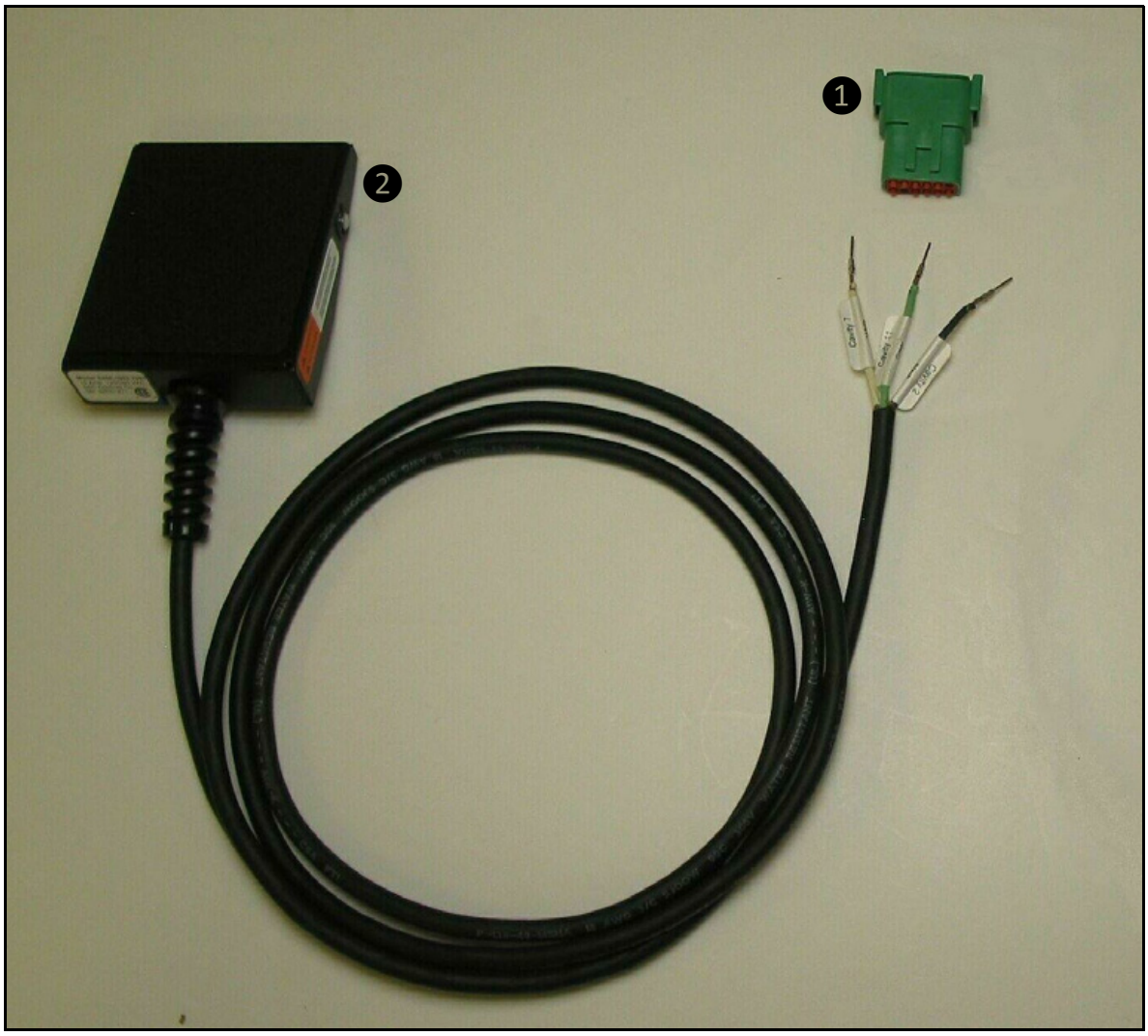
This chapter describes how to install the remote engage switch.

Remote engage switch components: Rocker switch



Item	Description
❶	DTM receptacle
❷	Remote engage rocker switch

Remote engage switch components: Foot switch

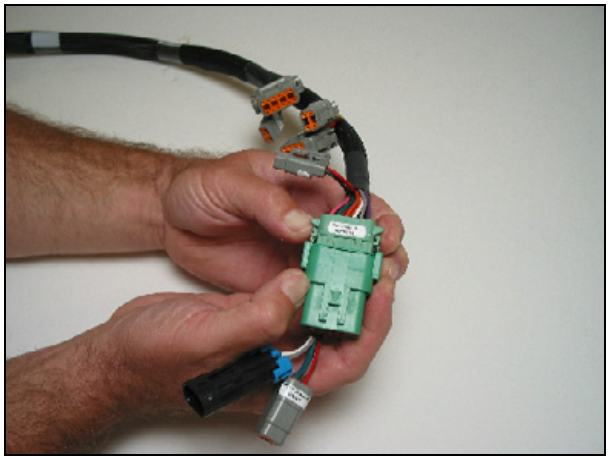


Item	Description
❶	DTM receptacle
❷	Remote engage rocker switch

Preparing the remote engage cable

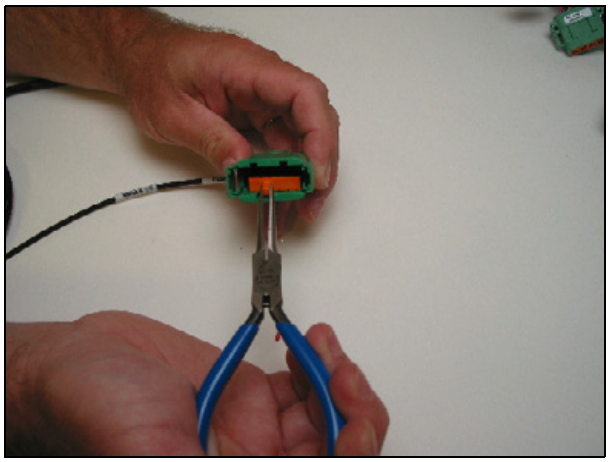
Step 1

Locate the green 12-pin Deutsch receptacle on the P-5 leg of the main controller harness. For more information, see Chapter 8, Controller Installation.



Step 2

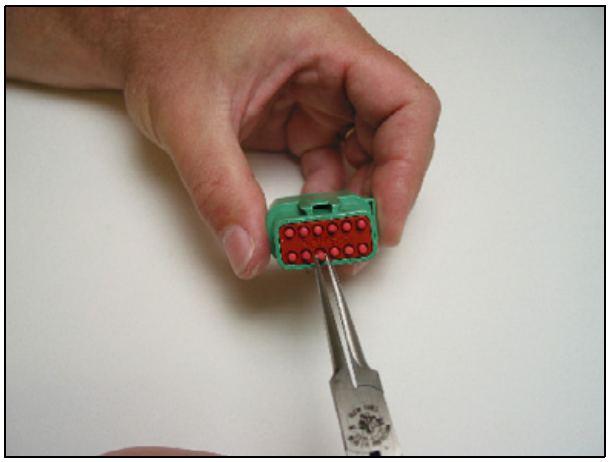
Remove the wedge from the connector.



Step 3

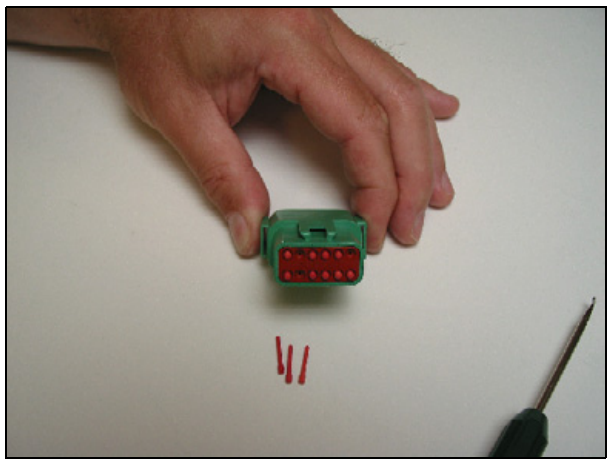
Rocker switch only

Remove the plugs from cavity 2 and cavity 7.



Foot Switch Only

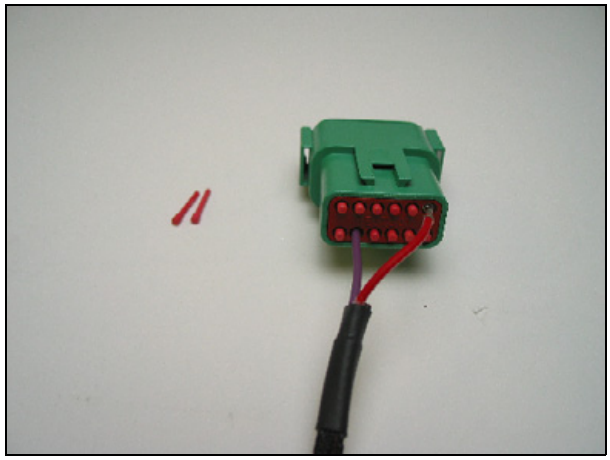
Remove the plugs from cavity 2, cavity 7, and cavity 11.



Step 4

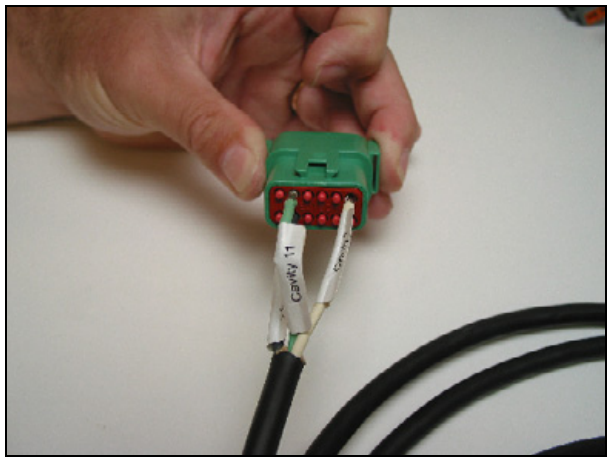
Rocker switch only

Insert the DTM pins into cavity 2 and cavity 7, according to the labels on the wires.



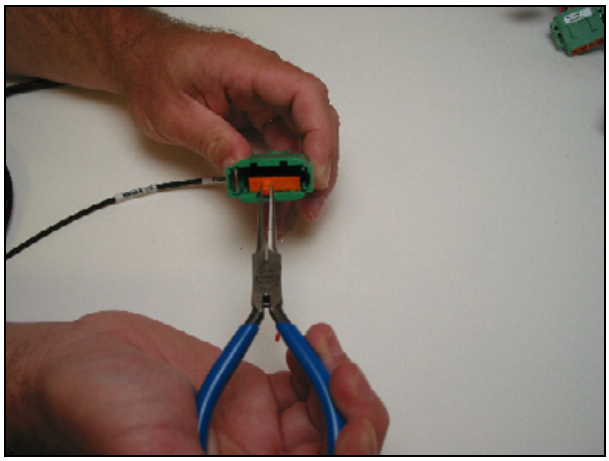
Foot switch only

Insert the DTM pins into cavity 2, cavity 7, and cavity 11, according to the labels on the wires.



Step 5

Pull on the wires to seat them in place and then replace the wedge in the connector.



Step 6

Replace the receptacle on the P5 plug of the NavController II harness.

Step 7

Rocker switch only

Run the spade ends of the cable to a knockout location in the operator console.



Foot switch only

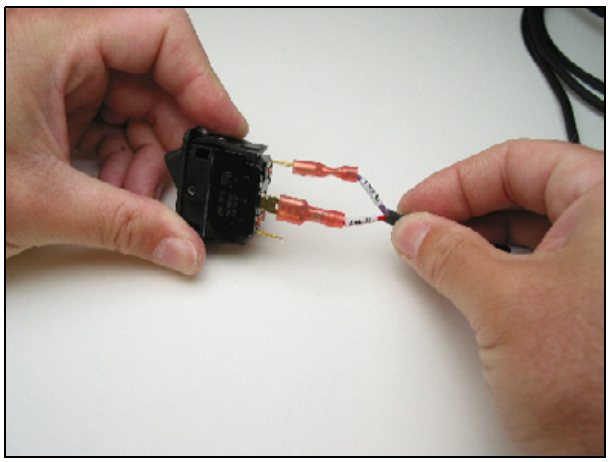
Run the cable to a clear location on the floor board. Use double-sided tape to secure the pedal. Route the cable under the floor mat.



Step 8

Rocker Switch Only

Connect the wires to the switch. Match the print on the switch body with the labels on the wires.



Step 9

Rocker Switch Only

Place the switch in the console.



Using the remote engage switch

To use NavController II to engage the system:

- For firmware versions 5.20 and earlier: Hold down the remote engage switch for longer than **0.5** seconds and less than **4** seconds.
- For firmware 5.21 and later: Hold the switch down for longer than **0.15** seconds and less than **4** seconds.

The system engages when you release the switch.

CHAPTER 8

Controller Installation

In this chapter:

- Installing the controller
- Controller connections

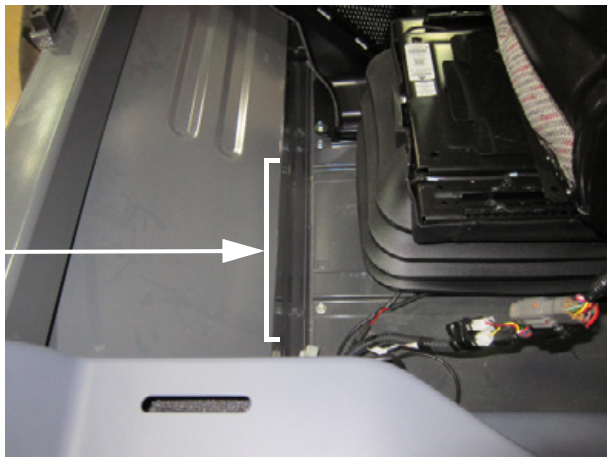
This chapter describes how to install the controller unit.

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

Installing the controller

Step 1

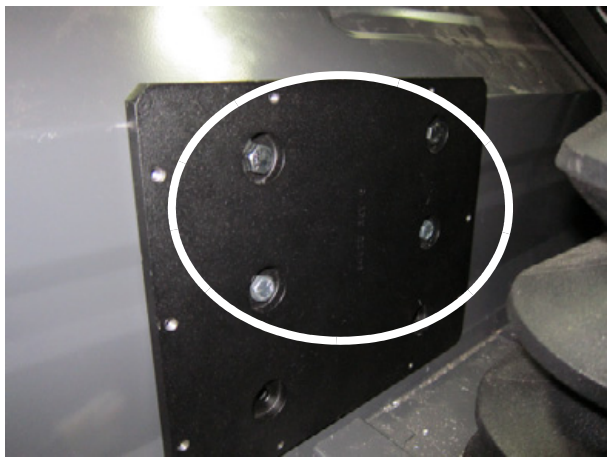
The NavController II will be installed on the steel wall behind the drivers seat of the machine in the area shown.



Step 2

Using the controller mounting plate as a template, carefully mark and drill four 5⁄16" holes for attaching the mounting plate to the machine.

Make sure that the mounting plate is as level as possible.



Step 3

Attach the mounting plate to the machine using the provided ¼" mounting hardware.



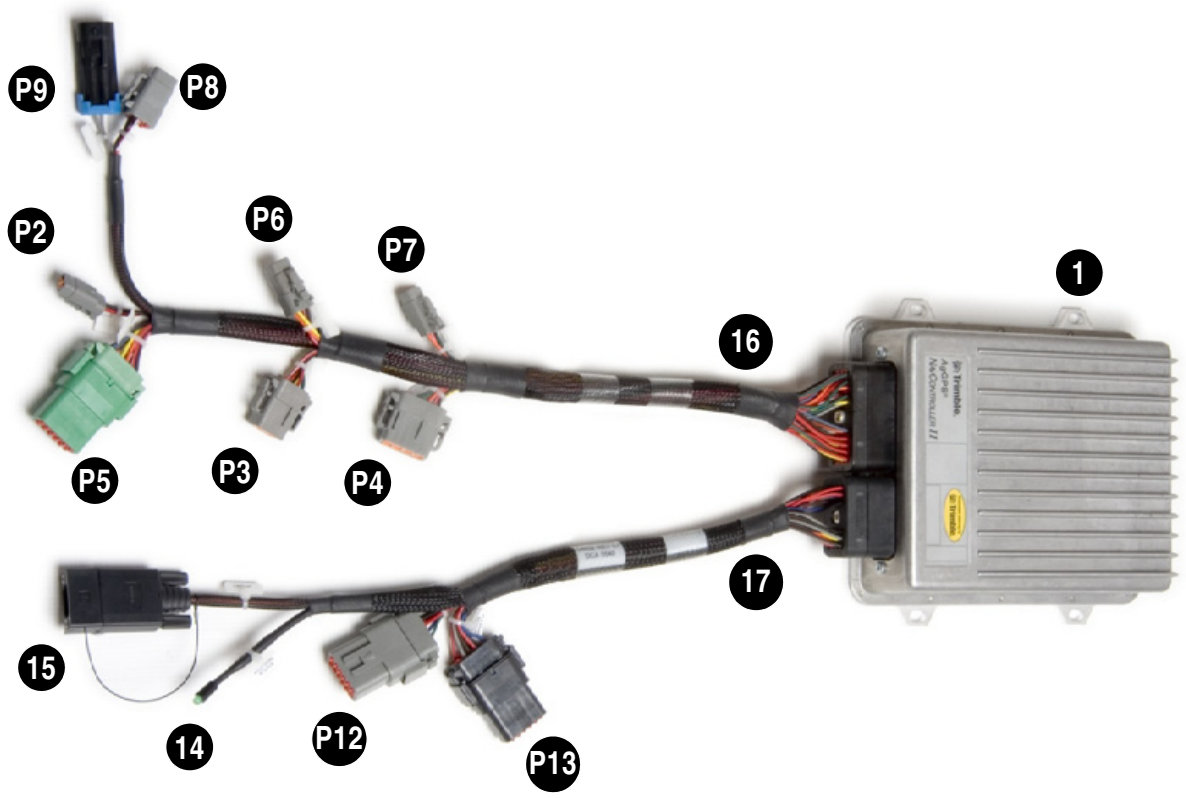
Step 4

Attach the controller to the mounting plate using the provided 10-32 screws.

Connect the controller harness to the controller so that the connector faces the right side of the machine.



Controller connections



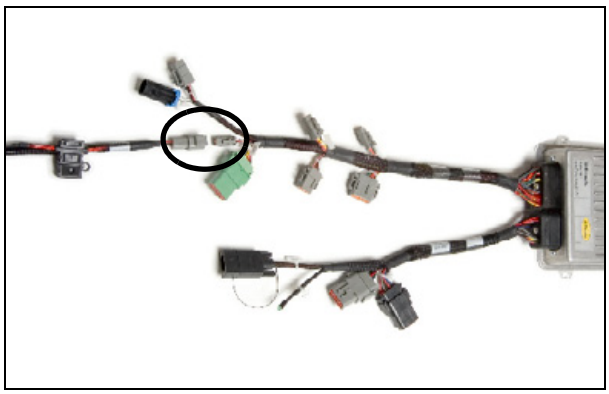
Item	Description
1	NavController II controller
P2	Power connector
P3	GNSS connector
P4	Display connector
P5	Vehicle sensors connector
P6	Steering sensor connector
P7	Manual override connector
P8	Hydraulic valve connector

Item	Description
P9	Sonalert connector
P12	Lightbar/spare connector
P13	Spare sensors connector
14	Status indicator
15	Laptop connector
16	Main harness
17	Auxiliary harness

Step 1

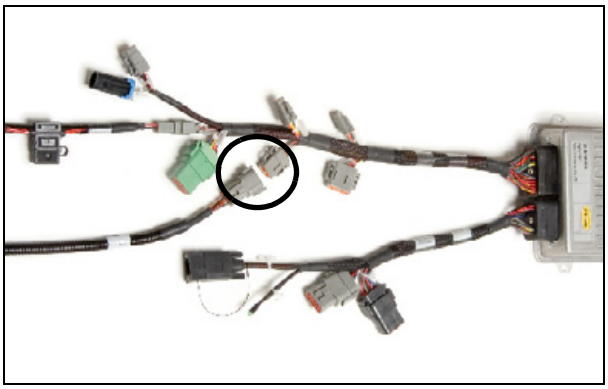
Connect the power cable connection to P-2, which is labeled “Power”. P-2 is located on the main wiring harness.

Note – *The power connection supplies power through the controller to all connected devices, including GNSS and displays.*



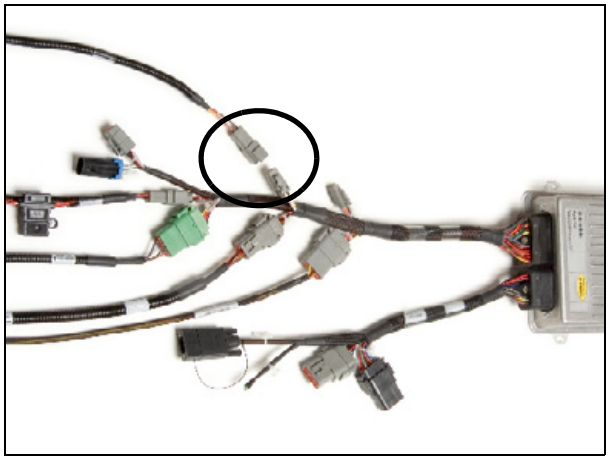
Step 2

Connect cable P/N 75741 cable from the display to P-3, which is labeled “GPS”. P-3 is located on the main wiring harness.



Step 3

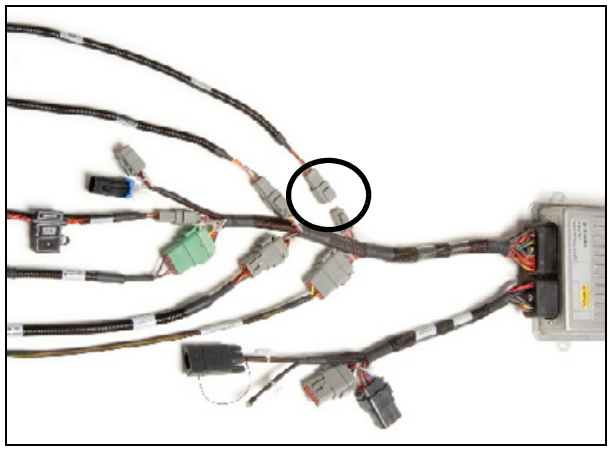
Connect the steering sensor cable connection to P-6, which is labeled “Steering Sensor”. P-6 is located on the main wiring harness.



Step 4

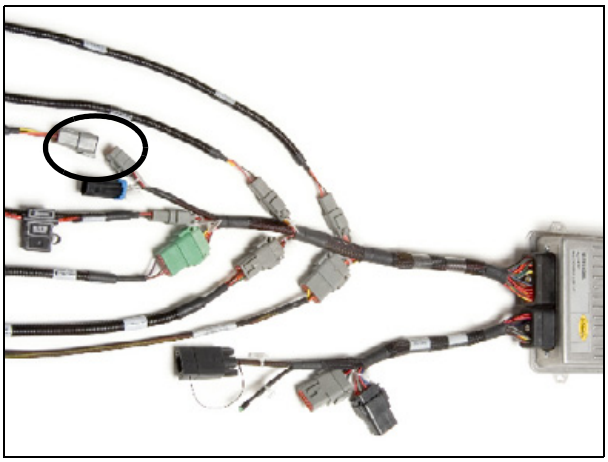
Connect the manual override cable connection to P-7, which is labeled “Manual Override”. P-7 is located on the main wiring harness.

Note – *When you install the remote engage harness, add the pins to the existing connector.*



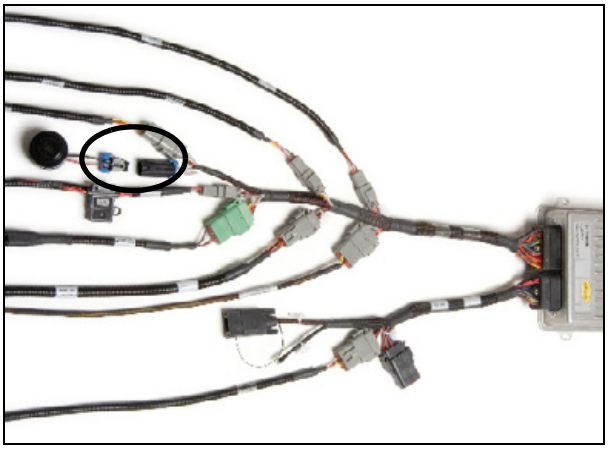
Step 5

Connect the hydraulic steering valve cable connection to P-8, which is labeled “Hydraulic Valve”. P-8 is located on the main wiring harness.



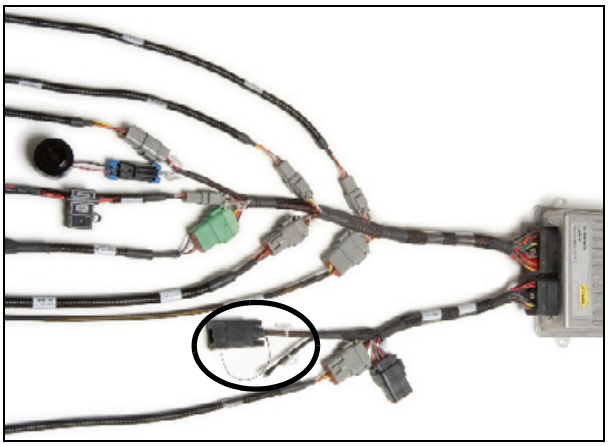
Step 6

Connect the Sonalert P-9 to the two pin Delphi connector on the main wiring harness. Route the cable so the Sonalert warning device is in a position that is audible to the operator.



Step 7

Route the LED and laptop lead, which is located on the auxiliary wiring harness, to a location that allows the operator to determine the controller status. See controller LED status for status determination. Six flashes per second indicates a correctly functioning controller.



Step 8

Use the provided sleeving to secure the harness cables with tie wraps. Cover and route the cable bundle to avoid damage to connectors and strain on wire connections.

CHAPTER 9

Final Machine Check

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

To perform the final machine check:

1. Connect the battery.
2. Start the machine and check for hydraulic leaks. Correct as needed.
3. Update the Trimble display and the Autopilot NavController II to the latest firmware from http://agpartners.trimble.com.

   You can use FlashLoader 200 software version 3.19 to update the Autopilot controller: Download it from http://agpartners.trimble.com.
4. Load the correct configuration file into the Autopilot NavController II for the vehicle model being used.

   Download the latest set of configuration files from http://agpartners.trimble.com.

   Locate the latest External Vehicle Profiles.

   You can use Autopilot Toolbox II software version 2.92 or later to load the configuration file into the Autopilot controller. You can download the AutoPilot Toolbox II software from http://agpartners.trimble.com.
5. Calibrate the Autopilot system using the Trimble display or Autopilot Toolbox II software version 2.92 or later. Depending on your machine type, the following items must be calibrated before you can use the Autopilot system:
   - NavController II mounting orientation
   - Manual override
   - Autosense mounting orientation
   - Valve deadzone
   - Autopilot P-gain
   - Antenna height/Antenna axle offset, and Roll offset