INSTALLATION INSTRUCTIONS

Trimble® Autopilot™ Automated Steering System

Versatile
- 350-620 4WD AGR
- 450-620 DeltaTrack AGR

This kit supports articulated 4WD AutoGuidance Ready (AGR) platforms with serial numbers greater than the following:

- Large frame (including DeltaTrack): 705533
- Small frame: 307823.

⚠ **CAUTION –** Due to the OEM firmware implementation of the **Guidance Active** indicator LED, the indicator may not always show the correct state for the system. The installer should verify the function of the light by engaging auto guidance with the remote engage button and disengaging by turning the wheel. If the indicator does not respond to the actual state of the system, the installer should consider disconnecting or covering the indicator. Contact your Versatile dealer for possible firmware updates.

Version 5.00
Revision A
January 2016
Part number 54036-110-E05

Trimble

Legal Notices

Agriculture Business Area

Trimble Agriculture Division
10368 Westmoor Drive
Westminster, CO 80021
USA
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Release Notice

This is the January 2016 release (Revision A) of the Autopilot Automated Steering System Installation Instructions, part number 54036-110-E05. It applies to version 5.00 of the Autopilot automated steering system.

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Trimble warrants that this Trimble product and its internal components (the "Product") shall be free from defects in materials and workmanship and will substantially conform to Trimble's applicable published specifications for the Product for a period of one (1) year, starting from the earlier of (i) the date of installation, or (ii) six (6) months from the date of product shipment from Trimble. This warranty applies only to the Product if installed by Trimble or a distributor authorized by Trimble to perform Product installation services.

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Trimble's sole liability and your exclusive remedy under the warranties set forth above shall be, at Trimble's option, to repair or replace any Product that fails to confirm to such warranty ("Nonconforming Product"), and/or issue a cash refund up to the purchase price paid by you for any such Nonconforming Product, excluding costs of installation, upon your return of the Nonconforming Product to Trimble in accordance with Trimble's standard return material authorization process.
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Class B Statement – Notice to Users. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
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.
Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

Notice to Our European Union Customers

For product recycling instructions and more information, please go to:
http://www.trimble.com/Corporate/Environmental_Compliance.aspx



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Or
Mail a request for recycling instructions to:
Trimble Europe BV
c/o Menlo Worldwide Logistics
Meerheide 45
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 the Autopilot system
- 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. Log into http://agpartners.trimble.com.
2. Click the *Feedback* link at the right of the screen. A form appears.
3. Complete the form and then click **Submit Feedback**.

Manual system upgrade to the Autopilot system

CFX-750 display and FmX integrated display

Retain
CFX-750™ display: P/N 94000-xx **FmX® integrated display: P/N 93700-xx** Antenna for display: P/N 60600-02 (DGPS) or 77038-00 (OmniStar/RTK)

Required components

Kits required
Platform kits: P/N 54036-110

Antenna mounting kits

Kits required
Bracket kit, GPS with magnetic mounting - V Base Plate - Indexing: P/N 62388-01 AG-15 high performance antenna mounting plate: P/N 62034

Accessory kits

Accessory options
Remote engage cable: P/N 57259

Autopilot hardware organization: As shipped

Hardware	Component	See...
Platform kit: P/N 54036-110	In-cab controller/display cable set	Chapter 2
	External Valve and Sensor Cable set	
Roof bracket kit: • P/N 62388-02 - use only with a VHB plate • P/N 62388-01 - use with magnets for removable mounting of the AG-372	Roof brackets	Chapter 3
	Bolt kit, roof bracket	
GNSS receiver	GNSS receiver	Chapter 3
	GNSS antenna	
	GNSS receiver power/data cable	
	RTK radio, cable, and radio antenna	
Display	CFX-750 display	Chapter 4
	FmX integrated display	
	Display cable	
	Mounting bracket	
Common parts	Controller	Chapter 6
	Controller mounting bracket	
	Cable kit: In-Cab Controller/Display Cable set External Valve and Sensor Cable set Sonalert alarm	

Notice to the installer

This kit supports articulated 4WD AutoGuidance Ready (AGR) platforms with serial numbers greater than the following:

- Large frame (including DeltaTrack): 705533
- Small frame: 307823

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

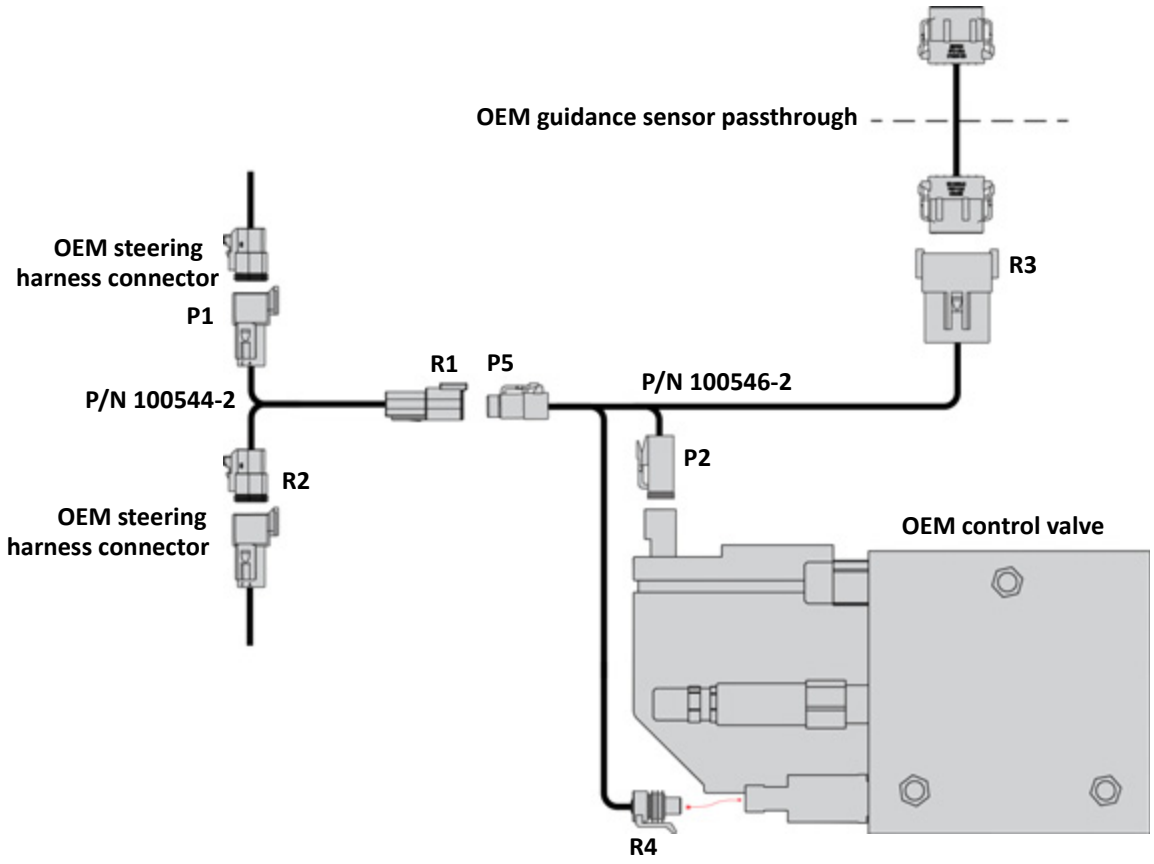
Cable Installation

In this chapter:

- External sensor harness
- External valve and sensor cable installation
- Connecting the OEM steering sensor

This chapter describes how to install the valve and sensor interface cable, and make the connections to the manual override sensor, valve controller and steering sensor.

External sensor harness



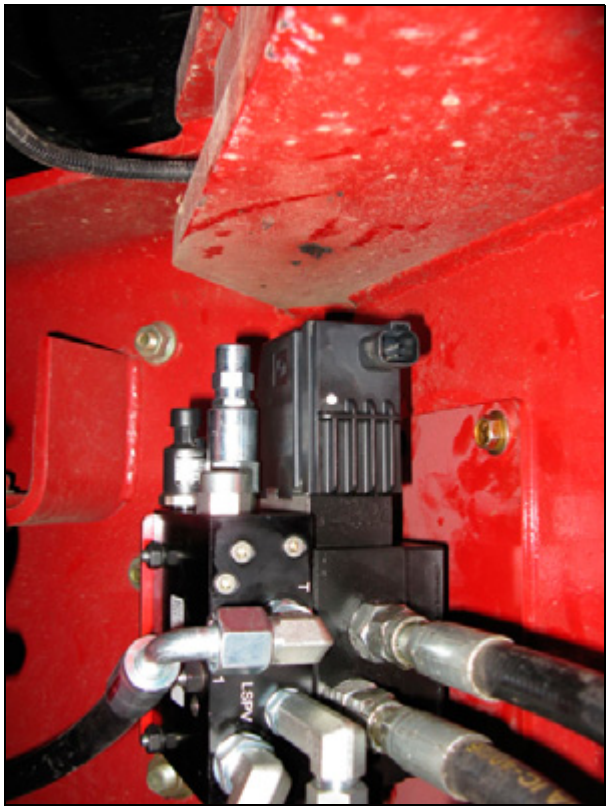
Connector	Description
P1	Connects to the OEM sensor harness at the front axle.
P2	Connects to the OEM valve controller.
P5	Connects to R1 of cable P/N 100544-2.
R1	Connects to P5 of cable P/N 100546-2.
R2	Connects to the OEM sensor harness at the front axle.
R3	Connects to 12-pin OEM sensor bulkhead passthrough.
R4	Connects to the manual override transducer.

External valve and sensor cable installation

Step 1

Locate the existing Danfoss steering valve under the cab, in front of the back edge of the fuel tank.





Step 2

Locate the guidance pass-through harness on the rear underside of the cab.



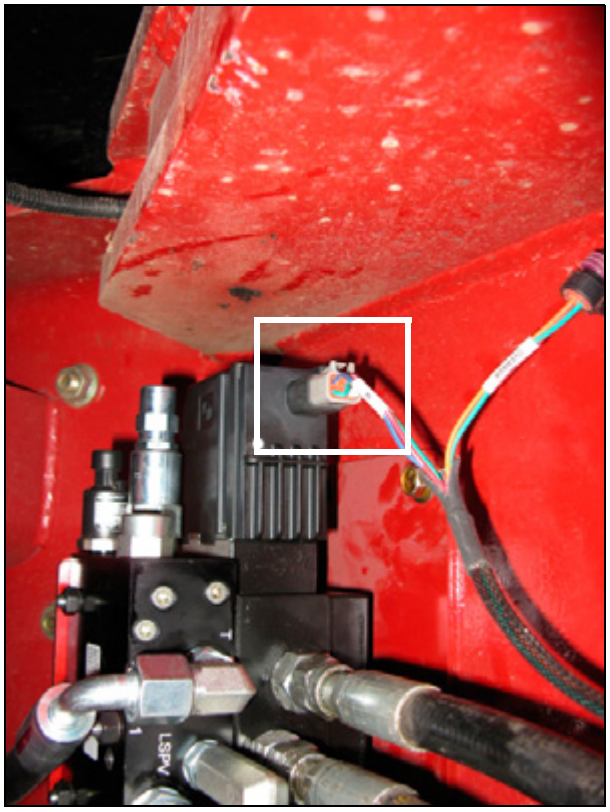
Step 3

Connect the R3 connector of the external cable, P/N 100546-2 (included), to the 12-pin Deutsch connector on the guidance cable harness you located in the previous step.



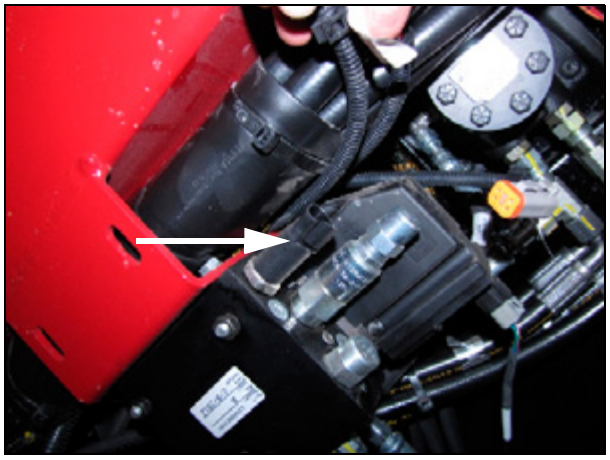
Step 4

Remove the existing valve control cable and connect the connector labeled **Valve A/B** on the Trimble P/N 100546-2 harness to the valve controller.



Step 5

Disconnect the existing cabling from the pressure transducer and secure it safely out of the way.



Step 6

Clean the area of any dirt or debris and then remove the pressure transducer from machine's steering valve.



Step 7

Install the Trimble supplied Autopilot manual override pressure transducer into the location where the sensor was removed in Step 6.



Step 8

Connect R4 on the P/N 100546-2 harness to the connector on the manual override transducer.

Verify that the P/N 100546-2 harness is routed away from any pinch points.

Secure both the P/N 100546-2 harness and the OEM harness ends to prevent damage to the wires.

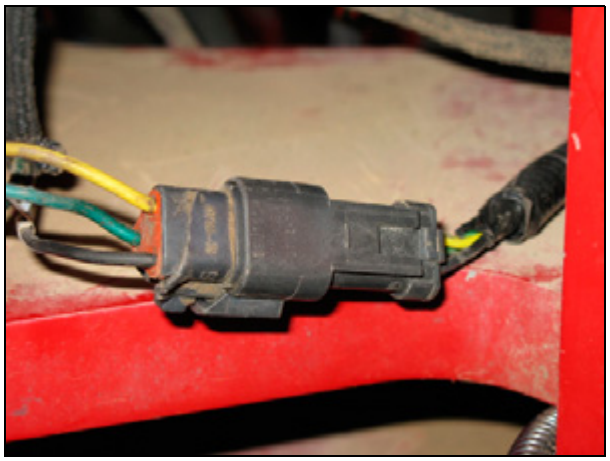


Connecting the OEM steering sensor

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

Locate the OEM steering sensor harness connection. It is a 3-wire Deutsch connector coupling, located just forward of the articulation joint.



Step 2

Separate the connectors and connect the mating ends of the Trimble P/N 100544-2 sensor cable to the connectors.



Step 3

Route the harness safely to ensure that it is not damaged or caught as the machine articulates.

Connect R1 on the sensor cable to the connector labeled **P5** on the P/N 100546-2 harness.



CHAPTER 3

Antenna/External Receiver (if Used) Installation

In this chapter:

- Antenna and receiver installation options
- CFX-750 and FmX displays: Installing the GNSS antenna and plate using the VHB adhesive method
- CFX-750 and FmX displays: Installing the RTK radio antenna

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

Antenna and receiver installation options

There are several options for mounting components (the antenna, radio module, or GNSS receiver) on the cab roof depending on the accuracy required and the antenna type:

- **Bolting to the OEM mount** - Trimble recommends bolting the antenna or V-plate to the existing OEM mount for high-accuracy applications.
- **VHB mount** – Attach a P/N 62034 plate or a V plate directly to the roof with VHB (Very High Bond) adhesive for magnetic mounting.

Possible mounting methods

GNSS receiver	VHB V plate on the roof	Bolted to an existing OEM mount
CFX-750 display; FmX integrated display	✓	✓

Note – *For WAAS, EGNOS, OmniSTAR VBS, Beacon, and DGPS applications, place either of the plates in a firm location using the VHB.*

CFX-750 and FmX displays: Installing the GNSS antenna and plate using the VHB adhesive method

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 7.*

Standard P/N 62034 plates are provided in most display kits. You can use Very High Bond (VHB) to attach either a P/N 62034 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”. The V plate provides repeatable positioning of the antenna.
- **WAAS, EGNOS, OmniSTAR VBS, Beacon applications** – Use a P/N 62034 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.

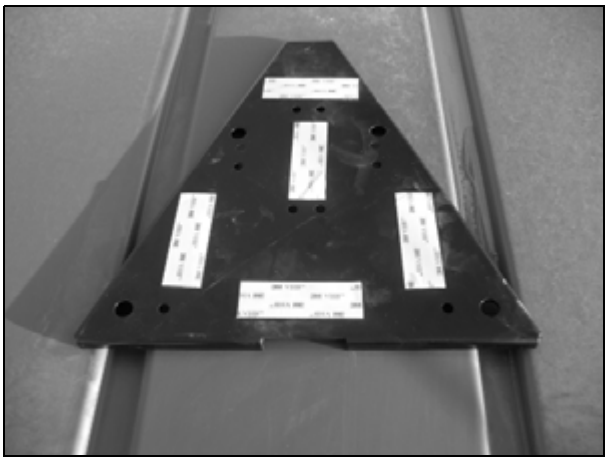


Step 2

V plate only

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

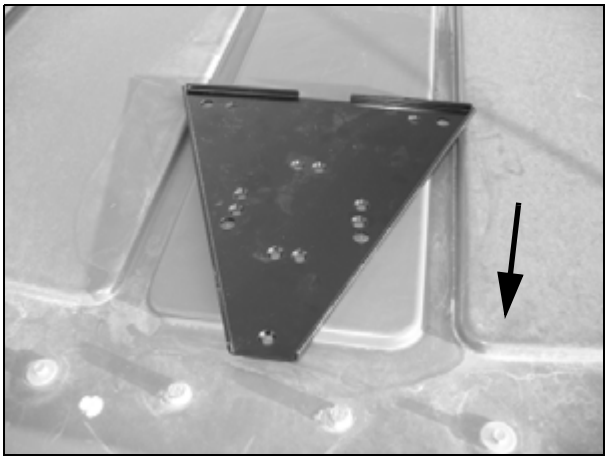
Note – *The VHB strips are pre-applied to the 4" x 6" plate.*



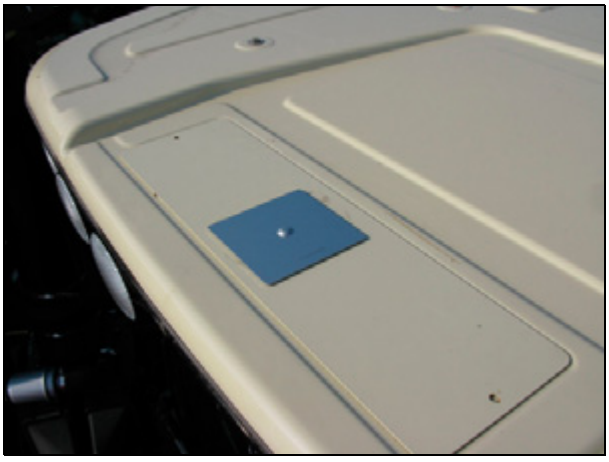
Step 3

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.*



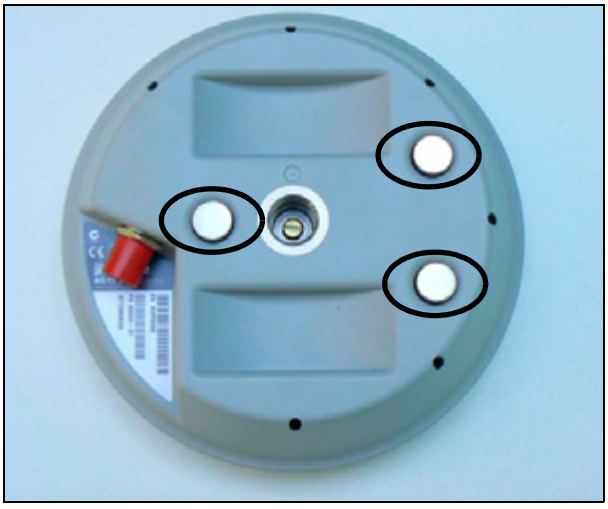
V plate



P/N 62034 plate

Step 4

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



Otherwise, attach the large magnet with a ⅝" stud to the GNSS antenna.



Step 5

GLONASS, RTK, OmniSTAR, DGPS, applications

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



WAAS, EGNOS, VBS, Beacon applications

Attach the antenna to the center of the existing steel plate or P/N 62034 plate.



Step 6

AGR models are equipped with a GPS antenna cable already installed. If available it will be at the center of the cab under the edge of the roof just above the windshield. Attach the TNC connector to the antenna.

If the antenna cable is not present, attach the Trimble antenna cable P/N 50449 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 P/N 62034 plate with the VHB provided to relocate the antenna.



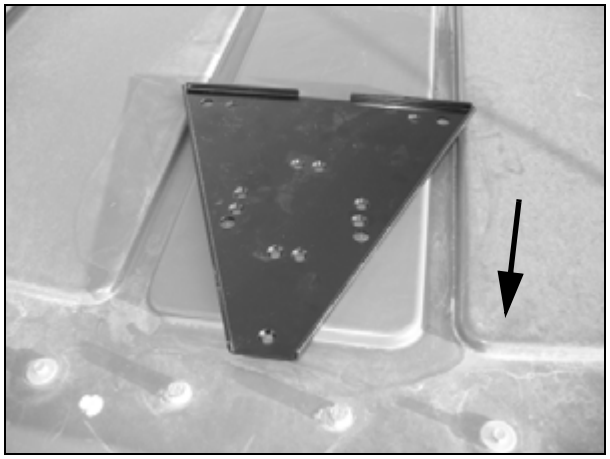
Step 3

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

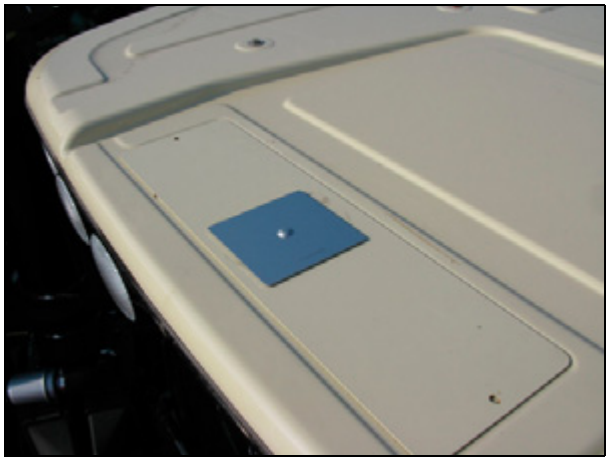
Step 4

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



P/N 62034 plate

CHAPTER 4

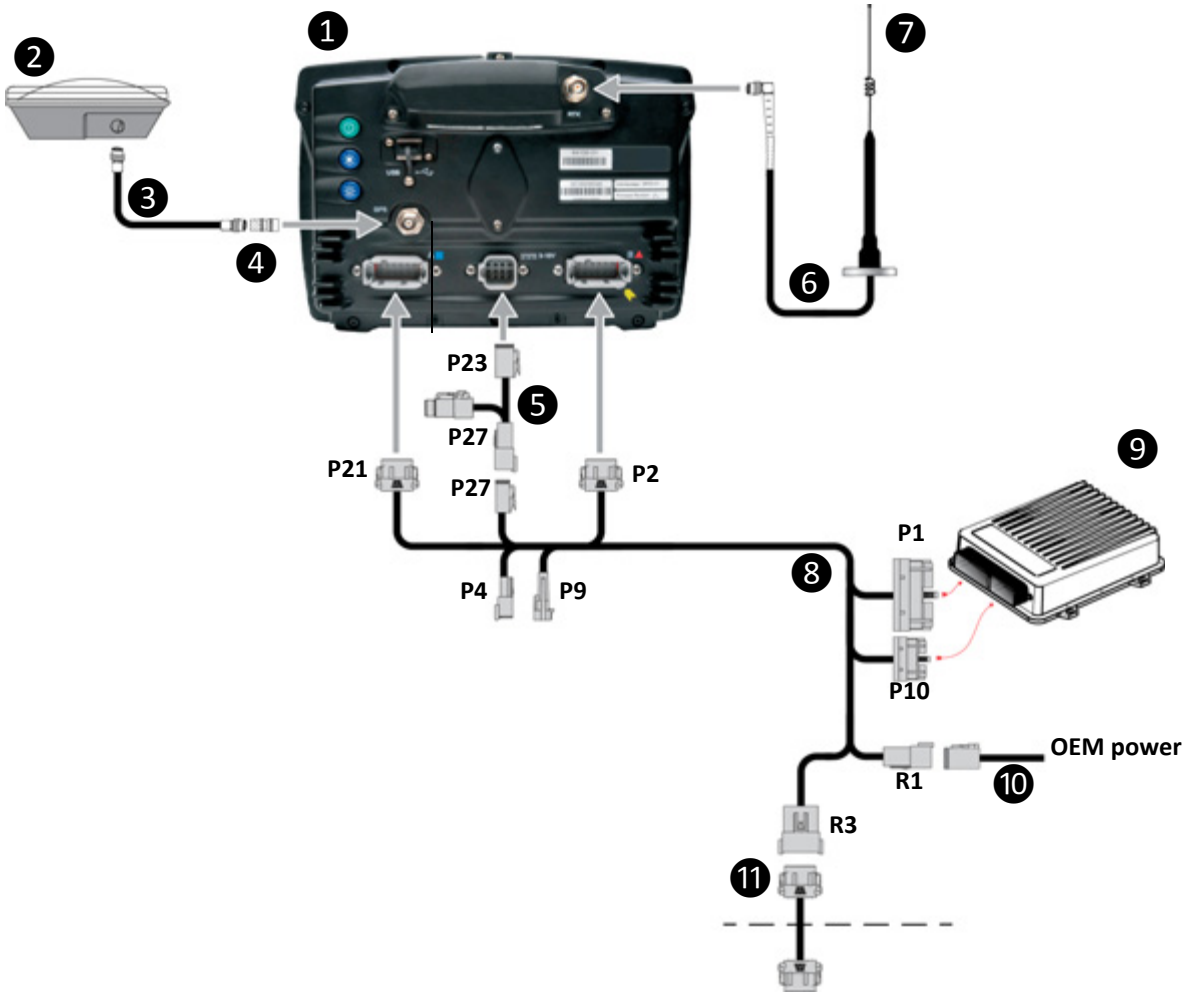
Display Installation

In this chapter:

- CFX-750 display components
- Preparing the CFX-750 display
- Installing the CFX-750 display
- FmX integrated display components
- Preparing the FmX integrated display
- Installing the FmX integrated display
- FmX integrated display: Installing the wiring harness
- CFX-750 display and FmX integrated display: Connecting accessory options

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

CFX-750 display components



Item	Description	Trimble P/N
1	CFX-750 display ***Note –*** *RTK password required.*	94000-xx
2	AG-25 GNSS antenna	77038-00
3	OEM installed GNSS TNC/BNC antenna cable	
4	BNC-to-TNC antenna adapter	83666
5	CFX-750 power adapter cable	Included in 100545
6	NMO-to-TNC 20 ft antenna cable and base	72122
7	Radio antenna kit • 430-450 MHz • 450-470 MHz • 900 MHz	 24253-44 24253-46 22882-10

Item	Description	Trimble P/N
8	In-cab guidance harness	100545
9	NavController	55563-00
10	OEM guidance power connector	
11	OEM guidance sensor pass-through	

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.

Decide where you will mount the display in the vehicle cab and then use the provided U-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.

Installing the wiring harness

Step 1

The in-cab harness connects the NavController directly to the CFX-750 display. Use the included power cable adapter to connect the P27 connector to the display.



Step 2

Once the adapter cable is connected to the harness, connect the free end of the adapter to the CFX-750 display's power port.



Step 3

Connect P21 of the cab harness to the A port of the CFX 750 display.



Step 4

Connect P2 of the cab harness to the B port of the CFX 750 display.



Step 5

The machine's existing antenna cable is under a cover on the right side of the cab. To find the panel locate electronics bay cover that is behind the seat, and then remove it. Then, look under the inner fender cover that is below the control switch panel.

The cable is terminated with a BNC style connector. The kit supplies a BNC-to-TNC adapter that must be used to connect the antenna cable to the display.

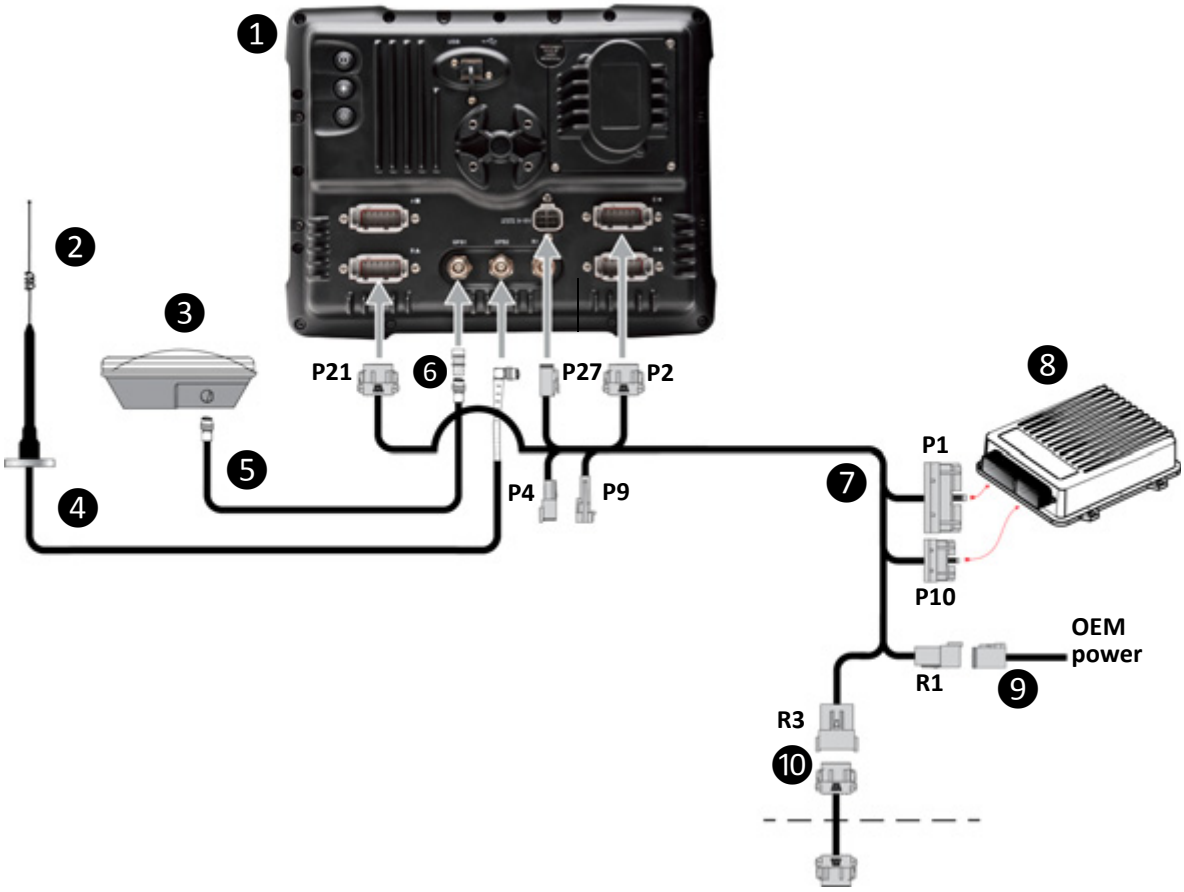
Note – *There are more images for this step on the next page.*




9-16V 7A
GPS2


7A
RTK
GPS2

FmX integrated display components



Item	Description	Trimble P/N
1	FmX integrated display	93700-00
2	Radio antenna kit • 430-450 MHz • 450-470 MHz • 900 MHz	 24253-44 24253-46 22882-10
3	AG-25 GNSS antenna	77038-00
4	NMO-to-TNC 20 ft antenna cable and base	72122
5	OEM installed GNSS TNC/BNC antenna cable	

Item	Description	Trimble P/N
6	BNC-to-TNC antenna adapter	83666
7	In-cab guidance harness	100545
8	NavController	55563-00
9	OEM guidance power connector	
10	OEM guidance sensor pass-through	

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.

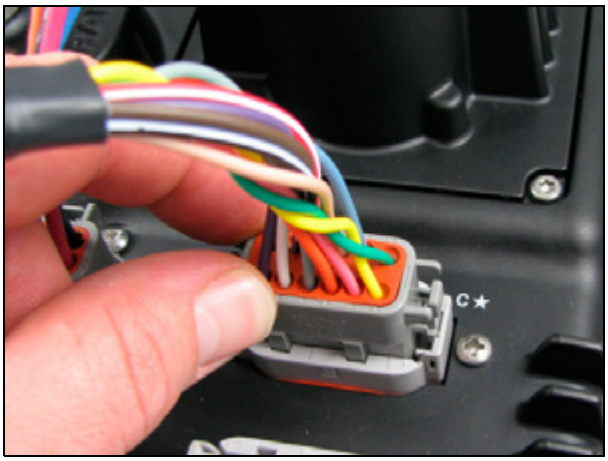
Step 1

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

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

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



Step 3

The machine's existing antenna cable is under a cover on the right side of the cab. To find the panel locate electronics bay cover that is behind the seat, and then remove it. Then, look under the inner fender cover that is below the control switch panel.

The cable is terminated with a BNC style connector. The kit supplies a BNC-to-TNC adapter that must be used to connect the antenna cable to the display.

Note – *There are more images for this step on the next page.*




9-16V 7A
GPS2


7A
RTK
GPS2

FmX integrated display: Installing the wiring harness

This image shows the wiring harness used with the FmX integrated display. For a diagram identifying the different parts, see FmX integrated display components, page 32.



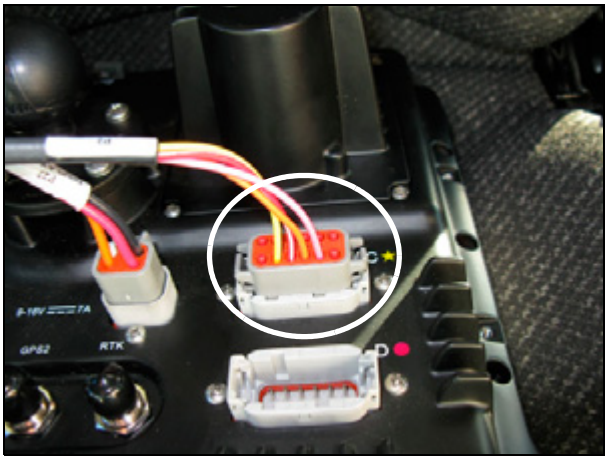
Step 1

Plug the power connector P27 on the P/N 100545 harness into the power socket on the display.



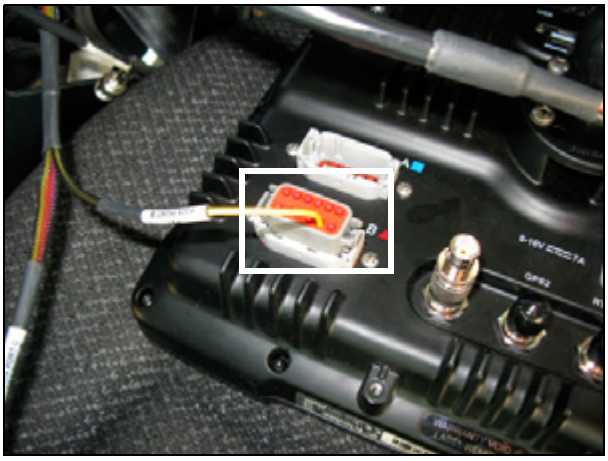
Step 2

Connect the P2 connector on the P/N 100545 harness into the C port on the display.



Step 3

Insert the harness connector labeled **P21** into the port labeled **B** on the display.



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

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

AgCam

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

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.



CFX-750 display



FmX display

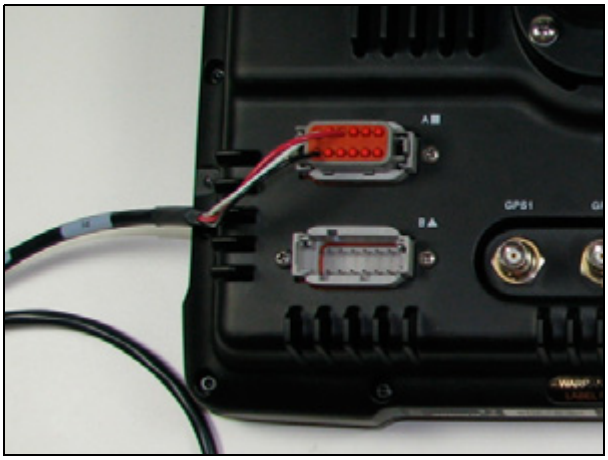
Step 3

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.



CHAPTER 5

In-Cab Harness Installation

In this chapter:

- Connecting the system power
- Connecting the sensor harness

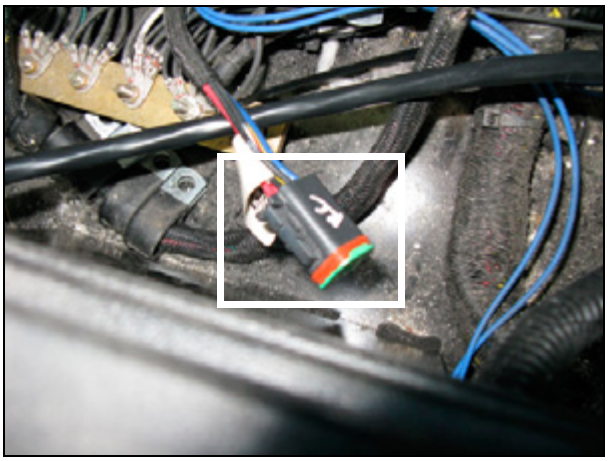
This chapter describes how to install the in-cab harness in the vehicle.

Connecting the system power

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

In the electronics bay behind the seat, locate the 6-pin power connector.



Step 2

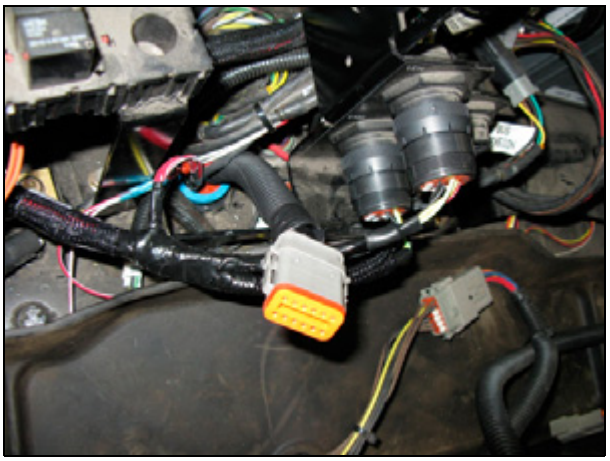
Connect the R1 socket on the P/N 100545 harness to the 6-pin power connector.



Connecting the sensor harness

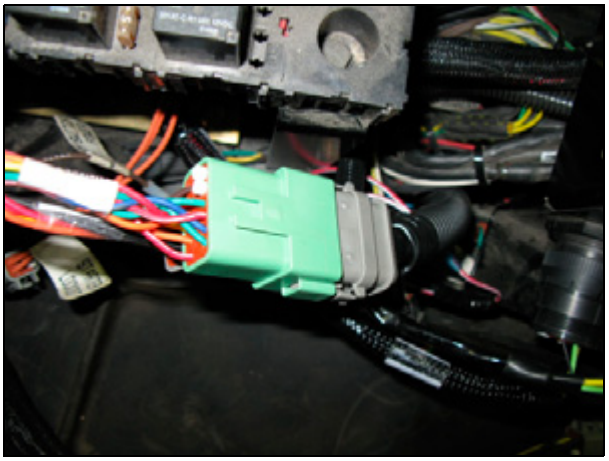
Step 1

Locate the 12-pin Deutsch connector from the in-cab side of the guidance cable pass-through harness.



Step 2

Connect the R3 connector on the P/N 100545 harness to the 12-pin Deutsch connector from the in-cab side of the guidance cable pass-through harness.





CHAPTER 6

Controller Installation

In this chapter:

- Installing the controller
- Controller connections

This chapter describes how to install the controller unit.

Installing the controller

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.

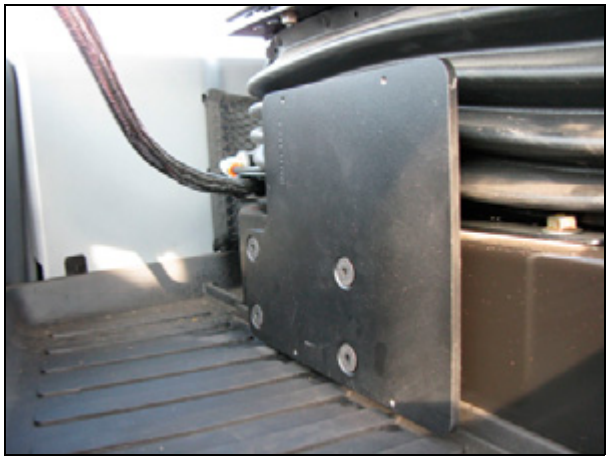
Step 1

Mount the controller to the right-side of the seat base. Four-threaded holes are provided for attaching the mounting bracket.

Step 2

Use the four supplied M10 flat head bolts and four spacers to mount the plate to the seat base. The spacers provide additional clearance for the seat at its lowest adjustment. If the threaded holes are available, tighten the bolts securely.





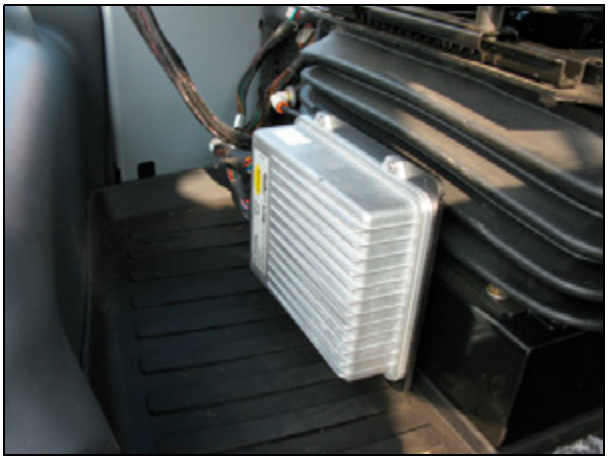
Step 3

Before you install the controller, attach the P1 and P10 connector on the in-cab harness, P/N 100545, to the Trimble NavController. Use an Allen wrench to secure the connectors to the controller.

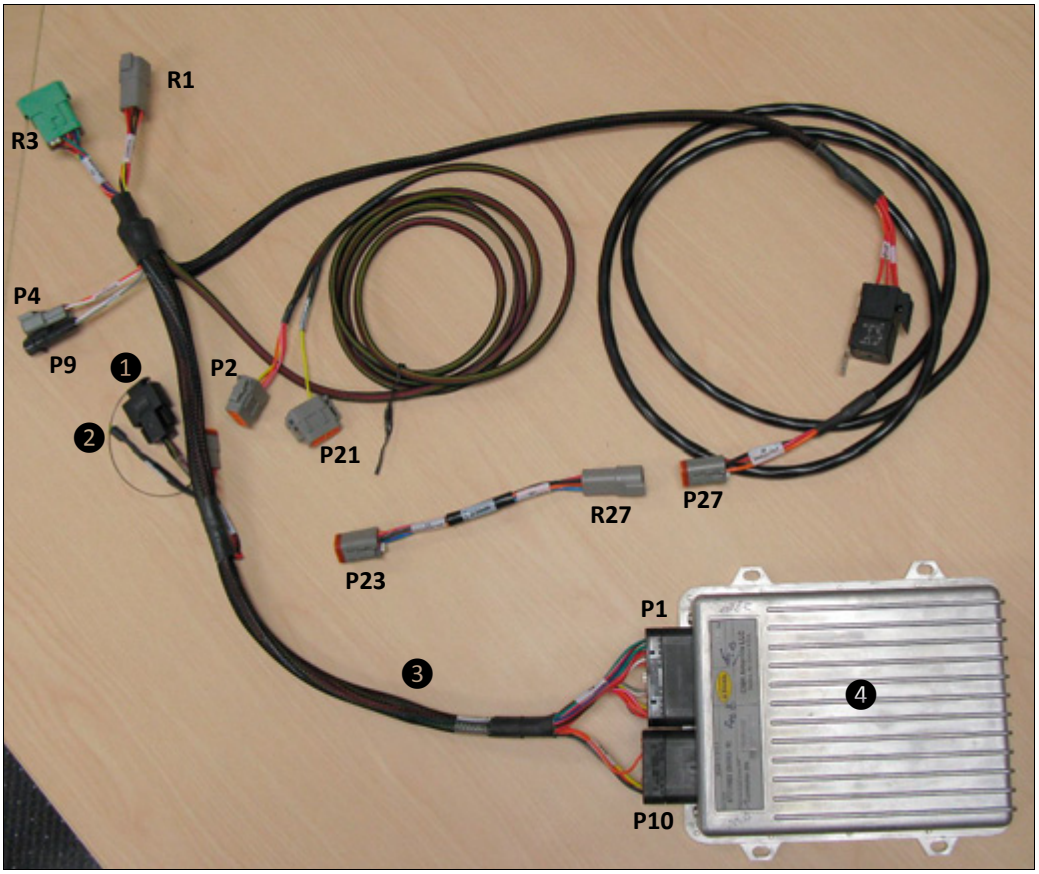


Step 4

Use the four #10 Phillips screws provided in the bolt kit to mount the controller to the bracket.



Controller connections



Item	Description	Item	Description
P1 / P10	Harness to NavController	❶	Laptop connector
P2	Display connector	❷	Status display LED
P4	Remote engage connector	❸	Main harness
P9	Sonalert connector	❹	NavController
P21	Display connector		
P23	Display power connector for CFX-750 display		
P27	Display power connector (FmX integrated display only)		
R27	Display power-in connector (CFX-750 display only)		
R1	OEM power connector		
R3	Cab floor connector		

CHAPTER 7

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 to the latest firmware from http://agpartners.trimble.com.

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

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

   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 mounting orientation
   - Manual override
   - Valve deadzone
   - Autopilot P-gain
   - Antenna height/Antenna axle offset, and Roll offset
6. For *Remote Output* turn on the *On When Engaged function* to make sure that the *Engaged* light lights up on the vehicle's dashboard when *Remote Output* is turn on. Do one of the following:
   - ***On the FmX display***: Add the *Remote output* plugin, select Port B as the *Output port*, and set the method to *On When Engaged*. The signals are output through port B.
   - ***On the CFX-750 display***: Go to *Settings* / *System* / *Advanced* /*Digital Output Mode*. Set the Digital Output Mode to *Remote Output* and then tap **OK**. The signals are output through port A.