INSTALLATION INSTRUCTIONS

Autopilot™ Automated Steering System

Valtra BH Tractors (BM Brazil)

- **BM100**
- **BM110**
- **BM125i**
- **BH145**
- **BH160**
- **BH165**
- **BH180**
- **BH185i**
- **BH205i**

Challenger WT Tractors

- **540**
- **560**
- **590**

Version 5.00
Revision A
March 2012
Part Number 54035-179-E05

Trimble

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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.

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.

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Or

Mail a request for recycling instructions to:

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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.

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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	

EZ-Guide 500 system

Retain	Remove
EZ-Guide® 500 lightbar: 66100-xx Antenna for EZ-Guide 500 lightbar: P/N 60600-xx (DGPS) or 57200-00 (OmniStar/RTK) Antenna to receiver cable: P/N 50449 Power cable: P/N 62817 *Optional.* Remote keypad	Power connection cable: P/N 62818

Required components

Kits required	Special tools
Platform kit: P/N 54035-179 Hydraulic hose kit: P/N 86049	Drill $^{7}/_{16}$'' drill bit

Antenna mounting kits

Antenna options
Antenna V plate mount: P/N 62388-01 – see Chapter 4, Antenna/Receiver Installation.

Accessory kits

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 54035-179)	Hydraulic valve	Chapter 2
	Hydraulic manifold	Chapter 2
	Transducer flow switch	Chapter 2
	Manual override cable	Chapter 2
	Hydraulic brackets and bolt kits	Chapter 2
	Hydraulic valve cable	Chapter 2
	AutoSense™ steering device and cabling	Chapter 3
	AutoSense mounting bracket and hardware	Chapter 3
	Power switch	Chapter 5
	Bolt kit controller	Chapter 7
Common parts	Controller	Chapter 7
	Controller mounting bracket	Chapter 1
	Cable kit: • Main wiring harness • Power bus auxiliary wiring harness • Sonalert alarm	Chapter 7
GNSS receiver	GNSS receiver	Chapter 4
	GNSS antenna	Chapter 4
	GNSS receiver power/data cable	Chapter 4
	RTK radio, cable, and radio antenna	Chapter 4
Display	CFX-750 display	Chapter 4
	FmX integrated display	Chapter 4
	EZ-Guide 500 lightbar	Chapter 4
	Display cable	Chapter 4
	Mounting bracket	Chapter 4
Hydraulic hose kit: P/N 86049	Hydraulic hoses	Chapter 2
	Hydraulic adaptors	Chapter 2

Hardware	Component	See...
Roof bracket kit: (P/N 62388-01)	Roof brackets	Chapter 4
	Bolt kit, roof bracket	Chapter 4

Preparing the vehicle for installation

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.

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

CHAPTER

2

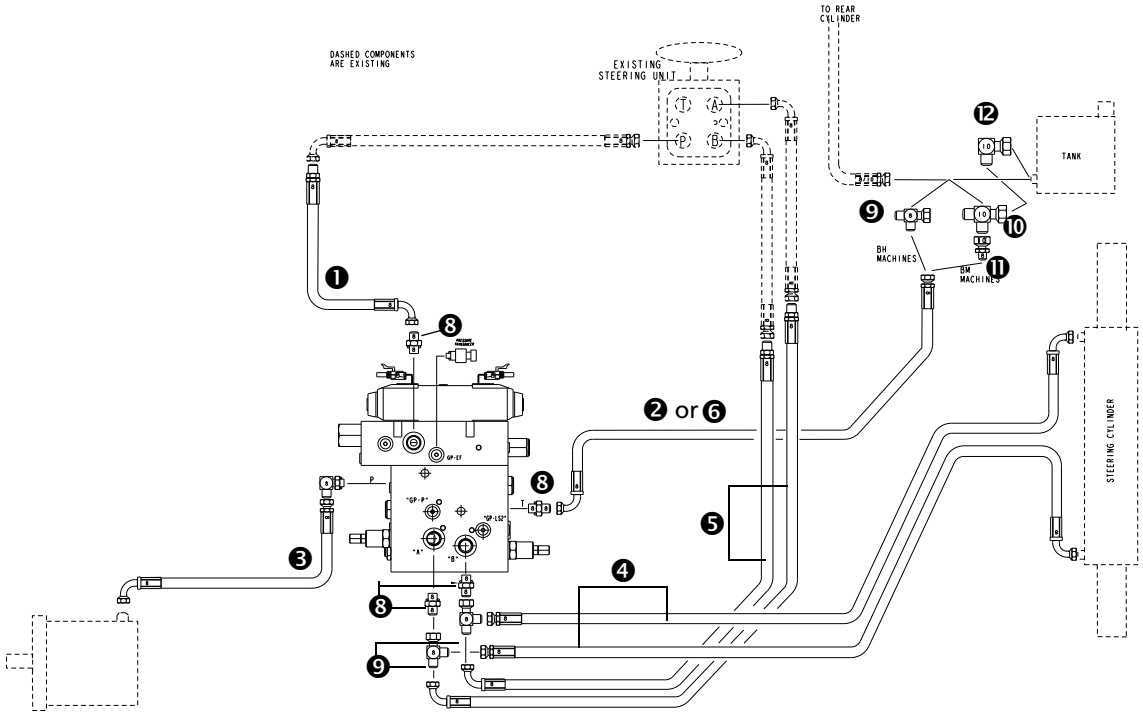
Hydraulic Control Valve Installation

In this chapter:

- Hydraulic control valve components
- Preparing the Autopilot manifold, sandwich block, and control valve
- Removing the front and side projection frames
- Installing the hydraulic manifold
- Manifold mounting position for a BH model with an oil radiator
- Installing the hydraulic hoses
- Tank connections
- Reinstalling the front frame

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

Hydraulic control valve components



Item	Description	Part number
❶	67" hose	F451TC0339-08-08-08-67
❷	177" hose	F451TC0639-08-08-08-177 *Used on the Valtra BH/BM tractors.*
❸	79" hose	F451TC0639-08-08-08-79
❹	47" hose	F451TC0639-08-08-08-47
❺	47" hose	F451TC0339-08-08-08-47
❻	146'' hose	F451TC0639-08-08-08-146 *Used on the Challenger WT tractors.*

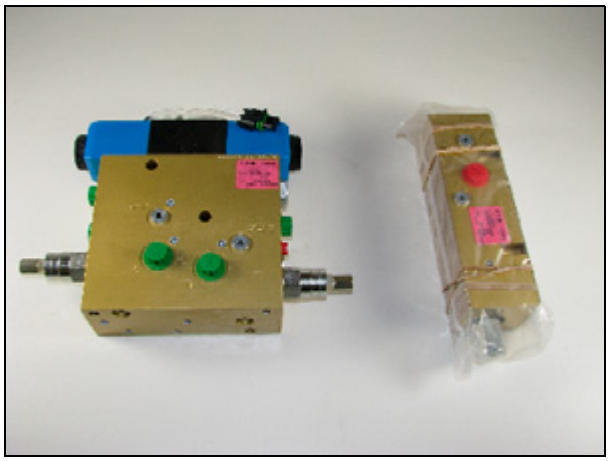
Item	Description	Part number
❼	Fitting	8 C50X
❽	Fitting (x4)	8 F50X
❾	Fitting (x3)	8 R6X
❿	Fitting	10 R6X
⓫	Fitting	10-8 TRTXN
⓬	Fitting	10 C6X

Note – *Part numbers are Parker numbers and are for reference only.*

Preparing the Autopilot manifold, sandwich block, and control valve

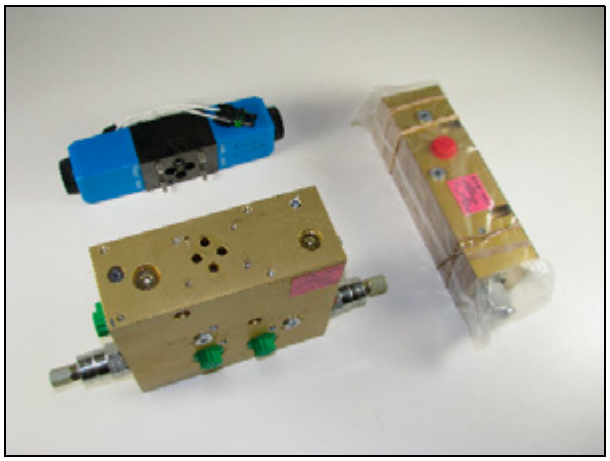
Step 1

Locate the Autopilot manifold and the sandwich block and place them on a clean work surface.



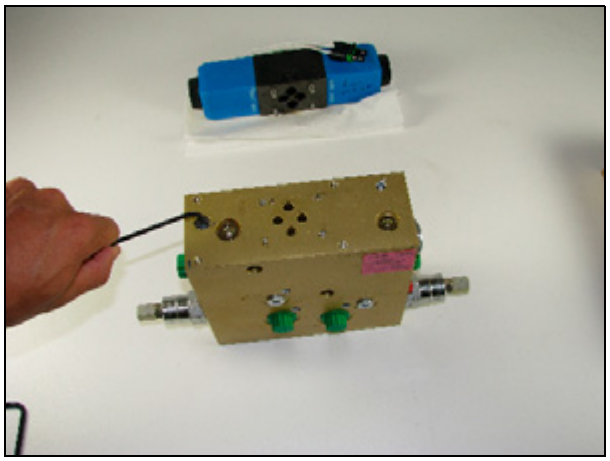
Step 2

Remove the four bolts holding the valve to the top of the Autopilot manifold and then detach the valve.



Step 3

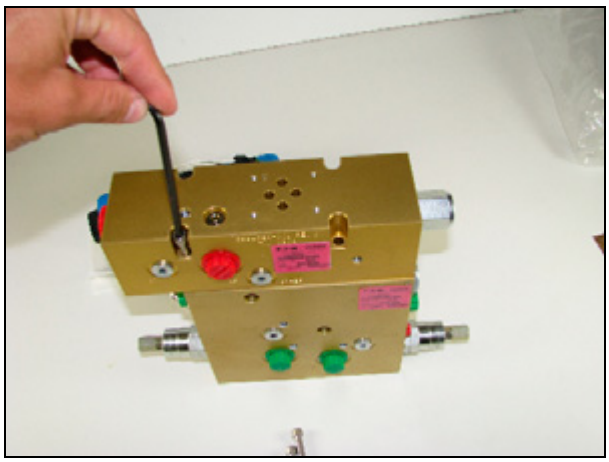
Use an Allen wrench to remove the plug from the top of the Autopilot manifold, as shown.



Step 4

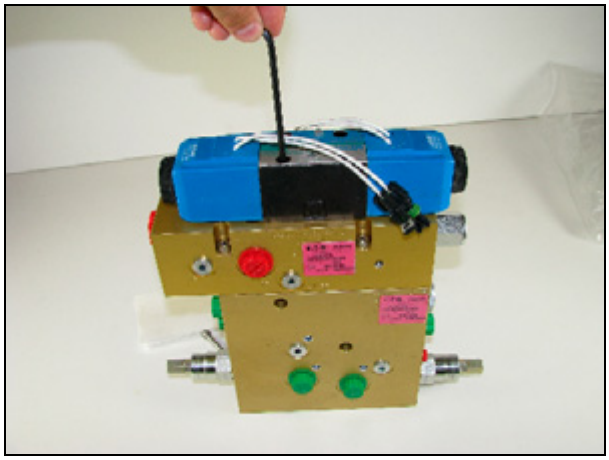
Use the supplied bolts and an Allen wrench to attach the sandwich block to the top of the Autopilot manifold.

Note – *Ensure all the O-rings are in place during assembly, and that the EF port on the sandwich plate is on the same side as the A and B ports on the Autopilot manifold.*



Step 5

Attach the Autopilot valve to the top of the sandwich block with the four existing bolts and then tighten the bolts.



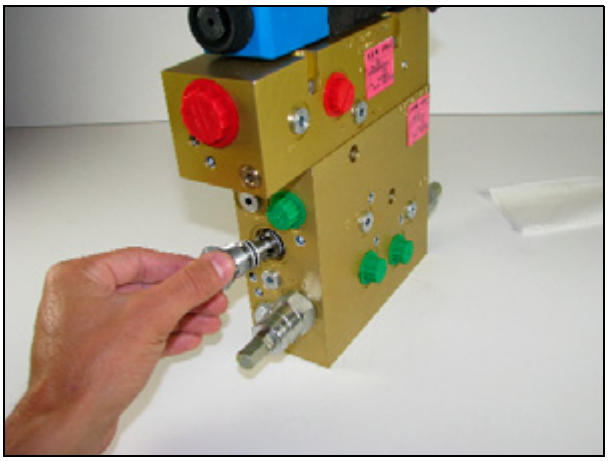
Step 6

Locate the cavity plug; it will be stamped with **2186484**.



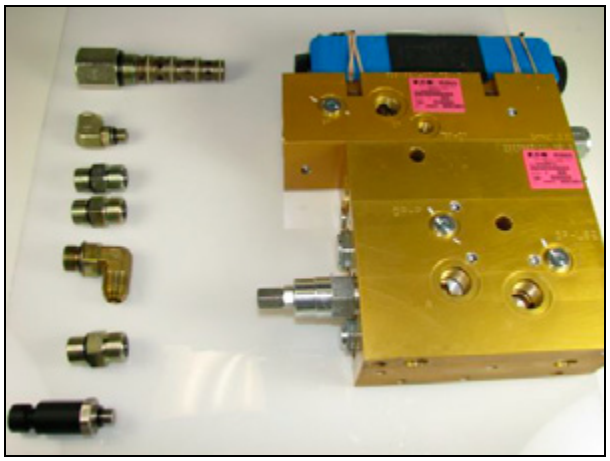
Step 7

Install the cavity plug into the PCOMP port on the AutoPilot manifold and then tighten it.



Step 8

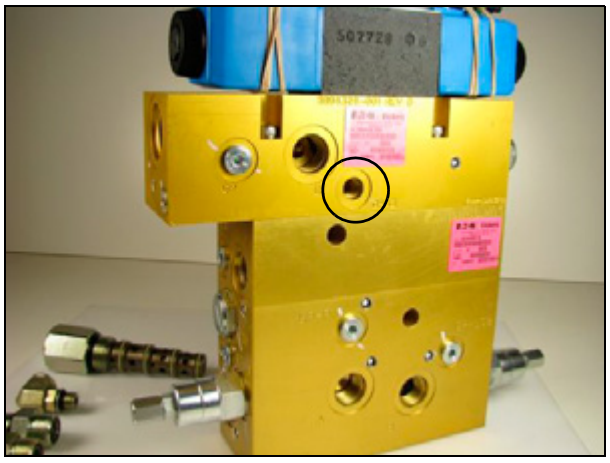
Place the Autopilot manifold and all the fittings on a clean work surface



Step 9

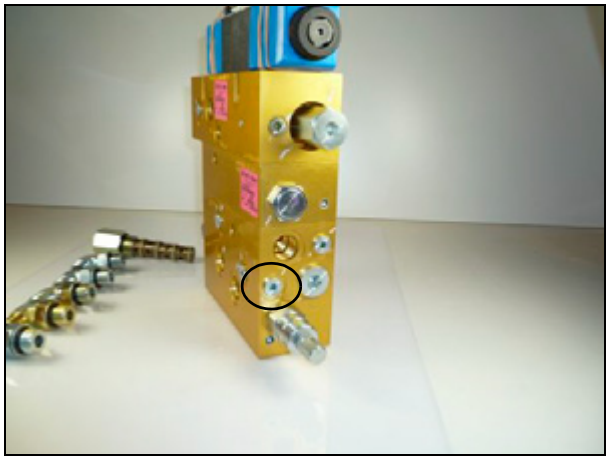
Remove the plastic plugs from the Autopilot manifold.

Use a 3/16" Allen wrench to remove the plug in the GP-EF port.



Step 10

Use a 3/16" Allen wrench to assemble the plug removed previously from the GP-EP port into the LS2 port.



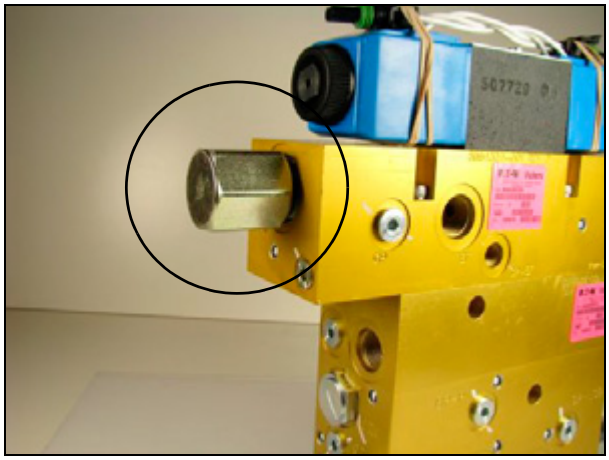
Step 11

Install the manual override pressure transducer (provided) into the GP-EF port.



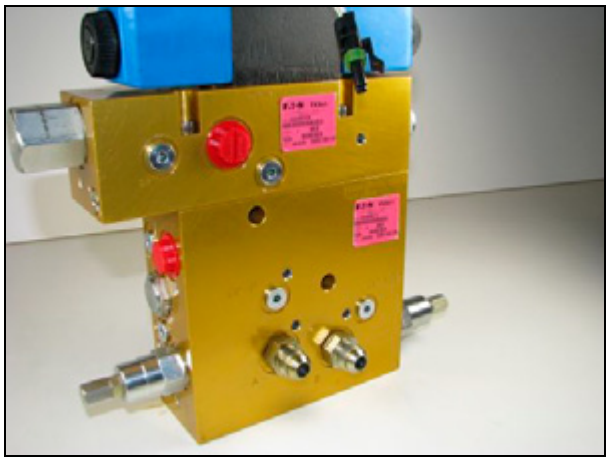
Step 12

Install the PFRD cartridge labelled PFRD-12-U-0-000-145-00 into the port shown.



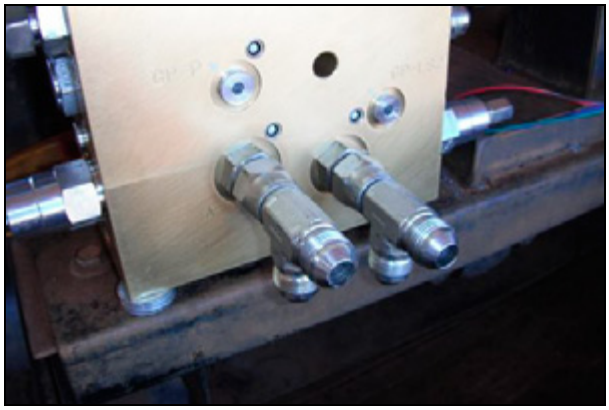
Step 13

Insert the -8 JIC straight fittings (provided) into the A and B ports.



Step 14

Attach the -8 JIC run T fittings onto the straight fittings inserted in the previous step into the A and B ports.



Step 15

Insert the -8 JIC 90° fitting into the P port. Orient the fitting approximately as shown.



Step 16

Insert the -8 JIC straight fittings into the EF ❶ and T ❷ ports.

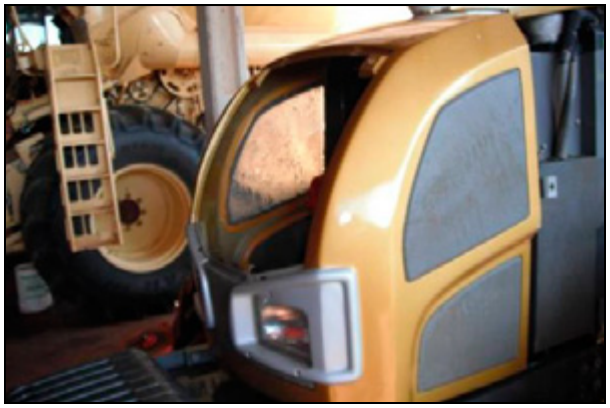


Removing the front and side projection frames

Step 1

Remove the side frames and then remove the front frame to mount the Autopilot manifold in that position.





Step 2

Remove the lights connectors as shown.



Step 3

To remove the front panel, remove the 4 bolts on both sides of the machine.



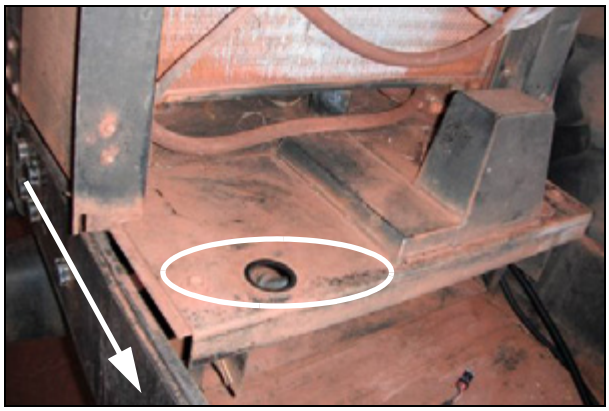


Installing the hydraulic manifold

Step 1

Open the hood of the machine and then locate the hydraulic manifold mounting area in front of the radiator.

Note – *The arrow points toward the front.*



Step 2

Use the Autopilot manifold to create a template and then mark two holes for mounting.



Valtra BH / BM valve mounting location



Challenger WT valve mounting location

Step 3

Drill two $^{7}/_{16}$" mounting holes to clear the $^{3}/_{8}$" mounting bolts for the manifold.

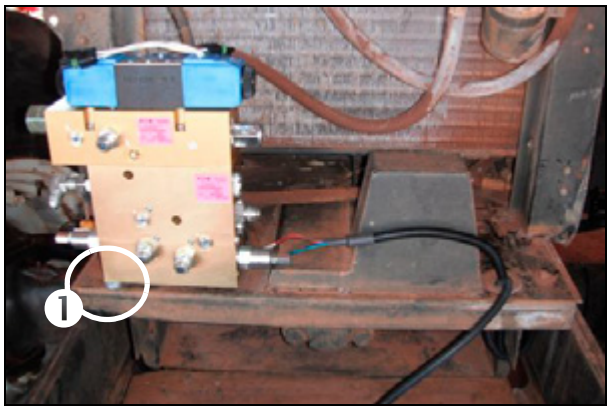




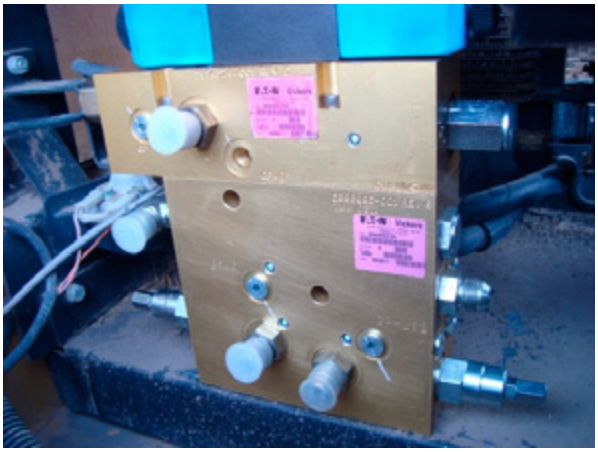
Step 4

Use the $^{3}/_{8}$" bolts and hardware provided to attach the manifold assembly to the machine.

Note – *It may be necessary to use a number of washers to raise the manifold so that it clears the frame of the machine* ❶.



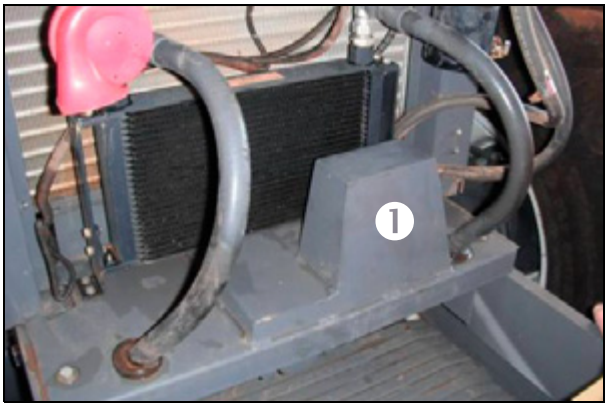
Valtra BH / BM



Challenger WT

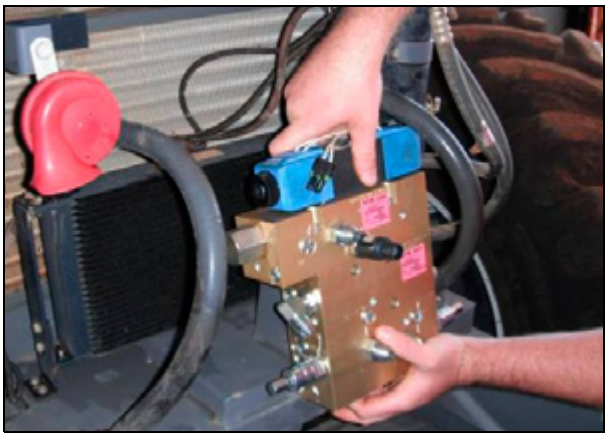
Manifold mounting position for a BH model with an oil radiator

If a BH model is equipped with an oil radiator, change the manifold installation position to the position identified here ❶.



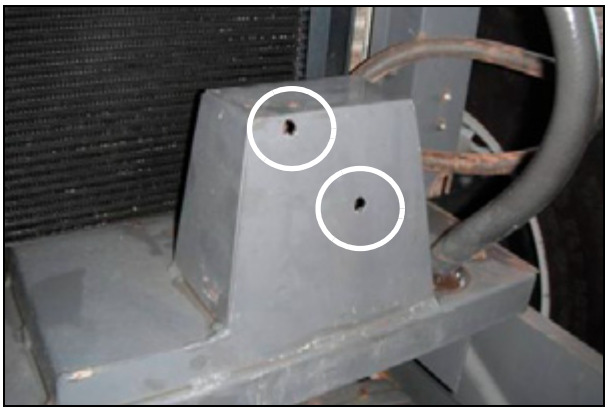
Step 1

Use the Autopilot manifold as a template to mark the two clearance holes for mounting.



Step 2

Drill two $^{7}/_{16}$" mounting holes to clear the $^{3}/_{8}$" mounting bolts for the manifold.



Step 3

Use the 3/8" bolts and hardware provided to attach the manifold assembly to the machine.



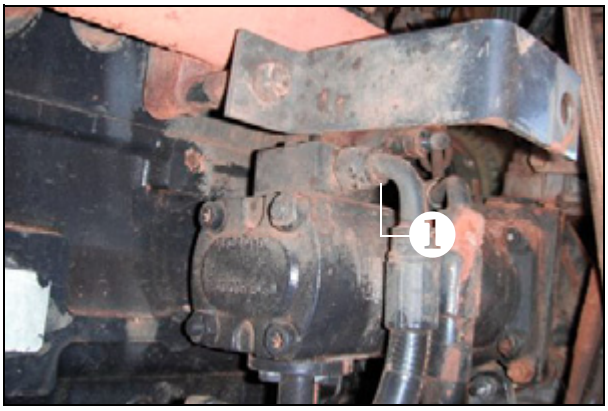
Installing the hydraulic hoses

Step 1

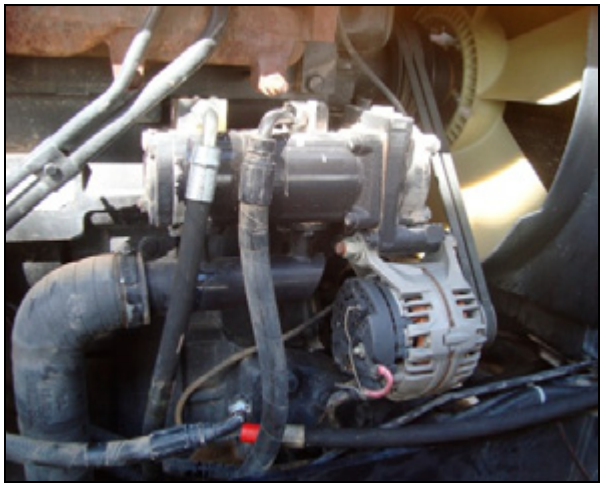
Under the exhaust manifold of the machine, located the hydraulic pump. The pressure line will be attached to location ❶.



Valtra BH / BM



Valtra BH / BM



Challenger WT

Step 2

Remove the line from the hydraulic pump and then attach the male end of the EF line to the removed line.





Step 3

Route the EF line to the EF port on the manifold and then attach it to the EF port.



Step 4

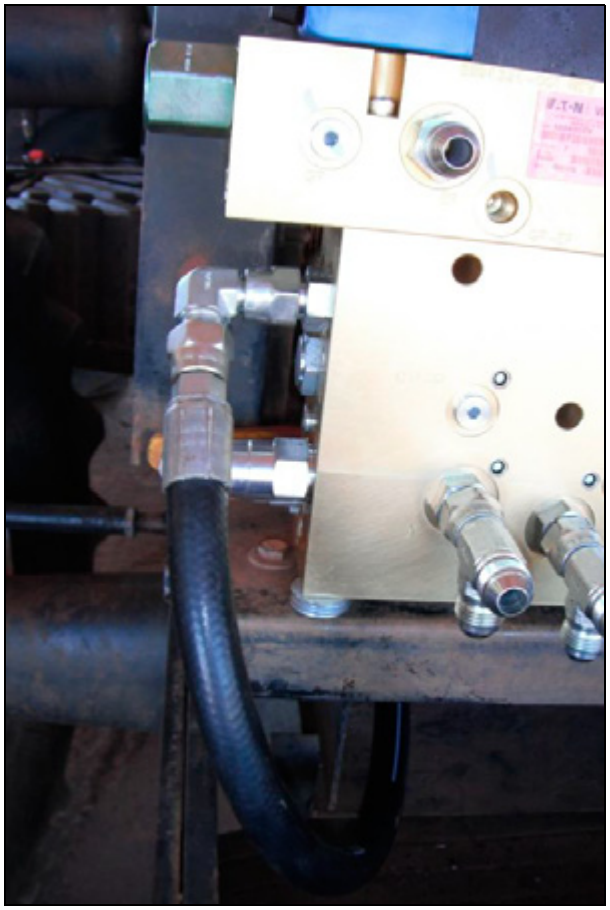
Connect the 90° end of the P line to the port on the hydraulic pump.

Route the line to the P port of the Autopilot manifold.



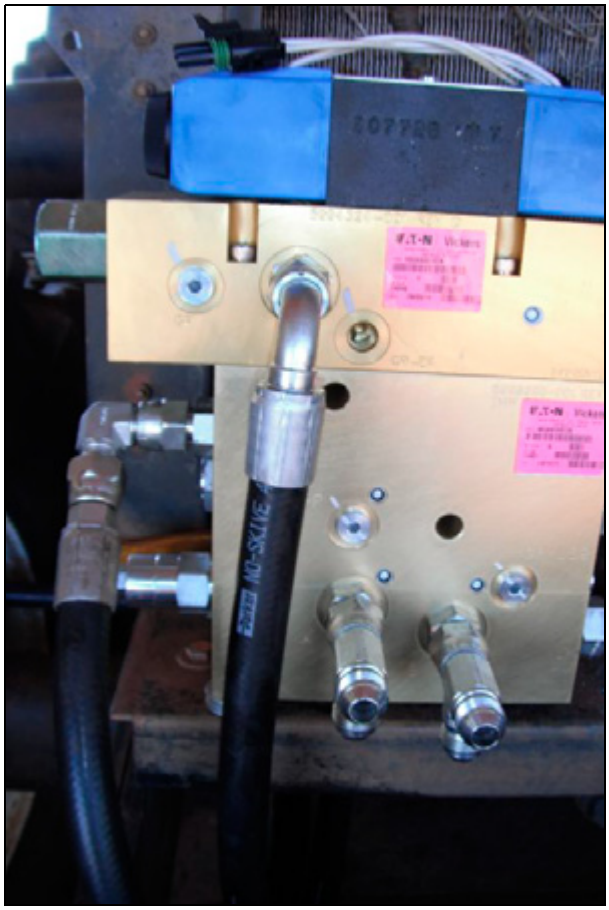
Step 5

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



Step 6

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



Tank connections

Valtra BH / BM

Step 1

Locate the tank line at the top of the rear 3-point hitch cylinder on the left side of the machine.



Step 2

Remove the existing hose and reorient the 90° fitting down.



Step 3

For the BH model, attach the provided -8 run tee to the T line as shown. For the Valtra BH / BM, use a 177" (450 cm) tank hose.

For a BM model, use the provided JIC-10 run tee combined with the JIC-10-8 adapter.



Step 4

Connect the run tee to the 90° fitting.



Step 5

Connect the hose removed previously to the run tee.



Challenger WT

Step 1

On the left rear of the vehicle, locate the tank port on the side of the 3-point housing.

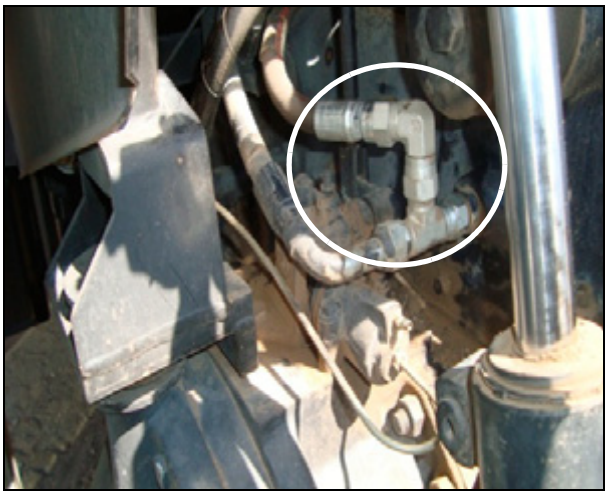


Step 2

Remove the attached hose.

Insert a -10 JIC run T and then attach a -10 90° elbow.

Reattach the previously removed hose to the end of the T and the 146" (370 cm) Autopilot tank line on the 90° elbow.



Completing the tank connection (all models)

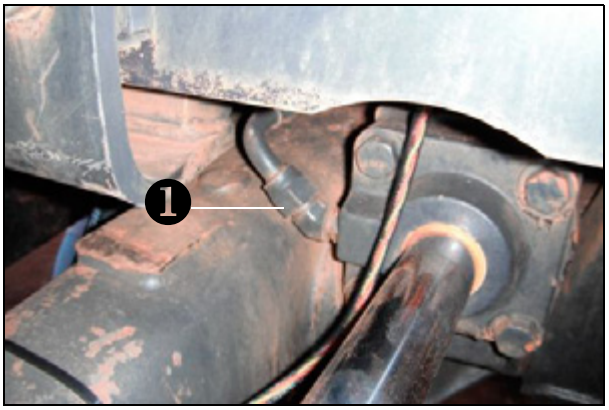
Step 1

Connect the 90° end of the T line to the straight fitting on the T port ❶ of the manifold.



Step 2

Locate the steering cylinder connection ❶ on the front of the machine.



Step 3

Disconnect the steering lines from the cylinder:

- The C1 and C2 lines are attached to the cylinder.
- The A and B lines are attached to the removed existing lines.



Step 4

Connect the C1 and C2 lines to the machine steering lines previously removed from the steering cylinder.



Step 5

Connect the male ends of the A and B hoses to the previously removed steering lines.



Step 6

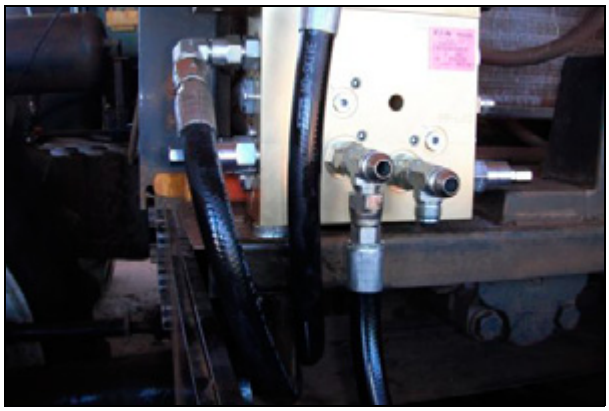
Route the C1 and C2 lines and the A and B lines to the Autopilot manifold.

Make sure that the hoses do not contact any moving components and that they are not pinched or pulled as the machine components move.



Step 7

Connect the straight end of the C1 line to the branch of the run tee fitting on the A port of the manifold.



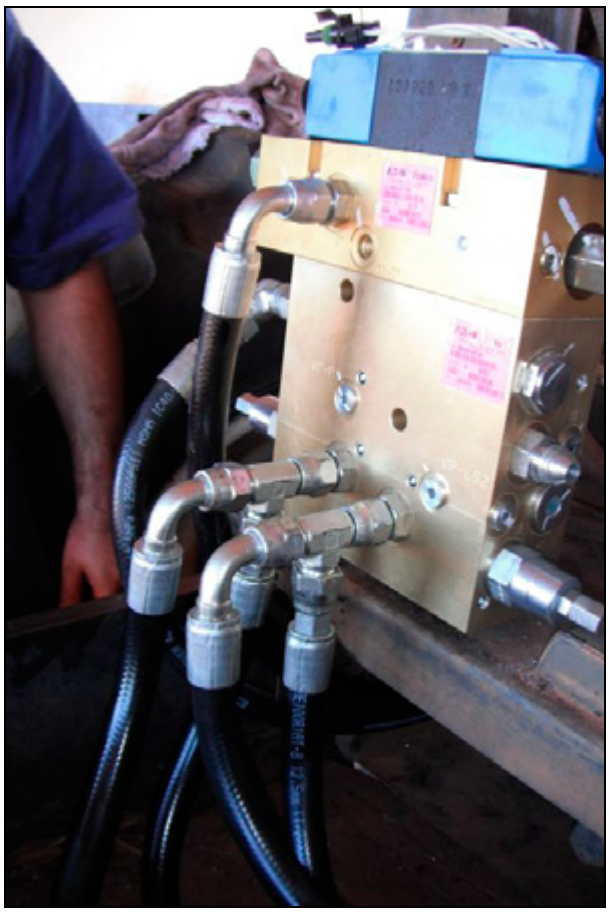
Step 8

Connect the 90° end of the A hose to the end of the run tee fitting on the A port of the manifold.



Step 9

Connect the C2 hose and the B hose to the branch and end of the run tee fitting on the B port of the manifold.



Step 10

Connect the manual override cabling to the manual override pressure transducer.

Connect the valve cabling to the valve on the manifold.

Route the cabling to the NavController II.



Reinstalling the front frame

Step 1

Place the front panel in position and then check where the hoses interfere with the installation.



Step 2

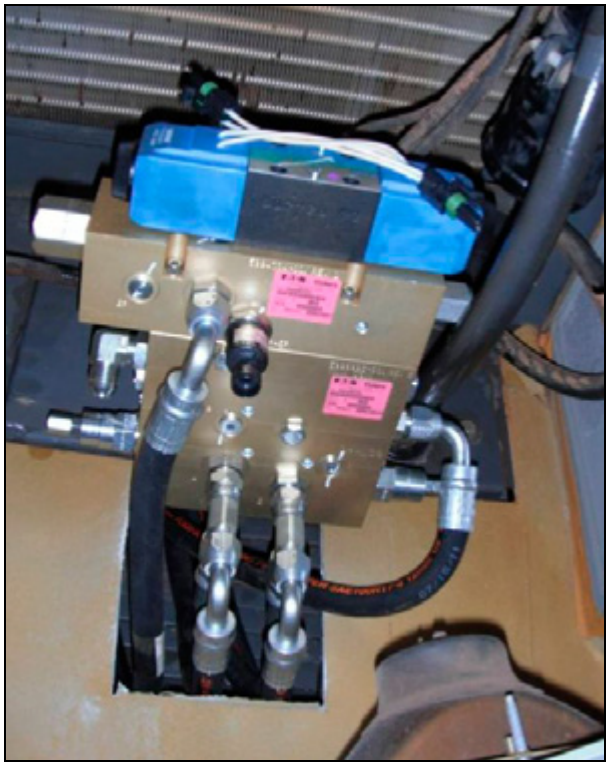
On the front panel, mark the space that you need to accommodate the hoses, and then mark and cut out the required gap.



Step 3

Place the front panel in position to check if the opening is large enough.

Make any adjustments required.



CHAPTER

3

AutoSense Steering Device Installation

In this chapter:

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

This chapter describes how to install the AutoSense™ steering device.

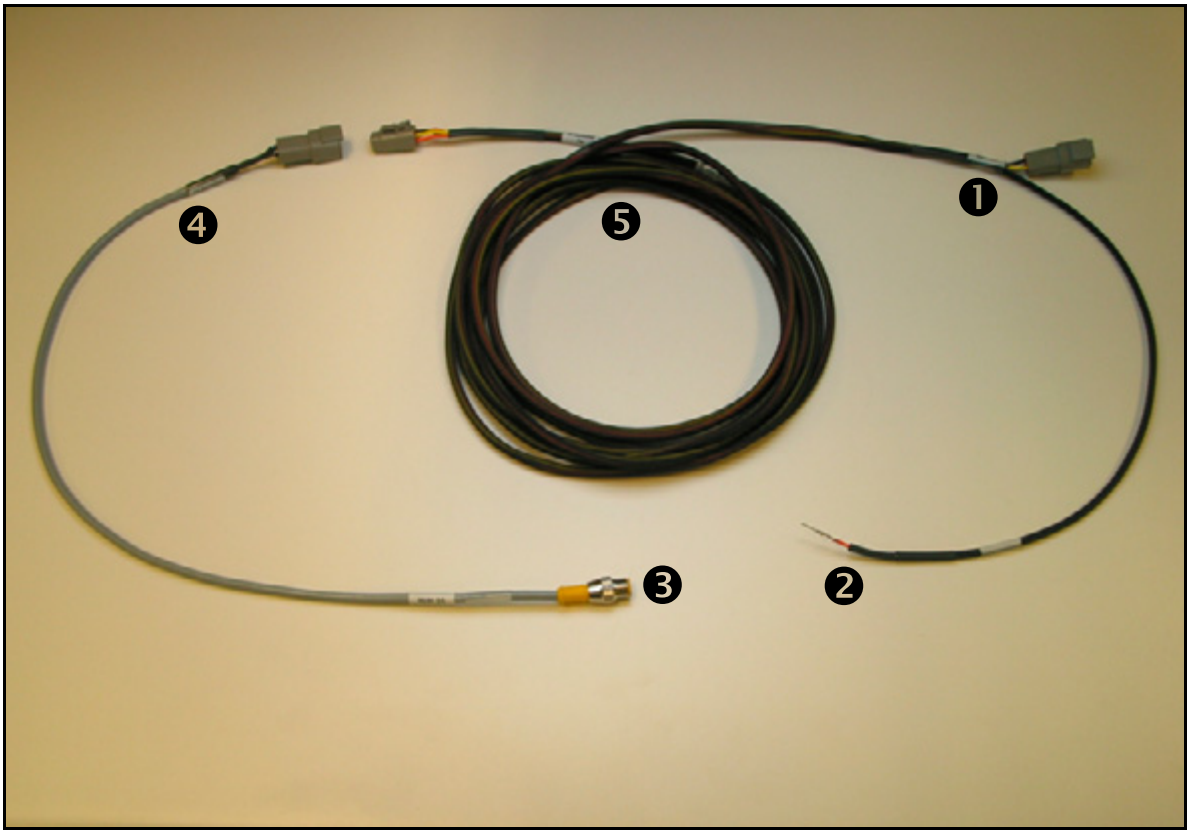
If the required mounting location is not accessible, chose a different place. To ensure proper function, the AutoSense device must be located where it is free of obstructions and can rotate with the wheels when they turn.

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	Trimble part number
❶	P-6 connector	
❷	Power connector	
❸	AutoSense connector	
❹	Jumper cable	57560
❺	AutoSense steering cable	57885

Installing the AutoSense steering 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 chapter.

Step 1

Locate the Autosense mounting plate near the wheel of the machine in the location shown.

Use the provided hardware to install the mounting plate.



Step 2

Use the hardware provide to attach the AutoSense sensor to the mounting plate.

Use the hardware provided to attach the AutoSense cabling to the sensor and then route the cabling to the NavController II.

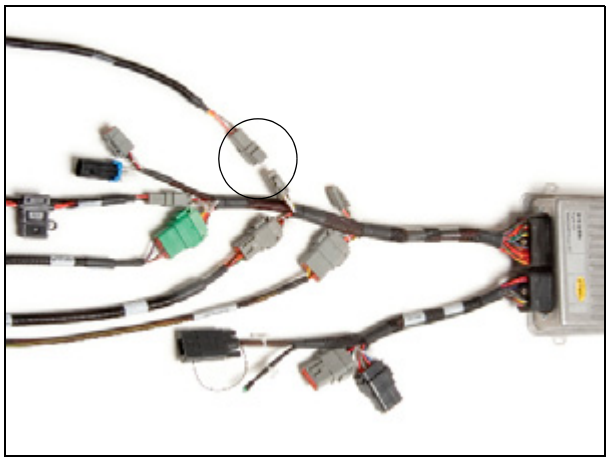


Note – *Make sure that the cable does not come into contact with any moving components and is not pinched or pulled as the wheels are steered left to right, lock to lock.*

Step 3

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

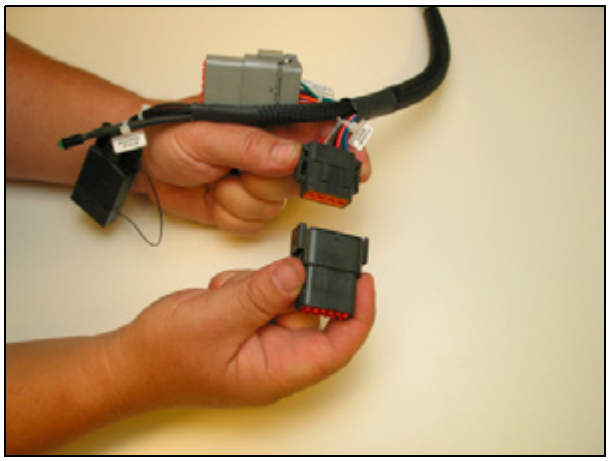
The P6 connector is labeled **Steering Sensor**.



Preparing the harness: P/N 54602 Rev C

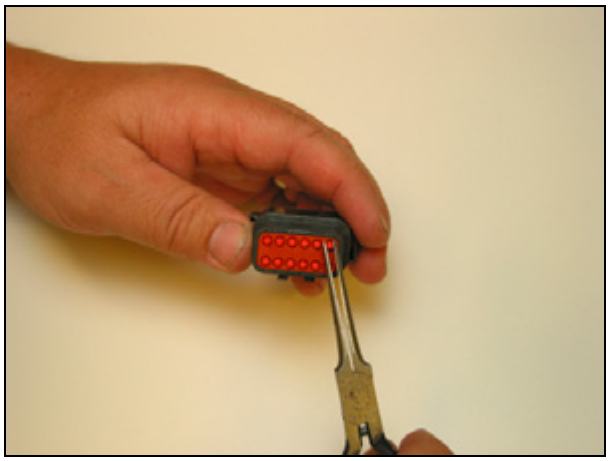
Step 1

Remove the black Deutsch DTM receptacle from the P-13 sensors leg of the auxiliary harness. See Chapter 7, Controller Installation.



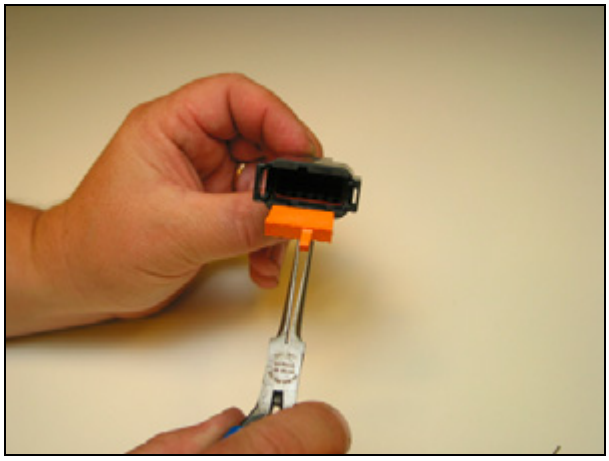
Step 2

Remove the plug from cavity number 1.



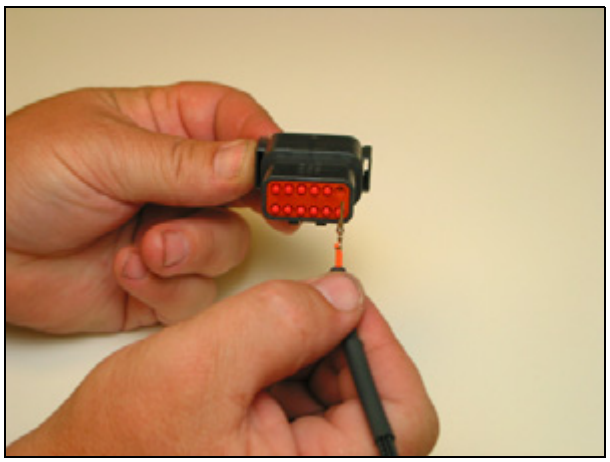
Step 3

Remove the wedge from the connector.



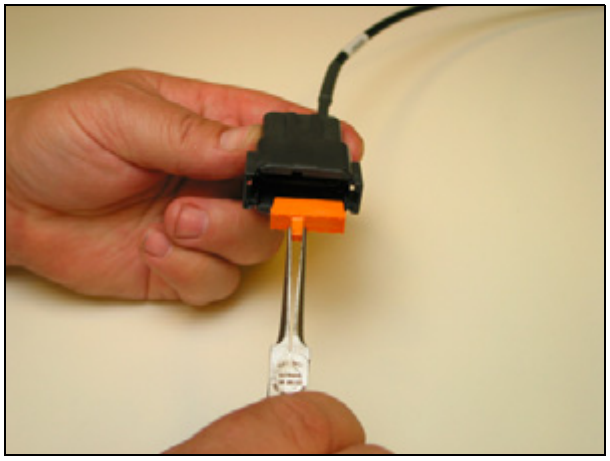
Step 4

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 7, Controller Installation.

CHAPTER

4

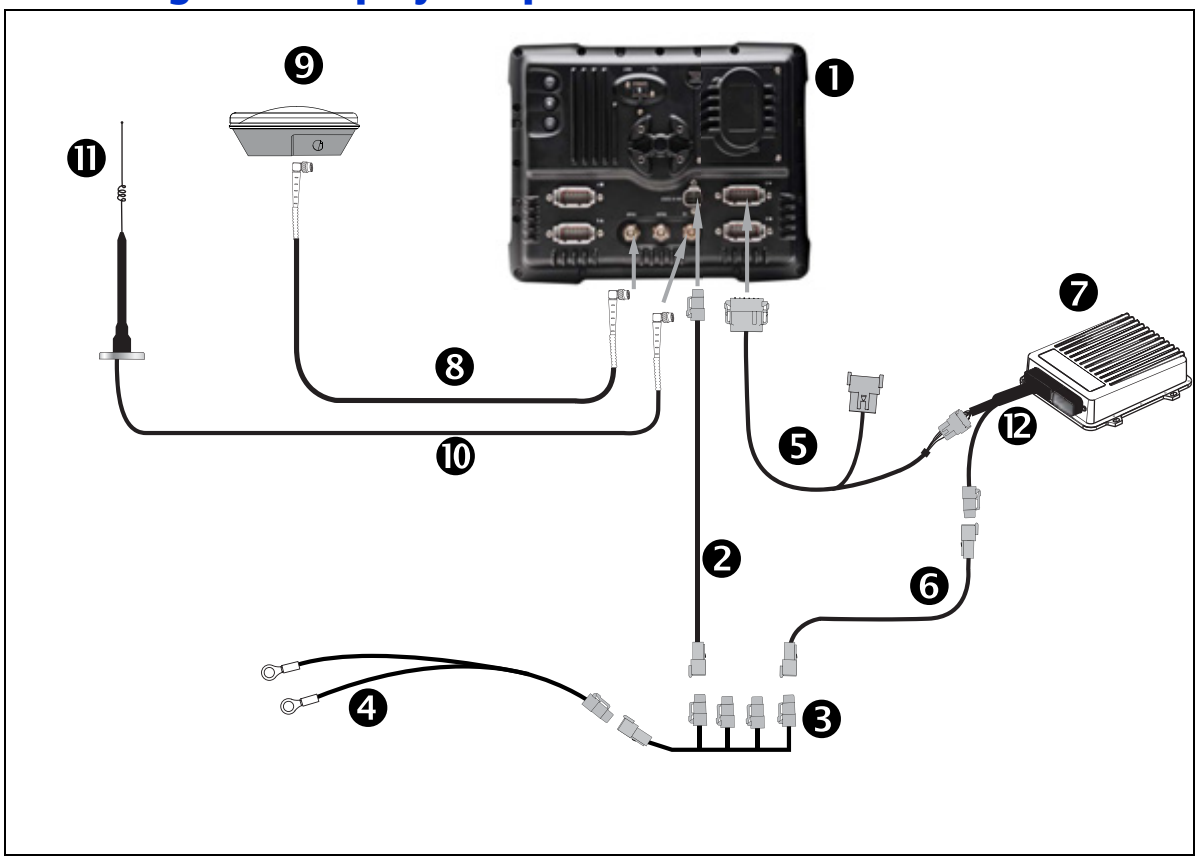
Display Installation

In this chapter:

- FmX integrated display components
- CFX-750 display components
- EZ-Guide 500 lightbar components: With SNB900 radio for RTK corrections (if equipped)
- Preparing the FmX integrated display
- Installing the FmX integrated display
- FmX integrated display: Installing the wiring harness
- 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
- Preparing the EZ-Guide 500 lightbar
- Connecting the EZ-Guide 500 lightbar cables
- Installing the EZ-Guide 500 lightbar
- EZ-Guide 500 lightbar, and CFX-750 and FmX displays: Installing the GNSS antenna and plate
- EZ-Guide 500 lightbar, and CFX-750 and FmX displays: Installing the RTK radio antenna

This chapter describes and how to install and connect the FmX integrated display, CFX-750 display, or the EZ-Guide 500 lightbar in the vehicle.

FmX integrated display components

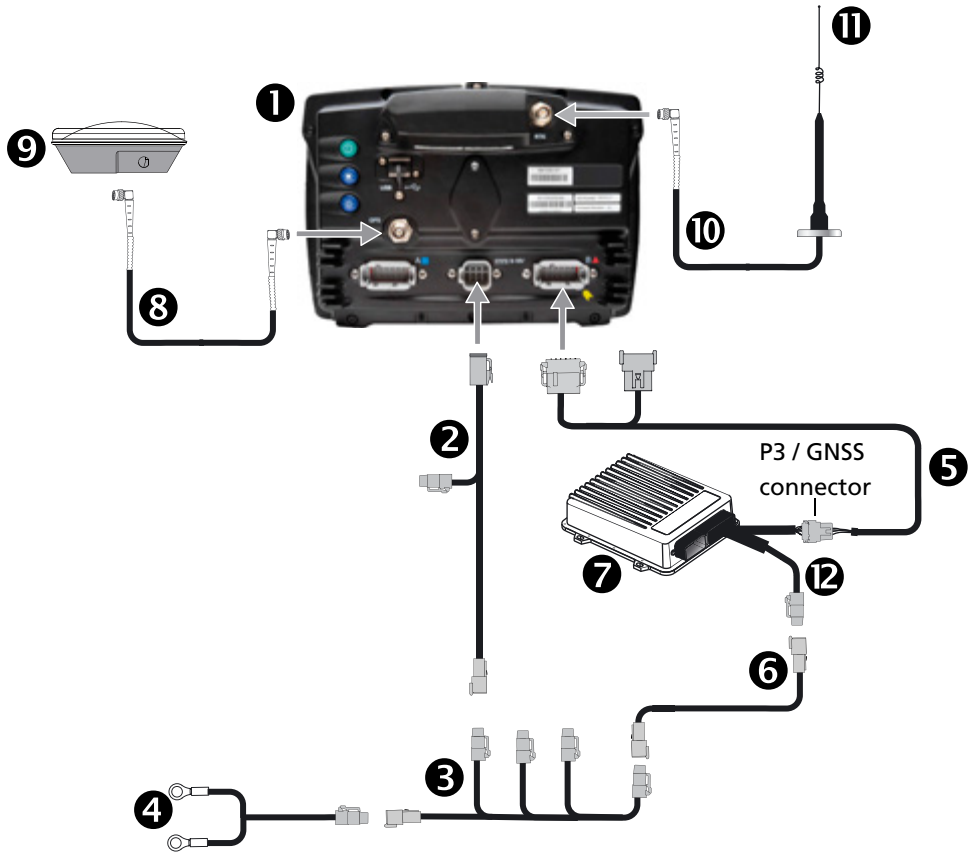


CAUTION – Connecting the Port Replicator on the FmX to NavController II cable ❺ to the P4 or P12 connector of the NavController II harness ⓬ will result in damage to the FmX / FM-1000 integrated display, and will void the warranty.

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	62120

Item	Description	Trimble part number
⓫	900 MHz radio antenna kit	22882-10
⓬	Main NavController II cable	54601

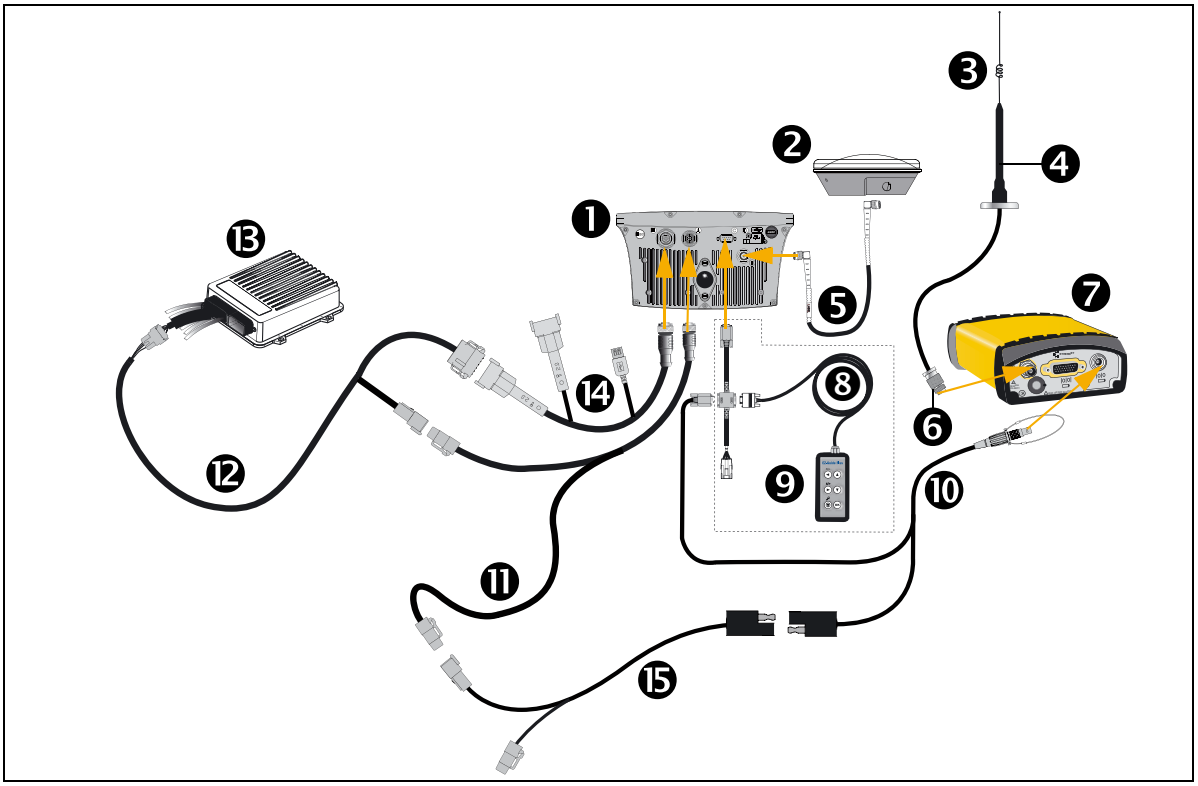
CFX-750 display components



CAUTION – Connecting the Port Replicator on the CFX-750 display to NavController II cable ❺ to the P4 or P12 connector of the NavController II harness ⓬ will result in damage to the CFX-750 display and will void the warranty.

Item	Description	Trimble part number
c	CFX-750 display ***Note –*** *RTK password required.*	94100-01
d	CFX-750 power cable	77282
e	CFX-750 power cable with relay and switch (power bus)	67259
f	Basic power cable	67258
g	CFX-750 to NavController II cable with port replicator	75741
h	2 pin DTM to 2 pin DT power adaptor	67095
i	NavController II	55563-00
j	8 m GNSS TNC/TNC RT angle cable	50449
k	AG25 GNSS antenna	77038-00
l	NMO to TNC 20ft antenna cable and base	62120
m	900 MHz radio antenna kit	22882-10
n	Main NavController II cable	54601

EZ-Guide 500 lightbar components: With SNB900 radio for RTK corrections (if equipped)



Item	Description	Trimble part number
❶	EZ-Guide 500 lightbar	
❷	GNSS antenna	57200-00
❸	SNB900 radio antenna	22882-00
❹	SNB900 radio antenna magnetic mount	62109
❺	GNSS antenna cable	50449
❻	N Female to REV. POL TNC Male	62114
❼	SNB900 radio	X8480-X0
❽	Remote keypad (optional)	66030-00
❾	External interface cable	62749
❿	Radio power/data cable	61158
⓫	EZ-Guide 500 power cable	62817
⓬	EZ-Guide 500-to-Autopilot cable	62754
⓭	NavController II	55563-00
⓮	Port expansion cable	62609
⓯	Power tap to PDL radio	63185

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 chapter.

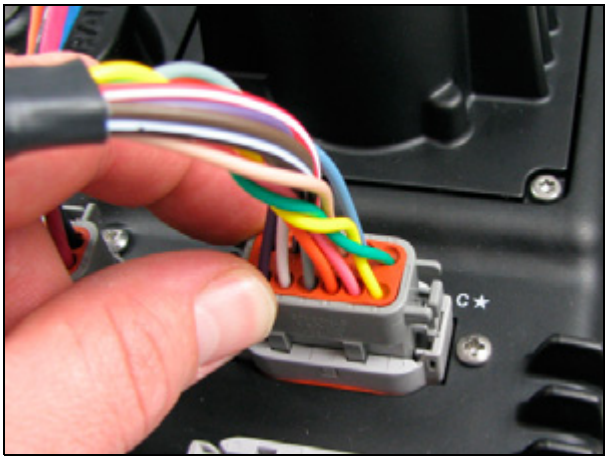
Step 1

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.

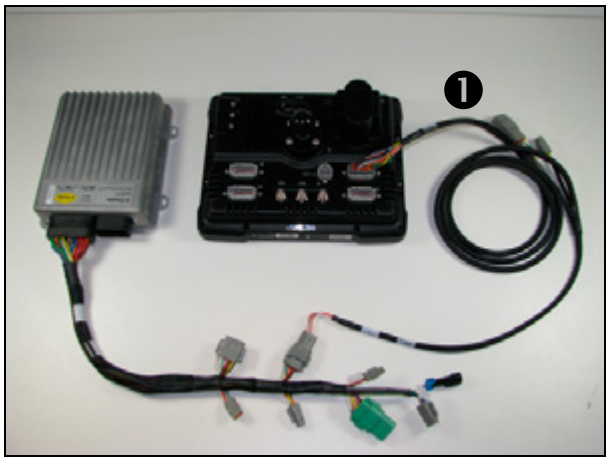
To connect power to the FmX integrated display, see Chapter 5, Power Harness Installation.



FmX integrated display: Installing the wiring harness

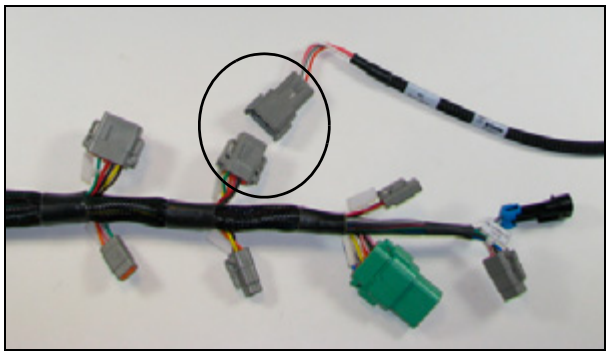
Step 1

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 chapter.

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 5, 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

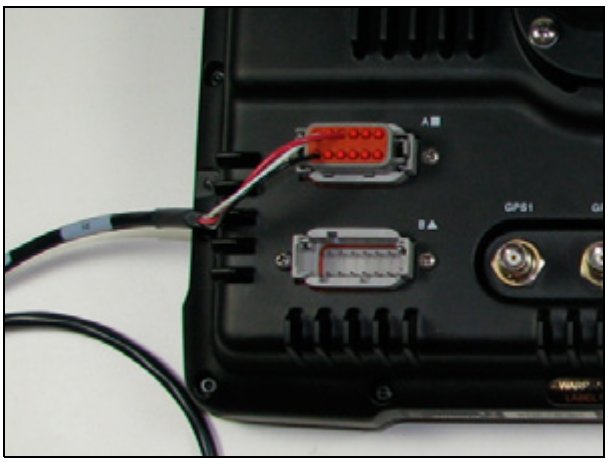
Step 3

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.



Preparing the EZ-Guide 500 lightbar

Note – *Before you attach the lightbar to the RAM mount, connect the EZ-Guide 500 cables to the back of the lightbar.*

Step 1

Locate the EZ-Guide 500 lightbar, the RAM mount and hardware, and the RAM mount clamp.



Step 2

Attach the RAM mount diamond base to the display using the hardware provided.

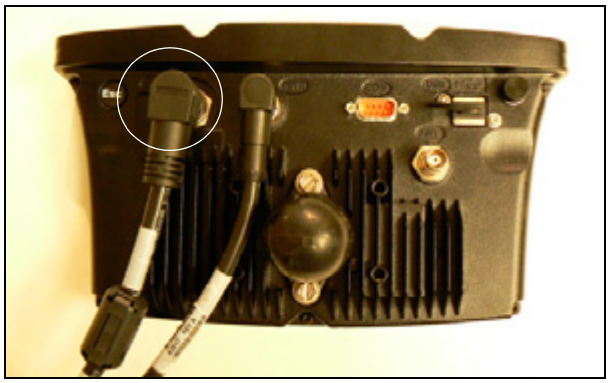


Connecting the EZ-Guide 500 lightbar cables

Note – *Before you attach the lightbar to the RAM mount, connect the EZ-Guide 500 cables to the back of the lightbar.*

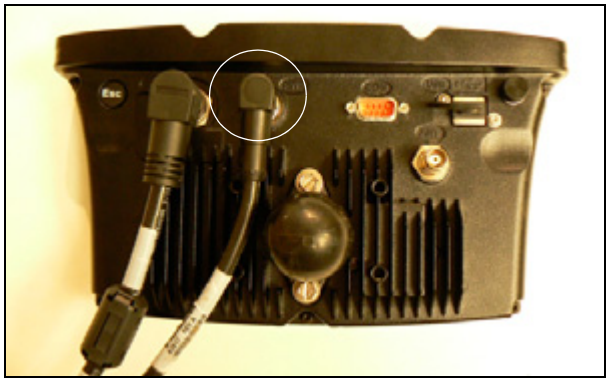
Step 1

Connect the port expansion cable (P/N 62609) to the AUX port on the back of the lightbar.



Step 2

Connect the EZ-Guide 500 power cable (P/N 62817) to the PWR port on the back of the lightbar.



Step 3

Connect the 2-pin connector on the port expansion cable and the 12-pin connector on the power cable to the matching connectors on the EZ-Guide 500-to-Autopilot cable (P/N 62754).

Step 4

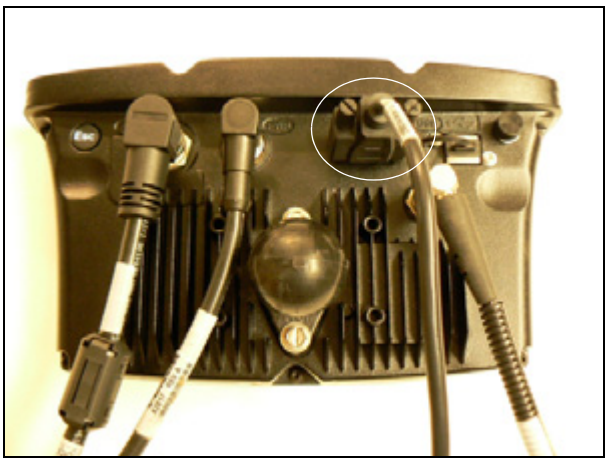
Feed the GNSS antenna cable into the cab and then connect it to the antenna port on the back of the lightbar.



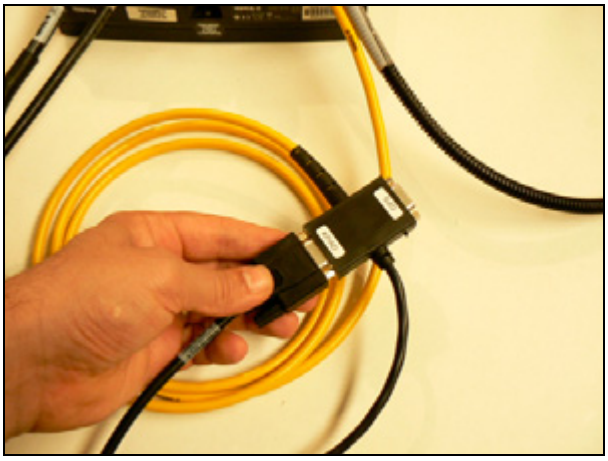
Step 5

With keypad

Connect the external interface cable (P/N 66030-00) to the serial port on the back of the lightbar.

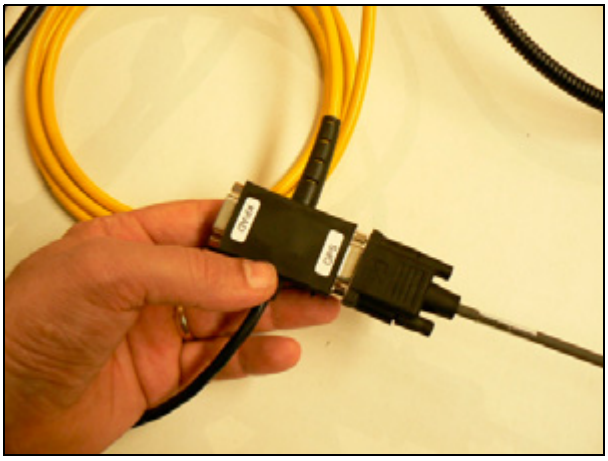


Connect the remote keypad to the KPAD serial port on the external interface cable.



Connect the appropriate cable to the GNSS serial port on the interface cable:

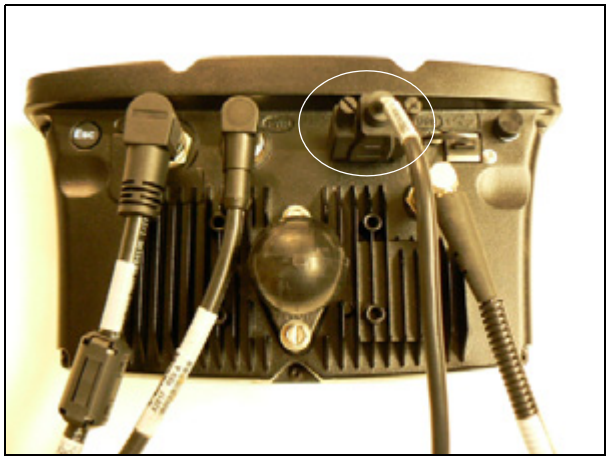
Radio type	Cable to connect
SNB900 radio	EZ-Guide 500-to-radio cable (P/N 61158)
PDL 450 radio	PDL radio power/data cable (P/N 51861-00)



Without keypad

Connect the appropriate cable to the serial port on the back of the lightbar:

Radio type	Cable to connect
SNB900 radio	EZ-Guide 500-to-radio cable (P/N 61158)
PDL 450 radio	PDL radio power/data cable (P/N 51861-00)



Step 6

Connect the other end of the radio cable to the radio.

Step 7

Connect the remaining connector on the PDL radio power/data cable to the matching connector on the power tap cable (P/N 63185).

Connect the connector at the other end of the power tap cable to the EZ-Guide 500 power cable.

Installing the EZ-Guide 500 lightbar

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 chapter.

Step 1

Test a location for the lightbar in the cab (there must be a bar that the RAM mount can be attached to); sit in the driver's seat and hold the lightbar in place.

Note – *Make sure the position allows comfortable access to the display buttons and does not obstruct instruments.*



Step 2

Attach the RAM mount to the ball on the rear of the lightbar.



Step 3

Attach the free end of the RAM mount to the bar mount, tighten the clamp on the RAM mount so that the lightbar is held securely in place and then adjust the angle of the RAM mount for ease of use.



EZ-Guide 500 lightbar, and 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 chapter.

Note – *The V plate antenna bracket is available on the Autopilot price list. See* *Antenna mounting kits, page 9**.*

VHB adhesive method

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.

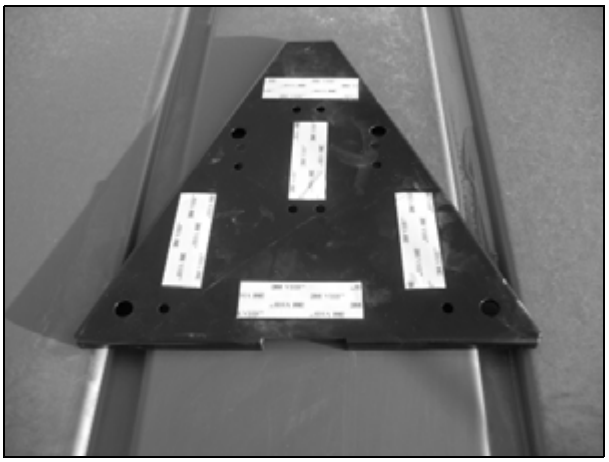


Step 2

V plate only

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

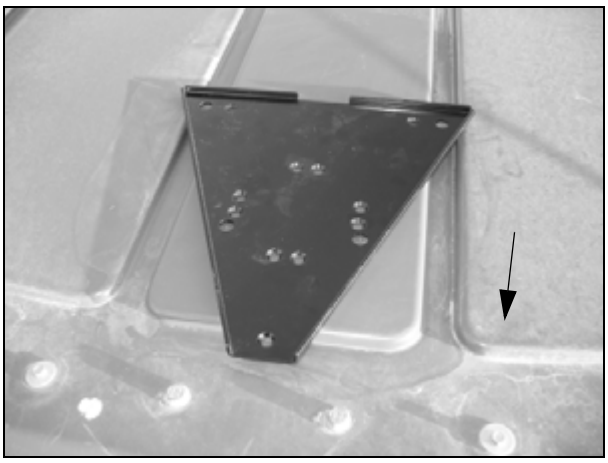
Note – *The VHB strips are pre-applied to the 4" x 6" plate.*



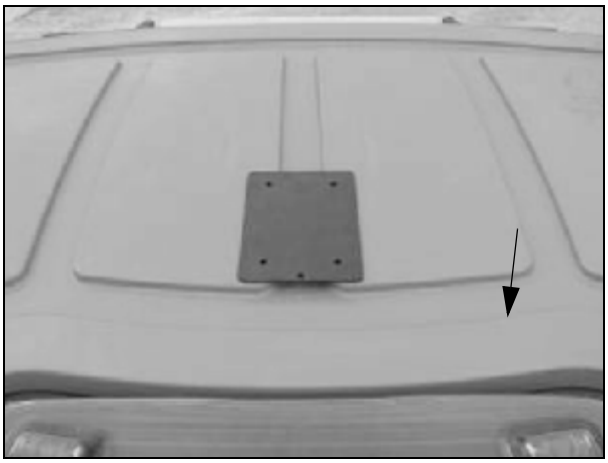
Step 3

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.*



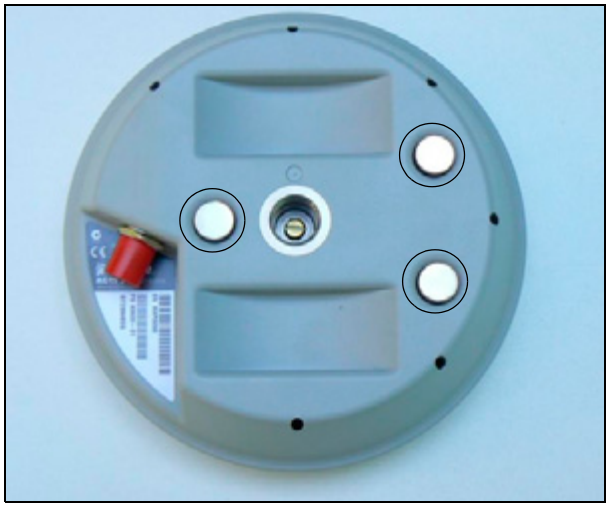
V plate



4" x 6" plate

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.



WAAS, EGNOS, VBS, Beacon applications

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



Step 6

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.



EZ-Guide 500 lightbar, and 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 chapter.

Step 1

Connect the radio antenna to the magnetic antenna base



Step 2

Attach the magnetic radio antenna base to the rear f 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.

CHAPTER

5

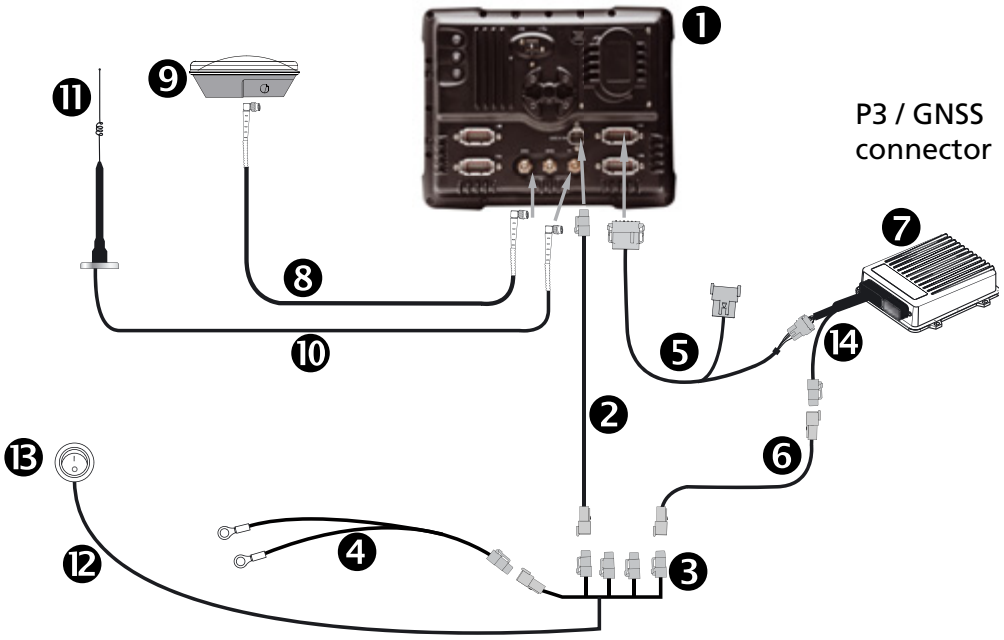
Power Harness Installation

In this chapter:

- FmX integrated display components
- CFX-750 display components
- EZ-Guide 500 lightbar components
- Installing the power harness for the display
- Configuring the power bus options for the display
- Configuring the power bus options for the EZ-Guide 500 lightbar

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

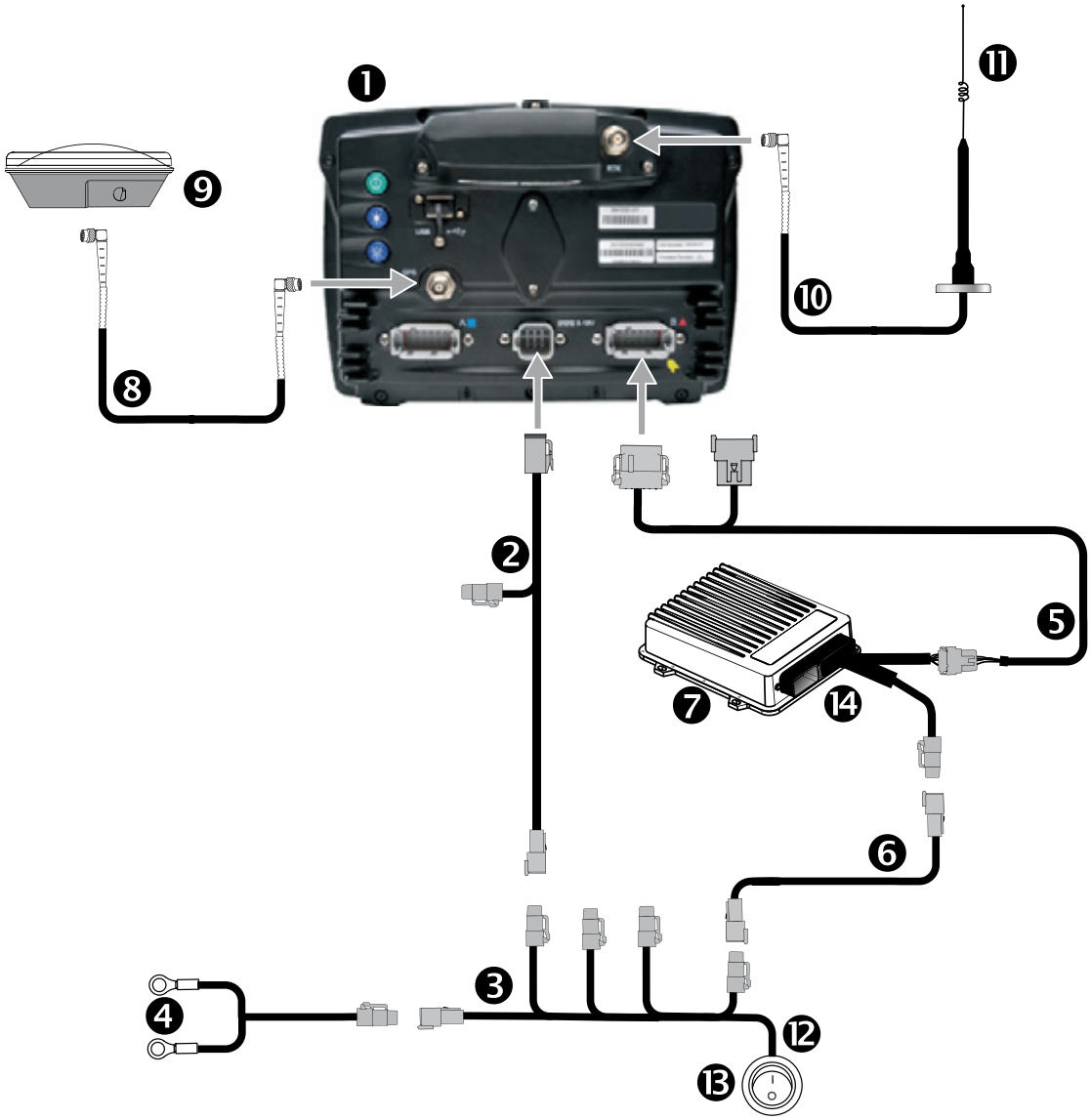
FmX integrated display components



CAUTION – Connecting the Port Replicator on the FmX to NavController II cable ❺ to the P4 or P12 connector of the NavController II harness ⓮ 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	68040-00S
❿	NMO to TNC 20ft antenna cable and base	62120
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

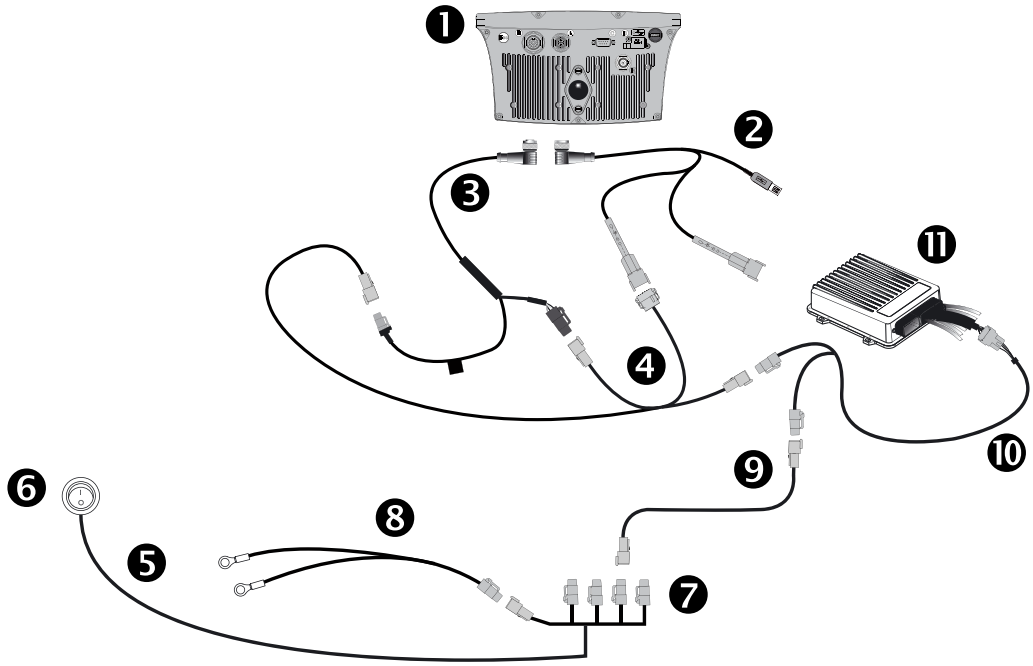


CAUTION – Connecting the Port Replicator on the CFX-750 display to NavController II cable ❺ to the P4 or P12 connector of the NavController II harness ⓮ will result in damage to the CFX-750 display and will void the warranty.

Item	Description	Trimble part number
❶	CFX-750 display ***Note –*** *RTK password required.*	94100-02
❷	CFX-750 power cable	77282

Item	Description	Trimble part number
❸	CFX-750 power cable with relay and switch (power bus)	67259
❹	Basic power cable	67258
❺	CFX-750 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	62120
⓫	900 MHz radio antenna kit	22882-10
⓬	External switch cable included with kit	Part of P/N 67259
⓭	External switch included with kit	Part of P/N 67259
⓮	Main NavController II cable	54601

EZ-Guide 500 lightbar components



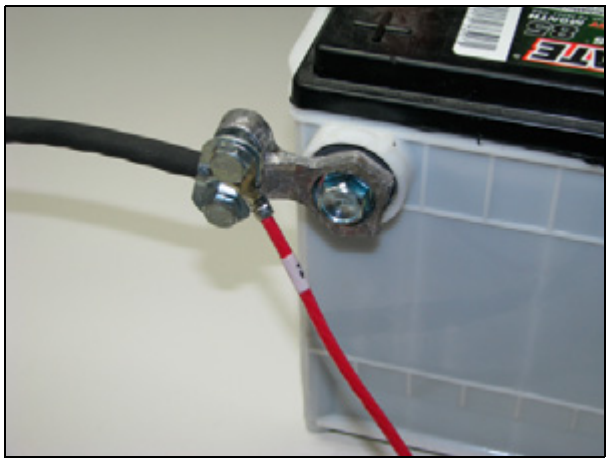
Item	Description	Trimble part number
❶	EZ-Guide 500 lightbar	
❷	EZ-Guide 500 lightbar 19 pin port expansion cable	62069
❸	EZ-Guide 500 lightbar/CAN 90° 5 pin connector	62817
❹	EZ-Guide 500 lightbar port A to NavController II cable	62754
❺	Switch cable	Part of 67259
❻	Switch	67095
❼	FmX power cable with relay and switch	67259
❽	FmX basic power cable	67258
❾	2 pin DTM to 2 pin 2 DT power adaptor	67095
❿	NavController II main cable	54601
⓫	NavController II	55563-00

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 chapter.

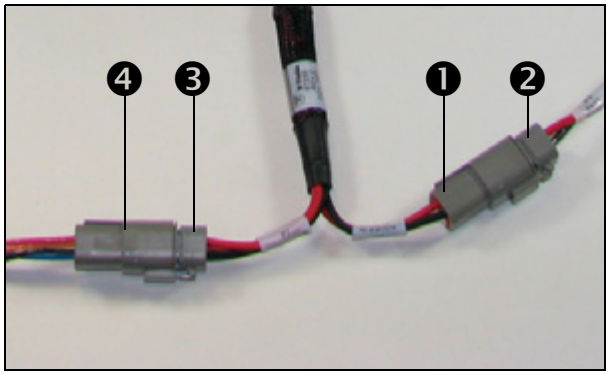
Step 1

Connect the basic power cable to the vehicle battery and then route the cable into the cab.



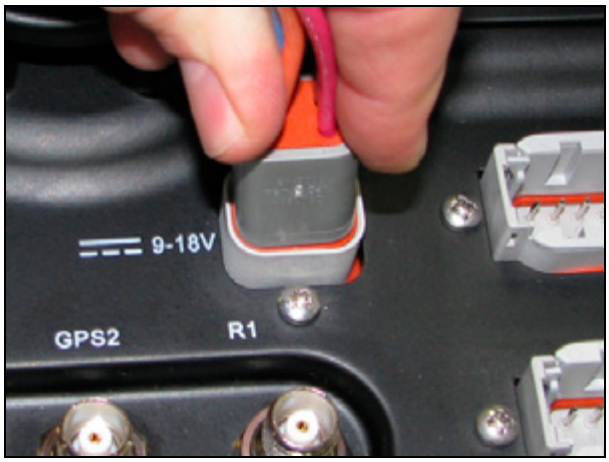
Step 2

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 3

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



FmX integrated display



CFX-750 display

Configuring the power bus options for the display

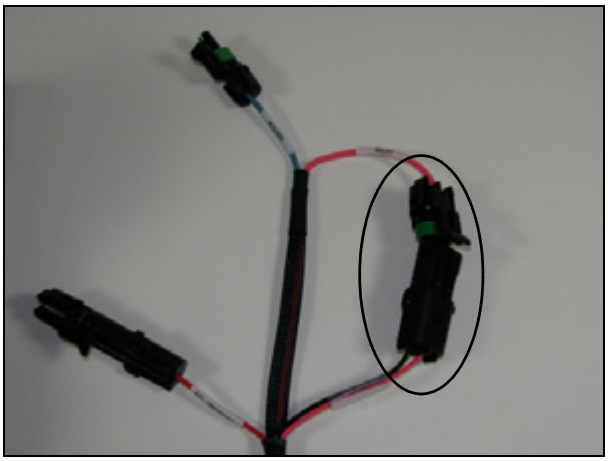
WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information chapter.

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.

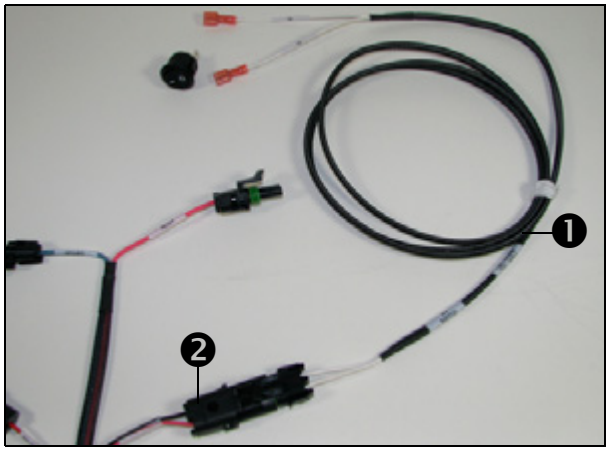


External switch is used to turn on the Autopilot system

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.

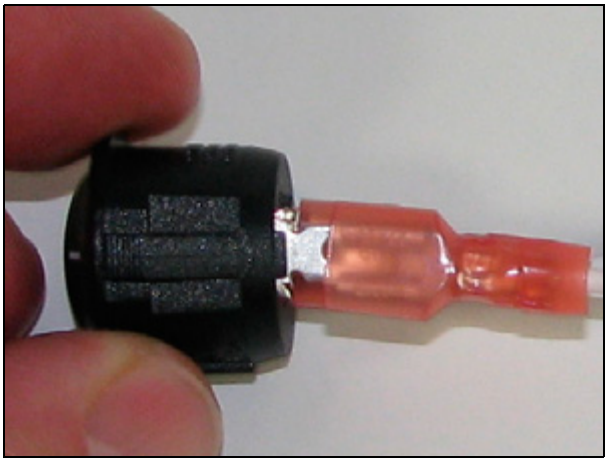
Note – *To install the switch provided, drill a ¾" hole.*



Step 2

Connect the cable labeled R7 to the switch pins.

Note – *Polarity is not important.*

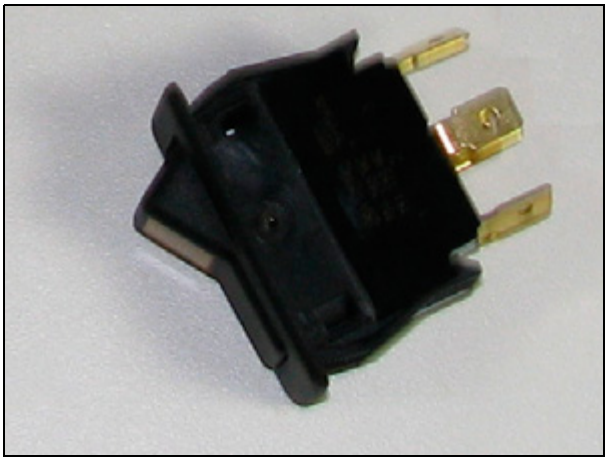


Installing the optional illuminated full or standard Euro switch

Step 1

Find an available knockout location on the vehicle console.

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

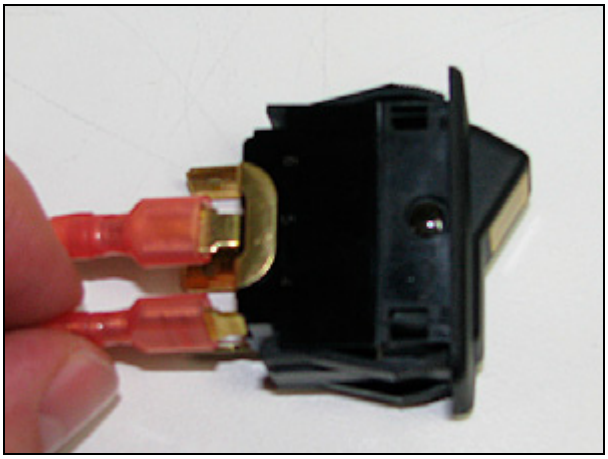


Step 2

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.

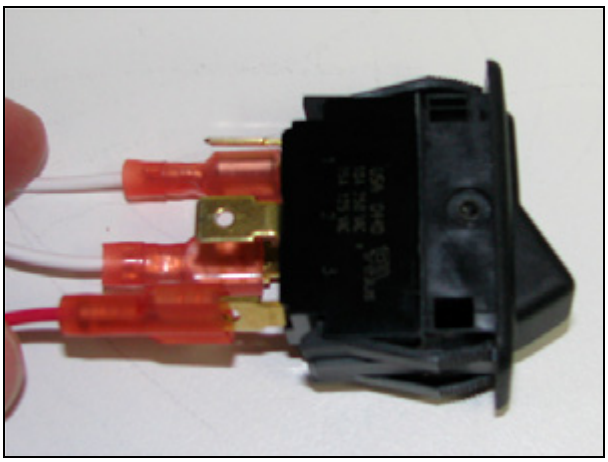
Note – *Polarity* ***is*** *important.*



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.*

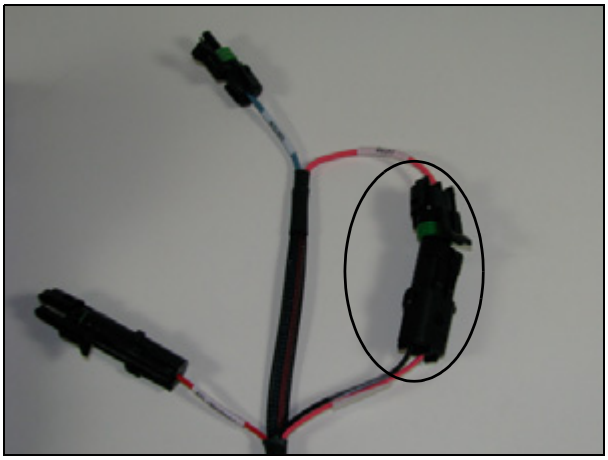


Ignition is used to turn on the Autopilot system

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

Step 1

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

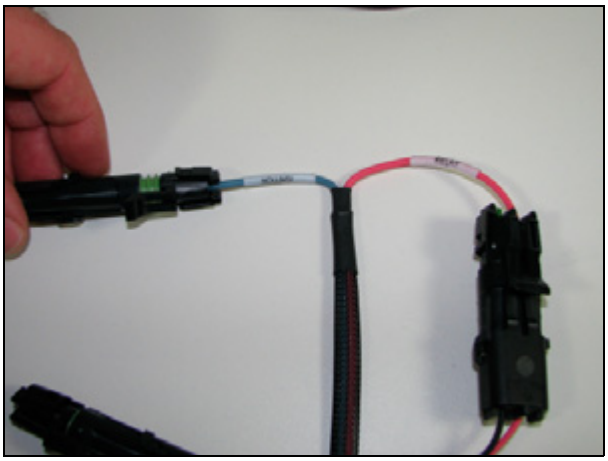


Step 2

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

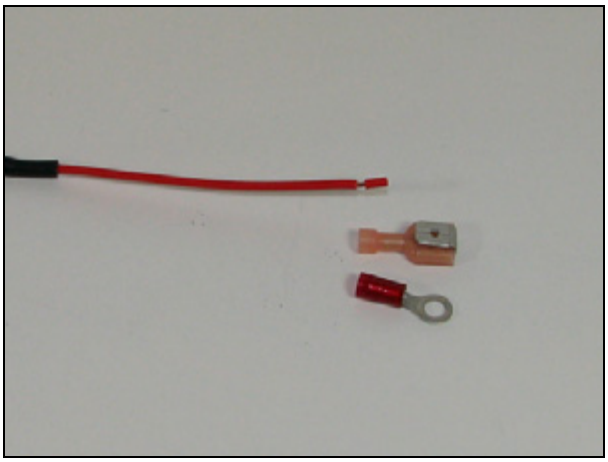
Step 3

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.



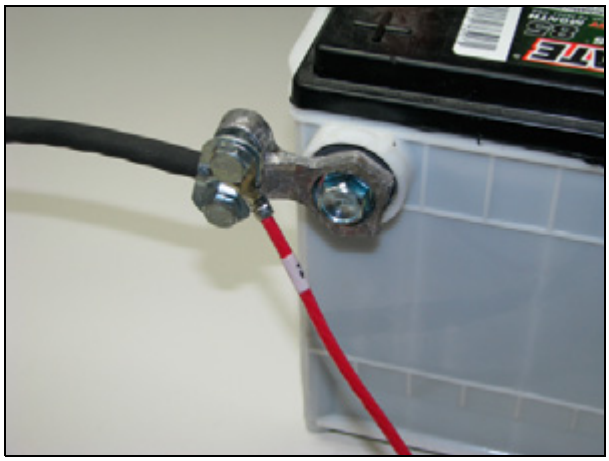
Configuring the power bus options for the EZ-Guide 500 lightbar

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 chapter.

Note – *For the EZ-Guide 500 lightbar cable installation instructions see,* *EZ-Guide 500 lightbar components, page 75**.*

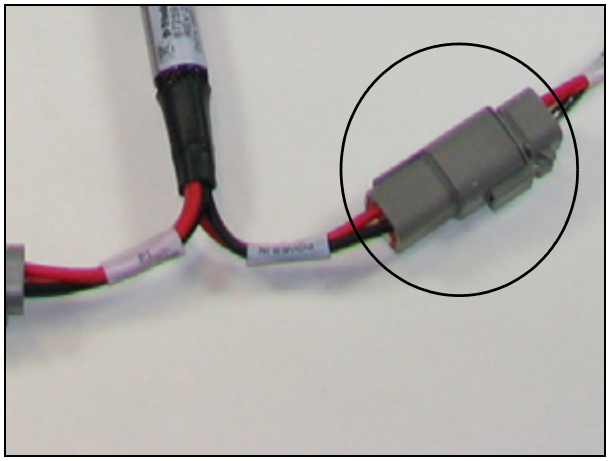
Step 1

Locate and connect the basic power cable to the vehicle battery and then route the cable into the cab.



Step 2

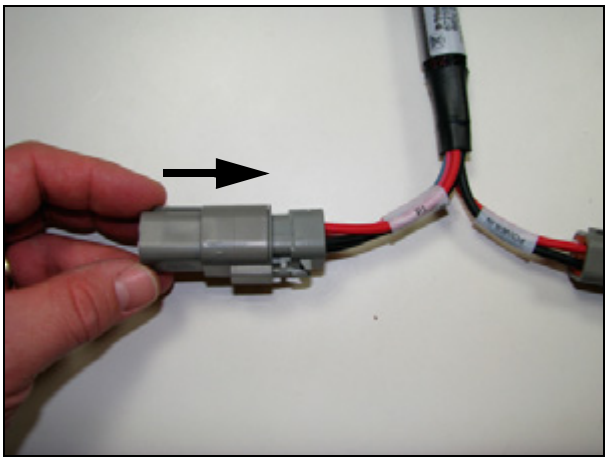
Locate and connect the 4-pin Deutsch DTP receptacle on the power bus to the 4-pin Deutsch DTP plug on the basic power cable.



Step 3

Verify that the protective receptacle is installed on the power bus.

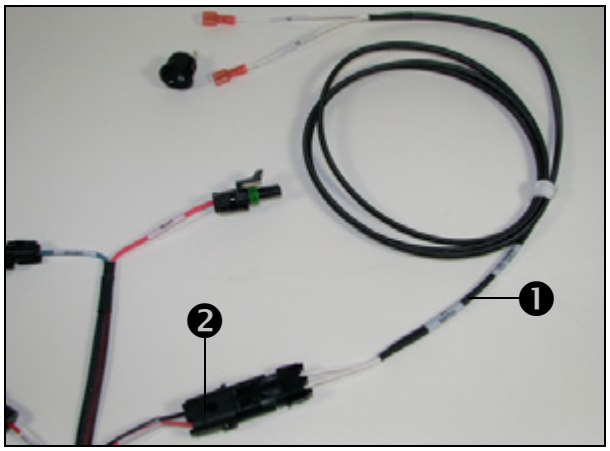
Note – *Damage to the system may result if the protective receptacle is not in place.*



Step 4

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.

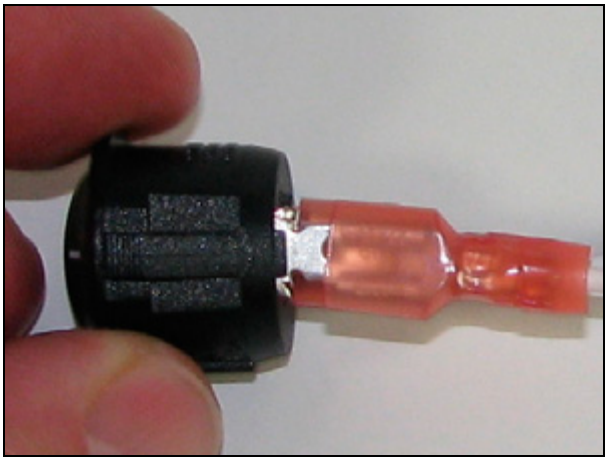
Note – *To install the switch provided, drill a ¾" hole.*



Step 5

Connect cable labeled R7 to the switch pins

Note – *Polarity is not important.*

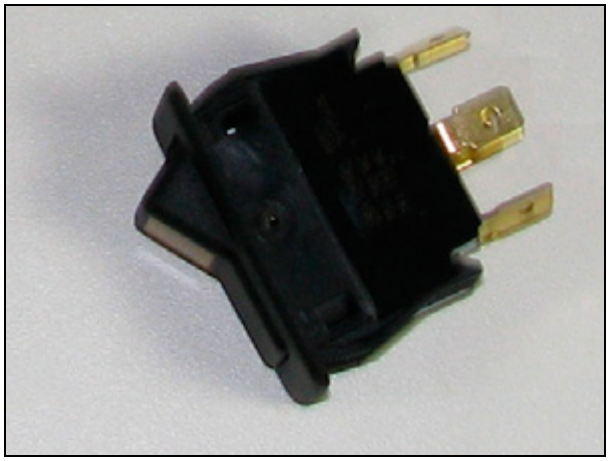


Installing the optional illuminated full or standard Euro switch

Step 1

Find an available knockout location on the vehicle console.

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

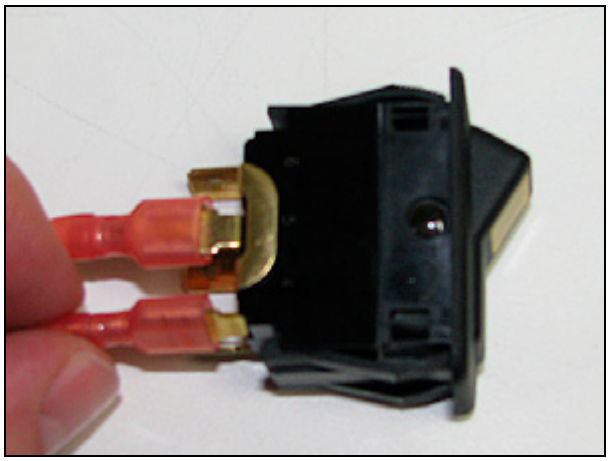


Step 2

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.

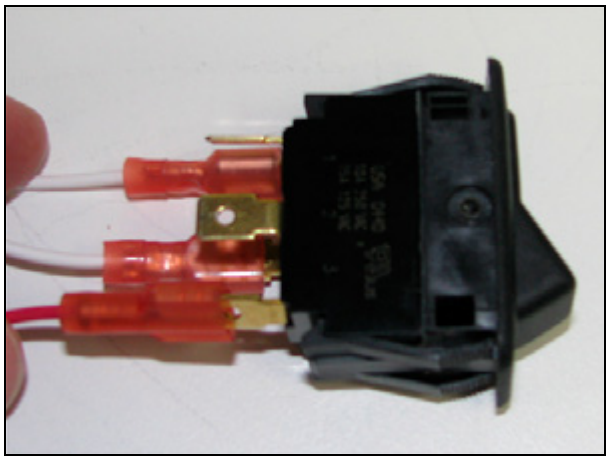
Note – *Polarity* ***is*** *important.*



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 vehicles switched power.

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



CHAPTER

6

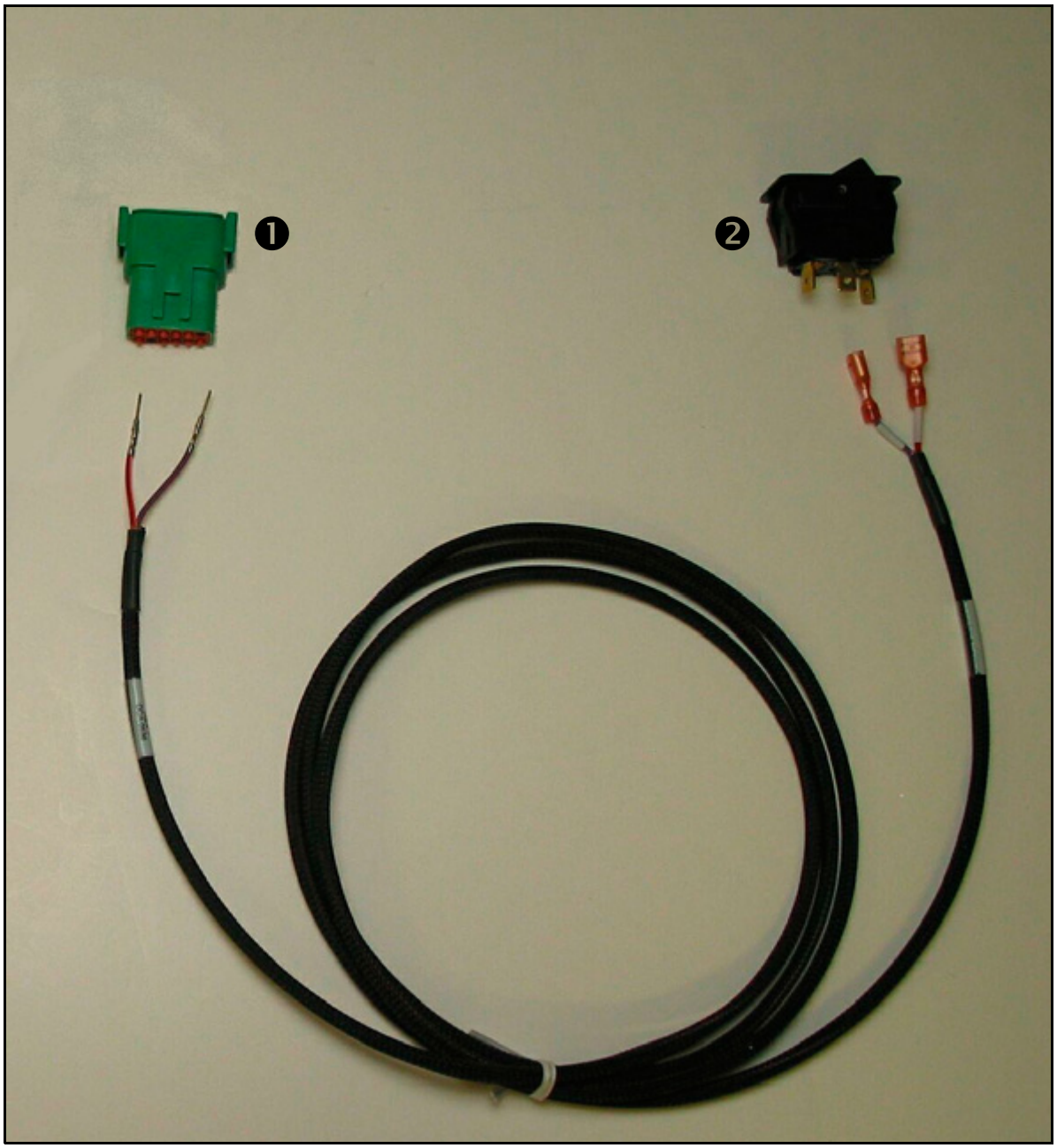
Remote Engage Switch Installation

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.

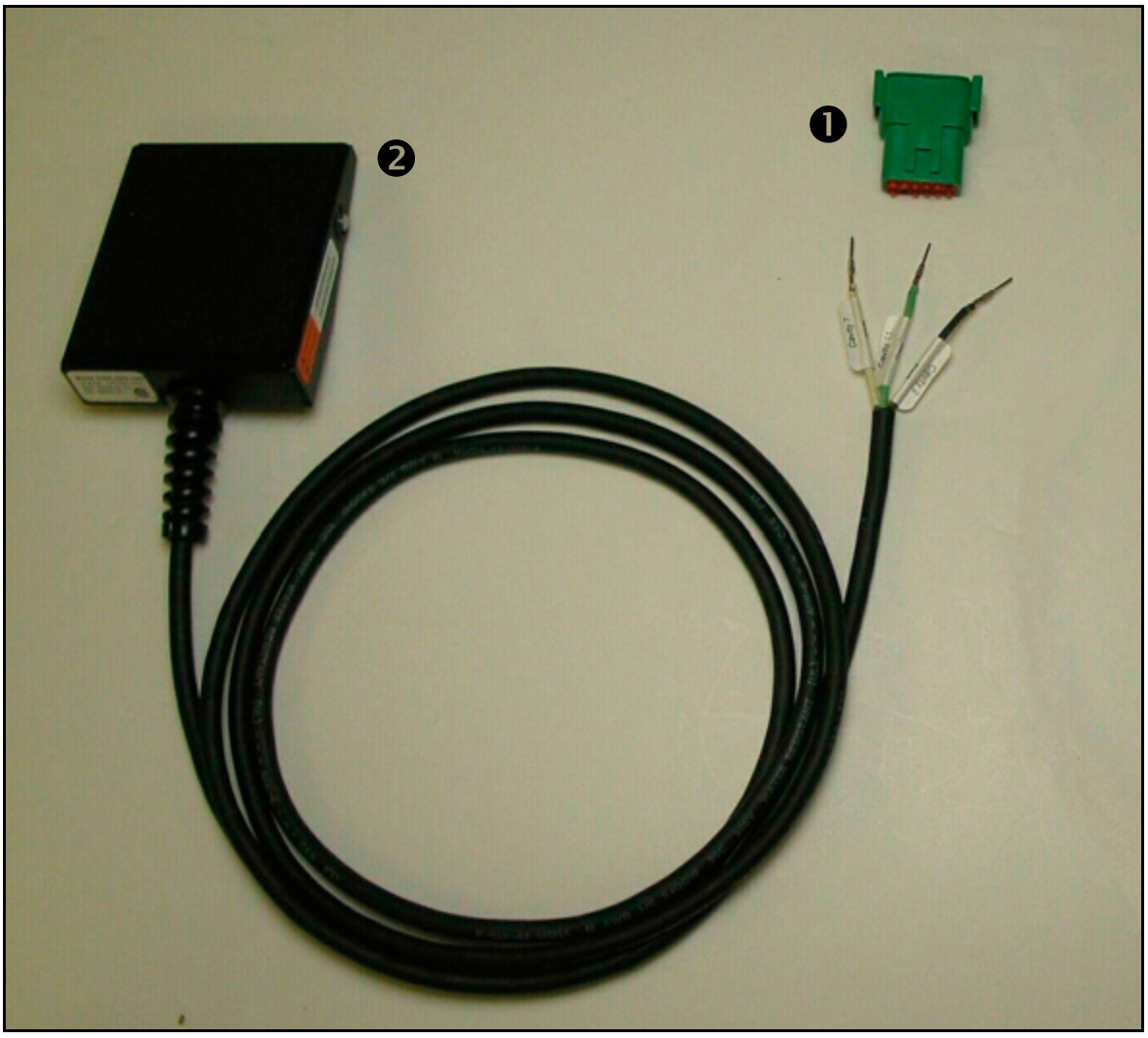
Remote engage switch components: Rocker switch



Item	Description
❶	DTM receptacle
❷	Remote engage rocker switch

Note – *This is a Full or Standard Euro switch, depending on the kit ordered.*

Remote engage switch components: Foot switch

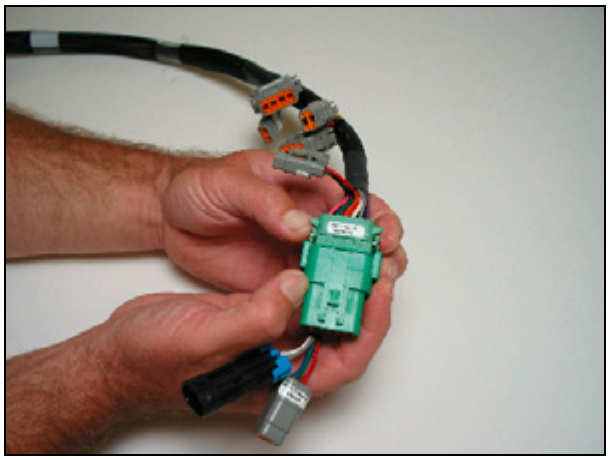


Item	Description
❶	DTM receptacle
❷	Remote engage foot switch

Preparing the remote engage cable

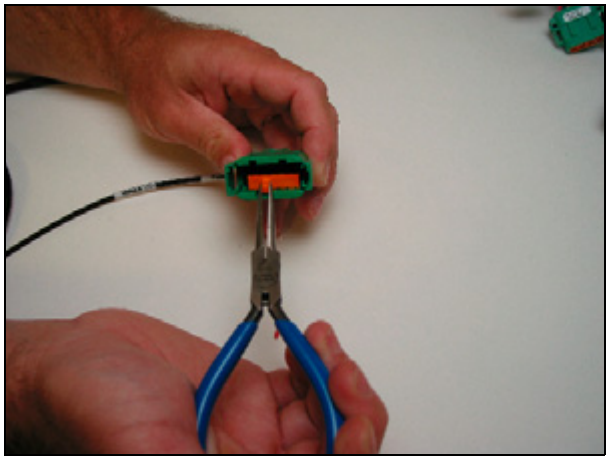
Step 1

Locate the green 12-pin Deutsch receptacle on the P-5 leg of the main controller harness. For more information, see Chapter 7, Controller Installation.



Step 2

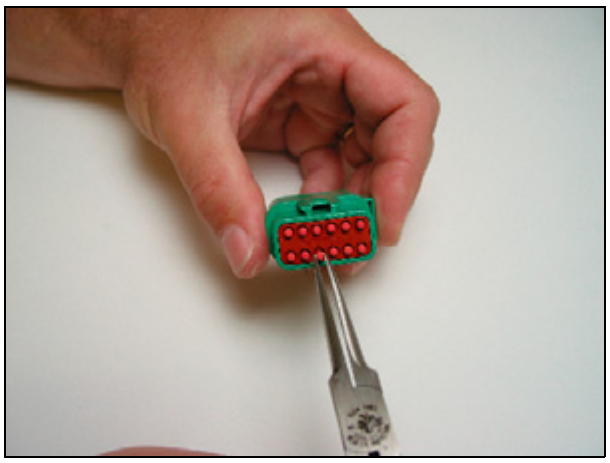
Remove the wedge from the connector.



Step 3

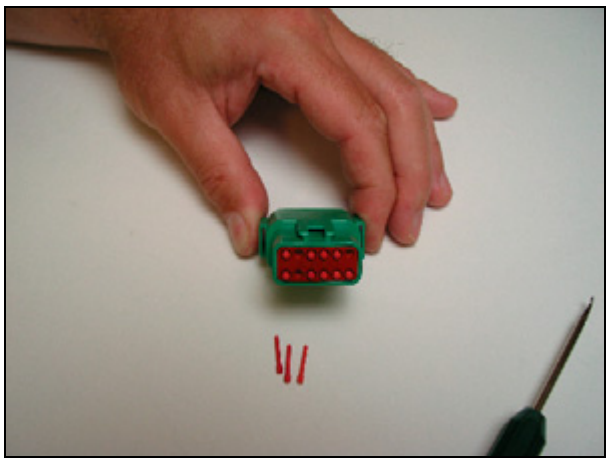
Rocker switch only

Remove the plugs from cavity 2 and cavity 7.



Foot Switch Only

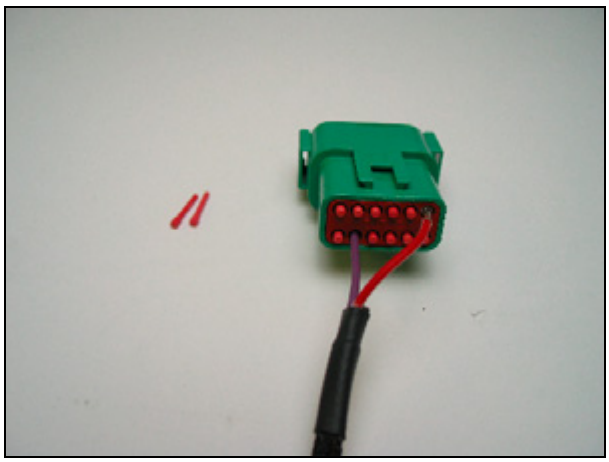
Remove the plugs from cavity 2, cavity 7, and cavity 11.



Step 4

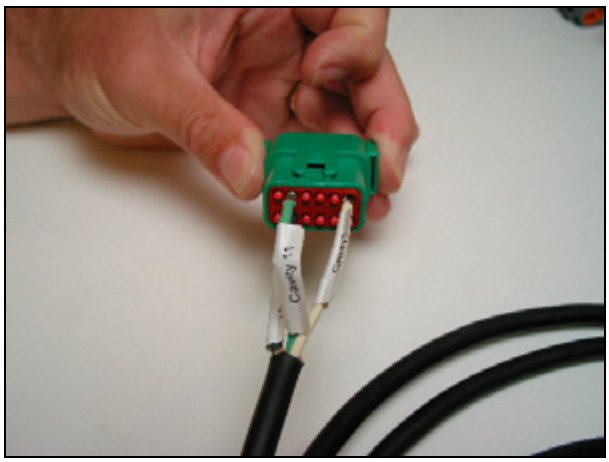
Rocker switch only

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



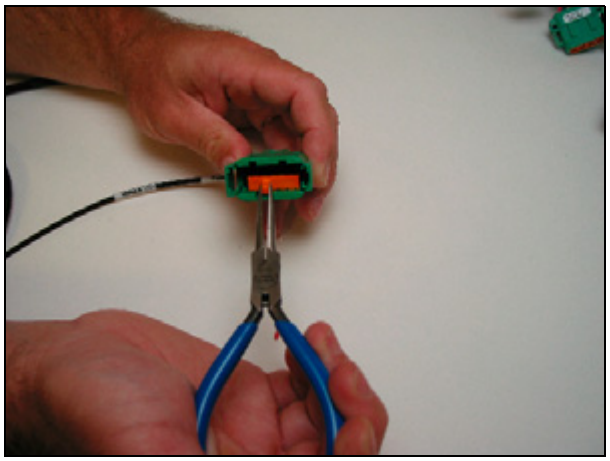
Foot switch only

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 Nav 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

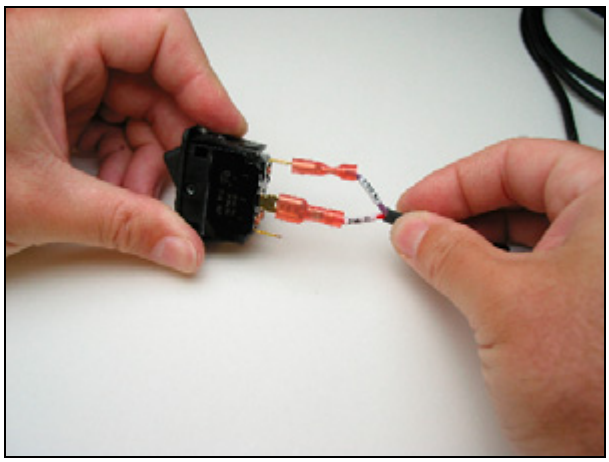
Run the cable to a clear location on the floor board. Use double-sided tape to secure the pedal. Route the cable under the floor mat.



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

1. Hold the switch down for at least 0.5 seconds.

Note – *Holding the switch for less than 0.5 seconds will not engage the system.*

2. Release the switch between 0.5 and 4.0 seconds. When you release the switch, the vehicle will engage.

CHAPTER

7

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 chapter.

Installing the controller

Step 1

Locate the area on the right side of the cab well, behind the seat.

Use the NavController II mounting plate as a template and mark and drill two $^{5}/_{16}$" mounting holes for mounting the plate to the machine.





Step 2

Mount and secure the controller mounting plate to the machine using the provided 3/8" bolts. Make sure the location is rigid and does not vibrate during vehicle operation as this will cause performance degradation.

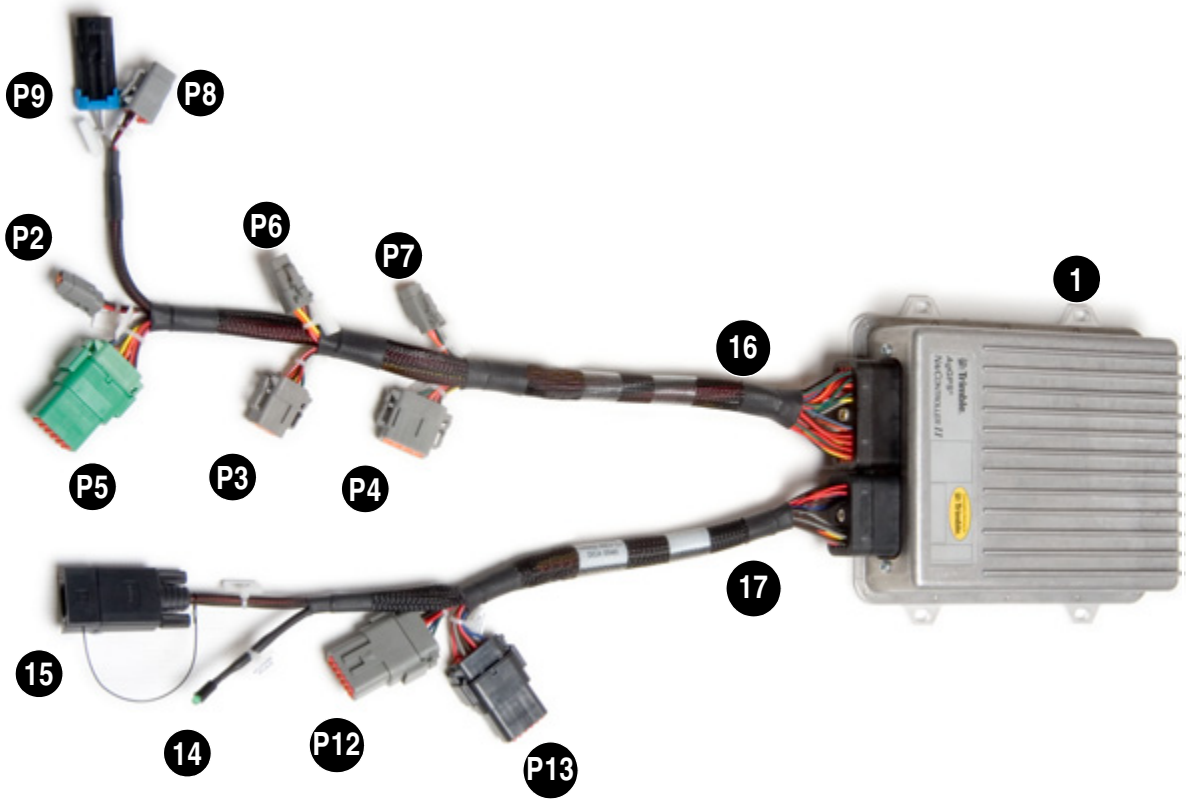


Step 3

With the connector facing down, use the provided 10-32 screws to attach the NavController II to the mounting plate.



Controller connections



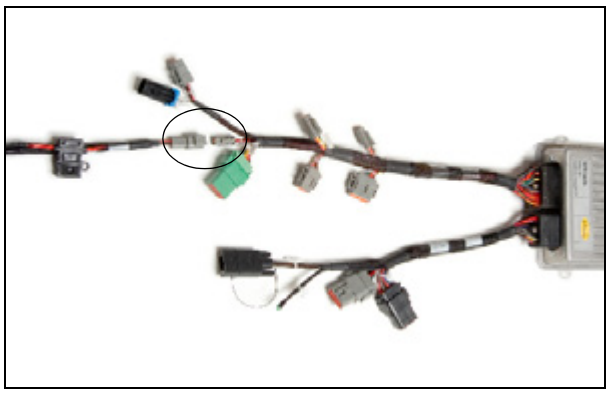
Item	Description
1	NavController II controller
P2	Power connector
P3	GNSS connector
P4	Display connector
P5	Vehicle sensors connector
P6	Steering sensor connector
P7	Manual override connector
P8	Hydraulic valve connector

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.

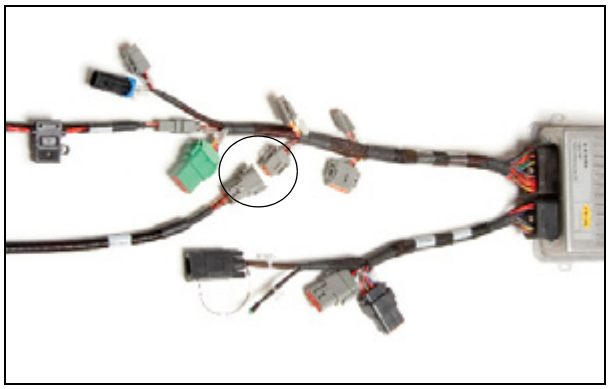
Note – *The power connection supplies power through the controller to all connected devices, including GNSS and displays.*



Step 2

Connect the GNSS cable connection to P-3, which is labeled “GPS”. P-3 is located on the main wiring harness.

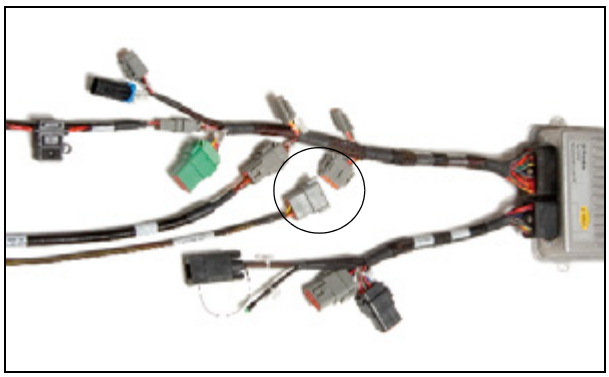
For FmX, CFX-750, and EZ-Guide installations, plug the display in here.



Step 3

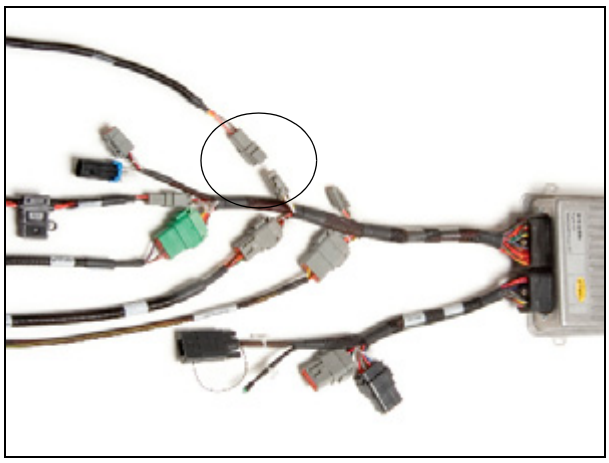
Connect the primary display cable connection to P-4, which is labeled “Display”. P-4 is located on the main wiring harness.

Note – Do not *connect the cable to the connector labeled “Spare” on the auxiliary harness. Do not use this connection for FmX, CFX-750, and EZ-Guide installations.*



Step 4

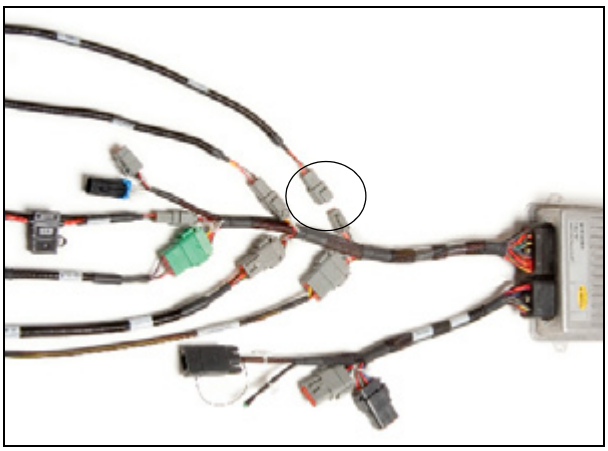
Connect the steering sensor cable connection to P-6, which is labeled “Steering Sensor”. P-6 is located on the main wiring harness.



Step 5

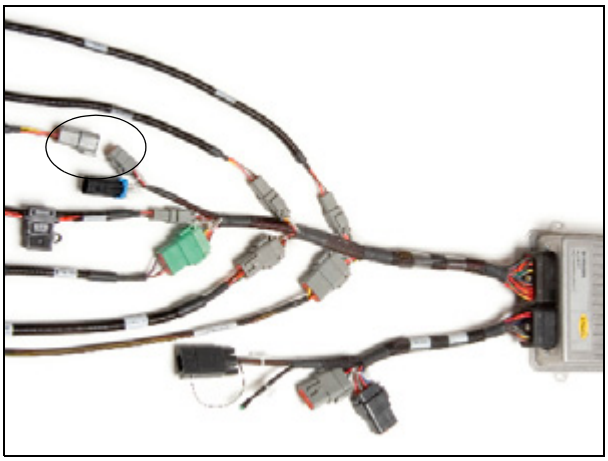
Connect the manual override cable connection to P-7, which is labeled “Manual Override”. P-7 is located on the main wiring harness.

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



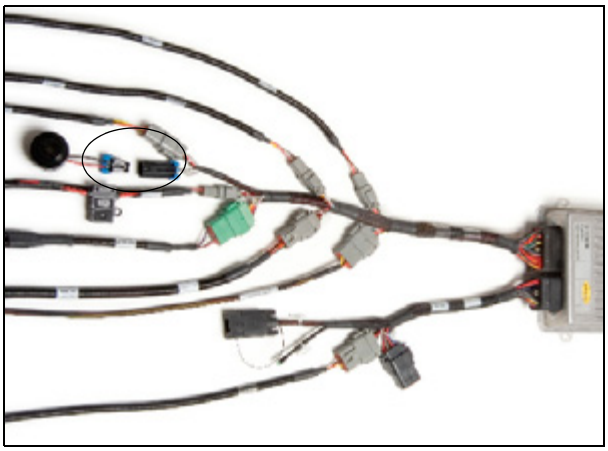
Step 6

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



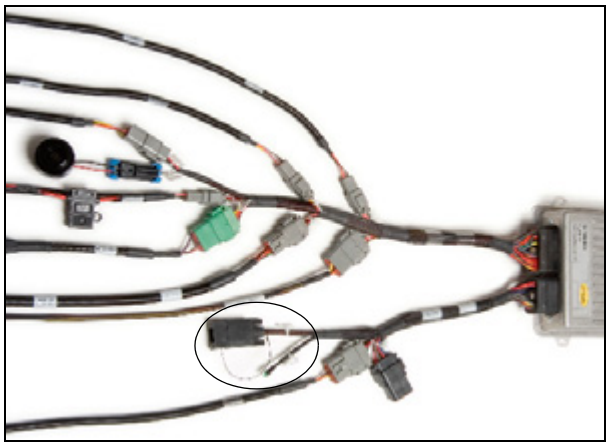
Step 7

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 8

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 9

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

8

Final Machine Check

In this chapter:

- Performing the final machine check

This chapter describes how to perform a final check of the vehicle.

Performing the 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 chapter.

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://www.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 NavControllerII for the vehicle model being used.

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

   Locate the latest version of the *External Vehicle Profiles*.

   You can use Autopilot Toolbox II software version 2.90 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 2.90 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