INSTALLATION INSTRUCTIONS

Autopilot™ Automated Steering System

Apache Sprayers ■ AS720 / 1020 / 1220

Version 5.00
Revision B
January 2013
Part Number 54037-100-E05-B

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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.

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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.

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CHAPTER

1

Introduction

In this chapter:

- Technical assistance
- Required Trimble display and installation kits
- 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 other Global Navigation Satellite Systems (GNSS) products before, such as the United States' Global Positioning System (GPS), Trimble recommends that you spend some time reading this manual to learn about the special features of this product. If you are not familiar with GNSS, visit the Trimble website (www.trimble.com) for an interactive look at Trimble and GNSS.

Note – *This manual describes Autopilot installation on the FmX® integrated display and the CFX-750™ display: Instructions for "the display" refer to both of them. Where instructions apply to only one display, this is clearly identified.*

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**.

Required Trimble display and installation kits

Required Trimble display and controller

Retain
FmX® integrated display: P/N 93000-xx, CFX-750™ display: P/N 94000-xx Autopilot NavController II: P/N 54425-xx Antenna for display: P/N 60600-02 (DGPS) or 77038-00 (OmniStar/RTK) Antenna to receiver cable: P/N 50449 Power cable FmX display: P/N 66694 Power cable CFX-750 display: P/N 77282 Basic cable (both displays): P/N 67258

Required installation kits

Kits required	Special tools
Platform kit: P/N 54037-100 Hydraulic hose kit: P/N 83167	Allen wrench set (SAE) Open end wrench set (SAE)

Antenna mounting kits

Antenna options
Antenna mount options Antenna V plate mount: P/N 60353. see Chapter 4, Antenna Installation Roof spar bracket: P/N 53676 Roof spar for 2013 and later machines: • For front of cap mounting: P/N: 55348 • For rear of cab mounting: P/N: 66774

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 54037-100)	Hydraulic valve	Chapter 2
	Hydraulic manifold	Chapter 2
	Pressure sensor	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 6
	Bolt kit controller	Chapter 8
Common parts	Controller	Chapter 8
	Controller mounting bracket	Chapter 1
	Cable kit: • Main wiring harness • Power bus auxiliary wiring harness • Sonalert alarm	Chapter 8
Antennas	GNSS receiver	Chapter 4
	GNSS antenna and cable	Chapter 4
	GNSS antenna mounting plate	Chapter 4
	Radio antenna and cable	Chapter 4
	GNSS receiver power/data cable	Chapter 4
	RTK radio, cable, and radio antenna	Chapter 4
Display	FmX integrated display	Chapter 5
	CFX-750 display	Chapter 5
	Display cable	Chapter 5
	Mounting bracket	Chapter 5
Hydraulic hose kit: P/N 83167	Hydraulic hoses	Chapter 2
	Hydraulic adaptors	Chapter 2
• For front of cap mounting: P/N: 55348 • For rear of cab mounting: P/N: 66774	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

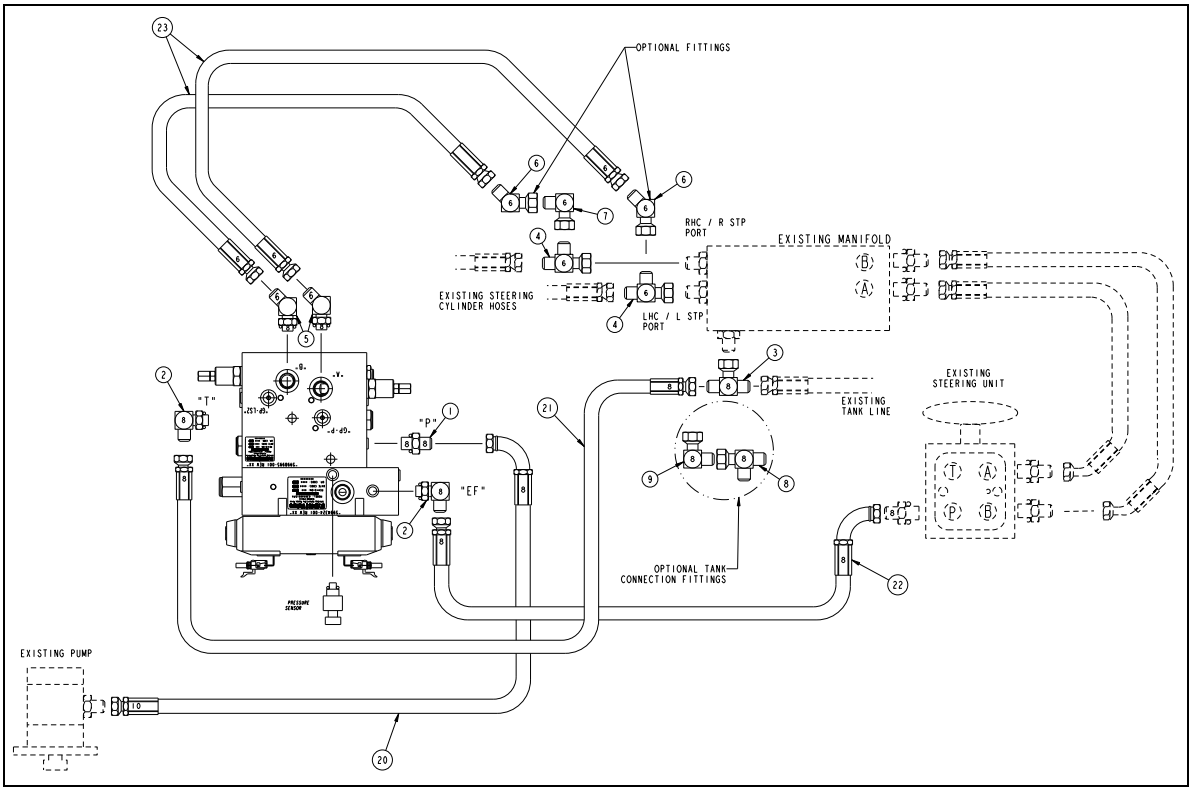
Hydraulic Control Valve Installation

In this chapter:

- Hydraulic control valve components
- Prepare the Autopilot manifold, sandwich block, and control valve
- Installing the hydraulic manifold
- Installing the hydraulic hose
- Secure the electrical connectors

This chapter describes how to configure the manifold and install both the manifold/valve assembly and hydraulic hose kit.

Hydraulic control valve components



Item	Description	P/N
1	Fitting	8 F50X-S
2	Fitting (x2)	8 C50X-S
3	Fitting	8 S6X-S
4	Fitting (x2)	6 R6X-S
5	Fitting (x2)	6-8 V50X-S
6	Fitting (x2)	6 V6X-S
7	Fitting	6 C6X-S
8	Fitting	8 R6X-S
9	Fitting	8 C6X-S

Item	Description	P/N
20	45" hose	F451TC0639-10-08-08-45
21	48" hose	F451TC0606-08-08-08-48
22	27" hose	F451TC0639-08-08-08-27
23	23" hose (x2)	F451TC0606-06-06-06-23

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

Prepare the Autopilot manifold, sandwich block, and control valve

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.

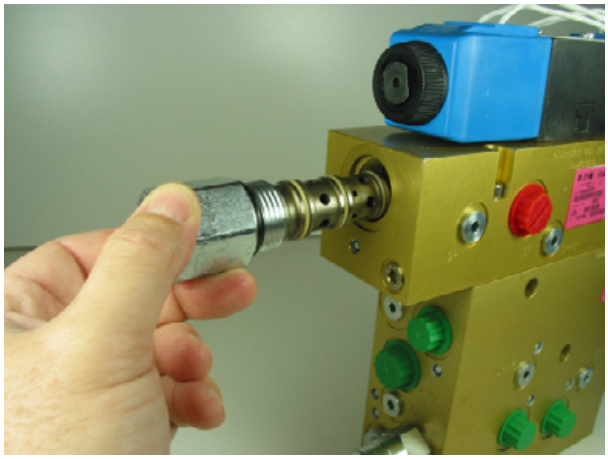
Step 1

Locate PFRD cartridge that is stamped **PFRD-12-4-0-000-110-00**.



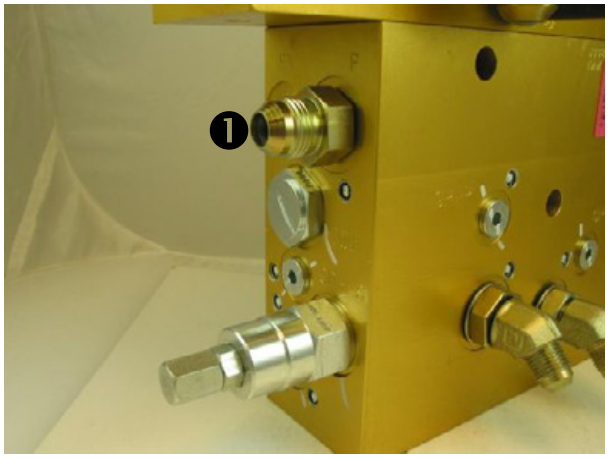
Step 2

Install the PFRD cartridge into the manifold sandwich plate.



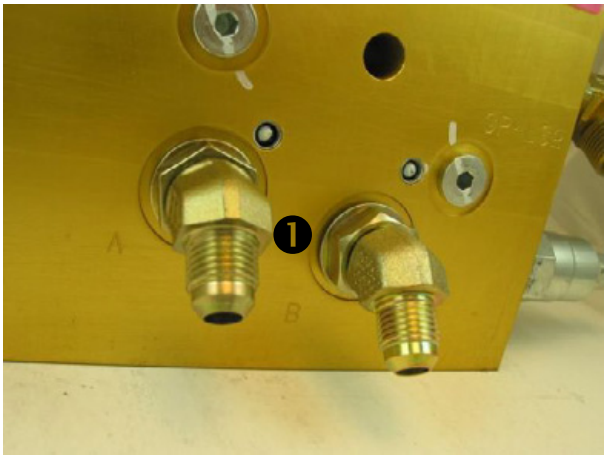
Step 3

Install an 8-8 ORB-JIC straight adaptor ❶ in the P port.



Step 4

On the front face of the manifold, install a pair of 8-6 ORB-JIC 45° adaptors ❶ into the A and B ports.



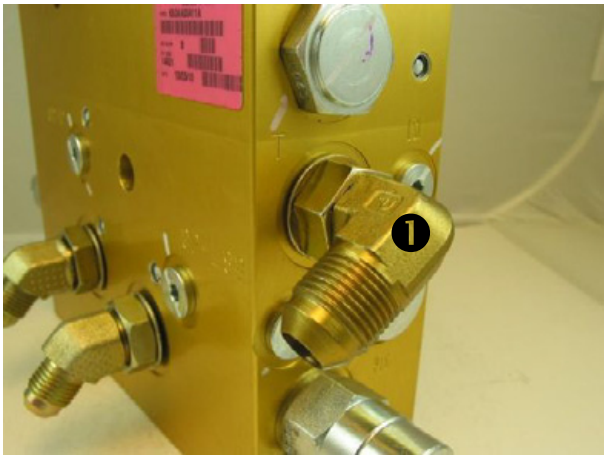
Install an 8-8 ORB-JIC 90° adaptor ❷ in the EF port.

With the EF port adaptor oriented roughly as shown, install the pressure transducer ❸ into the GP-EF port.



Step 5

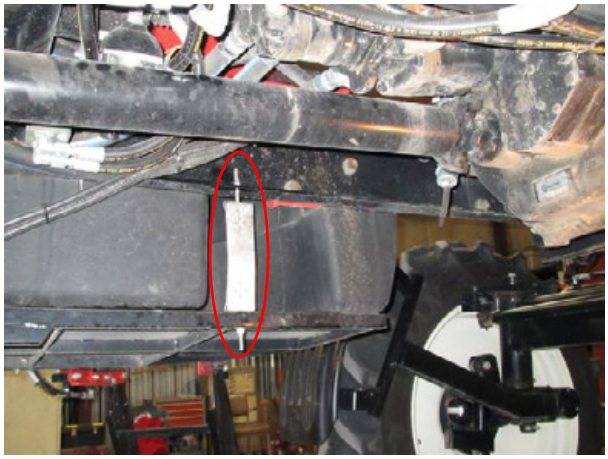
Install an 8-8 ORB-JIC 90° adaptor ❶ into the "T" port.



Installing the hydraulic manifold

Step 1

Locate the metal strap that supports the fuel tank on the left side of the machine. There are two pre-drilled holes in the C-channel frame to mount the Autopilot hydraulic manifold.



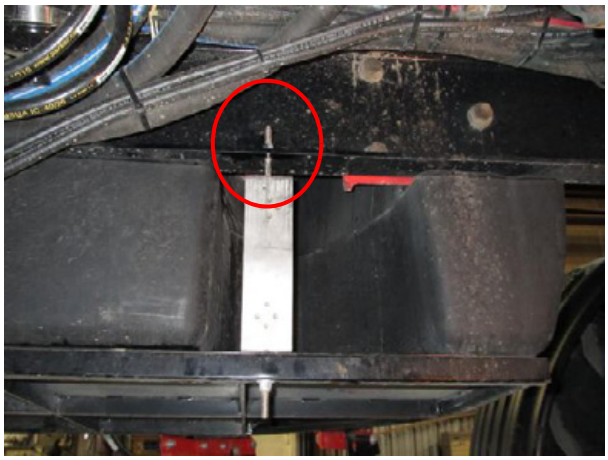
Step 2

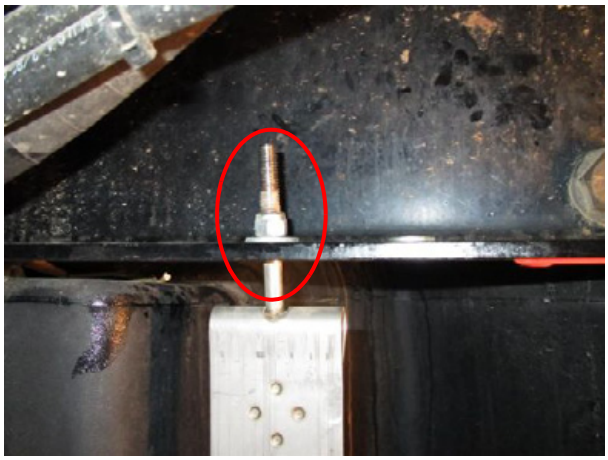
Support the fuel tank frame.



Step 3

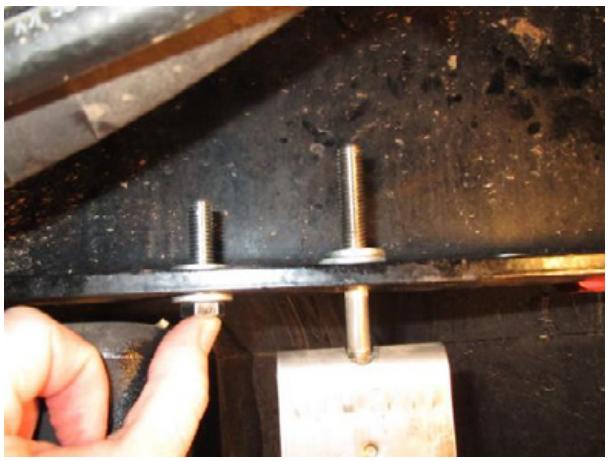
Loosen and remove the top hex nut and flat washer of the support strap.





Step 4

Mount the supplied 83172 bracket onto the top bolt of the metal support strap. Use the supplied 3/8" x 2.0" bolt, nylock nuts, and flat washers.



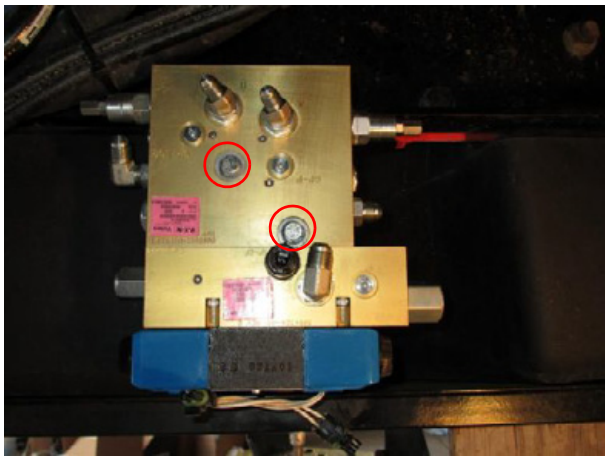


Make sure that the bracket is level when mounted.



Step 5

Use the supplied 3/8" x 3.5" bolts and flat washers to attach the Autopilot manifold assembly to the bracket.



Installing the hydraulic hose

Step 1

Locate the steering gear pump on rear of the transmission.

Disconnect the existing pressure hose from the gear pump.



Step 2

Locate the steering orbital pump and the steering pressure hose.

The pressure hose is the only straight hose connection attached to the orbital (at the lower left port of the motor).



Step 3

Disconnect the existing pressure hose from the orbital motor. Loosen the hose fitting and twist the hose by hand to remove it.



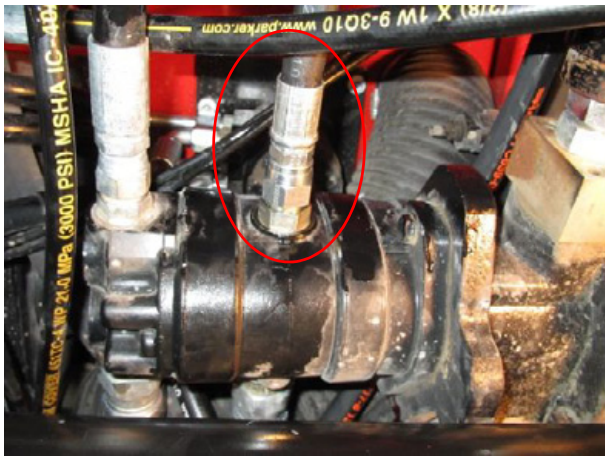
Step 4

Connect the 90° end of the 45" hose to the P port of the manifold: Orientate it as shown.



Step 5

Connect the straight end of the 45" hose to the pressure port on the gear pump.



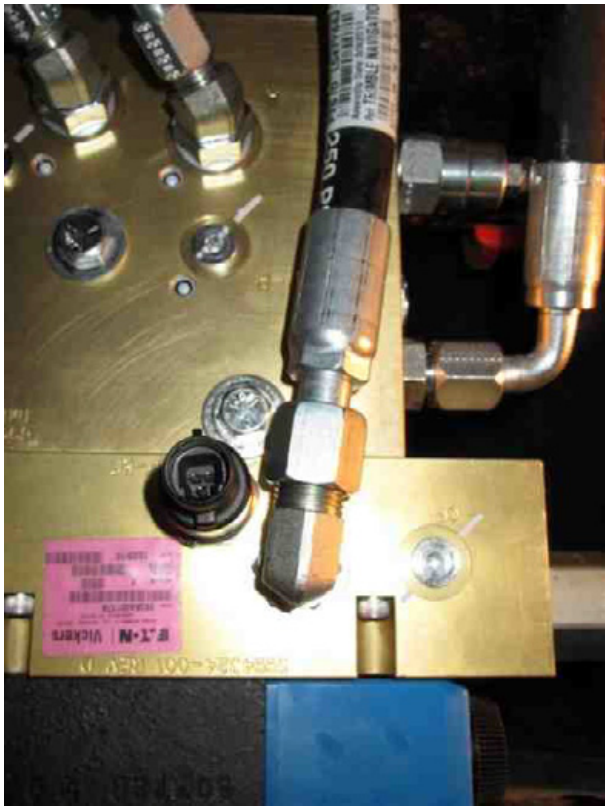
Step 6

Attach the 90° end of the 27" pressure hose to the P port of the orbital pump: Orientate it as shown.



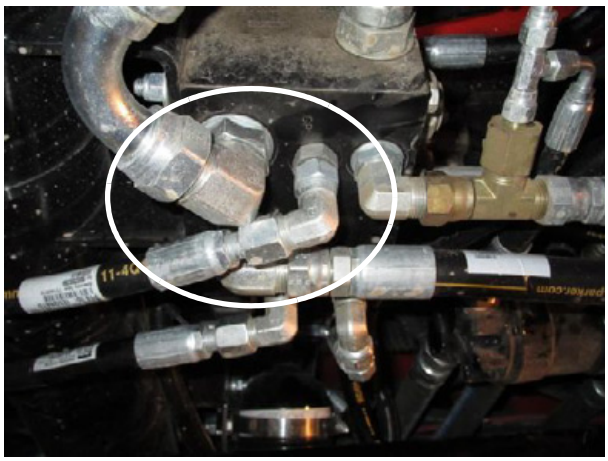
Step 7

Connect the straight end of the 27" hose to the EF port of the manifold: Orientate it as shown.



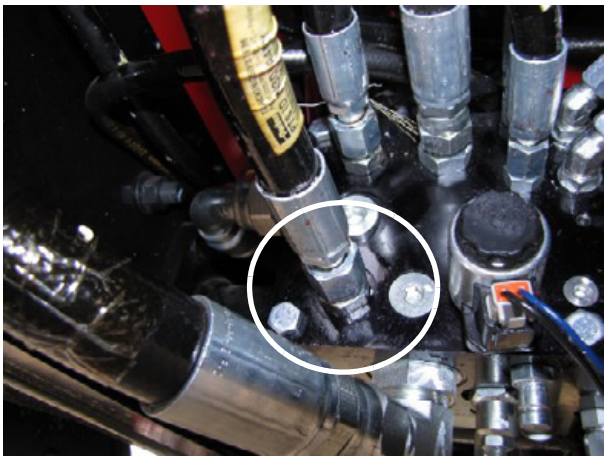
Step 8

Find the **GPS** port on the bottom of the distribution manifold.



2013 and later machines

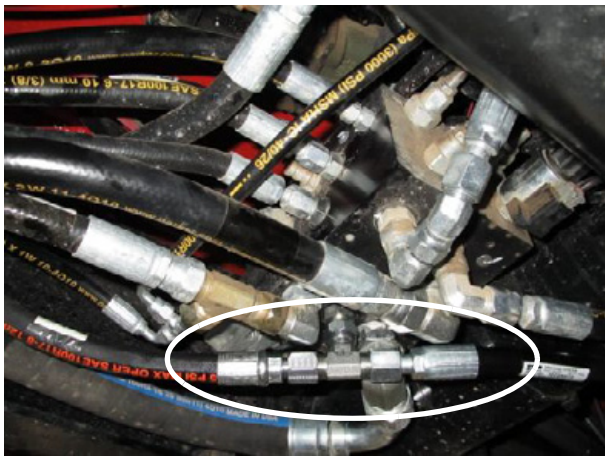
Find the port labeled **ST T** on the front of the manifold.



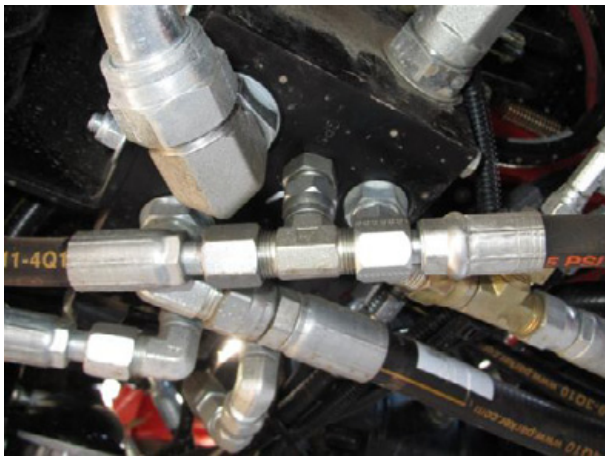
Step 9

Disconnect the existing tank line and then insert a supplied -8 JIC branch T-fitting.

Reconnect the existing tank line to the T-fitting.



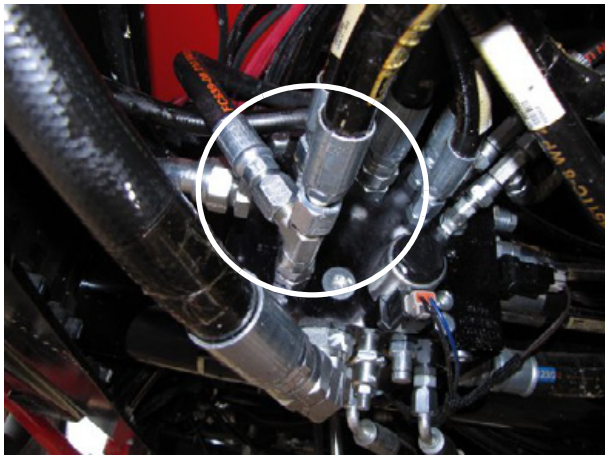
Connect the new 48" hose to the T-fitting and then route the opposite end of the hose to the Autopilot hydraulic manifold.



2013 and later machines

Disconnect the existing tank line and then insert a supplied -8 JIC run T-fitting.

Reconnect the existing tank line to the T-fitting.



Connect the new 48" hose to the T-fitting and then route the opposite end of the hose to the Autopilot hydraulic manifold.



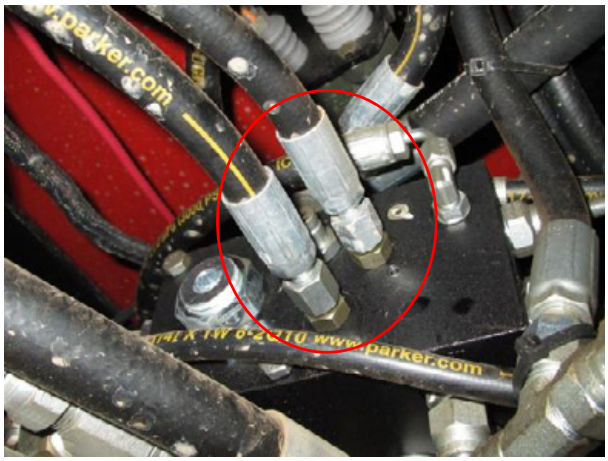
Step 10

Connect the opposite end of the 48" hose to the Autopilot manifold T port: Orientate it as shown.

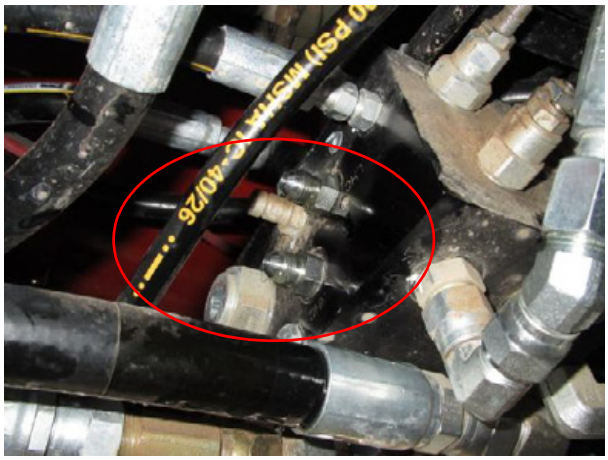


Step 11

Locate where the steering cylinder hoses connect to the distribution manifold. The manifold ports are labeled **RHC** and **LHC**.



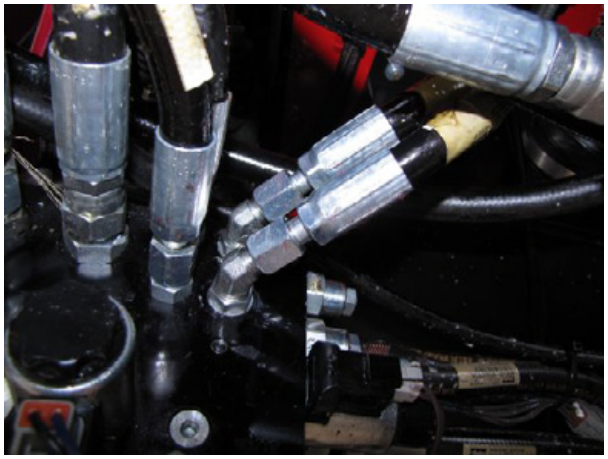
Label the existing cylinder hoses and then disconnect them from the manifold.



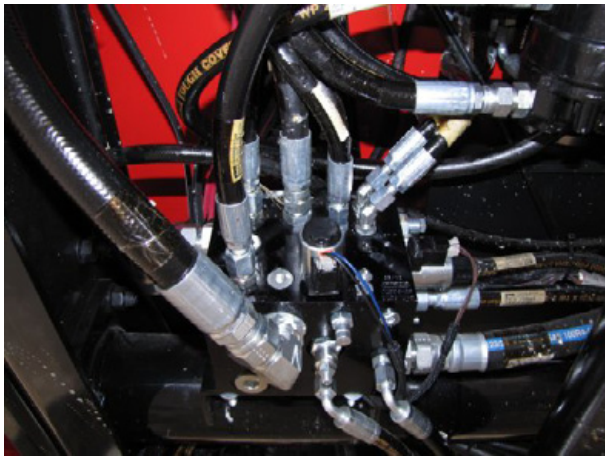
2013 and later machines

Locate where the steering cylinder hoses connect to the distribution manifold. The manifold ports are labeled R STP and LSTP.

On these machines, 45° fittings are fitted at the distribution manifold.

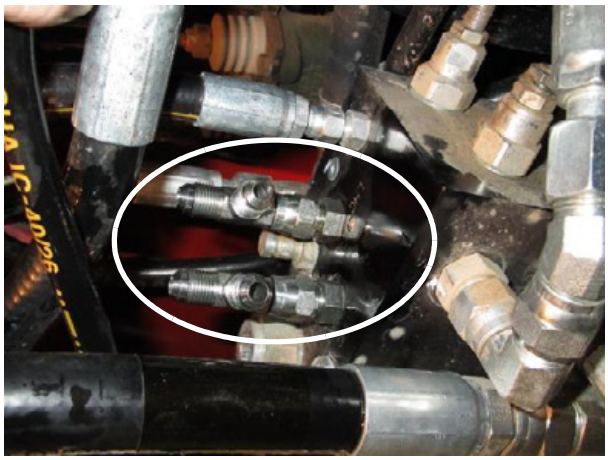


Label the existing cylinder hoses and then disconnect them from the manifold.



Step 12

Attach a -6 JIC run T-fitting to each existing adaptor in the RHC and LHC ports.



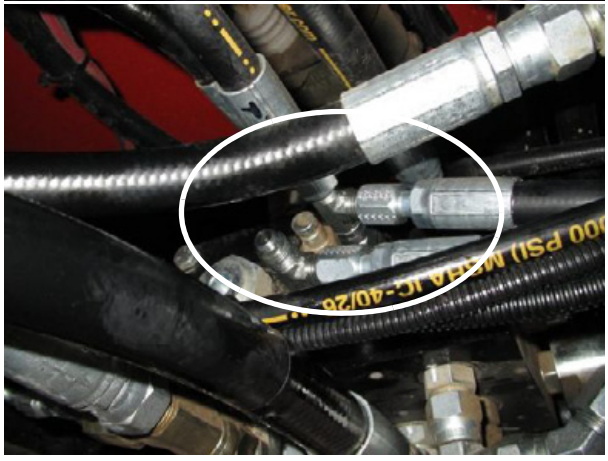
2013 and later machines



Step 13

Connect a 23" hose to the branch port of each T-fitting.

Route each hose towards the Autopilot manifold.



2013 and later machines



Step 14

Connect the LHC 23" hose to the A port of the Autopilot manifold.

Connect the RHC 23" hose to the B port of the Autopilot manifold.



Step 15

Add a -6 JIC elbow to the tee in the LHC port.

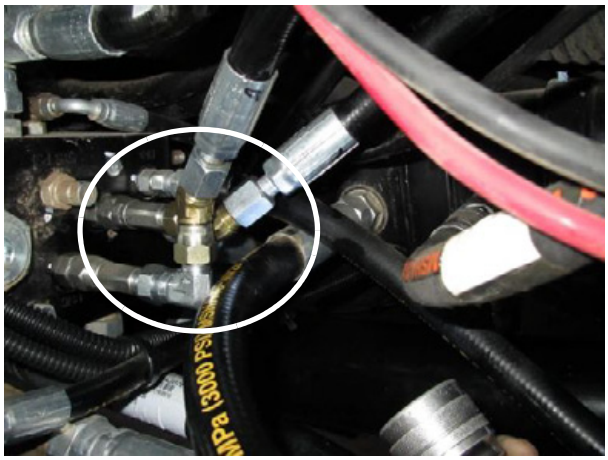
Reconnect the original hose to the 45 elbow.



Step 16

Add a -6 JIC 90° elbow and a 45° elbow (as shown) to the tee in the RHC port.

Reconnect the original hose to the 45° elbow



Step 17

Check and tighten all of the fittings.

Refill the hydraulic reservoir if necessary.

Start the engine and then have someone else turn the steering from full left lock to full right lock to check for leaks. If the sprayer steers backward while manual steering, reverse the steering cylinder hoses at the RHC and LHC ports.

Reconnect the original hoses to the ends of the run tee fittings installed on the R STP and L STP.

Secure the electrical connectors

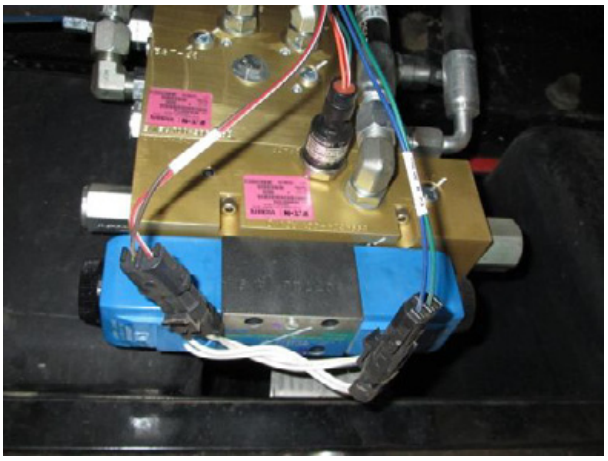
Step 1

Locate the 54617 control valve cable.

Plug the weatherpack connectors from the cable into the control valve.

Route the cable towards the right rear corner of the operator's cab following the existing hoses and steel lines.

Secure the harness with tie straps along the path.



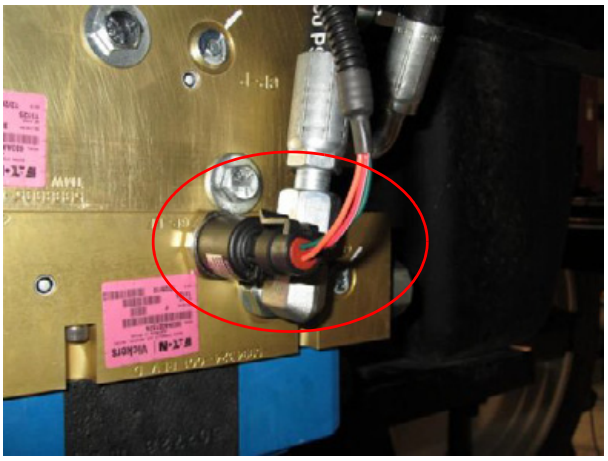
Step 2

Locate the 54618 pressure transducer sensor.

Plug the cable into the pressure sensor located at the manifold block.

Route the cable towards the right rear corner of the operator's cab following the existing hoses and steel lines.

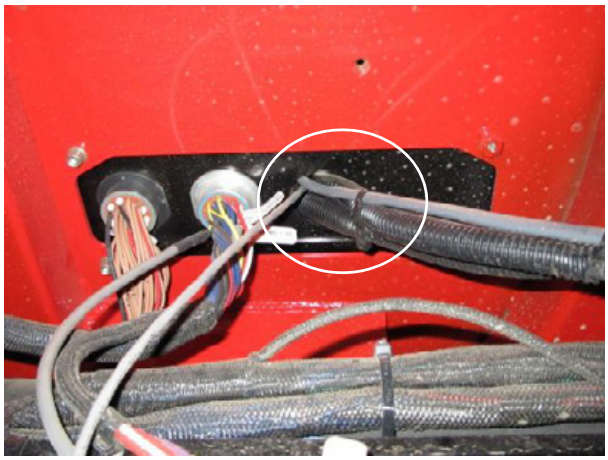
Secure the harness with tie straps along the path.



Step 3 .

In the right rear corner of the operator's cab, route all cables inside the cab through the existing hole in the cab floor.





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.

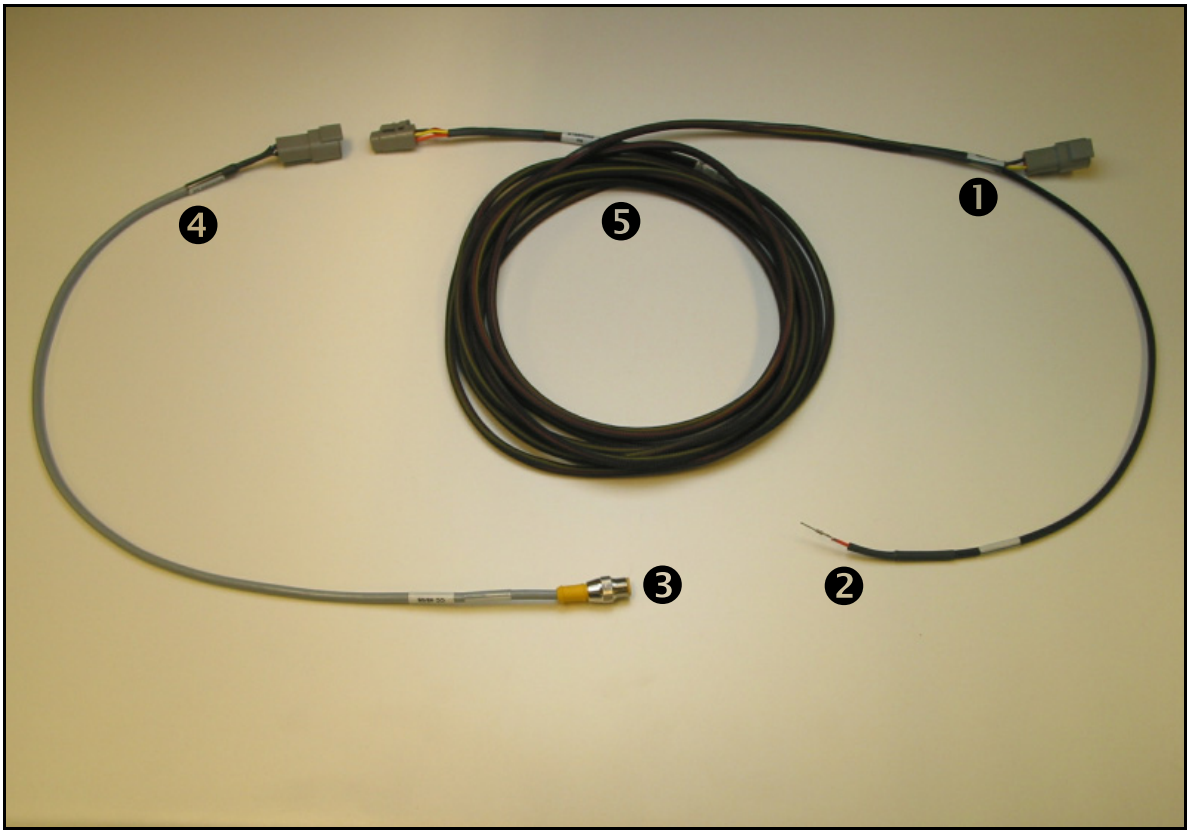
If the required mounting location is not accessible, chose a different place. To ensure proper function, the AutoSense device must be located where it is free of obstructions and can rotate with the wheels when they turn.

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 steering cylinder tie-rod nut on the left side of the machine.



Step 2

Remove the split-pin and castle nut from the tie rod joint.



Replace the original castle nut with the Autosense tie-rod mount nut and then re-install the split-pin.





Step 3

Use the supplied 3/8" bolt and blue thread lock to attach the AutoSense mount plate.





Step 4

Use four of the supplied #6-32 socket-head cap screws to attach the AutoSense device to the mount plate.

Note – *The AutoSense connector points towards the rear of the machine.*



Step 5

Route the 57560 jumper cable across the top of the axle to the steering device.

Connect the jumper cable to the steering device. Leave adequate length on the service loop to avoid stretching the cable.

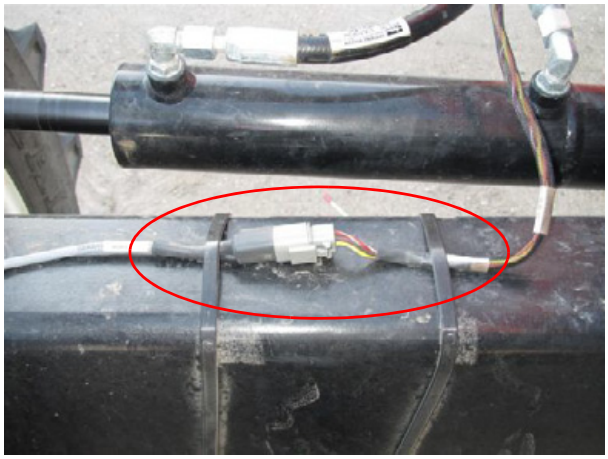


Step 6

Connect the 57885 steering cable to the 57560 jumper cable. Leave adequate length on the service loop to avoid stretching the cable.

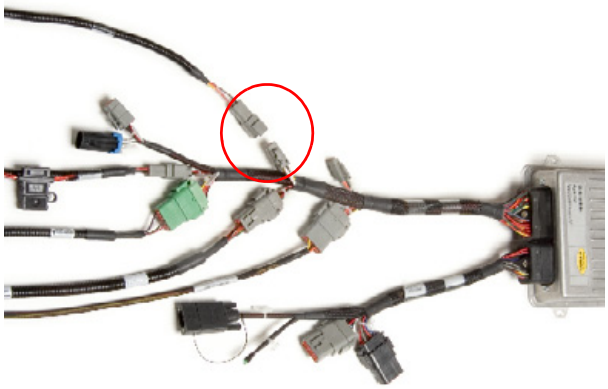


Route the steering cable to the right rear corner of the operator's cab. Follow the existing steering cylinder hoses and then secure the cable using plastic zip ties.



Step 7

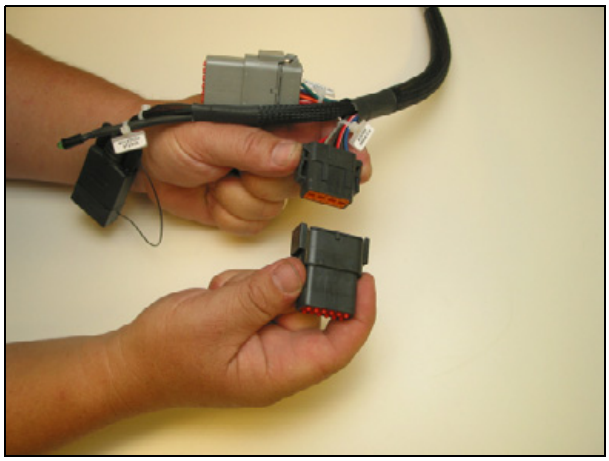
Connect the steering device cable connection to P-6 on the main wiring harness. P-6 is labeled **Steering Sensor**.



Preparing the harness: P/N 54602 Rev C

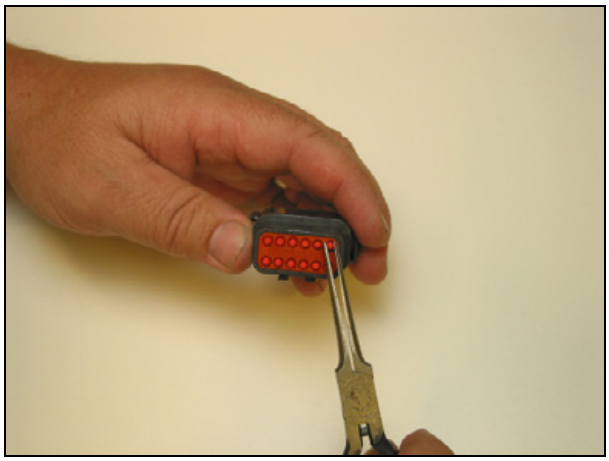
Step 1

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



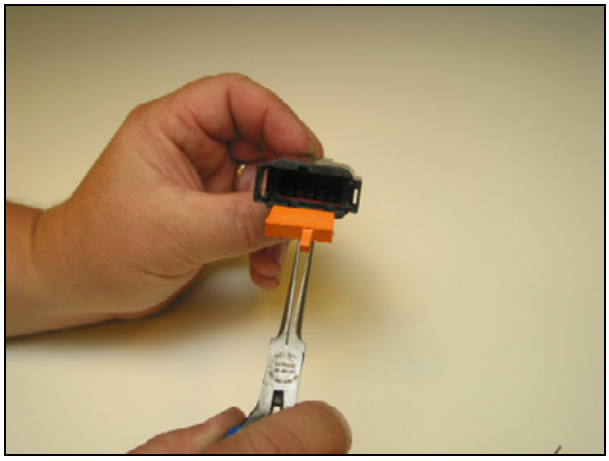
Step 2

Remove the plug from cavity number 1.



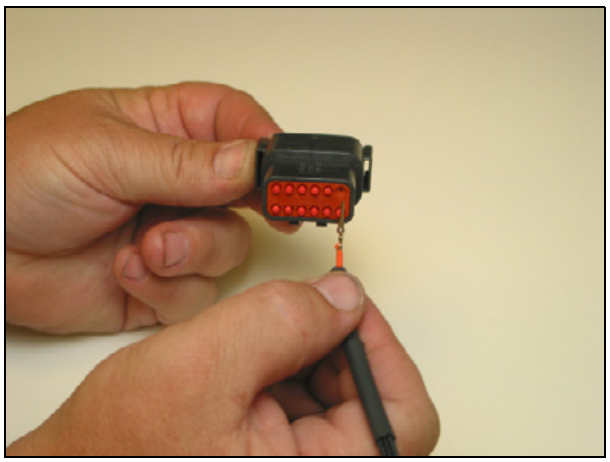
Step 3

Remove the wedge from the connector.



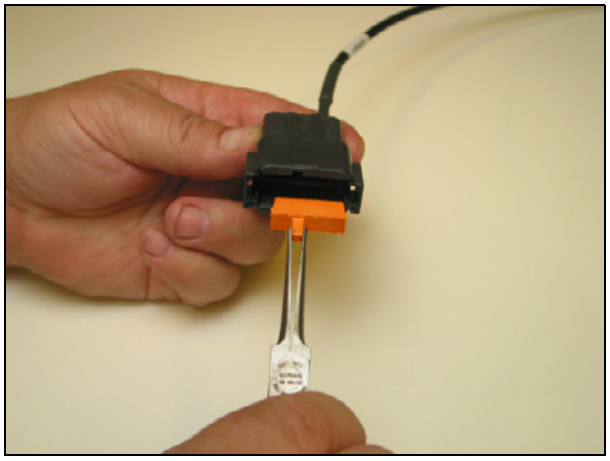
Step 4

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



Step 5

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



Step 6

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

CHAPTER

4

Antenna Installation

In this chapter:

- Antenna installation options
- Mounting an adjustable spar to roof bolts

This chapter describes how to install an *Ag*GPS antenna or an RTK radio antenna.

Antenna installation options

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

- **Spar mount**: This bracket mounts directly to the roof bolts and is required for all high accuracy applications such as RTK and OmniSTAR XP/HP. Bolt a metal spar to the roof and then attach a V plate for magnetic mounting.
- **VHB mount**: Attach a 5" x 5" plate or a V plate directly to the roof with VHB (Very High Bond) adhesive for magnetic mounting. VHB mounting is for quick and simplified installations in applications where high accuracy is not critical such as WAAS, EGNOS and OmniStar VBS.
- **Magnetic mounting:** Magnetic mounting for quick release is available for both VHB and spar type mounting.

Possible mounting methods

GNSS receiver	V plate on spar (removable)	VHB plate on roof (removable)	AG25 antenna bolted to spar mount
FmX integrated display CFX-750 display	✓	✓	✓

Mounting an adjustable spar to roof bolts

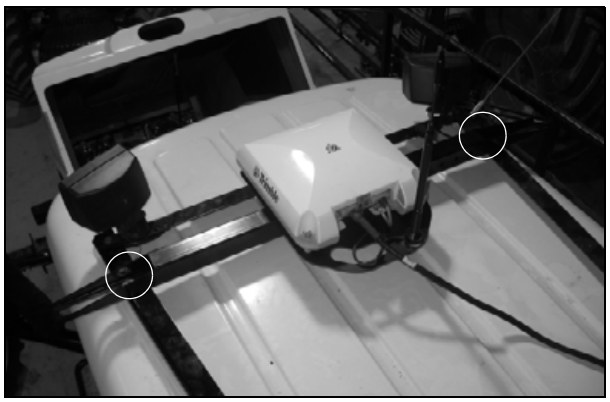
WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information chapter.

Step 1

Position the cab bolts on the roof of the vehicle.



If a light bracket already occupies the roof studs, mount the spar directly onto the light bracket.



Step 2

If required, replace the existing bolts with longer bolts.



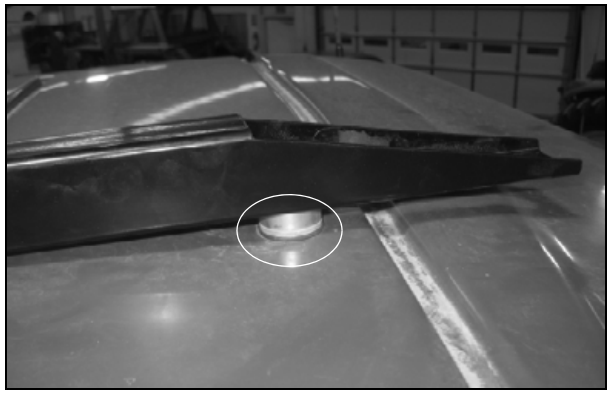
If you use the light bracket, drill two holes to match the spar width.



Step 3

Use the slotted holes to center the spar and then tighten the bolts. If required, use the spacers and flat washers provided to secure the spar.

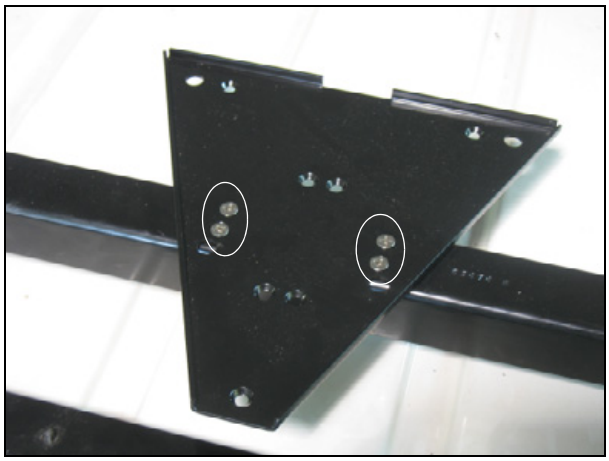
Note – *If the receiver is offset to the left or the right of the vehicle, Autopilot system performance may be affected. Before you tighten the cab bolts, make sure that the GPS antenna is aligned with the center of the vehicle.*



Step 4

Attach a V plate with four ¼" flathead screws.

The narrow end points to the front of the vehicle.



V plate on the spar

Attaching the plate with VHB adhesive

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.

Standard 5" x 5" plates are provided in most kits. You can use the VHB mounting method to attach either a 5" x 5" plate or a V plate.

- GLONASS, RTK, and OmniSTAR XP / HP applications: The spar mounting method is recommended. The V plate provides repeatable positioning of the antenna.
- WAAS, EGNOS, and OmniSTAR VBS applications: Use a 5" x 5" plate for simplified installation in applications where high accuracy is not critical.

Step 1

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

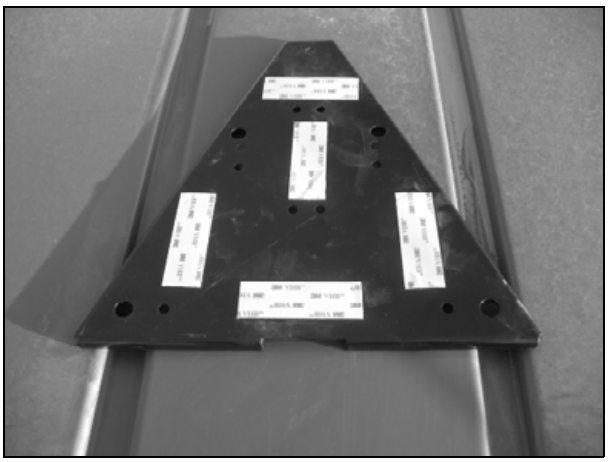


Step 2

V plate only

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

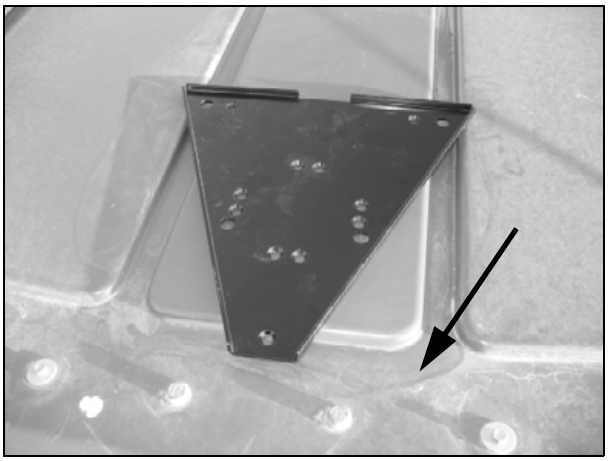
Note – *The VHB strips are pre-applied to the 5" x 5" plate.*



Step 3

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

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



V plate



5" x 5" plate

CHAPTER

5

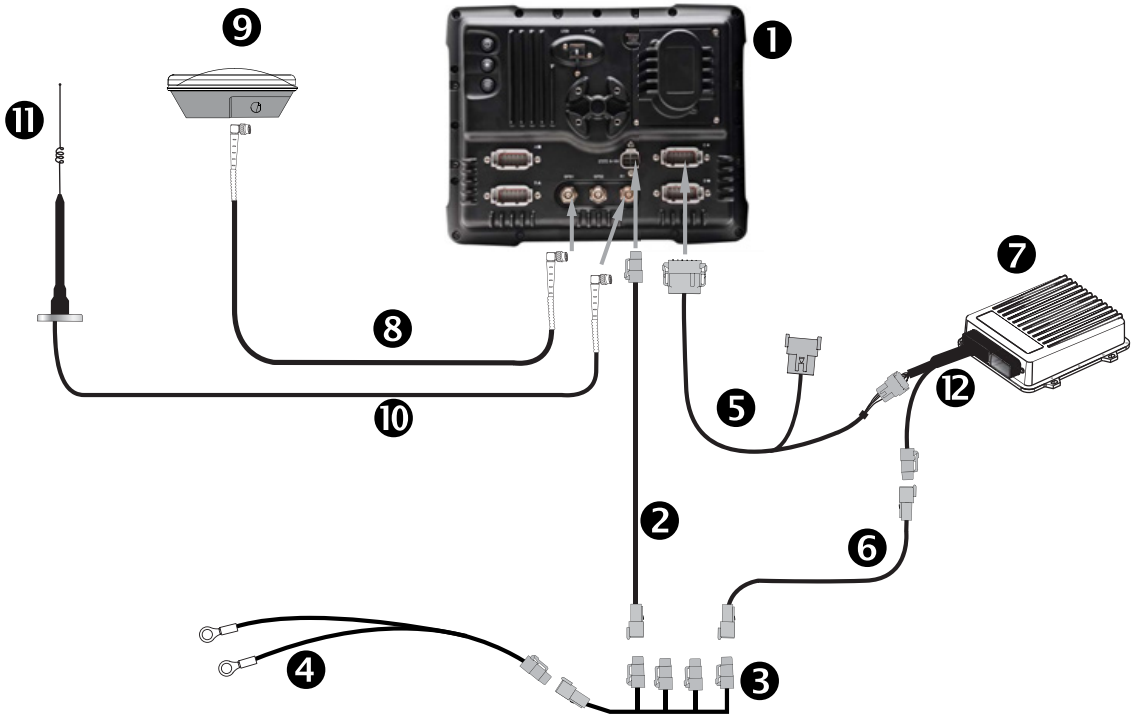
Display Installation

In this chapter:

- FmX integrated display components
- CFX-750 display components
- Preparing the FmX integrated display
- Installing the FmX integrated display
- 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
- CFX-750 and FmX displays: Installing the GNSS antenna and mounting plate
- CFX-750 and FmX displays: Installing the RTK radio antenna

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

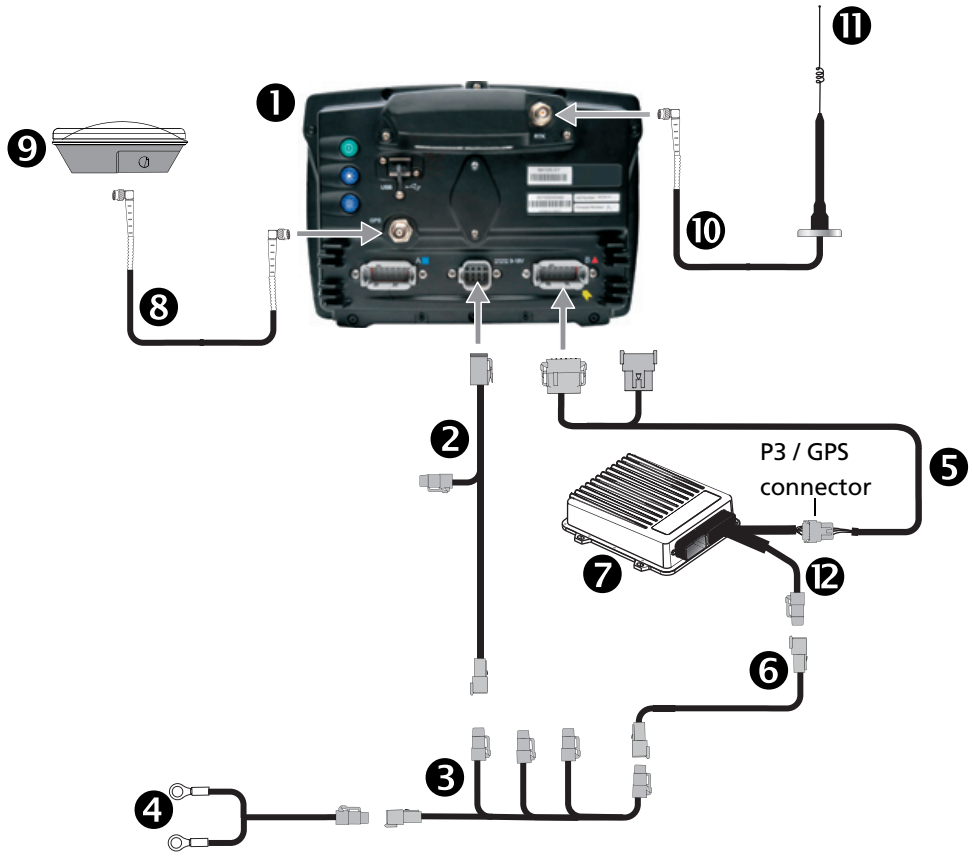
FmX integrated display components



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

Item	Description	Trimble part number
❶	FmX integrated display	93100-02
❷	FmX power cable	66694
❸	FmX power cable with relay and switch (power bus)	67259
❹	Basic power cable	67258
❺	FmX to NavController II cable with port replicator	75741
❻	2 pin DTM to 2 pin DT power adaptor	67095
❼	NavController II	55563-00
❽	8 m GPS TNC/TNC RT angle cable	50449
❾	AG25 GNSS antenna	77038-00
❿	NMO to TNC 20ft antenna cable and base	62120
❶❶	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
❶	CFX-750 display ***Note –*** *RTK password required.*	94100-01
❷	CFX-750 power cable	77282
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 GPS 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	Main NavController II cable	54601

Preparing the FmX integrated display

Step 1

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



Step 2

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



Step 3

Attach the RAM mount to the rear of the display.



Installing the FmX integrated display

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

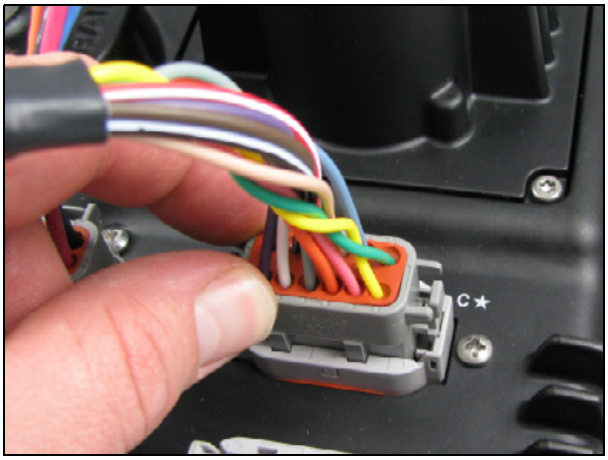




Step 2

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

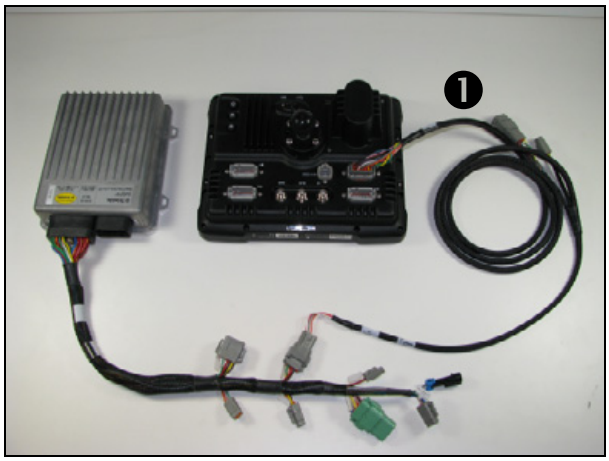
To connect power to the FmX integrated display, see Chapter 6, Power Harness Installation.



FmX integrated display: Installing the wiring harness

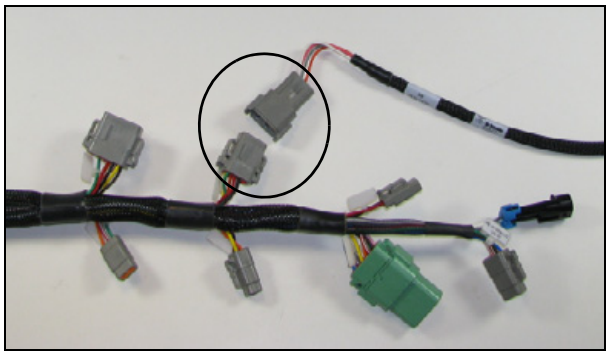
Step 1

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



Step 2

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



Preparing the CFX-750 display

Step 1

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



Step 2

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



Step 3

Attach the RAM mount to the rear of the display.



Installing the CFX-750 display

WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information 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 6, Power Harness Installation.



CFX-750 display: Installing the wiring harness

Step 1

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

Step 2

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



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

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

AgCam

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

Step 1

Locate the AgCam and AgCam cable.

Step 2

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



FmX display



CFX-750 display

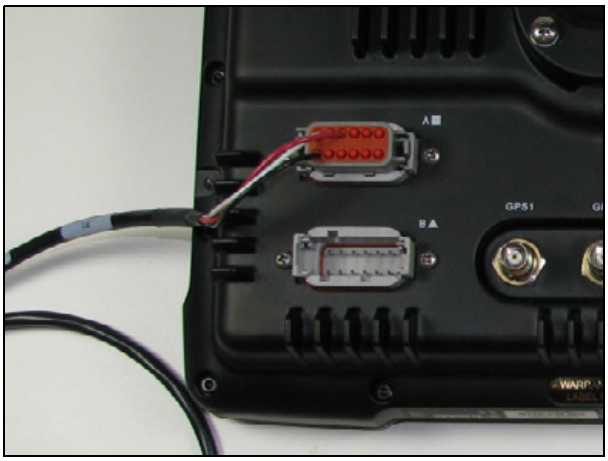
Step 3

Connect the AgCam cable to the display adaptor cable.



Step 4

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



CFX-750 and FmX displays: Installing the GNSS antenna and mounting 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 8**.*

Use one of the following methods:

- Spar mount
- VHB adhesive

Spar mount method

Trimble recommends that you use this method for RTK and OmniSTAR operations. For more information, see Antenna installation options, page 40.

Attach the V plate to the spar with the four supplied ¼"-20 flathead screws as shown. The narrow end points forward.



VHB adhesive method

Standard 5" x 5" plates are provided in most kits. You can use the VHB mounting method to attach either a 5" x 5" plate or a V plate.

- GLONASS, RTK, OmniSTAR XP / HP applications**:** The spar mounting method is recommended. The V plate provides repeatable positioning of the antenna.
- WAAS, EGNOS, OmniSTAR VBS applications: Use a 5" x 5" 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.

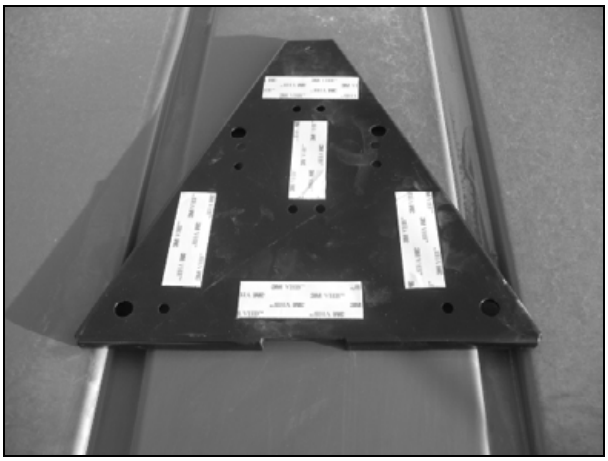


Step 2

V plate only

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

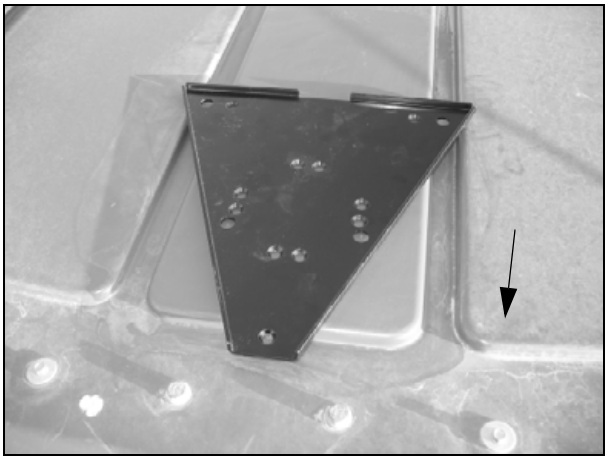
Note – *The VHB strips are pre-applied to the5" x 5" plate.*



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



5" x 5" plate

Step 4

Both models

Attach the antenna/receiver cable to the antenna and then route the cable into the cab. Secure the cable along the way.



Step 5

AG25 dual band antenna (GLONASS, RTK, OmniSTAR XP/HP)

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



AG25 dual band antenna (GLONASS, WAAS, EGNOS, OmniSTAR VBS)

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



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 of the V plate on the roof.



If the cable does not reach the V plate, use the 5" x 5" plate with the VHB provided to relocate the antenna, as shown in the image below.



5" x 5" plate

Step 3

Route cable from the vehicle roof into the cab, and connect the radio cable to the CFX-750 or FmX display.

CHAPTER

6

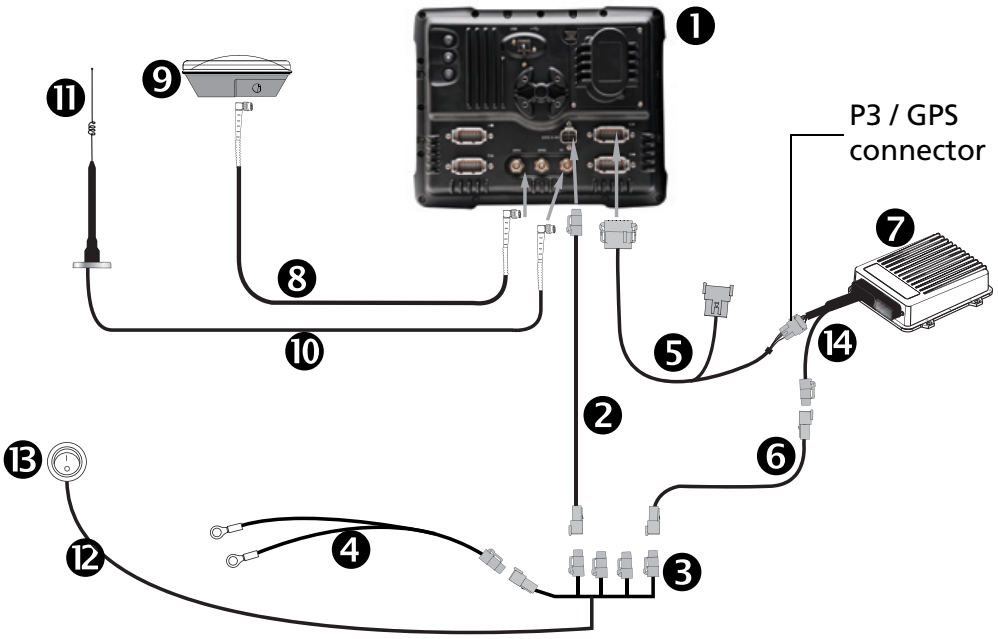
Power Harness Installation

In this chapter:

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

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

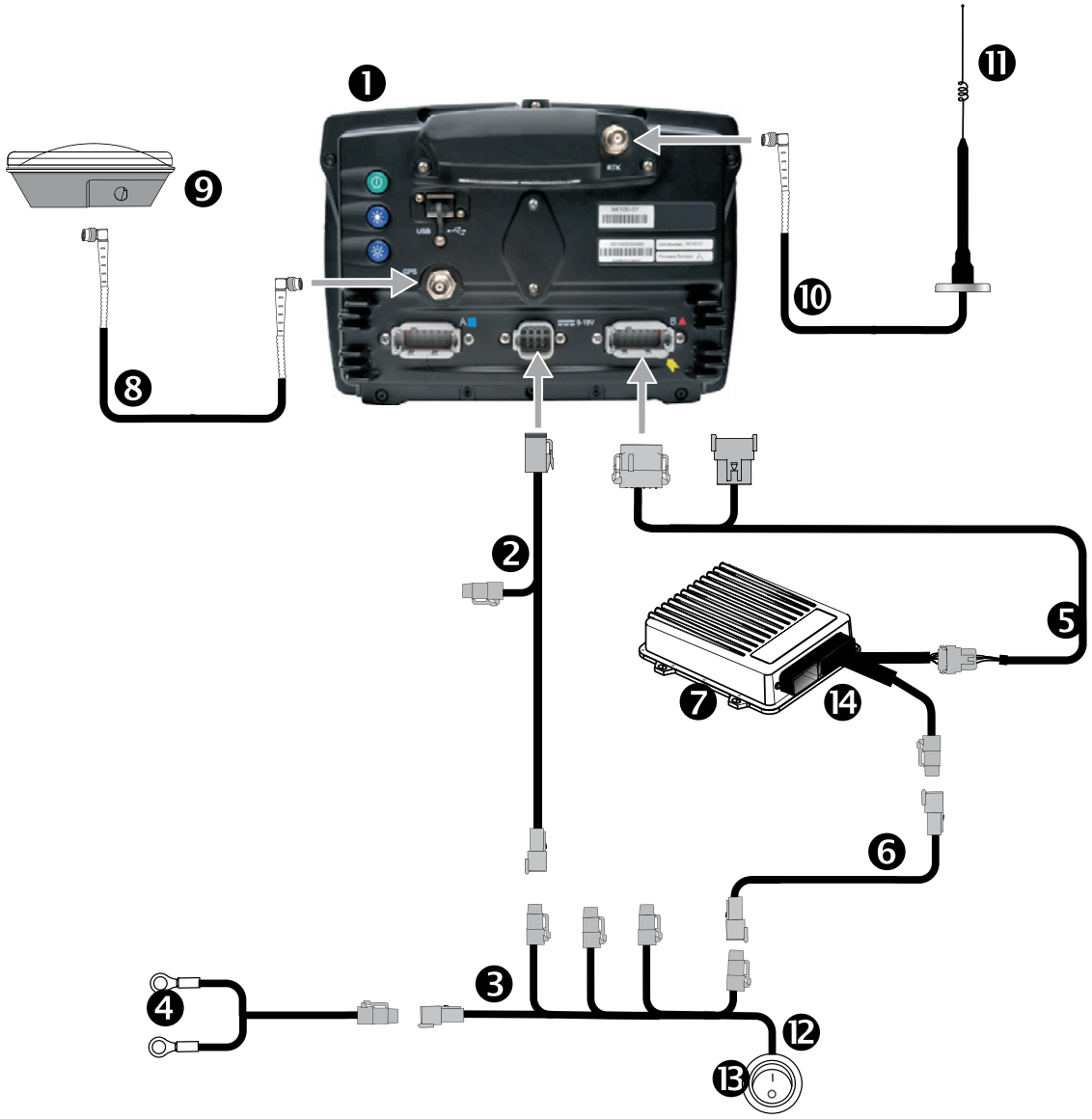
FmX integrated display components



CAUTION – Connecting the Port Replicator on the FmX display to the 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 GPS TNC/TNC RT angle cable	50449
❾	AG25 GNSS antenna	77038-00
❿	NMO to TNC 20 ft 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
❸	CFX-750 power cable with relay and switch (power bus)	67259

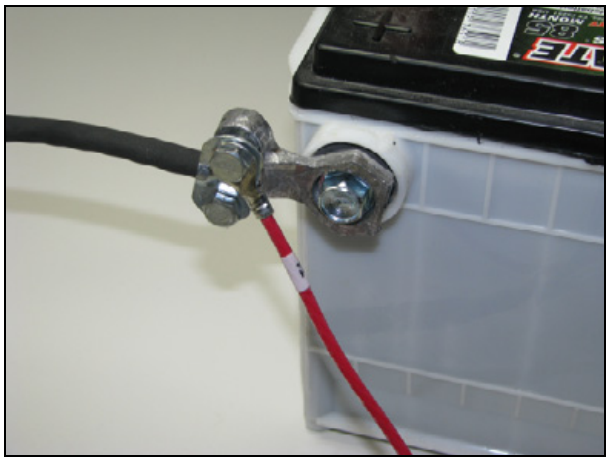
Item	Description	Trimble part number
❹	Basic power cable	67258
❺	CFX-750 to NavController II cable with port replicator	75741
❻	2 pin DTM to 2 pin DT power adaptor	67095
❼	NavController II	55563-00
❽	8 m GPS TNC/TNC RT angle cable	50449
❾	AG25 GNSS antenna	77038-00
❿	NMO to TNC 20ft antenna cable and 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

Installing the power harness for the display

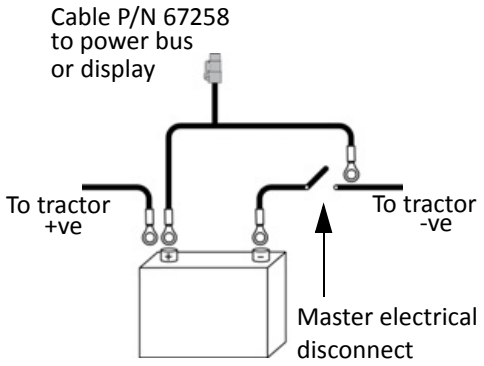
WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information chapter.

Step 1

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

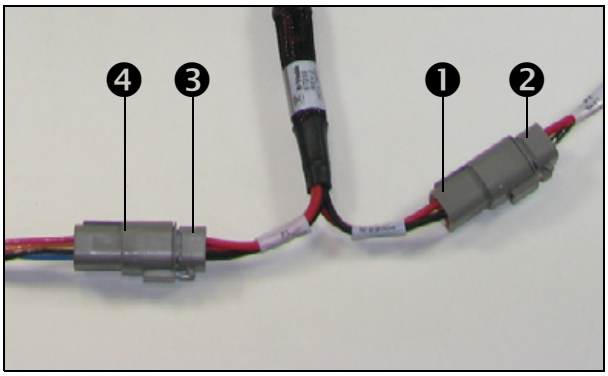


CAUTION – If the vehicle has a master electrical disconnect, make sure that the basic power cable (P/N 67258), is not directly attached to the battery terminal that is disconnected by the master switch - the negative pole in this example.
Attach this terminal side just past the main disconnect so that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



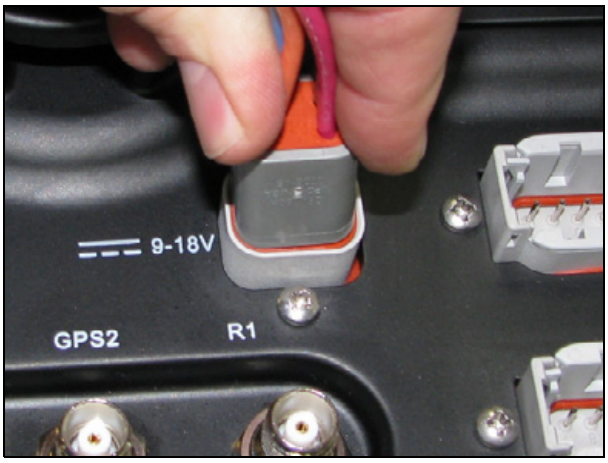
Step 2

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 display



CFX-750 display

Configuring the power bus options for the display

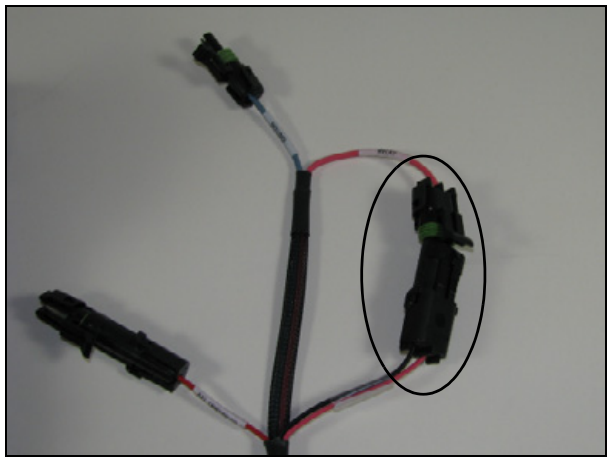
WARNING – To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information chapter.

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.

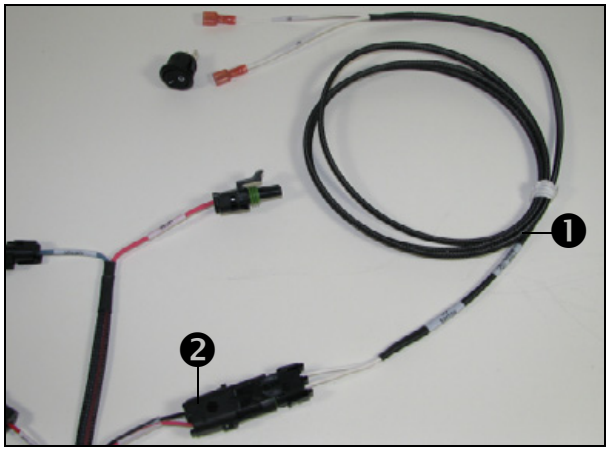


External switch is used to turn on the Autopilot system

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.

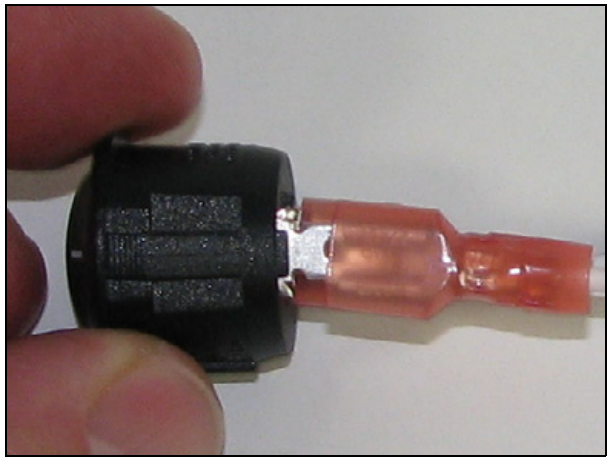
Note – *To install the switch provided, drill a ¾" hole.*



Step 2

Connect the cable labeled R7 to the switch pins.

Note – *Polarity is not important.*

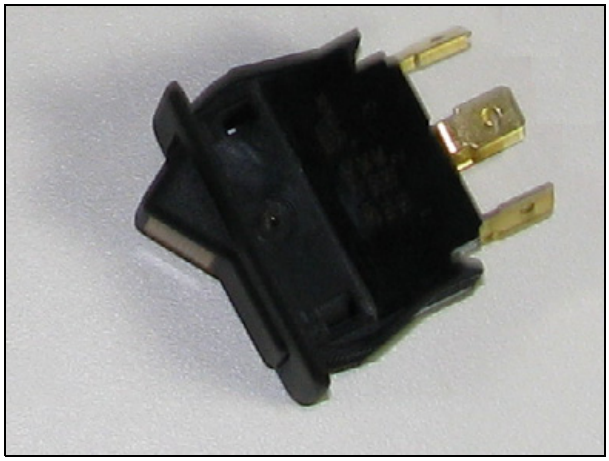


Installing the optional illuminated full or standard Euro switch

Step 1

Find an available knockout location on the vehicle console.

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

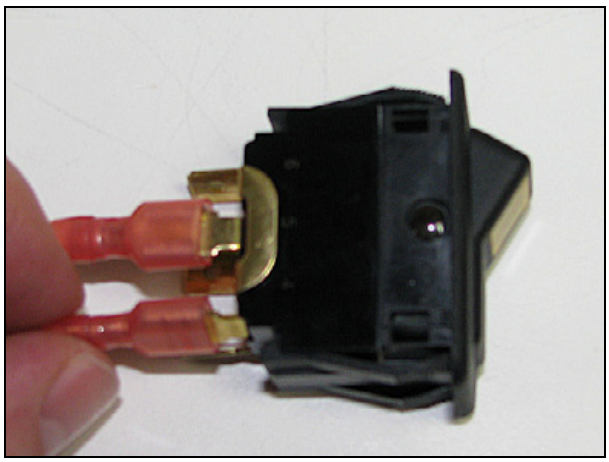


Step 2

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.

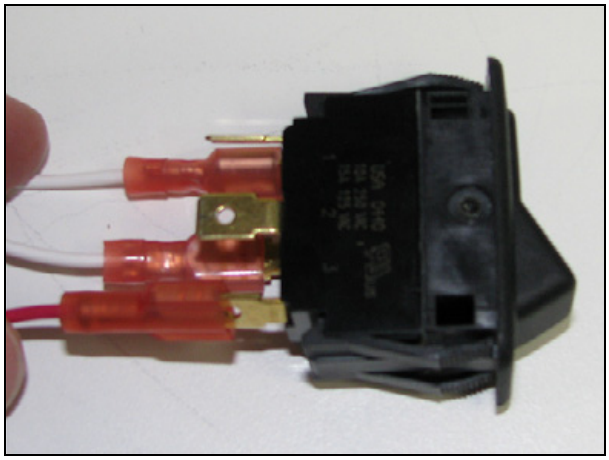
Note – *Polarity* ***is*** *important.*



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.*

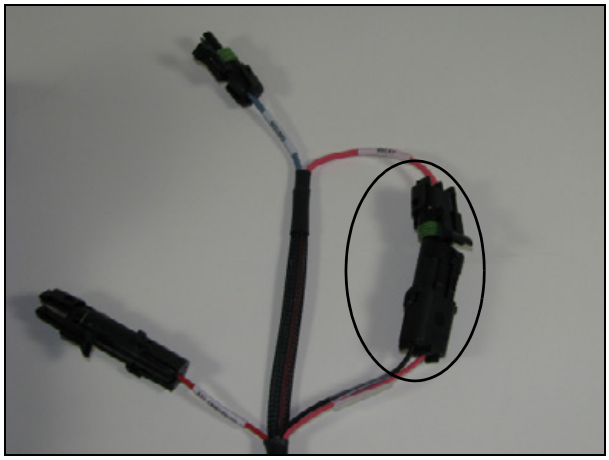


Ignition is used to turn on the Autopilot system

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

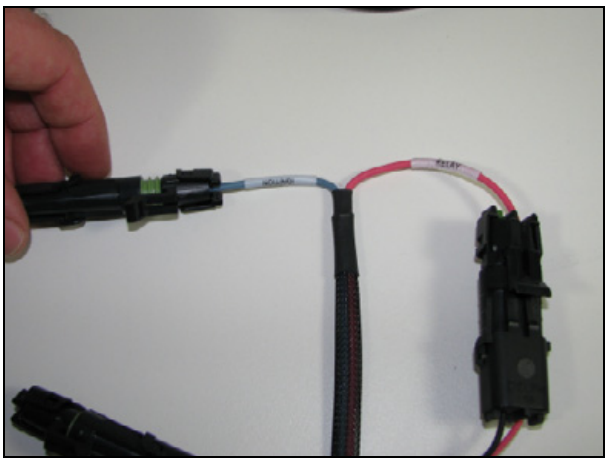
Step 1

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.

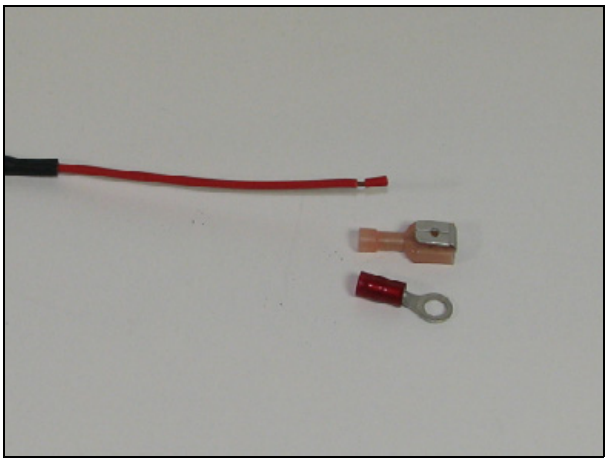


Step 3

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.



CHAPTER

7

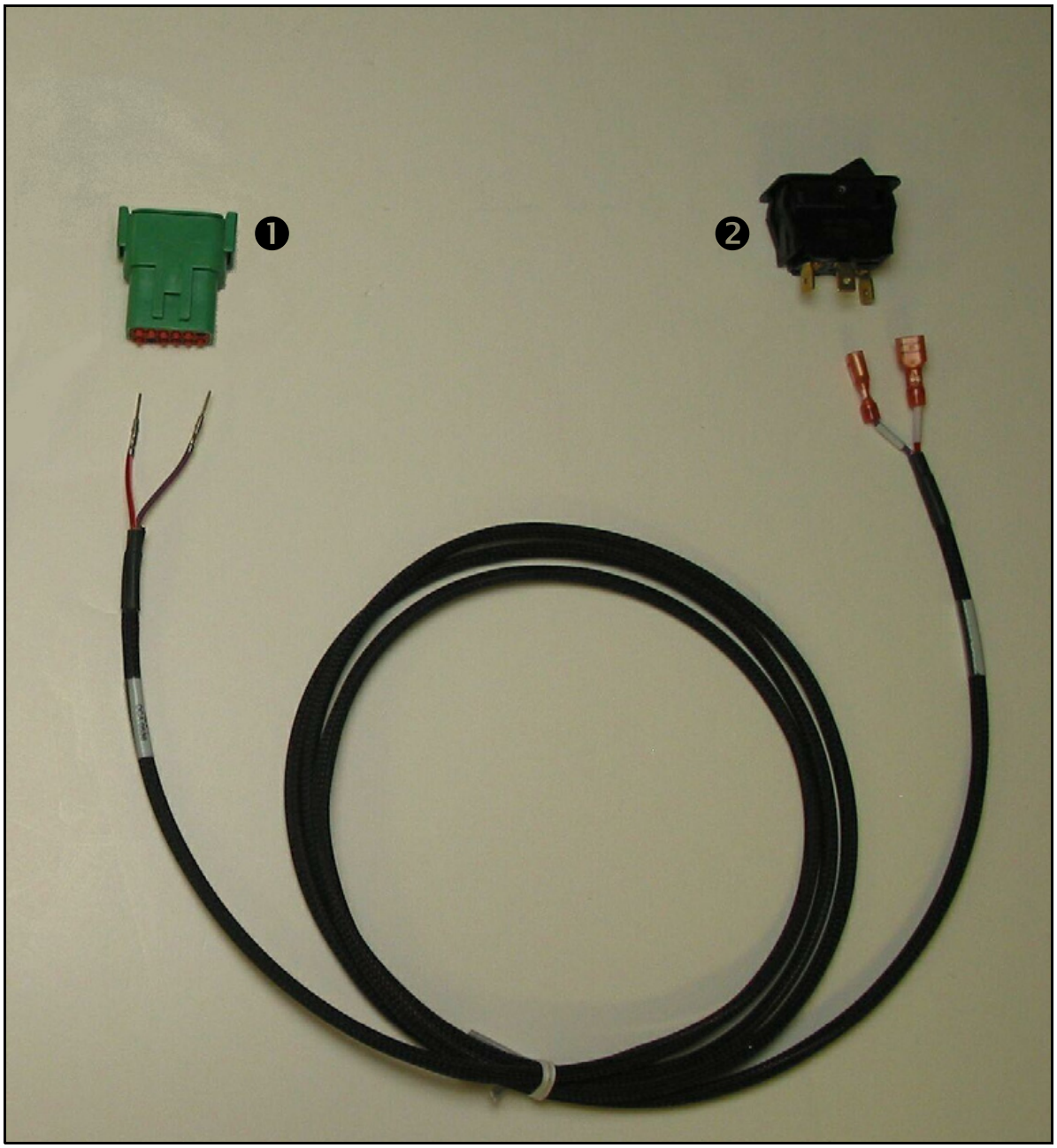
Remote Engage Switch Installation

In this chapter:

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

This chapter describes how to install the remote engage switch.

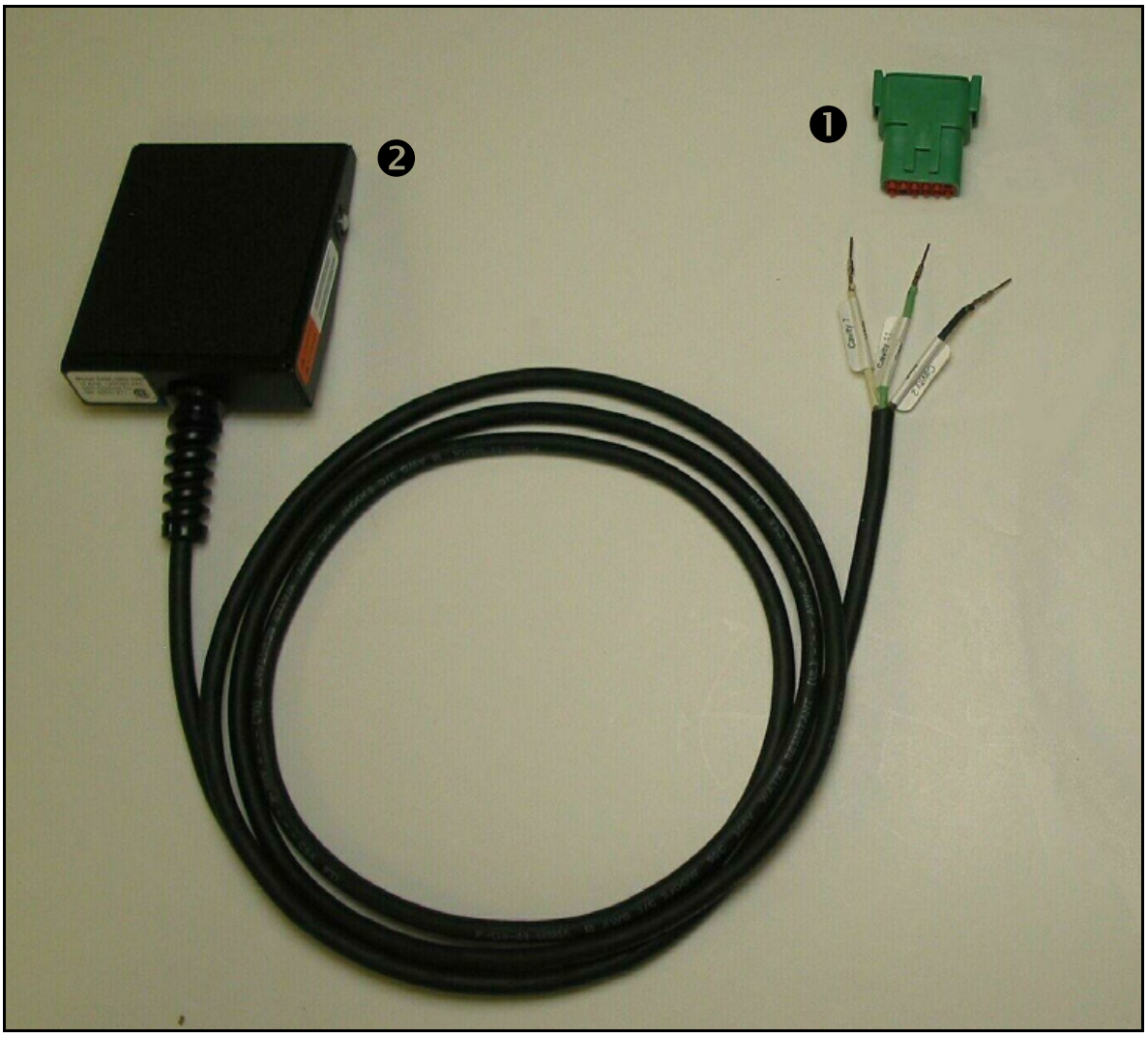
Remote engage switch components: Rocker switch



Item	Description
❶	DTM receptacle
❷	Remote engage rocker switch

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

Remote engage switch components: Foot switch

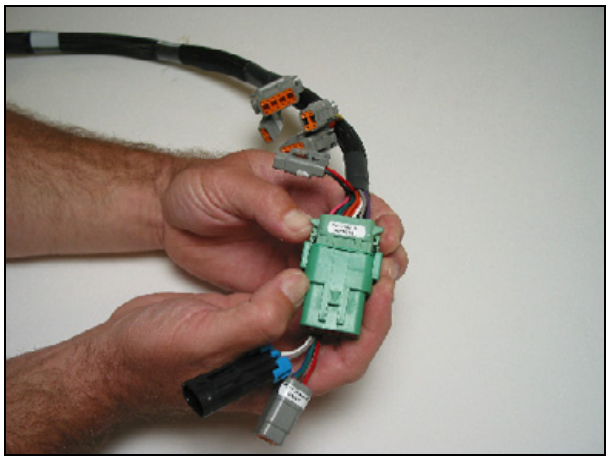


Item	Description
❶	DTM receptacle
❷	Remote engage foot switch

Preparing the remote engage cable

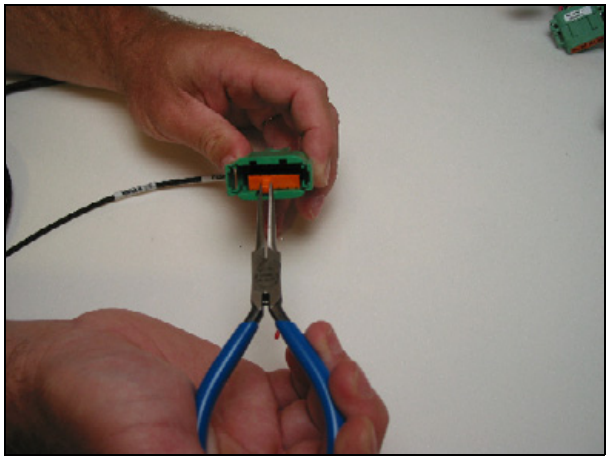
Step 1

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



Step 2

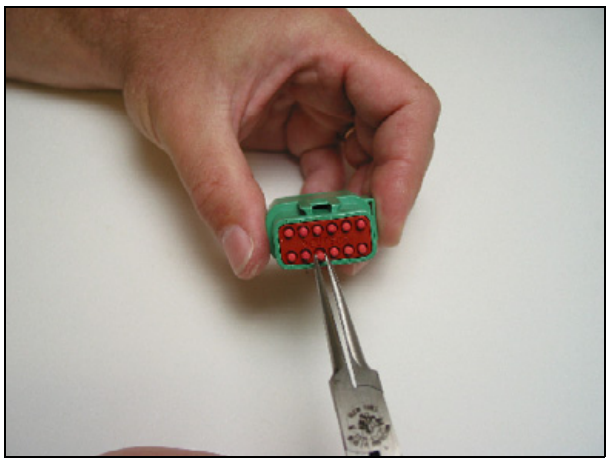
Remove the wedge from the connector.



Step 3

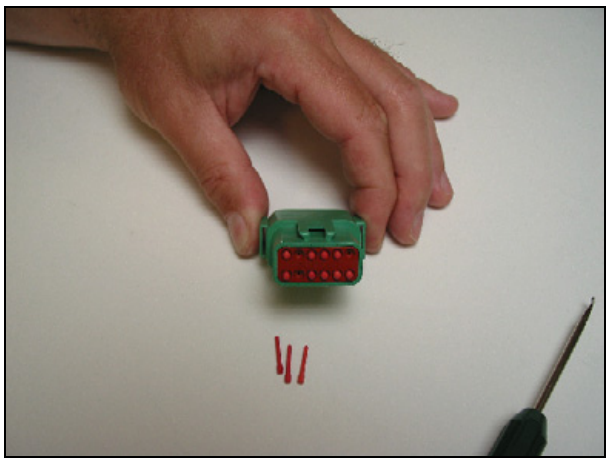
Rocker switch only

Remove the plugs from cavity 2 and cavity 7.



Foot Switch Only

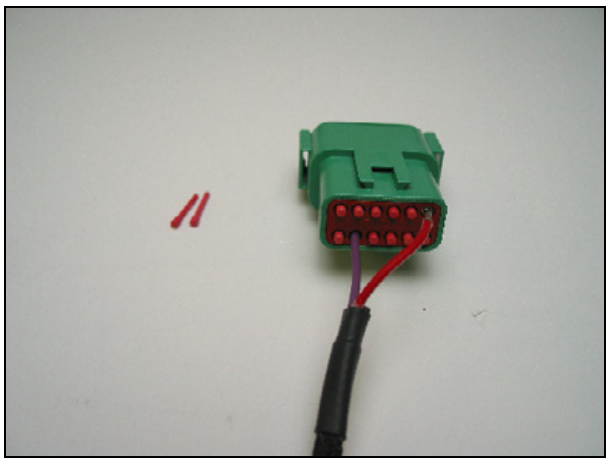
Remove the plugs from cavity 2, cavity 7, and cavity 11.



Step 4

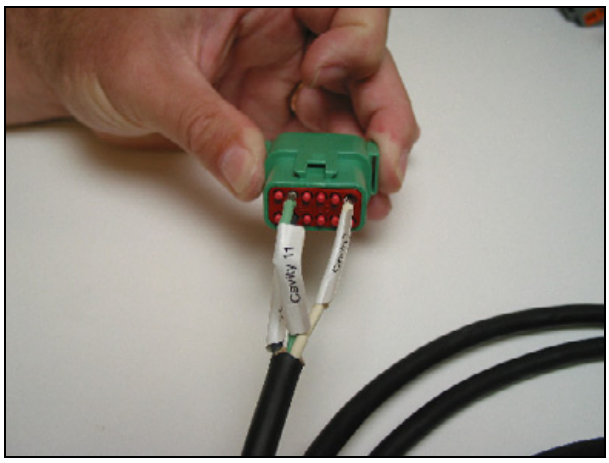
Rocker switch only

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



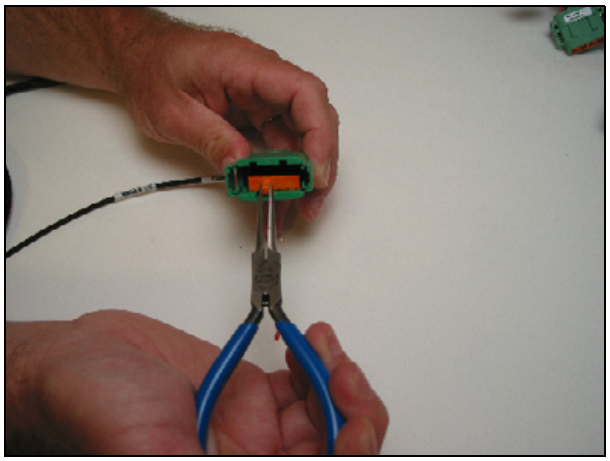
Foot switch only

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



Step 5

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



Step 6

Plug the assembled Deutsch receptacle into the P-5 leg of the Autopilot controller harness. See Chapter 8, Controller Installation.

Step 7

Rocker switch only

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



Foot switch only

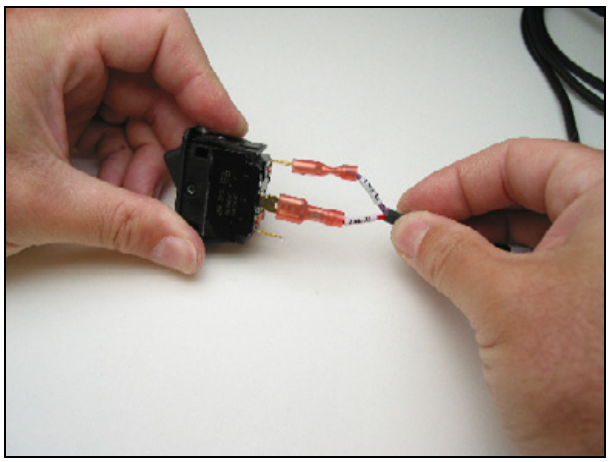
Run the cable to a clear location on the floor board. Use double-sided tape to secure the pedal. Route the cable under the floor mat.



Step 8

Rocker Switch Only

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



Step 9

Rocker Switch Only

Place the switch in the console.



Using the remote engage switch

To engage a system using the NavController II:

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

The system engages when you release the switch.

CHAPTER

8

Controller Installation

In this chapter:

- Installing the controller
- Controller connections

This chapter describes how to install the controller NavControllerII.

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

Remove the bolts from the seat base..



Step 2

Use the provided #10-32 screws to attach the Autopilot controller to the supplied mounting plate P/N 84141.



Step 3

Before you install the controller, attach the main and auxiliary cable harnesses. Use an Allen wrench to secure the connectors to the controller.

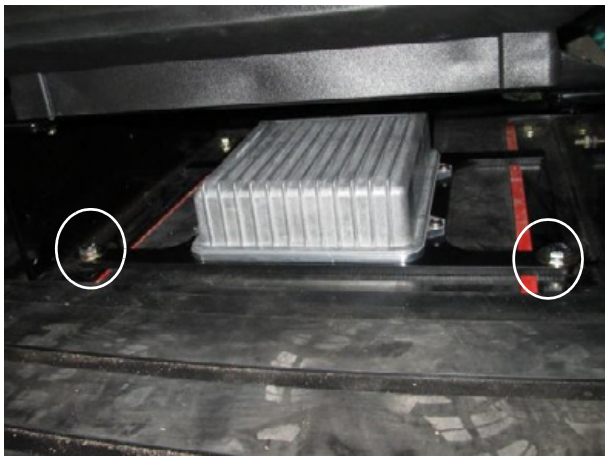




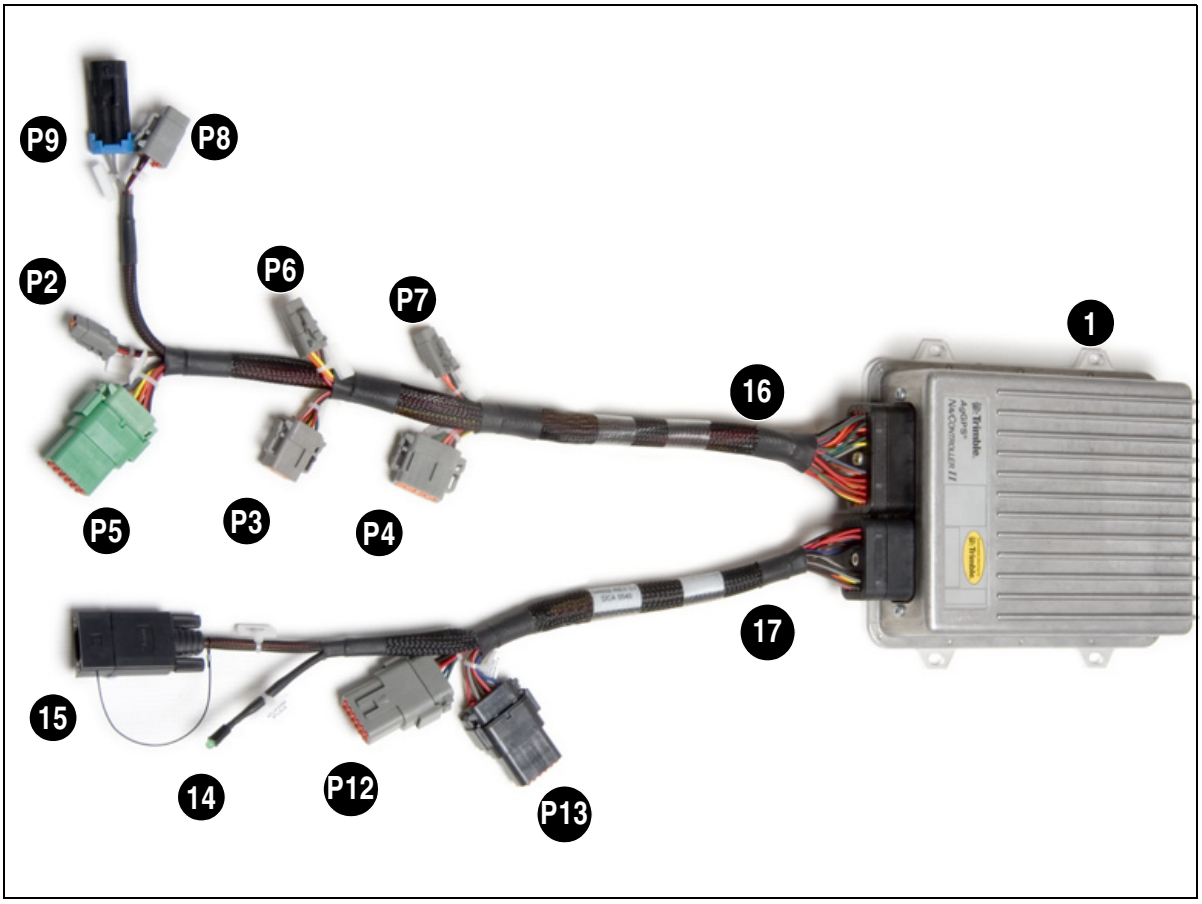
Step 4

Install the plate/controller assembly under the operator's seat.

Use the supplied 3/8" x 1.5" bolts, and reuse the existing flat washers.



Controller connections



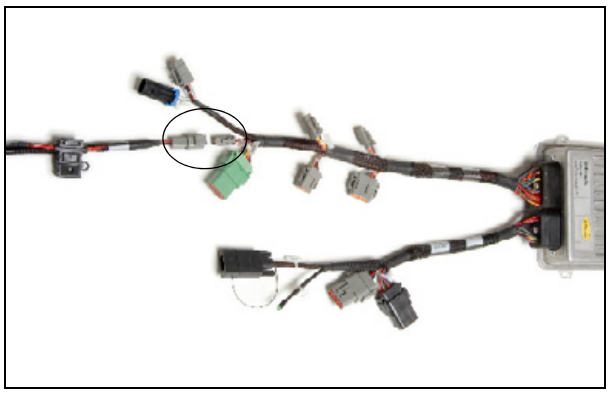
Item	Description
1	NavController II controller
P2	Power connector
P3	GPS connector
P4	Display connector
P5	Vehicle sensors connector
P6	Steering sensor connector
P7	Manual override connector
P8	Hydraulic valve connector

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.

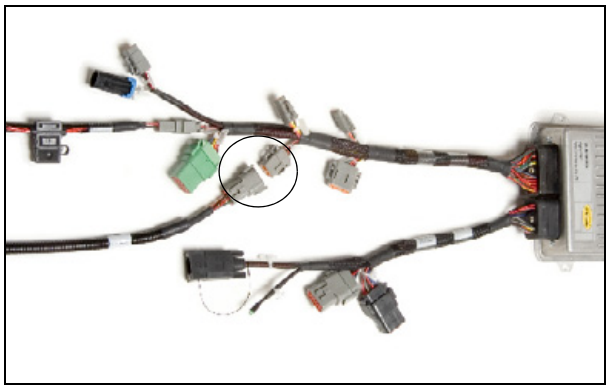
Note – *The power connection supplies power through the controller to all connected devices, including GPS and displays.*



Step 2

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

For CFX-750 and FmX installations, plug in the display cable P/N 75741 here.

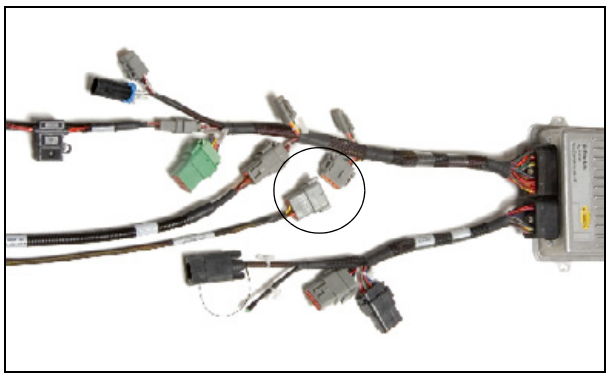


Step 3

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

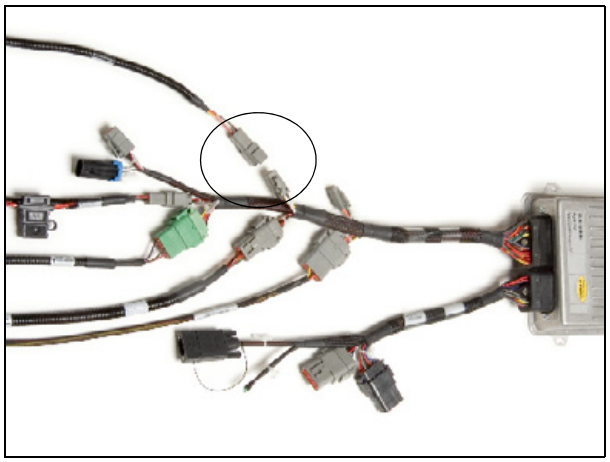
Do not connect the cable to the connector labeled “Spare” on the auxiliary harness.

Do not use this connection for CFX-750 or FmX installations.



Step 4

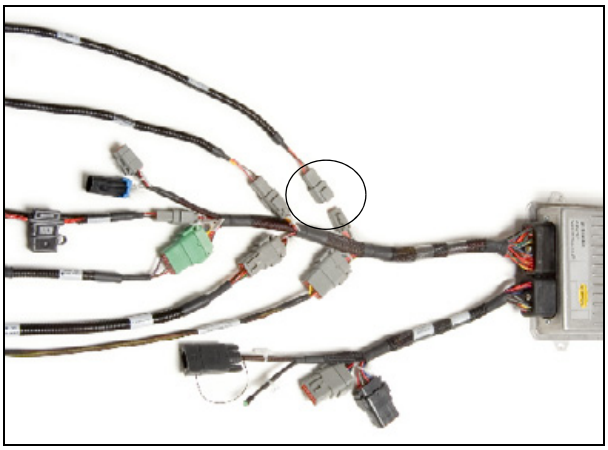
Connect the steering sensor cable connection to P-6, which is labeled “Steering Sensor”. P-6 is located on the main wiring harness.



Step 5

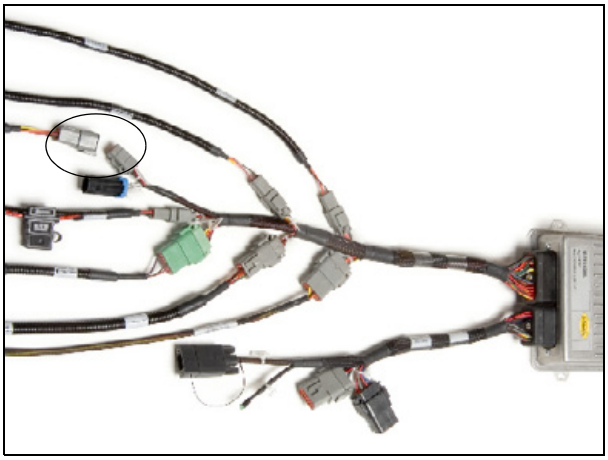
Connect the manual override cable connection to P-7, which is labeled “Manual Override”. P-7 is located on the main wiring harness.

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



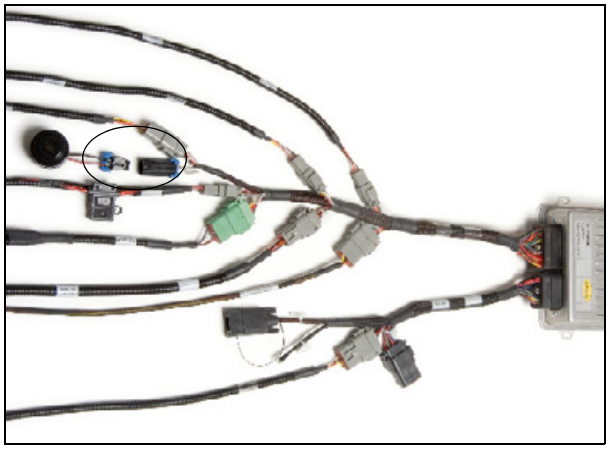
Step 6

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



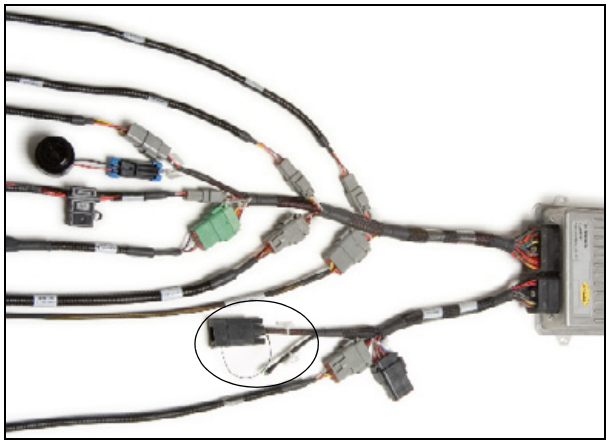
Step 7

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

9

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 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 VDB file into the NavControllerII for the machine model being used.

   You can download the latest set of configuration files from http://www.agpartners.trimble.com.

   You can use Autopilot Toolbox II software version 2.89 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 Toolbox II software version 2.89. 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