# INSTALLATION INSTRUCTIONS

## Trimble® Autopilot™ Automated Steering System

**Farmall**

- **110A**
- **120A**
- **125A**
- **140A**

Version 5.00
Revision C
November 2015
Part number 54035-151-E05-C

Trimble

# Legal Notices

## Agriculture Business Area

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## Product Limited Warranty

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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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c/o Menlo Worldwide Logistics
Meerheide 45
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# Safety Information

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

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

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

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

## Warnings

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

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

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

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

## Cautions

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

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

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

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

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

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



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

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

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CHAPTER 1

# Introduction

**In this chapter:**


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


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

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

## Technical assistance

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

1. Log into http://agpartners.trimble.com.
2. Click the *Feedback* link at the right of the screen. A form appears.
3. Complete the form and then click **Submit Feedback**.

# Manual system upgrade to Autopilot

## CFX-750 display and FmX integrated display

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

# Required components

| Kits required | Special tools |
|---|---|
| Platform kit: P/N 54035-151<br>Hydraulic hose kit: P/N 94578 | Drill<br>$^{5}/_{16}$" drill bit<br>⅜-16 tap<br>2" hole saw |

## Antenna mounting kits

| Kits required |
|---|
| Antenna brackets:<br>• AG 15 antenna mounting plate: P/N 62034<br>• Bracket, GPS - V-base plate indexing: P/N 62388-02 |

## Accessory kits

| Kits required |
|---|
| Remote engage switch assembly – standard Euro: P/N 57227-10<br>Remote engage switch assembly – full Euro: P/N 57227-20<br>Remote engage foot pedal: P/N 57259 |

# Autopilot hardware organization: As shipped

| Hardware | Component | See... |
|---|---|---|
| Platform kit: P/N 54035-151 | Hydraulic valve | Chapter 2 |
| | Hydraulic manifold | |
| | Transducer flow switch | |
| | Manual override cable | |
| | Hydraulic brackets and bolt kits | |
| | Hydraulic valve cable | |
| | Autosense™ steering device and cabling | Chapter 3 |
| | Autosense mounting bracket and hardware | |
| | Power switch | Chapter 6 |
| | Bolt kit controller | Chapter 8 |
| Hydraulic hose kit: P/N 94578 | Hydraulic hoses | Chapter 2 |
| | Hydraulic adaptors | |
| Roof bracket kit:<br>• AG 15 antenna mounting plate: P/N 62034<br>• Bracket, GPS - V-base plate indexing: P/N 62388-02 | Roof brackets | Chapter 4 |
| | Bolt kit, roof bracket | |
| GNSS receiver | GNSS receiver | Chapter 4 |
| | GNSS antenna | |
| | GNSS receiver power/data cable | |
| | RTK radio, cable, and radio antenna | |
| Display | CFX-750 display | Chapter 5 |
| | FmX integrated display | |
| | Display cable | |
| | Mounting bracket | |
| Common parts | Controller | Chapter 8 |
| | Controller mounting bracket | |
| | Cable kit:<br>Main wiring harness<br>Power bus auxiliary wiring harness<br>Sonalert alarm | |

# Preparing the vehicle for installation

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

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

CHAPTER 2

# Hydraulic Control Valve Installation

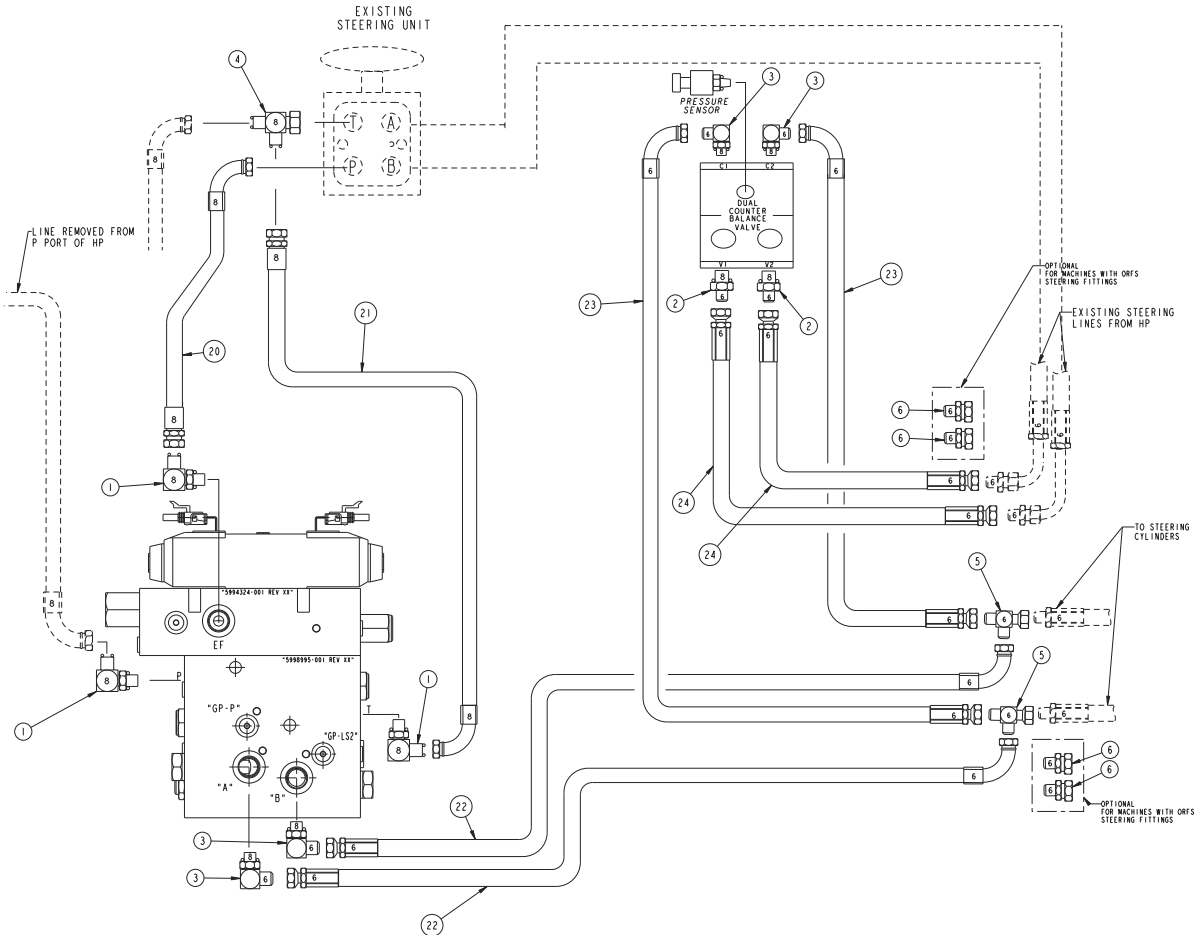
**In this chapter:**


- Hydraulic system components
- Hydraulic system components: South American machine configuration
- Assembling the hydraulic control valve
- Preparing the DCBV manifold
- Mounting the hydraulic manifold
- Connecting the hydraulic lines
- Connections on the Autopilot manifold
- Connections on the DCBV manifold
- Cable connections on the manifold
- Checking the hydraulics


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

# Hydraulic system components

***Note –*** *On this diagram, "HP" refers to steering orbital.*



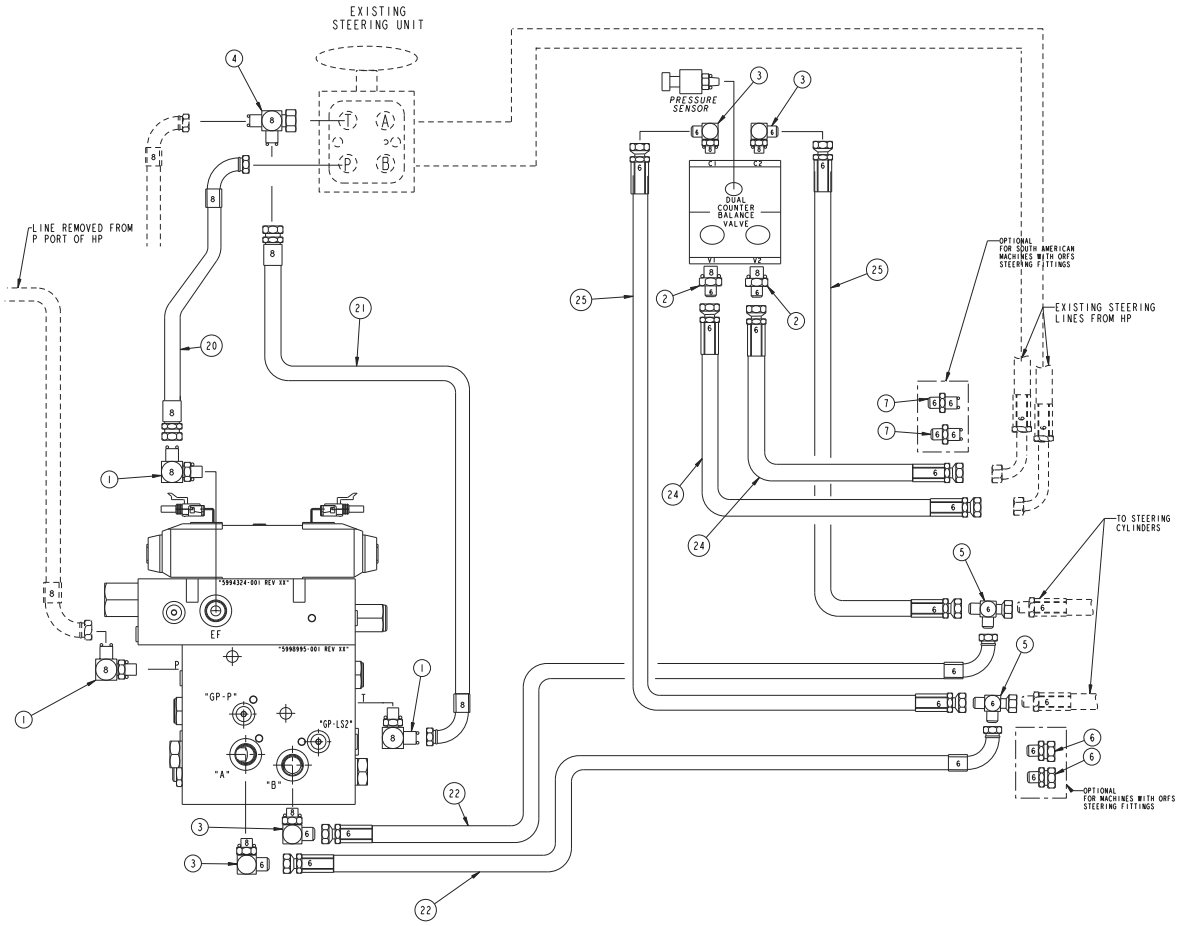

| | Hoses (part number, length, and quantity) |
|---|---|
| **20** | F45ITCJSJ9 -08-08-08-42" (x1) |
| **21** | F45ITCJSJ9 -08-08-08-46" (x1) |
| **22** | F45ITC0639-06-06-06-84" (x2) |
| **23** | F45ITC0639-06-06-06-28" (x2) |
| **24** | F45ITC0606-06-06-06-35" (x2) |

| | Hydraulic adapters (part number and quantity) |
|---|---|
| **1** | 8 C50L0 (x3) |
| **2** | 6-8 F50X (x2) |
| **3** | 6-8 C50X (x4) |
| **4** | 8 R6L0 (x1) |
| **5** | 6 R6X (x2) |
| **6** | 6 XHL6 (x4) |

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

# Hydraulic system components: South American machine configuration

***Note –*** *The diagram is for reference only—items 7 and 25 shown here are not included in the P/N 94578 hose kit. On this diagram, "HP" refers to steering orbital.*




| | Hoses (part number, length, and quantity) |
|---|---|
| **20** | F45ITCJSJ9 -08-08-08-42" (x1) |
| **21** | F45ITCJSJ9 -08-08-08-46" (x1) |
| **22** | F45ITC0639-06-06-06-84" (x2) |
| **23** | F45ITC0639-06-06-06-28" (x2) |
| **24** | F45ITC0606-06-06-06-35" (x2) |
| **25** | F45ITC0606-06-06-06-32'' (x2) |

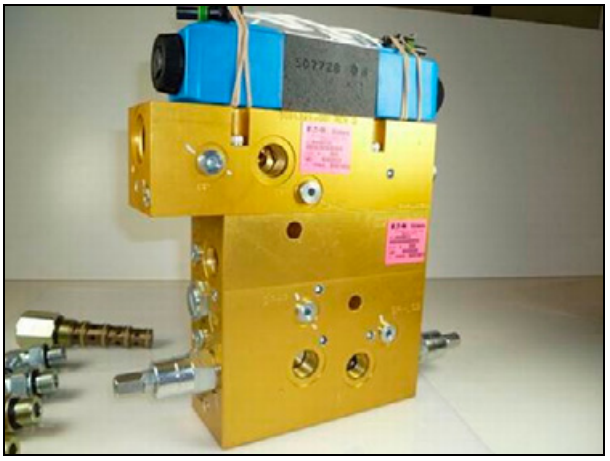
| | Hydraulic adapters (part number and quantity) |
|---|---|
| **1** | 8 C50L0 (x3) |
| **2** | 6-8 F50X (x2) |
| **3** | 6-8 C50X (x4) |
| **4** | 8 R6L0 (x1) |
| **5** | 6 R6X (x2) |
| **6** | 6 XHL6 (x4) |
| **7** | 6 XHL6 (x2) |

# Assembling the hydraulic control valve

### Step 1

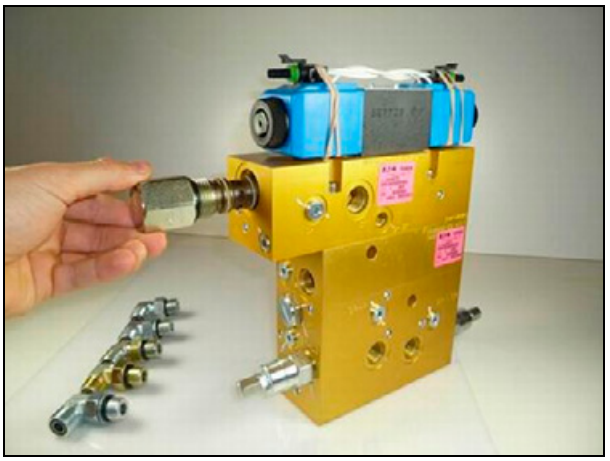
On a clean work surface gather the Autopilot manifold and fittings.

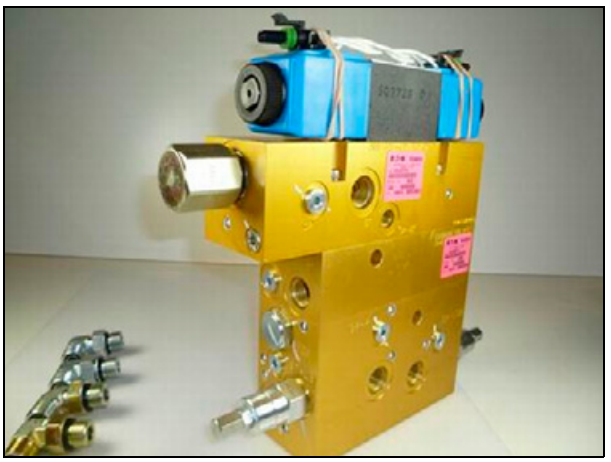
Remove the plastic plugs from the A, B, P, T, EF, and PFRD ports.



### Step 2

Assemble the provided PFRD cartridge into the PFRD port of the Autopilot manifold.

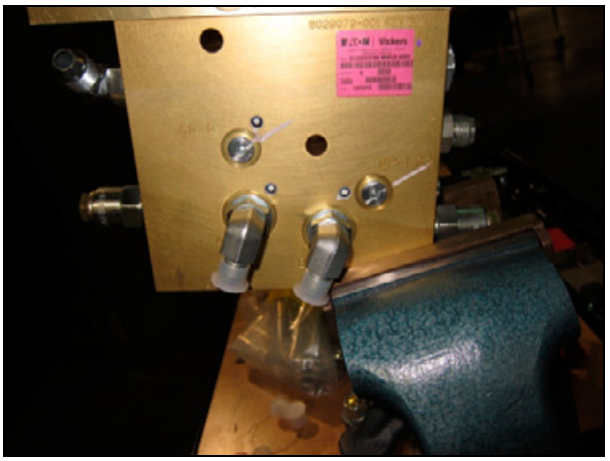




### Step 3

Assemble the provided -6 JIC 90° fittings into the A and B ports of the Autopilot manifold.

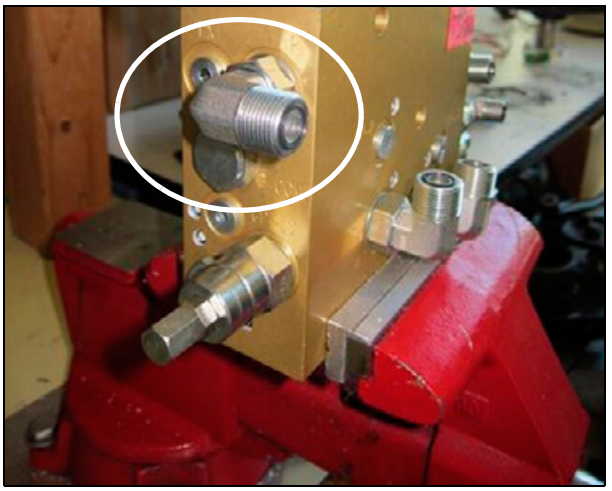
Orientate the fittings so that the lines will run towards the P side of the manifold.



### Step 4

Assemble the provided 8 ORFS 90° fitting into the P port of the Autopilot manifold.

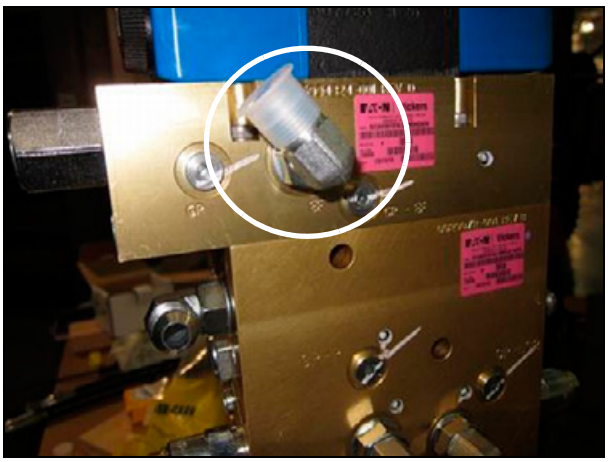
You can set the orientation later when the pressure line is connected.



### Step 5

Assemble the provided 8 ORFS 90° fitting into the EF port of the Autopilot manifold.

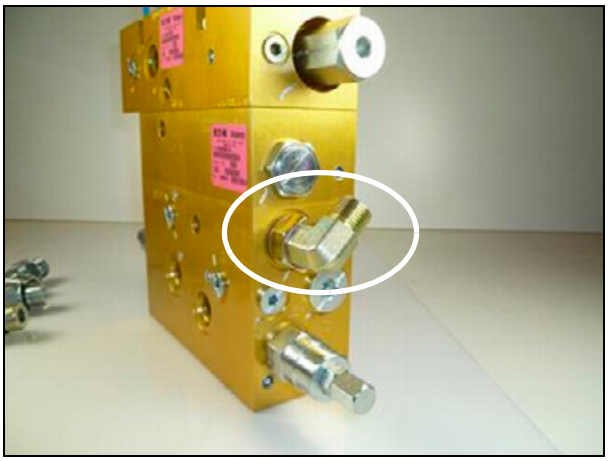
Orientate the fitting so that the line will run towards the P side of the manifold.



### Step 6

Assemble the provided 8 ORFS 90° fitting into the T port

Initially orient the fitting so that it points toward the A and B side of the manifold. You will set the final orientation later when the T line is connected.



# Preparing the DCBV manifold

### Step 1

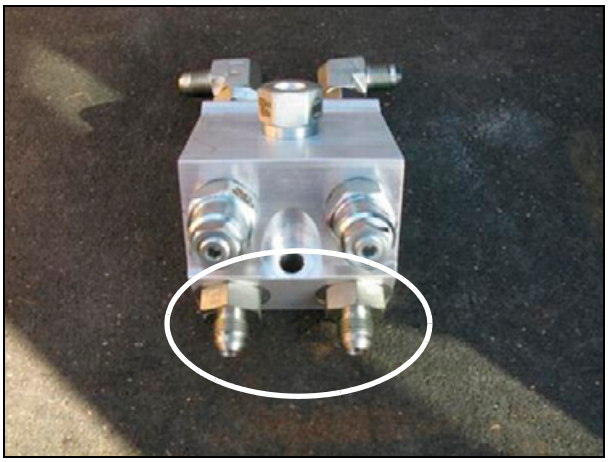
Assemble the two provided JIC 90° fittings into the C1 and C2 ports.

Orient the fittings so they face out as shown.



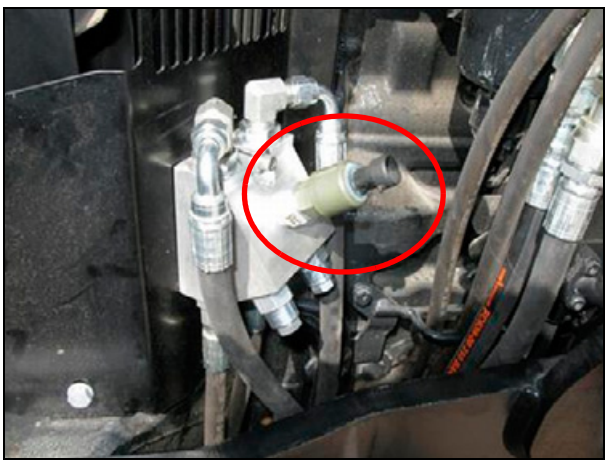
### Step 2

Assemble the two provided -6 JIC fittings into the V1 and V2 ports.



### Step 3

Assemble the provided manual override pressure transducer on the DCBV in the port shown.



# Mounting the hydraulic manifold

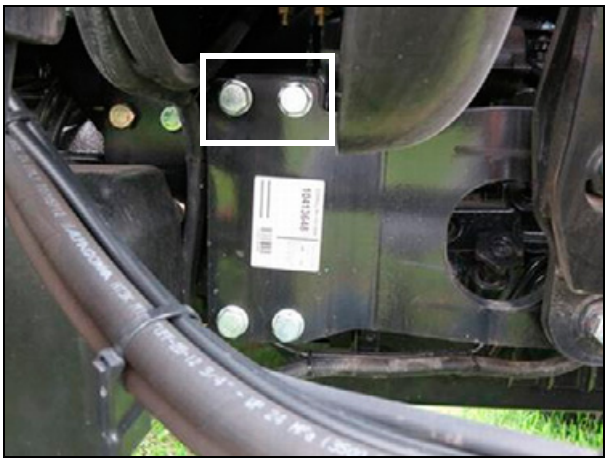
### Step 1

Install the Autopilot manifold just under the cab of the machine, near the right-side stairs.



### Step 2

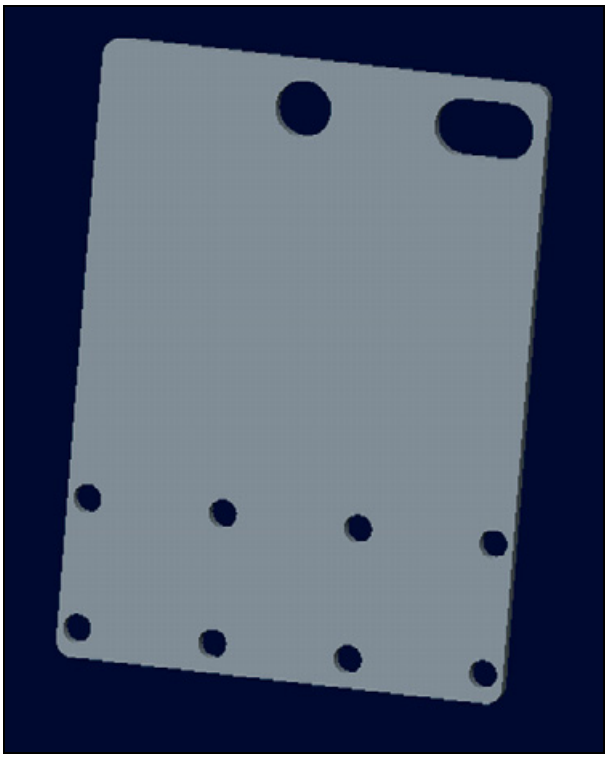
To install the Autopilot manifold, removed the two bolts at the top of the space.



### Step 3

Temporarily mount the Autopilot manifold bracket to the machine to determine which bolts will work best for mounting it.

Once the mounting holes are determined, bolt the manifold to the mounting plate using the provided ⅜" hardware.



### Step 4

Attach the Autopilot manifold and mounting plate to the machine with the provided M20 bolts and spacers.

***Note –*** *For machines with loader arms, bolts may need to be purchased separately.*





### Step 5

Install the DCBV manifold on the side of the machine, on the fan shroud in the location shown



### Step 6

Use the DCBV manifold as a template to mark two hole locations.

Drill two 5⁄16" holes to clear the ¼" mounting hardware.



### Step 7

Use the two provided ¼" bolts and hardware to attach the DCBV manifold to the machine.



# Connecting the hydraulic lines

## Machine hydraulic connections

### Step 1

With the hood of the machine open, locate the steering orbital.




The pressure and tank lines are on the right side of the machine at the steering orbital.

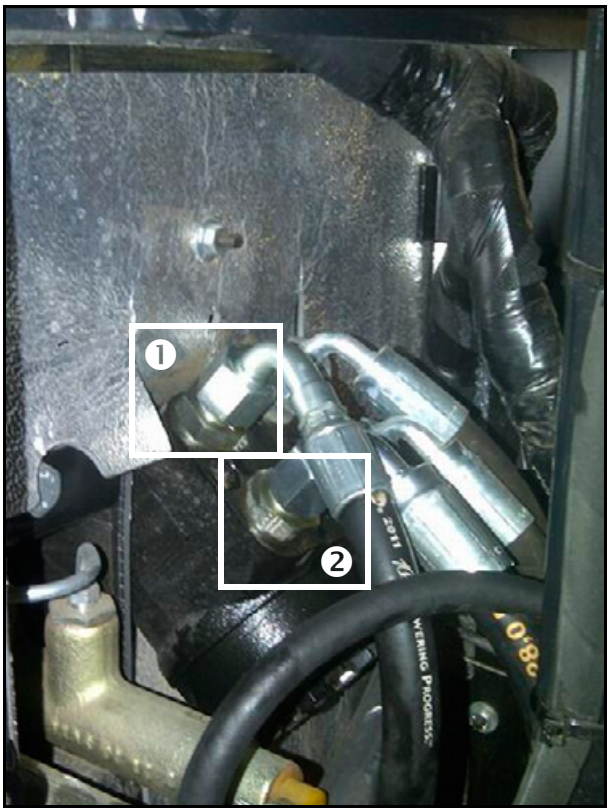


### Step 2

Remove the sheetmetal guard.

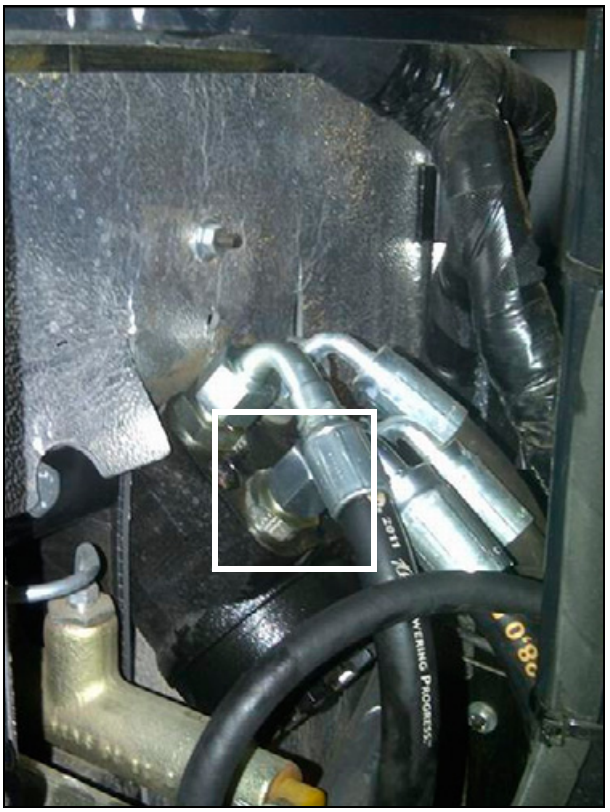
Label the top line ***Tank*** ❶ and the bottom line ***Pressure*** ❷.

Once you have labelled the lines, remove the P line and route it to the P port on the Autopilot manifold.




### Step 3

Connect the 90° end of the EF line to the steering orbital P port, then route the other end of the line to the EF port on the Autopilot manifold.



### Step 4

Route the P line removed In the previous step to the P port on the Autopilot manifold.

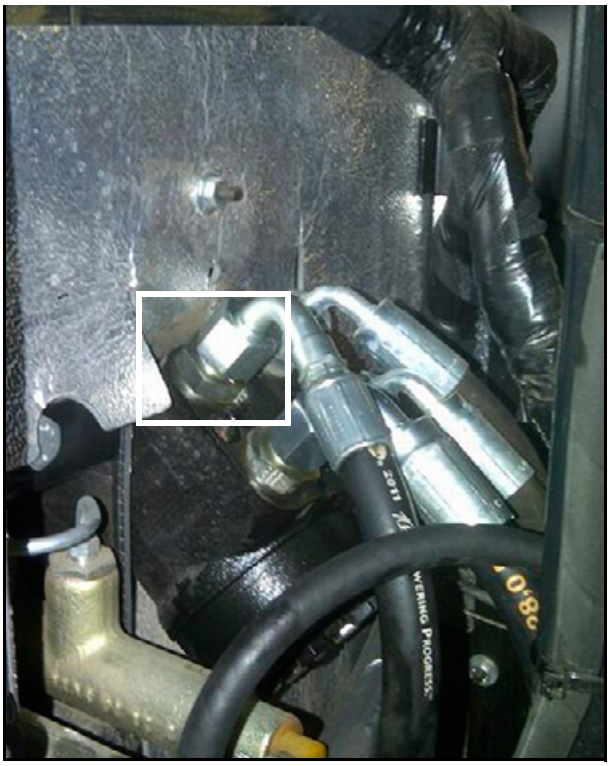


You can connect the Tank line in one of two ways:

### T-line connection, option 1

a. Remove the T line from the steering orbital, install the provided run tee fitting onto the steering orbital and then connect the existing line to the end of the run tee fitting.

b. Connect the Autopilot T hose to the branch of the run tee fitting and route the line to the T port on the Autopilot manifold.



### T-line connection, option 2

a. On some machines, the tank line from the steering orbital connects to the back of the filter element (as shown here). On these machines the tank line can be installed at this location.

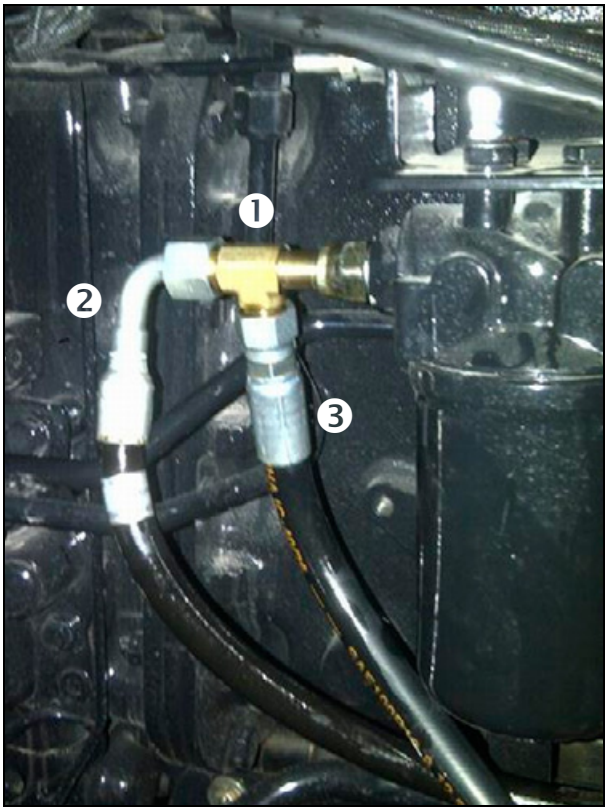


b. Locate and disconnect the tank line hose.



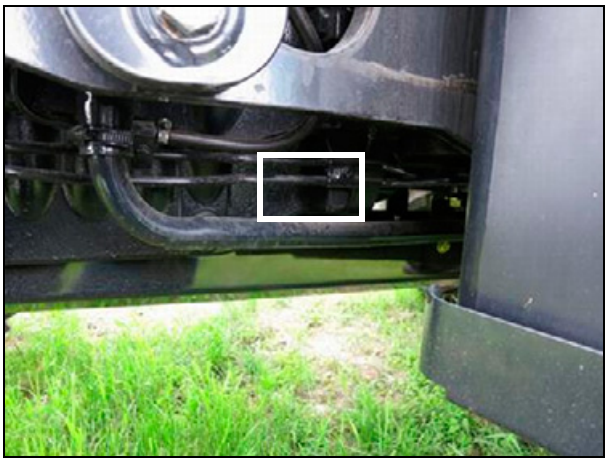
c. Install the provided Run tee fitting ❶ onto the filter housing, then re-attach the existing T-line ❷ to the end of the run tee fitting.

d. Connect the Autopilot T-line ❸ to the branch of the run tee fitting as shown.



### Step 5

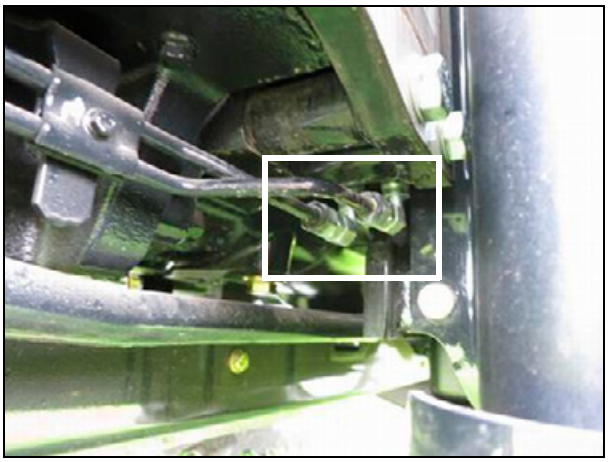
On the left side of the machine, under the left side frame rail near the engine, locate the left and right hard steering lines.



### Step 6

You will remove the two hard lines and replace them with the hoses provided in the hose kit.

Remove the clips that hold the hard lines to the machine and then remove the hard lines by disconnecting them at the location shown here and at the front of the machine near the front axle.



### Step 7

Once you have removed the hard lines, label the existing hoses and connect the straight ends of the V1 and V2 hoses to the soft lines that were attached to the machine hard lines.

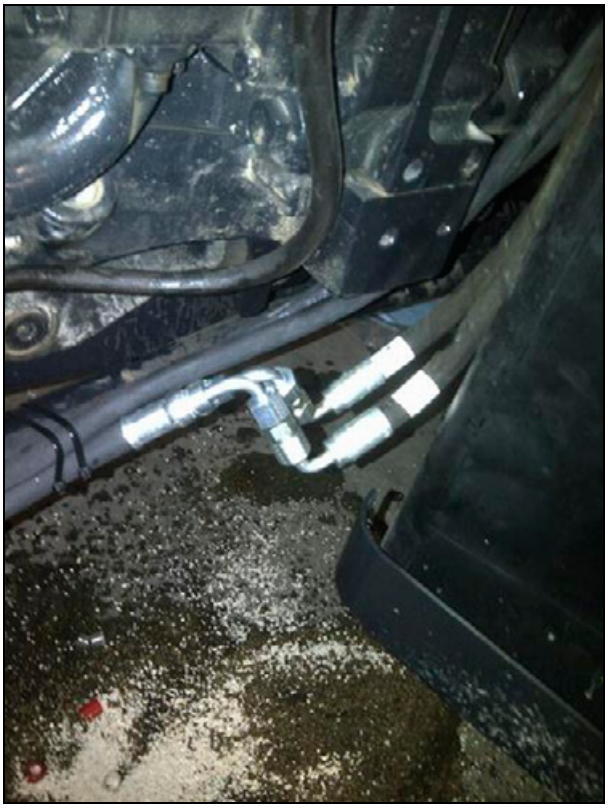
The connection is shown with a 90° hose end on the V1 and V2 lines. However, Trimble recommends that you connect the straight ends of the V1 ands V2 lines here.

Route the lines to the V1 and V2 ports of the DCBV.

Some machines require optional ORFS / JIC adapter fittings.

***Note –*** *South American machines may require a male-to-male ORFS / JIC adapter (see* *Hydraulic system components: South American machine configuration, page 14**). This item is not provided in the hydraulic hose kit.*

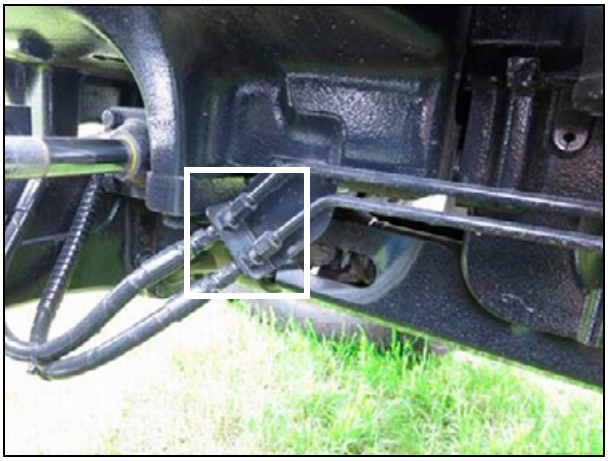
The front end of the hard lines that were removed previously is shown here.





### Step 8

If not done previously, remove the hard lines at the connection shown here.



### Step 9

Install the provided run tee fittings on the machine as shown here.

Attach the C1 and C2 straight hose ends to the end of the run tee fittings. Route the lines to the C1 and C2 ports of the DCBV.

***Note –*** *C1 and C2 hoses are item 23. South American machines may require the use of item 25 for these hoses. This item is not included in the platform kit. See* *Hydraulic system components: South American machine configuration, page 14**.*

Connect the 90° ends of the A and B lines to the branches of the run tee fittings and route the A and B lines to the Autopilot manifold.

Some machines require optional ORFS / JIC adapter fittings to be installed before installing the Run tee fittings.



# Connections on the Autopilot manifold

### Step 1

Route the P line that you previously removed from the machine steering orbital to the P port on the Autopilot manifold.

Set the orientation of the fitting on the P port and then attach the P line.



### Step 2

Connect the straight end of the EF line to the EF port of the Autopilot manifold.



### Step 3

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

Connect the straight ends of the A and B lines to the A and B ports of the Autopilot manifold.

The connection is shown with 90° fittings. However, Trimble recommends that you connect the straight ends of the A and B lines to the Autopilot manifold.



# Connections on the DCBV manifold

### Step 1

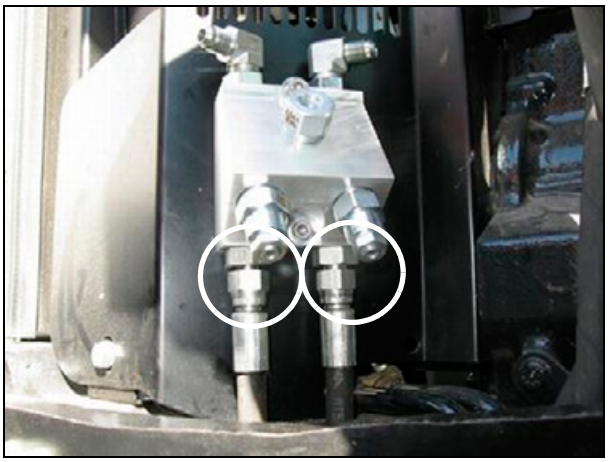
Connect the C1 and C2 hoses to the C1 and C2 ports of the DCBV.

***Note –*** *For South American machines, if hose 25 (not provided) is used, these hoses will have straight ends, not the pictured 90° ends. See* *Hydraulic system components: South American machine configuration, page 14*.



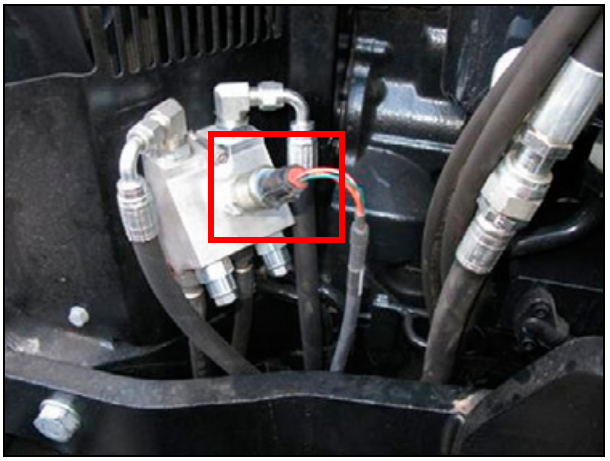
### Step 2

Connect the V1 and V2 hoses to the V1 and V2 ports of the DCBV.



### Step 3

If not already completed, install the pressure transducer into the port on the DCBV shown here.



### Step 4

**CAUTION –** Take care that you route the lines in such a way that they do not come into contact with any hot or moving parts.

You can use zip ties to route lines together and to tie them to the machine.



# Cable connections on the manifold

### Step 1

Connect the valve wiring to the valve as shown here.

Route the other end of the wire to the NavController II harness.



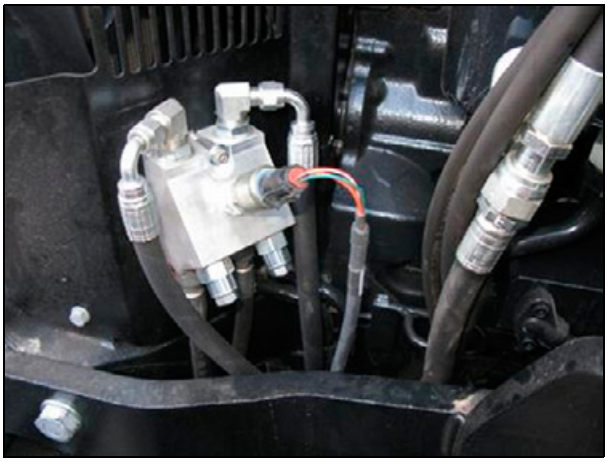
### Step 2

Connect the manual override pressure transducer cable to the pressure transducer on the DCBV manifold.

Route the cable to the NavController II harness.

⚠ **CAUTION –** Take care to ensure that the cable does not come into contact with any hot or moving parts.





# Checking the hydraulics

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

CHAPTER 3

# Autosense Steering Device Installation

**In this chapter:**


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

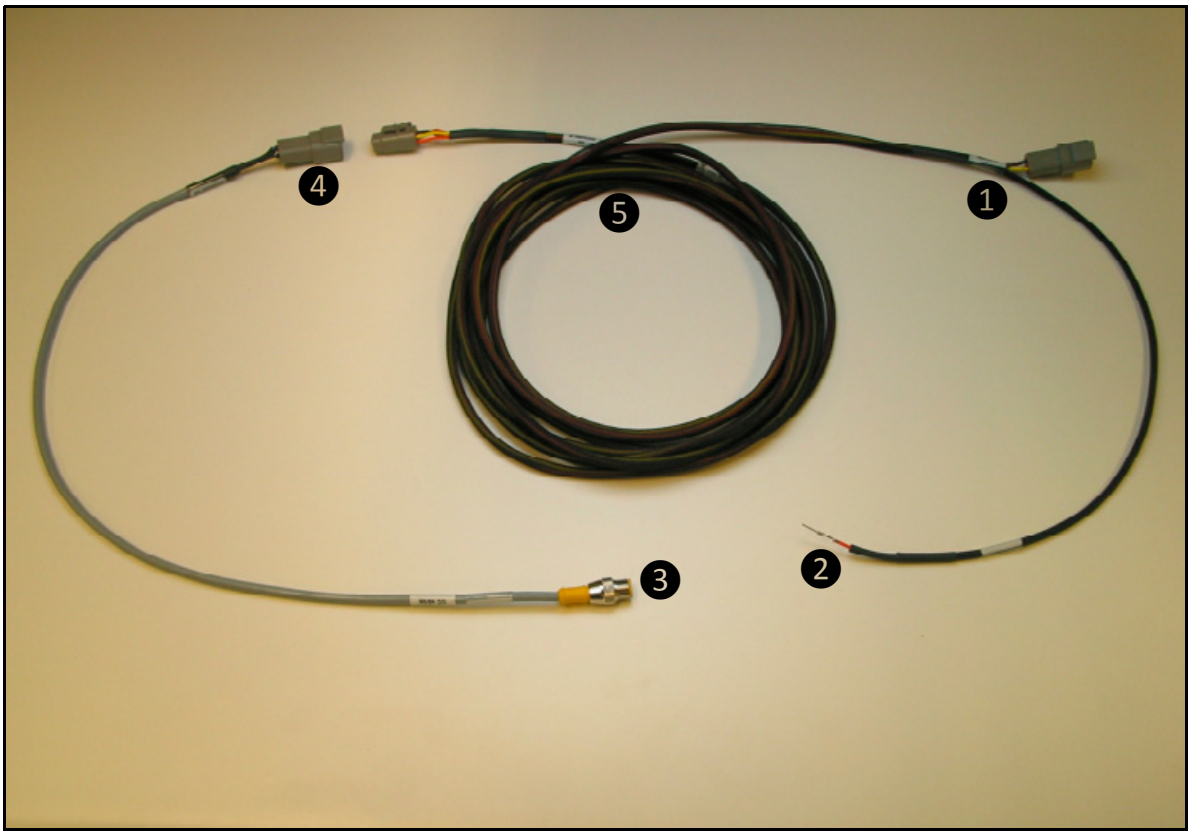

This chapter describes how to install the Autosense™ steering device. If the required mounting location is not accessible, chose a different place. To ensure proper function, the Autosense device must be located where it is free of obstructions and can rotate with the wheels when they turn.

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

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

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

# Autosense steering device components




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

# Installing the Autosense device

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

### Step 1

Locate and remove the forward-most bolts on the spindle bearing cap.



### Step 2

Use the existing bolts to attach the Autosense bracket to the spindle bearing cap and then attach the Autosense using the supplied hardware.



### Step 3

Connect the steering device cable to the Autosense.

**CAUTION –** Take care to ensure the cable does not contact any moving parts.



***Alternative mounting location***

Use the provided bolts and spacers to attach the Autosense bracket to the machine.



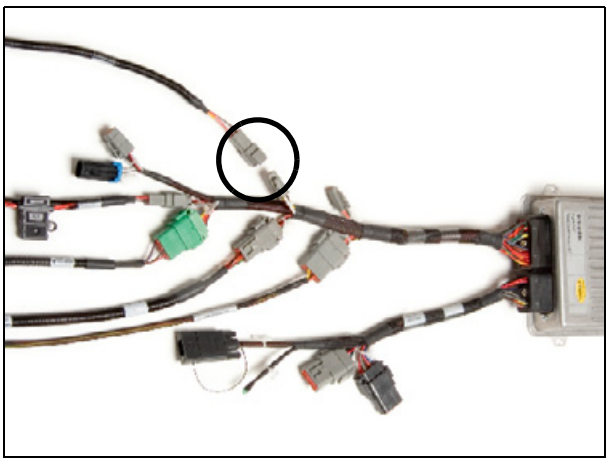
Connect the steering device cable to the Autosense device.



**Step 4**

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

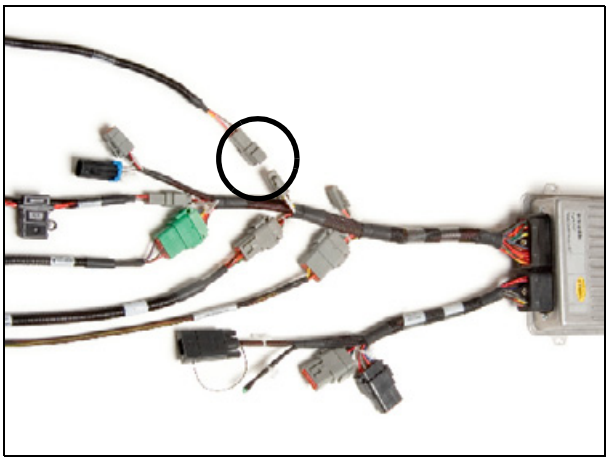
The P6 connector is labeled **Steering Sensor**.



### Step 5

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

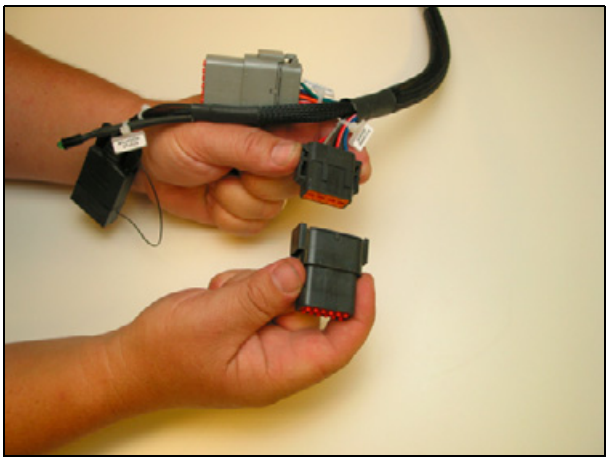
The P6 connector is labeled **Steering Sensor**.



# Preparing the harness: P/N 54602 Rev C

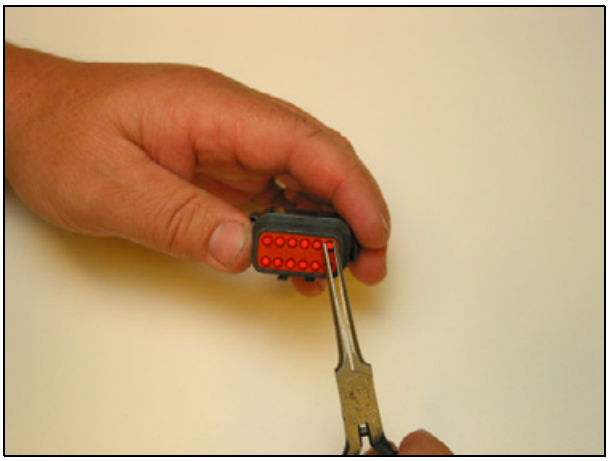
### Step 1

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



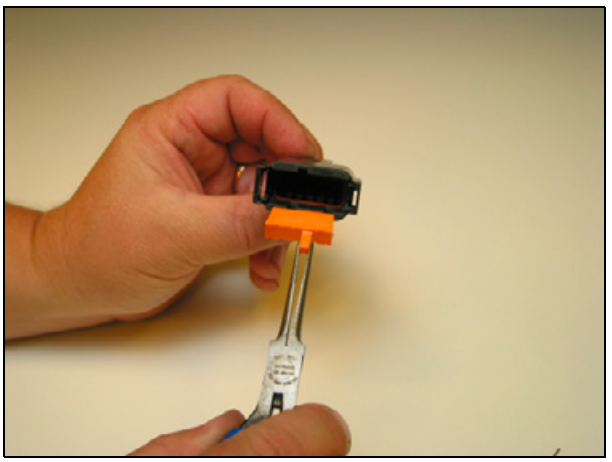
### Step 2

Remove the plug from cavity number 1.



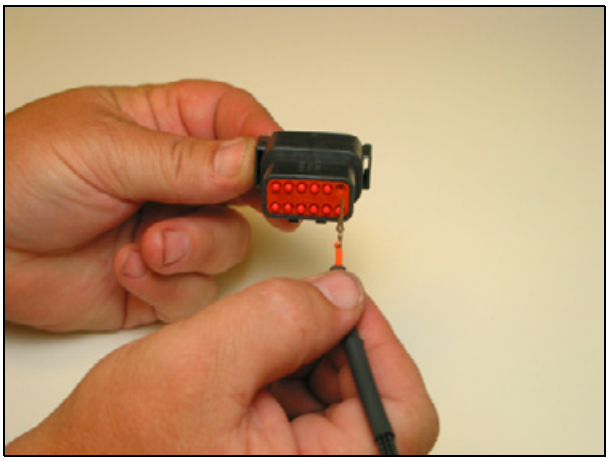
### Step 3

Remove the wedge from the connector.



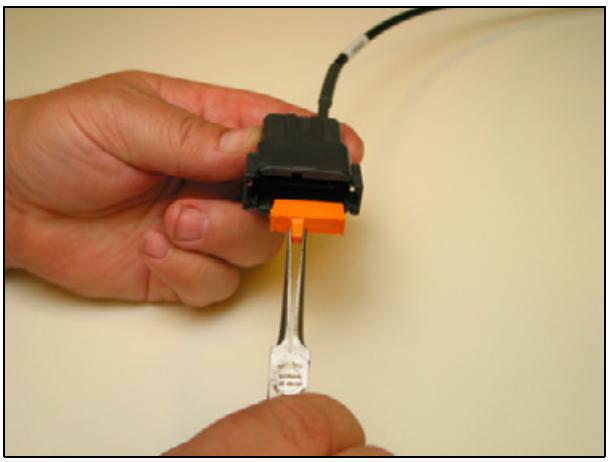
### Step 4

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



### Step 5

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



### Step 6

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

CHAPTER 4

# Antenna/Receiver Installation

**In this chapter:**


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


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

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

# Antenna and receiver installation options

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

- **VHB mount –** Attach a P/N 62034 plate or a V plate directly to the roof with VHB (Very High Bond) adhesive for magnetic mounting. See page 47.
- **Magnetic mounting –** Magnetic mounting for quick release is available for both VHB and spar type mounting.

## Possible mounting methods

| GNSS receiver | VHB mounted plate | VHB V mounted plate |
|---|---|---|
| CFX-750 display; FmX integrated display | ✓ | ✓ |
| AG-372 receiver | ✘ | ✓ |
| *Ag*GPS® 542 receiver | ✓ | ✓ |

***Notes:***

- *For quick release magnetic mounting with an AG-372 receiver, order the kit listed in Antenna mounting kits, page 9 and bolt the V plate to the spar.*
- *With all other antennas, bolt the V plate to the spar for high accuracy and repeatability.*
- *For WAAS, EGNOS, OmniSTAR VBS, Beacon, and DGPS applications, place either of the plates in a firm location using the VHB.*

# Attaching the plate with VHB adhesive

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

Standard P/N 62034 plates are provided in most kits. You can use the VHB mounting method to attach either a P/N 62034 plate or a V plate.

- **RTK, OmniSTAR, DGPS, GLONASS applications** – To use this method for high accuracy, the surface must be rigid and free of “oil panning”. 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 P/N 62034 plate for simplified installation in applications where high accuracy is not critical.

### Step 1

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

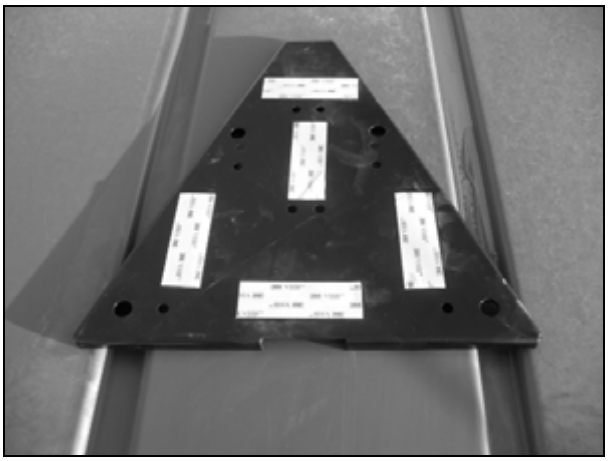


### Step 2

**V plate only**

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

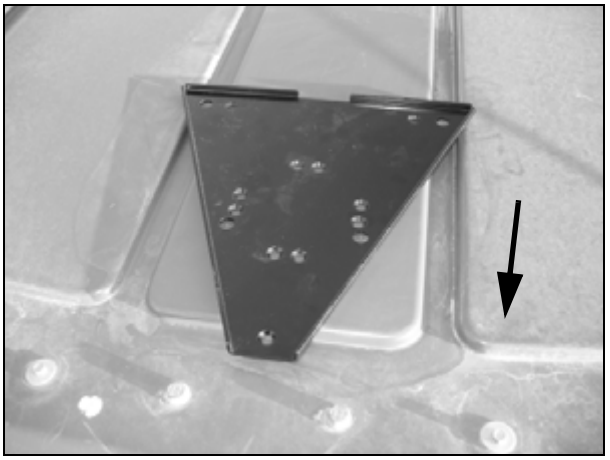
***Note –*** *The VHB strips are pre-applied to the P/N 62034 plate.*



### 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**



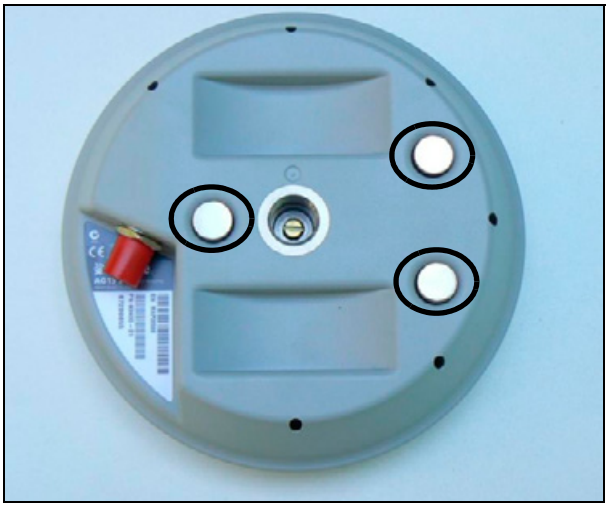
**P/N 62034**

### Step 4

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



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



### Step 5

**GLONASS,RTK, OmniSTAR, DGPS applications**

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



**WAAS, EGNOS, VBS, Beacon applications**

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



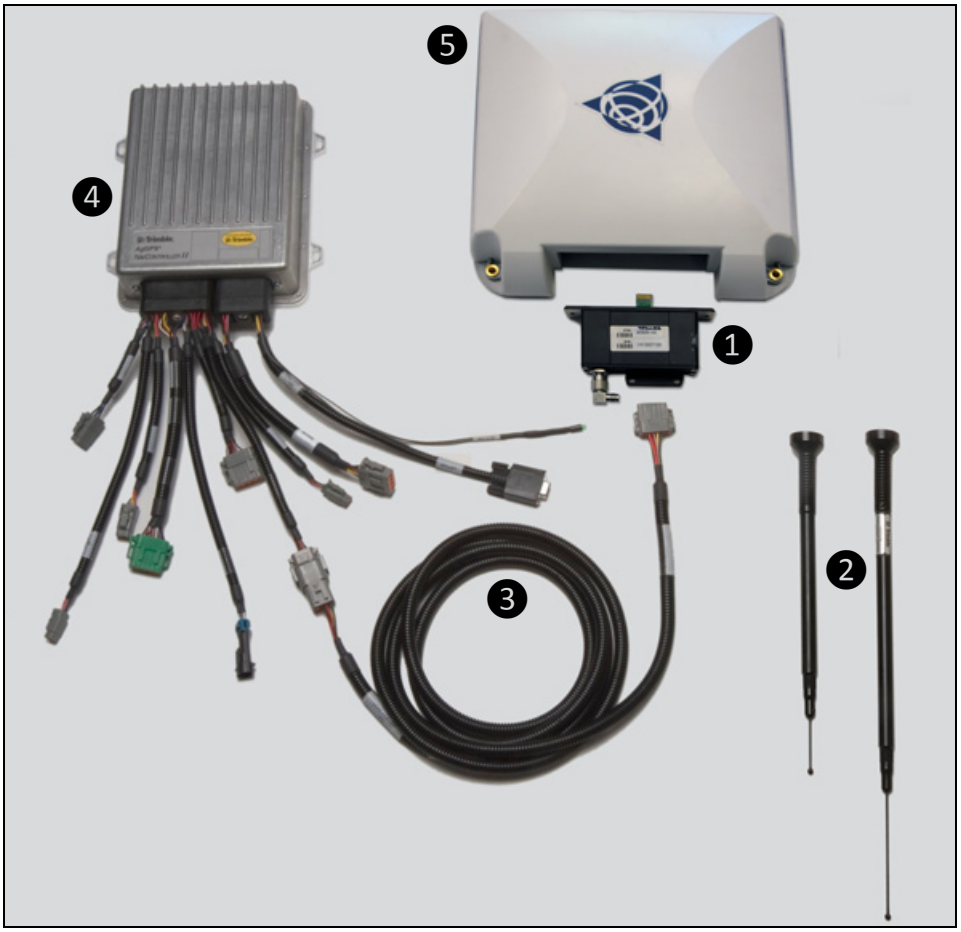
### Step 6

**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.



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




| Item | Description | Trimble part number |
|---|---|---|
| 1 | *Ag*GPS 450 or 900 radio (if equipped) | |
| 2 | Radio antenna cable and magnetic mount | |
| 3 | *Ag*GPS 450 or 900 radio antenna | |
| 4 | Antenna/receiver cable | 54608 |
| 5 | Autopilot controller | |

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

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

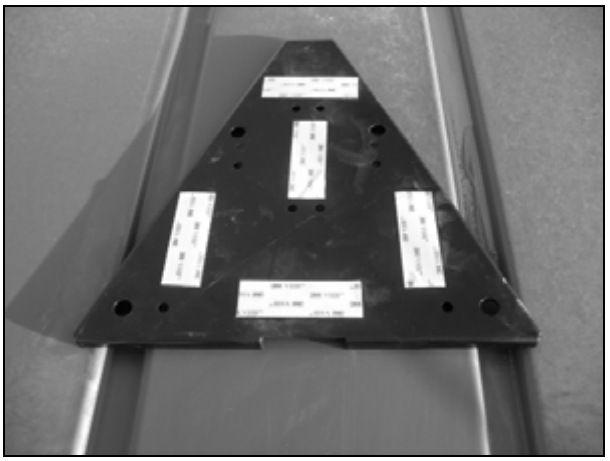
To attach the AG-372 receiver plate to the cab roof, attach the V-plate to the roof using VHB and then stick the receiver to the V-plate with magnets.

## Removable installation

### Step 1

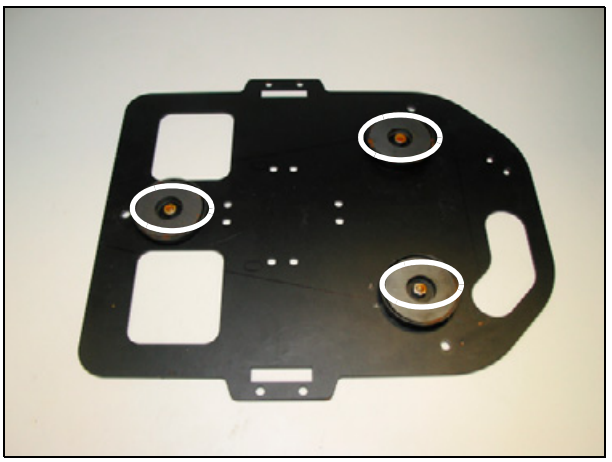
**V-plate**

Attach the V-plate to the roof using VHB.



**Mounting plate**

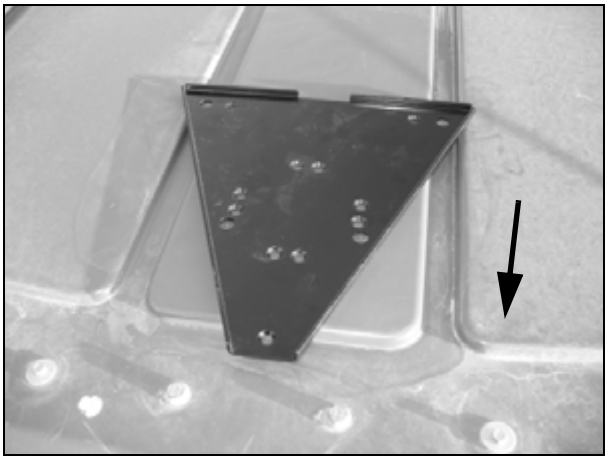
Attach the three provided magnets to the plate with the ¼" flathead screws and hardware provided.



**Underside of plate**

### Step 2

Attach the V-plate squarely on the roof with the nose of the plate facing the front of the tractor.



**V plate**

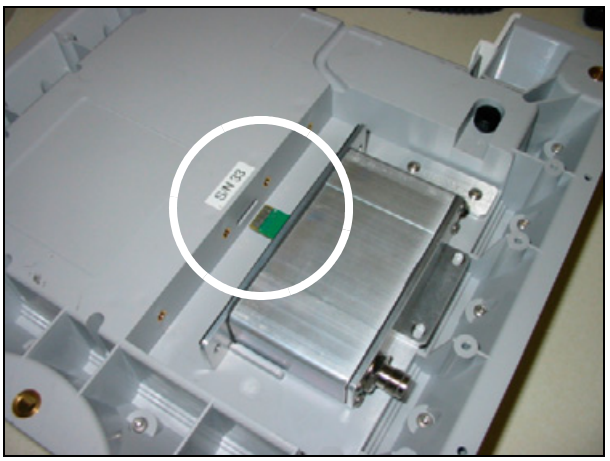
### Step 3

If a radio is being installed, remove the blanking plate and set it aside.



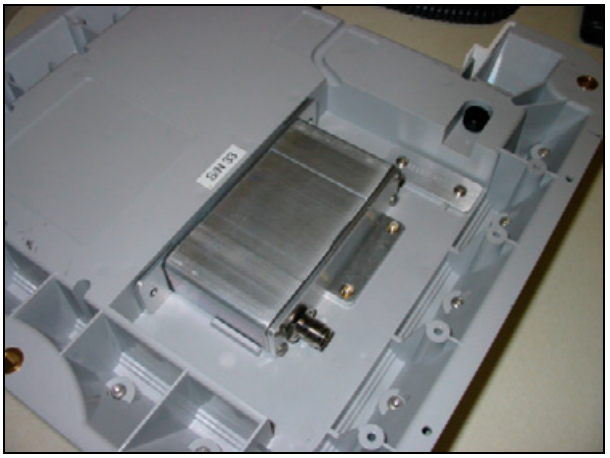
### Step 4

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



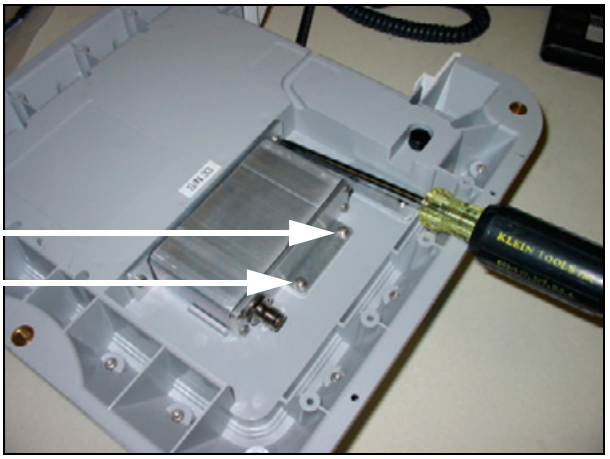
### Step 5

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




### Step 6

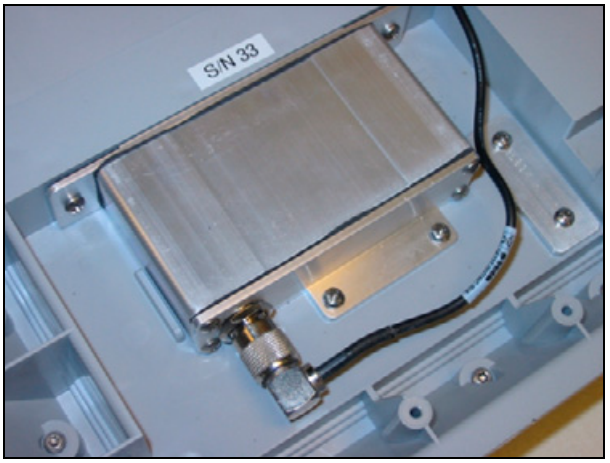
Use a #1 or #2 Phillips screwdriver and the supplied screws to install the integrated radio. First insert and tighten the two screws on the horizontal wall (arrowed), and then insert the remaining screws.



### Step 7

Install the supplied antenna cable.

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

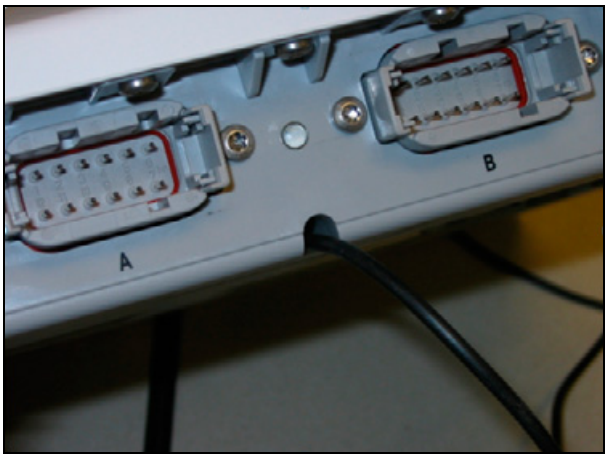


### Step 8

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

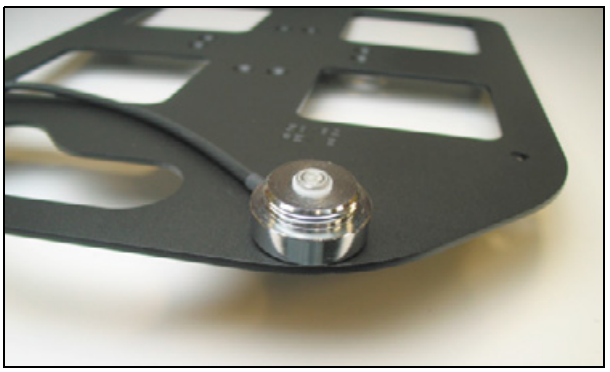


This image shows the unit with the cable routed through the channel.



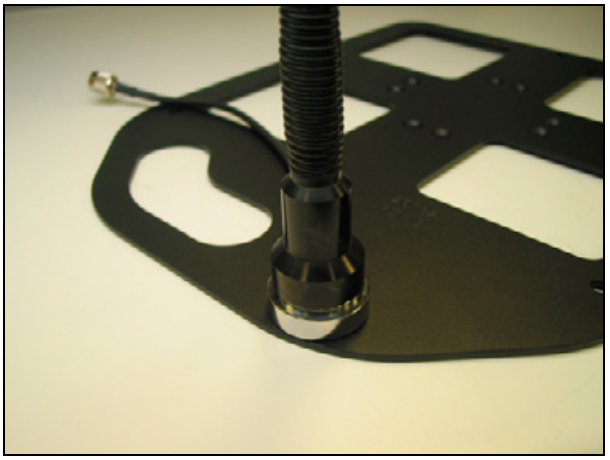

### Step 9

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



### Step 10

Attach the radio antenna to the antenna base.



### Step 11

Position the AG-372 receiver and radio on the mounting plate with the connector ports facing the radio antenna. Align the three bolt holes with the receiver, radio, and mounting plate.



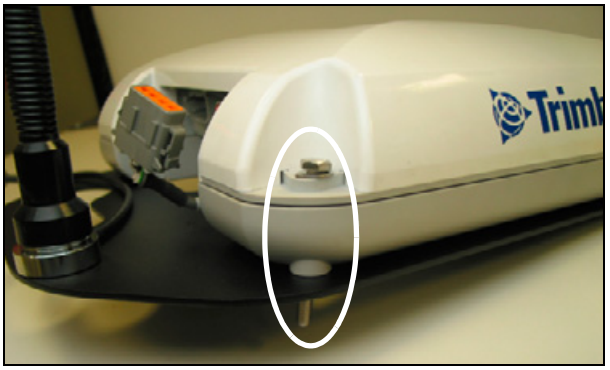

### Step 12

Insert the nylon bushings provided.



### Step 13

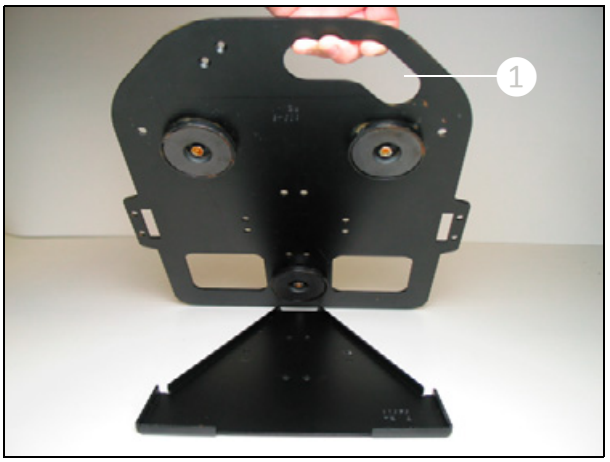
Insert the bolts through the receiver, radio, and mounting bracket. Place nuts on the bolt ends and then tighten them.



### Step 14

**Magnet method**

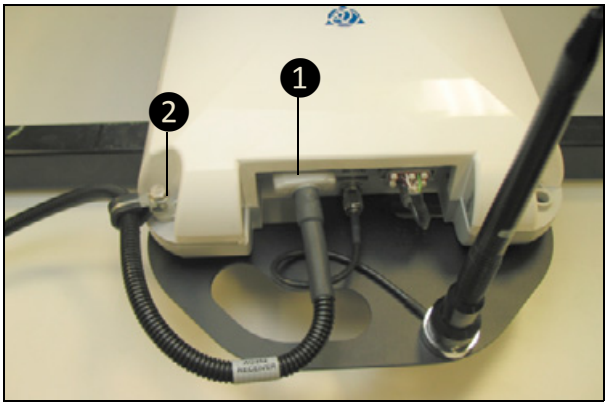
Place the receiver on the roof by aligning the magnets with the V plate. Ensure that the handle ❶ is toward the back of the vehicle.




### Step 15

Connect the cable from the cab controller into port A ❶ of the AG-372 receiver. Bolt the cable clamp ❷ to the left side of the receiver.

Route the cable into the cab and into the controller.



# Installing an AG-372 receiver with magnetic feet

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

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

### Step 1

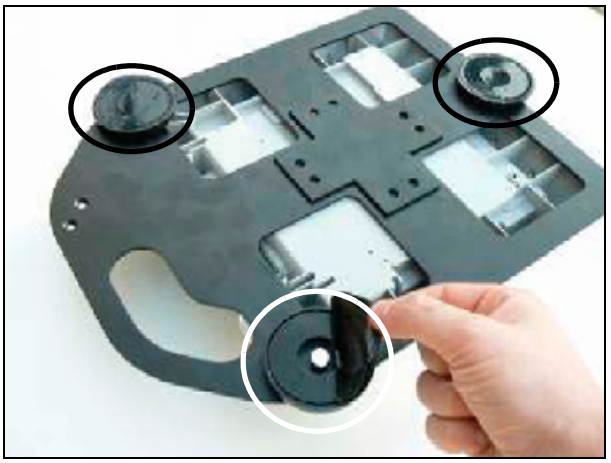
Attach the magnets to the receiver mounting plate. Use the three ¼" bolts to mount the AG-372 receiver.

Place the nuts on the receiver side.



### Step 2

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

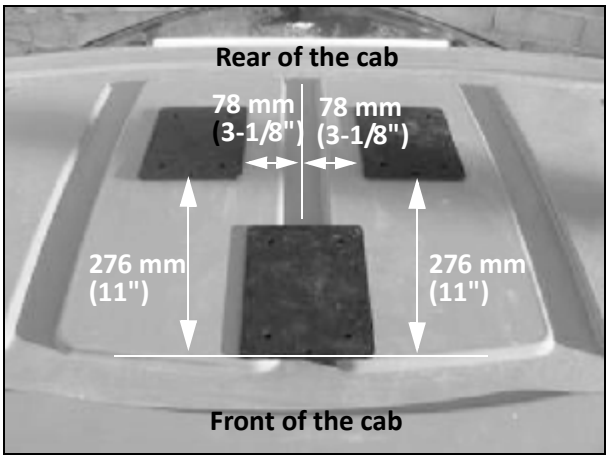


### Step 3

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

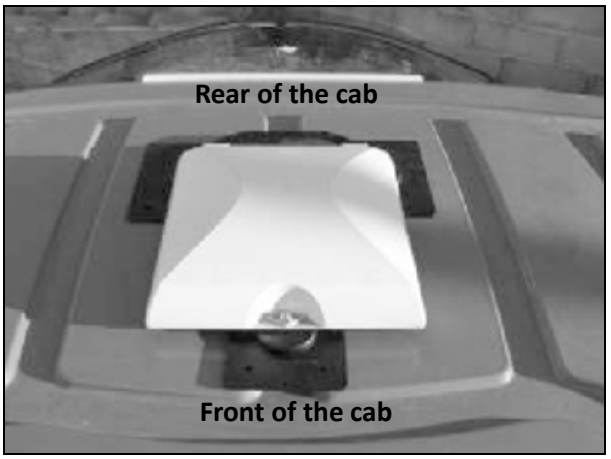
Remove the backing from the VHB strips and then apply the plates to the cab roof.

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




### Step 4

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

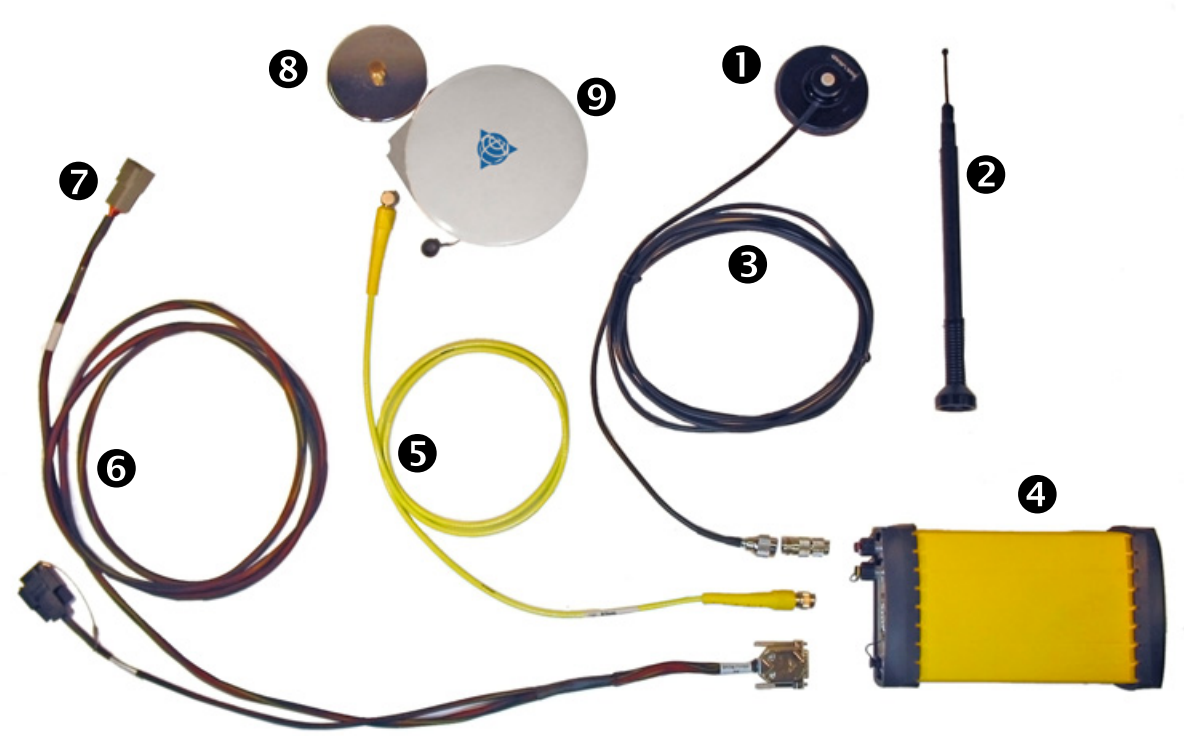



### Step 5

Connect the antenna cable to port A of the AG-372 GPS receiver and then route the cable toward the NavController II harness.



# *Ag*GPS 542 receiver components




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

# Installing the *Ag*GPS 542 receiver

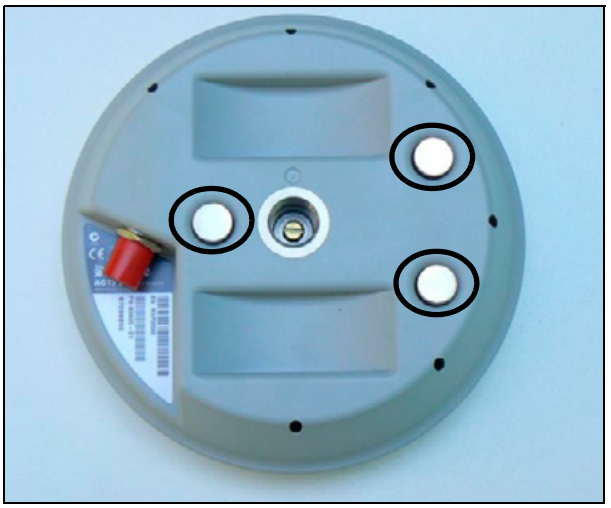
**WARNING –** To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information chapter.

### Step 1

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



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



### Step 2

**GLONASS,RTK, OmniSTAR, DGPS applications**

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



### Step 3

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



### Step 4

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

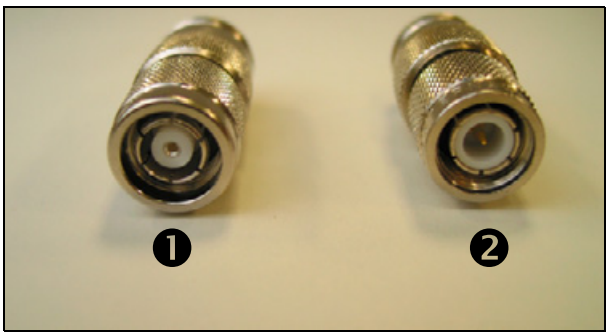


### Step 5

Identify the correct adaptor for the radio connection:

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

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



### Step 6

Attach the adaptor to the radio port.



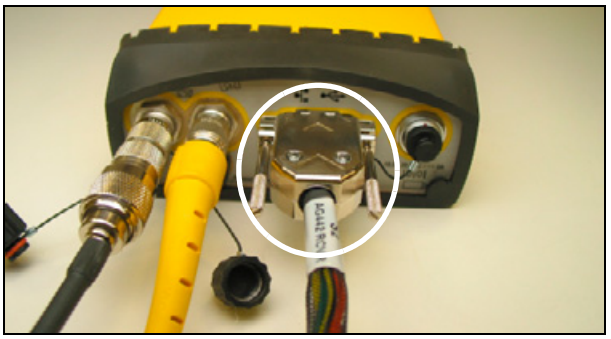
### Step 7

Connect the radio antenna cable to the radio port adaptor.



### Step 8

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



### Step 9

Connect the radio antenna to the magnetic antenna base.



### Step 10

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



CHAPTER 5

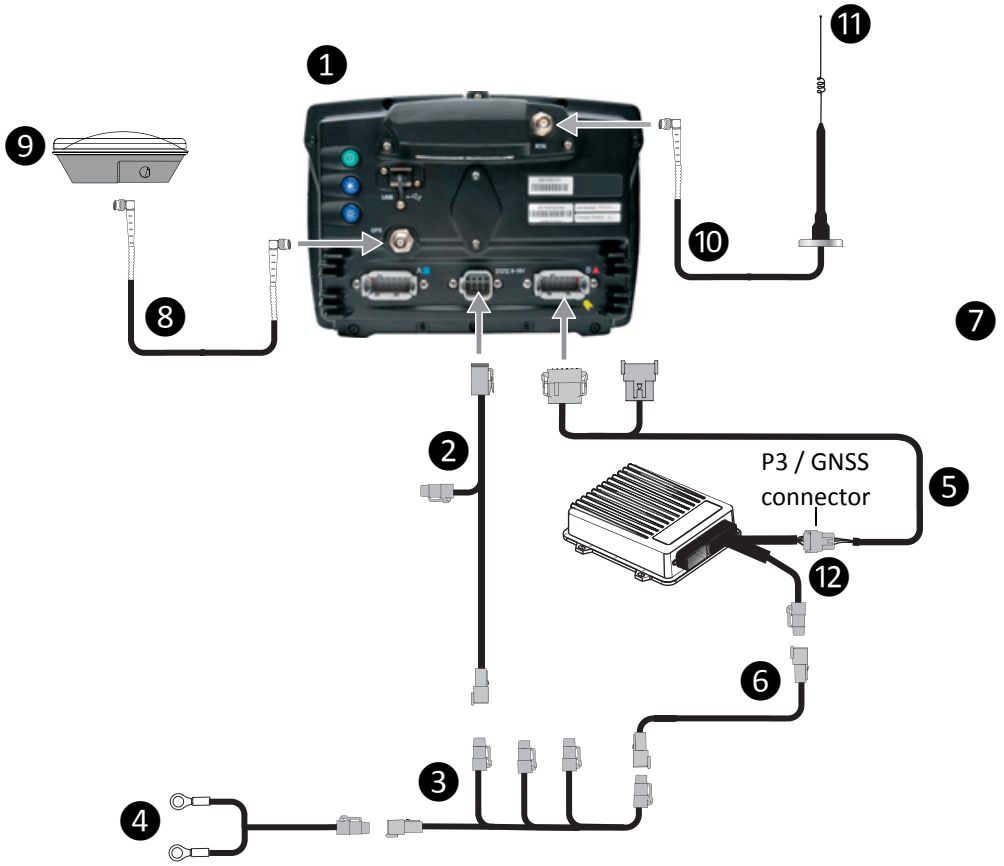
# Display Installation

**In this chapter:**


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


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

# CFX-750 display components




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

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

# Preparing the CFX-750 display

### Step 1

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



### Step 2

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



### Step 3

Attach the RAM mount to the rear of the display.



# Installing the CFX-750 display

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

### Step 1

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

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

### Step 2

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

To connect power to the CFX-750 display, see Chapter 8, Controller Installation.



# Installing the wiring harness on the CFX-750 display

### Step 1

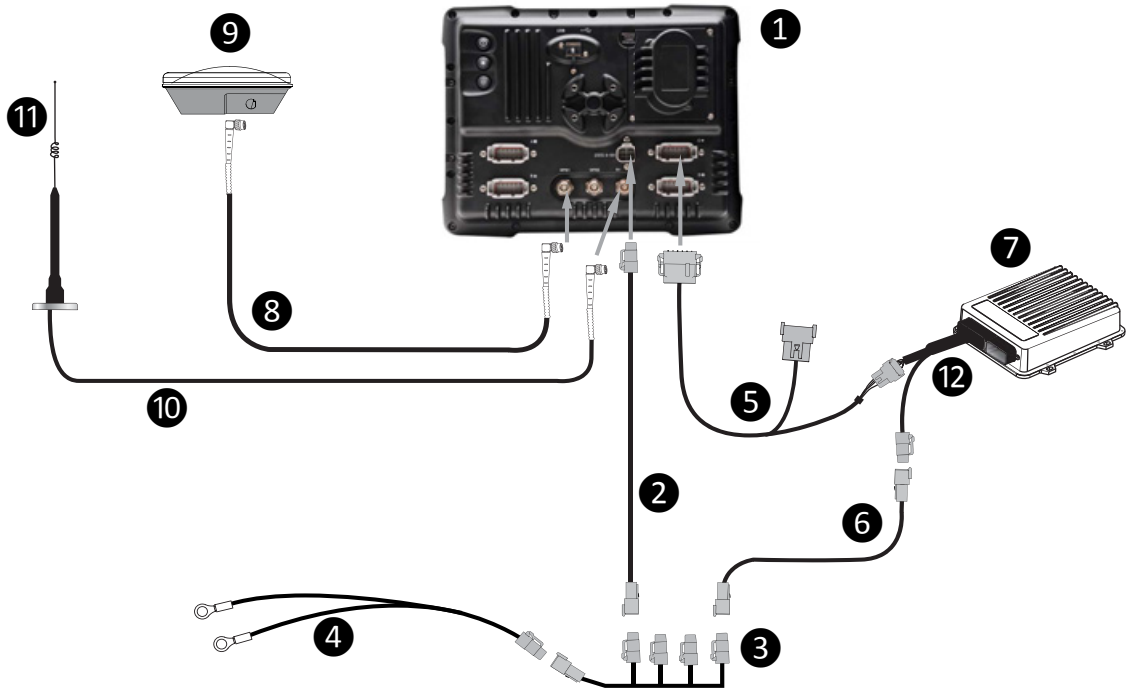
Locate the cable that connects the CFX-750 display to the NavController II.

### 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 components




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

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

# Preparing the FmX integrated display

### Step 1

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



### Step 2

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



### Step 3

Attach the RAM mount to the rear of the display.



# Installing the FmX integrated display

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

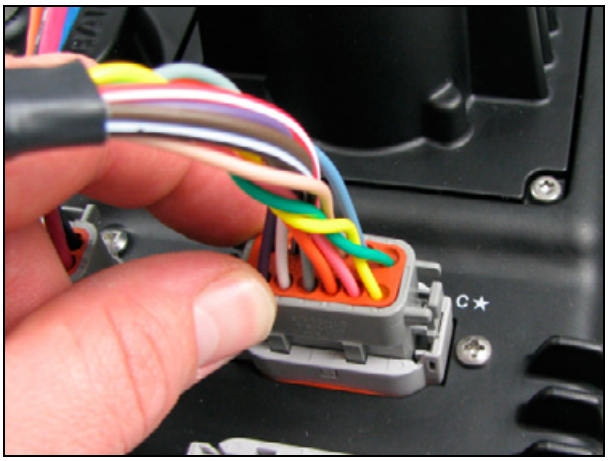
### Step 1

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

### Step 2

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

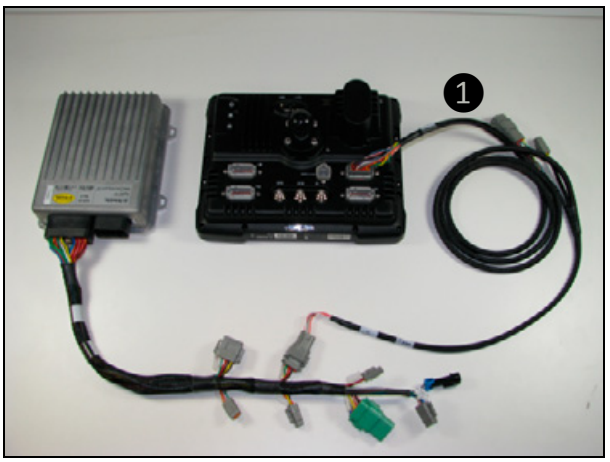
To connect power to the FmX integrated display, see Chapter 8, Controller Installation.



# Installing the wiring harness on the FmX integrated display

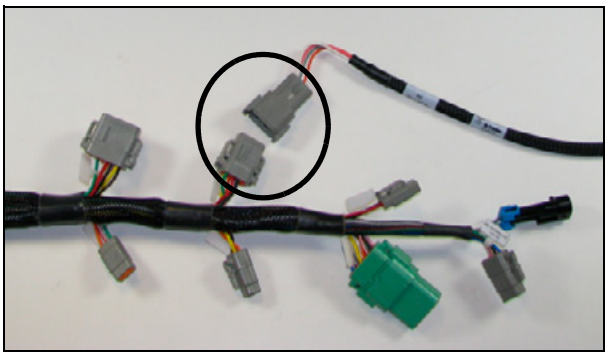
### Step 1

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.



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

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

## AgCam

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

### Step 1

Locate the AgCam and AgCam cable.

### Step 2

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



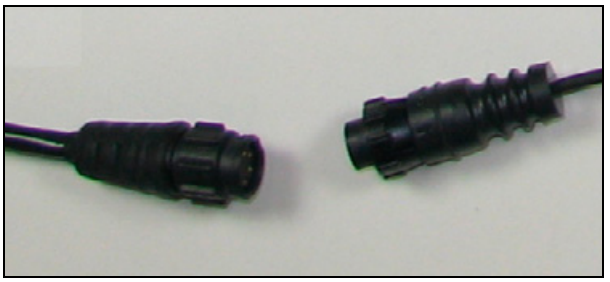
**CFX-750 display**



**FmX display**

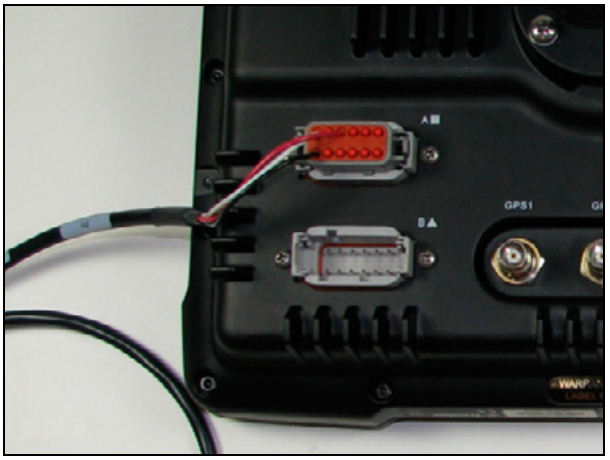
### Step 3

Connect the AgCam cable to the display adaptor cable.



### Step 4

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



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

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

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

Use VHB adhesive to install the antenna and plate, as follows:

Standard plates, P/N 62034 are provided in most kits. You can use Very High Bond (VHB) to attach either a P/N 62034 plate or a V plate.

- **GLONASS, RTK, OmniSTAR, DGPS applications** – To use this method for high accuracy, the surface must be rigid and free of “oil panning”. 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 the P/N 62034 plate for simplified installation in applications where high accuracy is not critical.

### Step 1

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

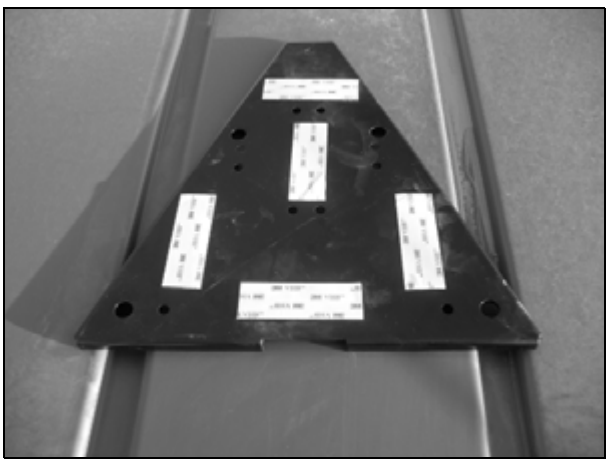


### Step 2

**V plate only**

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

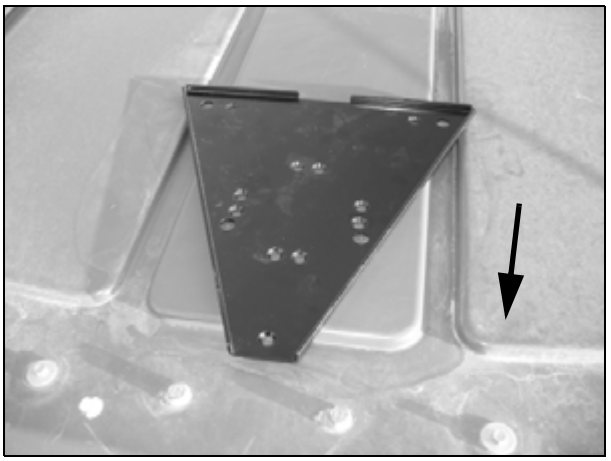
***Note –*** *The VHB strips are pre-applied to the P/N 62034 plate.*



### Step 3

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

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



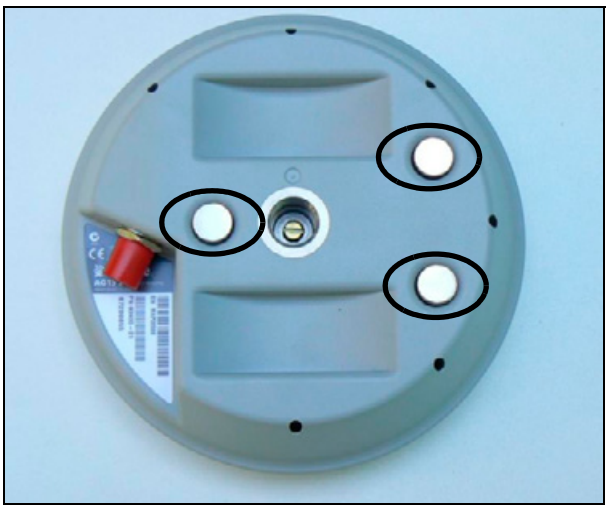
**V plate**



**P/N 62034**

### 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

**GLONASS, RTK, OmniSTAR, DGPS, applications**

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



**WAAS, EGNOS, VBS, Beacon applications**

Attach the antenna to the center of the P/N 62034 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.



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

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

### Step 1

Connect the radio antenna to the magnetic antenna base



### Step 2

Attach the magnetic radio antenna base to the rear of the V plate on the roof. If the cable does not reach the V plate, use the P/N 62034 plate with the VHB provided to relocate the antenna.



### Step 3

Attach the magnetic radio antenna base to the rear of the V plate on the roof. If the cable does not reach the V plate, use the P/N 62034 plate with the VHB provided to relocate the antenna.



CHAPTER 6

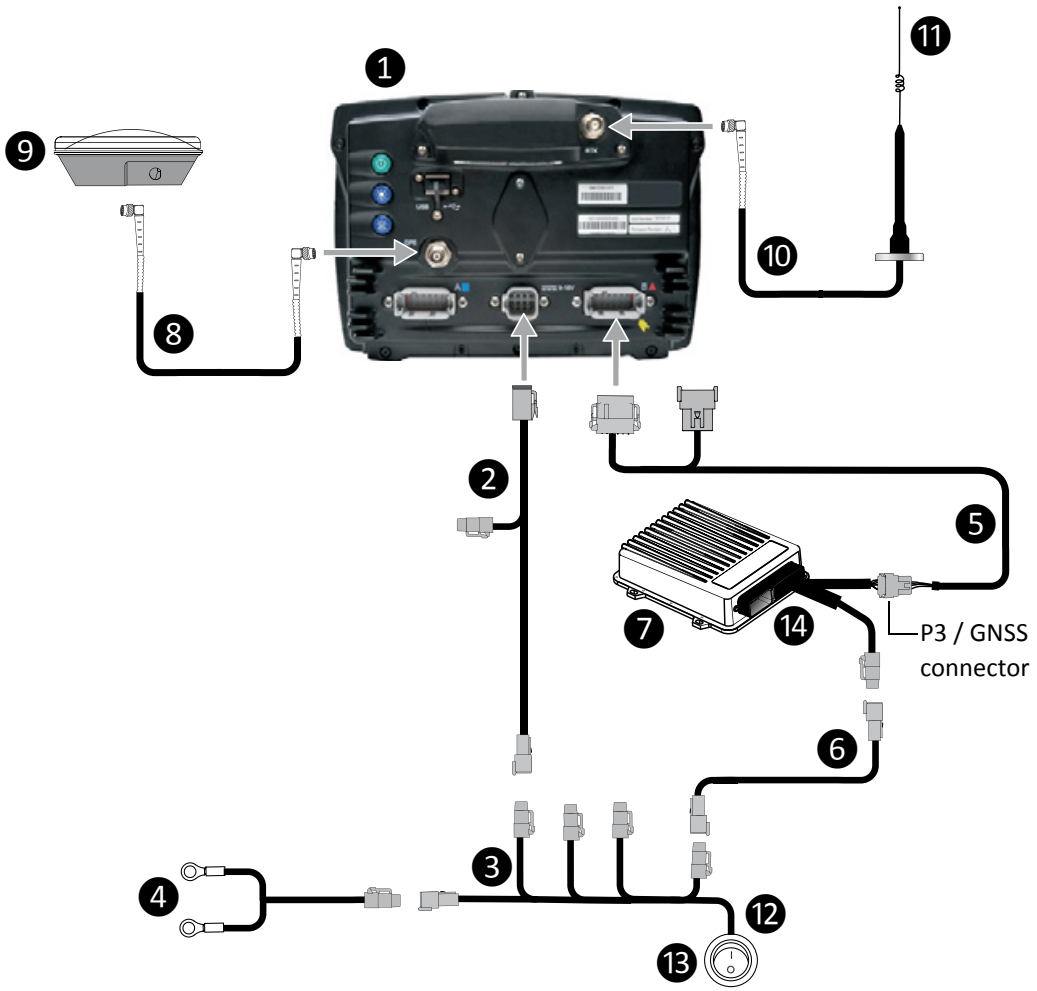
# Power Harness Installation

**In this chapter:**


- CFX-750 display components
- FmX integrated 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.

# CFX-750 display components

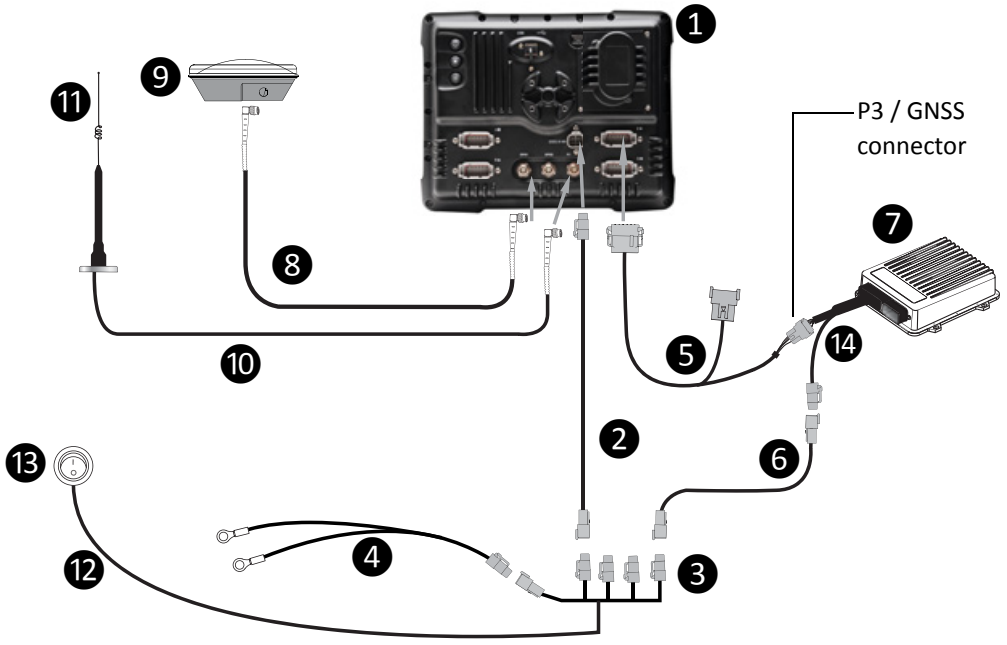



⚠ **CAUTION –** Connecting the Port Replicator on the FmX to NavController II cable ❺ to the P4 or P12 connector of the NavController II harness ⓬ will result in damage to the FmX / FM-1000 integrated display, and will void the warranty.

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

| Item | Description | Trimble part number |
|---|---|---|
| ❾ | AG25 GNSS antenna | 77038-00 |
| ❿ | NMO to TNC 20ft antenna cable and base | 72122 |
| ⓫ | 900 MHz radio antenna kit | 22882-10 |
| ⓬ | External switch cable included with kit | Part of P/N 67259 |
| ⓭ | External switch included with kit | Part of P/N 67259 |
| ⓮ | Main NavController II cable | 54601 |

# 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.

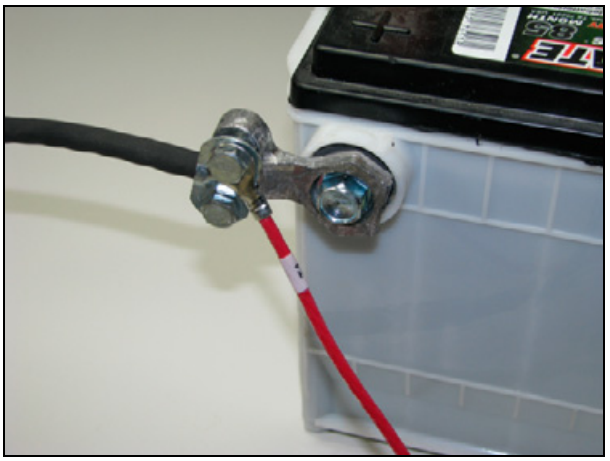
| Item | Description | Trimble part number |
|---|---|---|
| ❶ | FmX integrated display | 93100-02 |
| ❷ | FmX power cable | 66694 |
| ❸ | FmX power cable with relay and switch (power bus) | 67259 |
| ❹ | Basic power cable | 67258 |
| ❺ | FmX to NavController II cable with port replicator | 75741 |
| 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 | AG-25 GNSS antenna | 77038-00 |
| ❿ | NMO to TNC 20ft antenna cable and base | 72122 |
| ⓫ | 900 MHz radio antenna kit | 22882-10 |
| ⓬ | External switch cable included with kit | Part of P/N 67259 |
| ⓭ | Switch | 67095 |
| ⓮ | NavController II harness | 54601 |

# Installing the power harness for the display

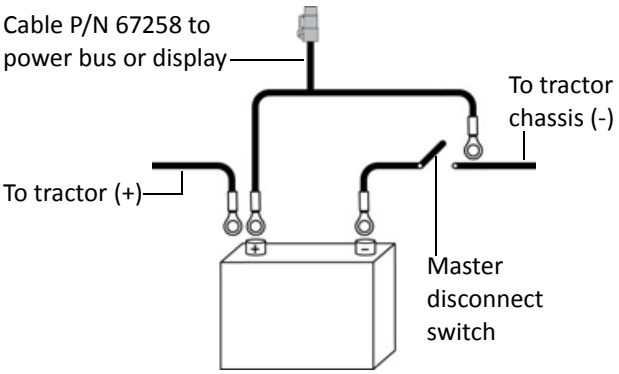
**WARNING –** To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

### Step 1

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

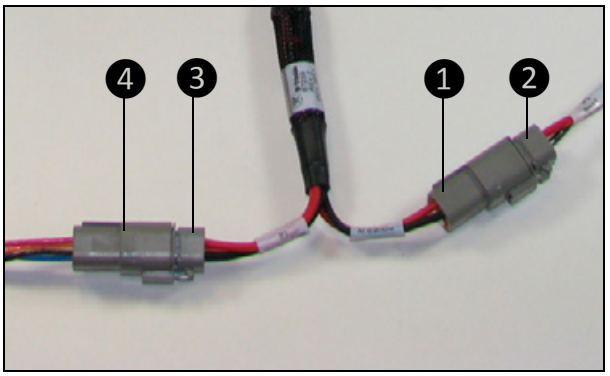


**CAUTION –** If the vehicle has a master electrical disconnect, make sure the basic power cable (P/N 67258) is ***not*** directly attached to the battery terminal that is disconnected by the master switch - the negative pole in this example.
Attach this terminal side just past the main disconnect so 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 damaging the display.



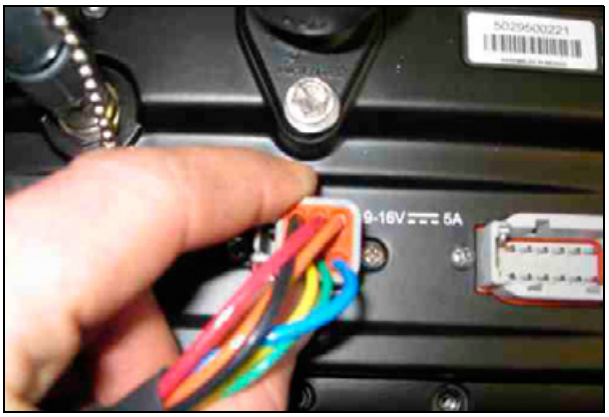

### Step 2

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.

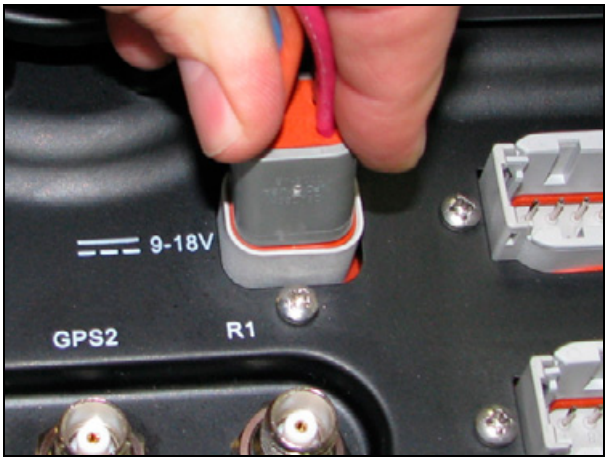


### Step 3

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




**CFX-750 display**




**FmX display**

# Configuring the power bus options for the display

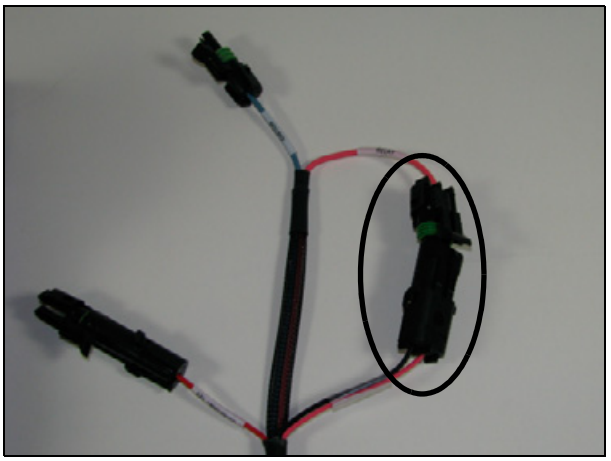
**WARNING –** To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

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

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

## Display power button is used to turn on the Autopilot system

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

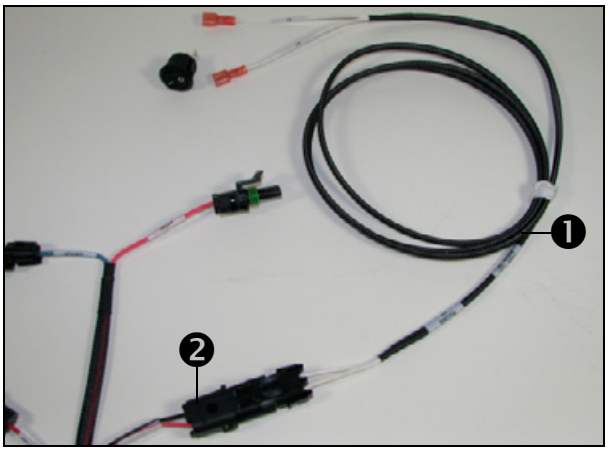


## External switch is used to turn on the Autopilot system

### Step 1

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

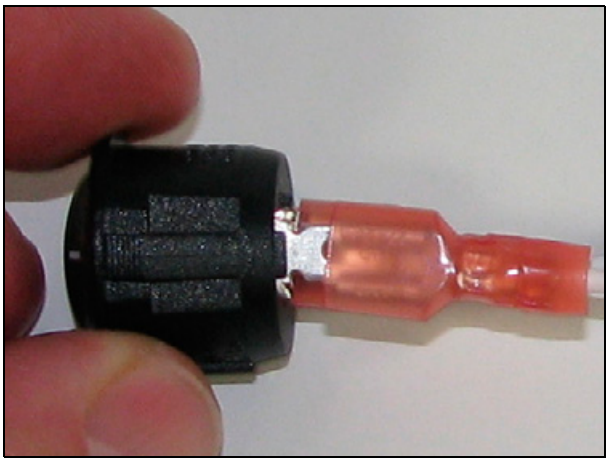
***Note –*** *To install the switch provided, drill a ¾" hole.*



### Step 2

Connect the cable labeled R7 to the switch pins.

***Note –*** *Polarity is not important.*

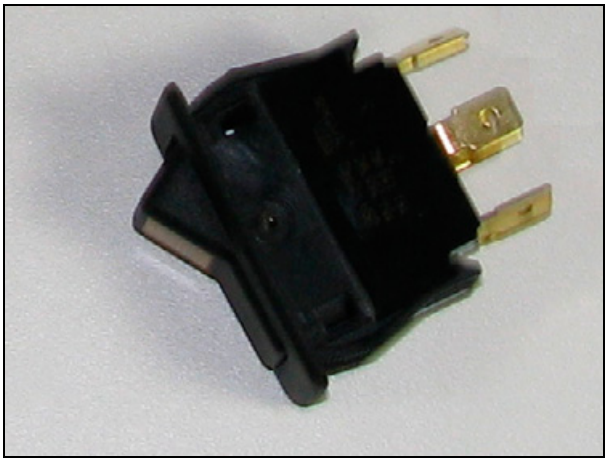


## Installing the optional illuminated full or standard Euro switch

### Step 1

Find an available knockout location on the vehicle console.

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

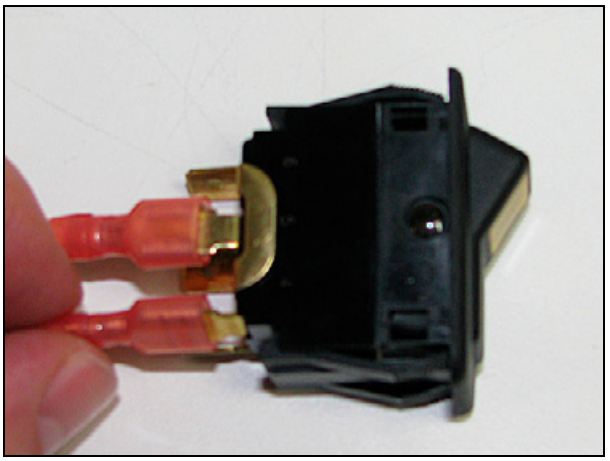


### Step 2

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

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

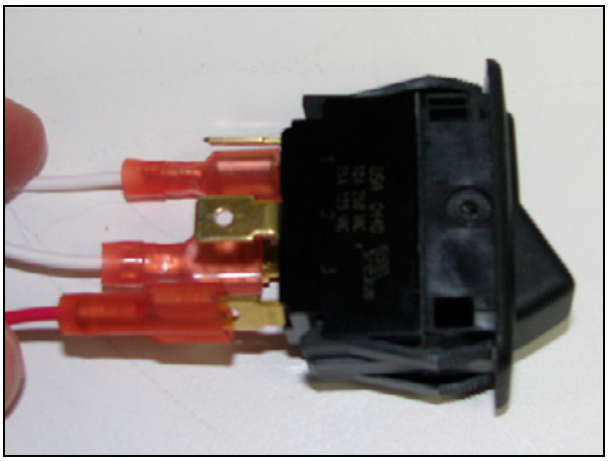
***Note –*** *Polarity **is** important.*



### Step 3

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

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

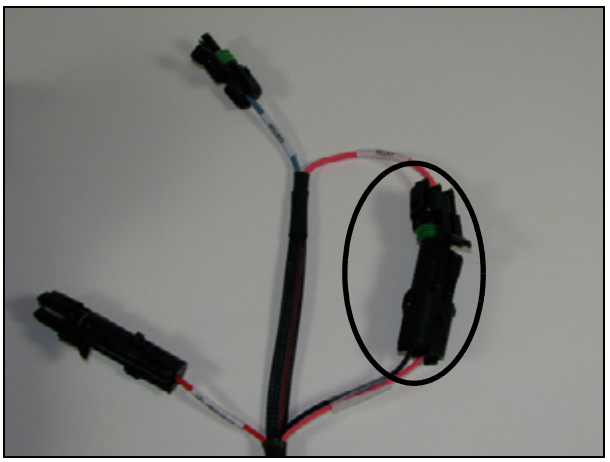


## Ignition is used to turn on the Autopilot system

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

### Step 1

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

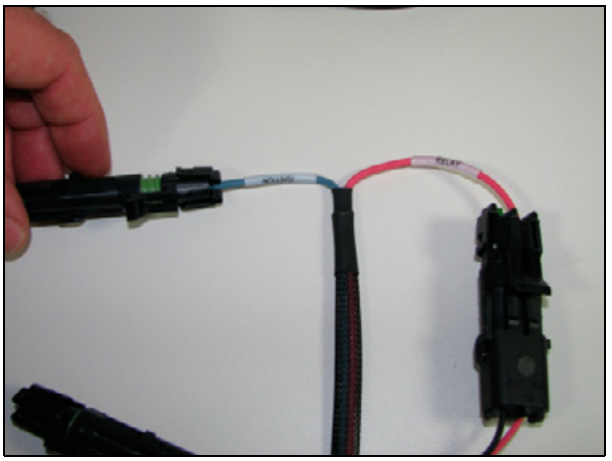


### Step 2

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

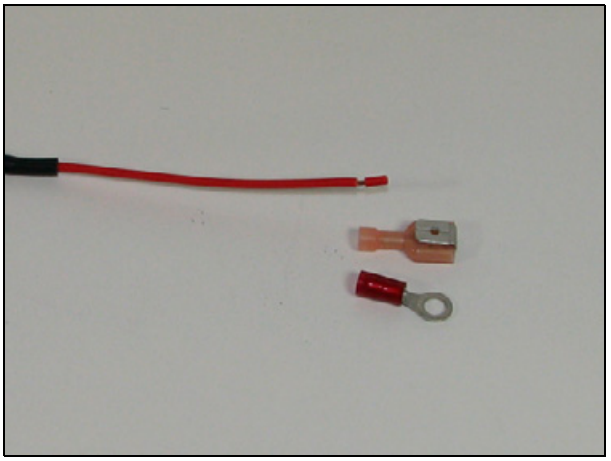
### Step 3

Route the cable to the vehicles ignition.



### Step 4

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



CHAPTER 7

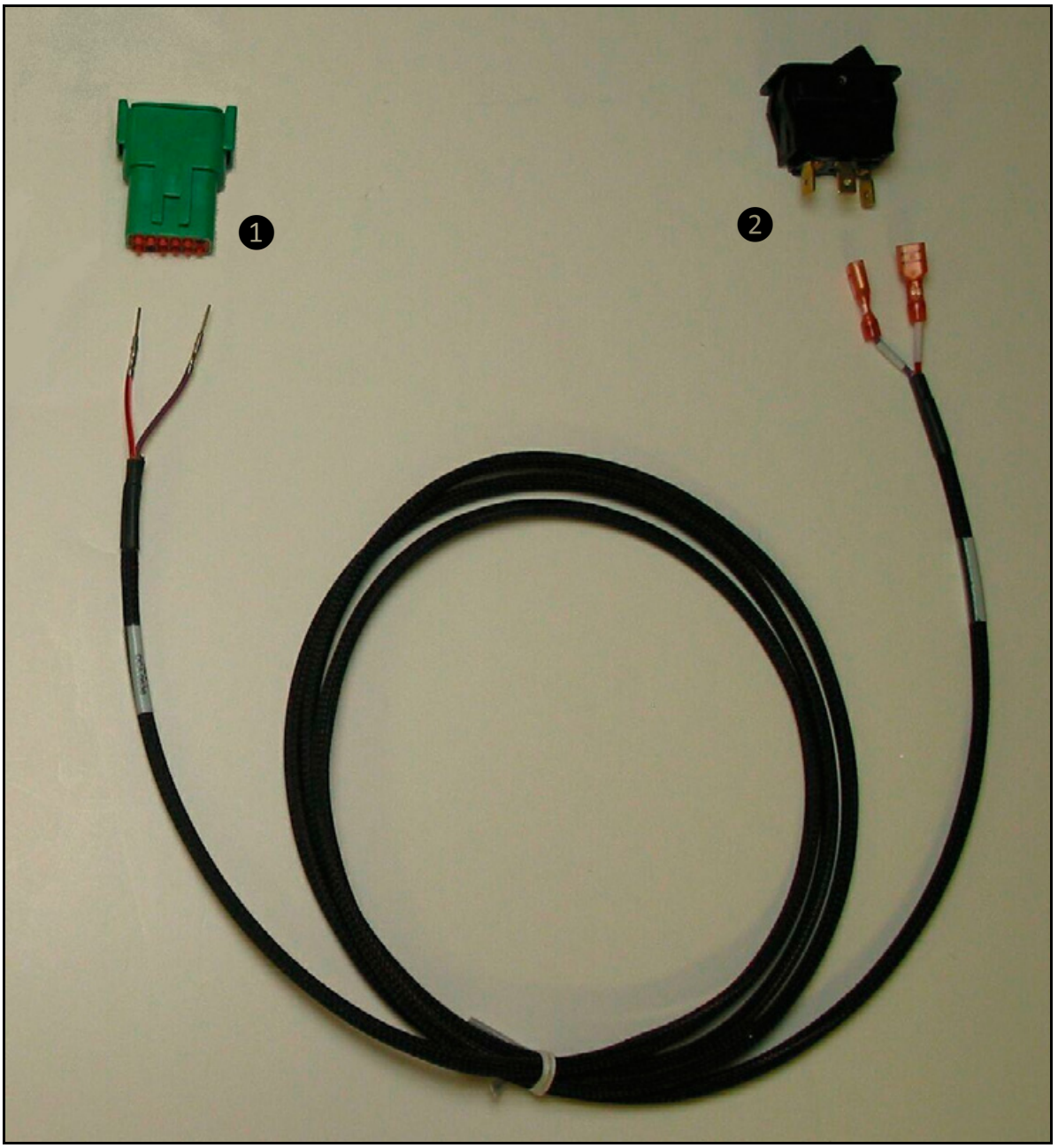
# Remote Engage Switch Installation

**In this chapter:**


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

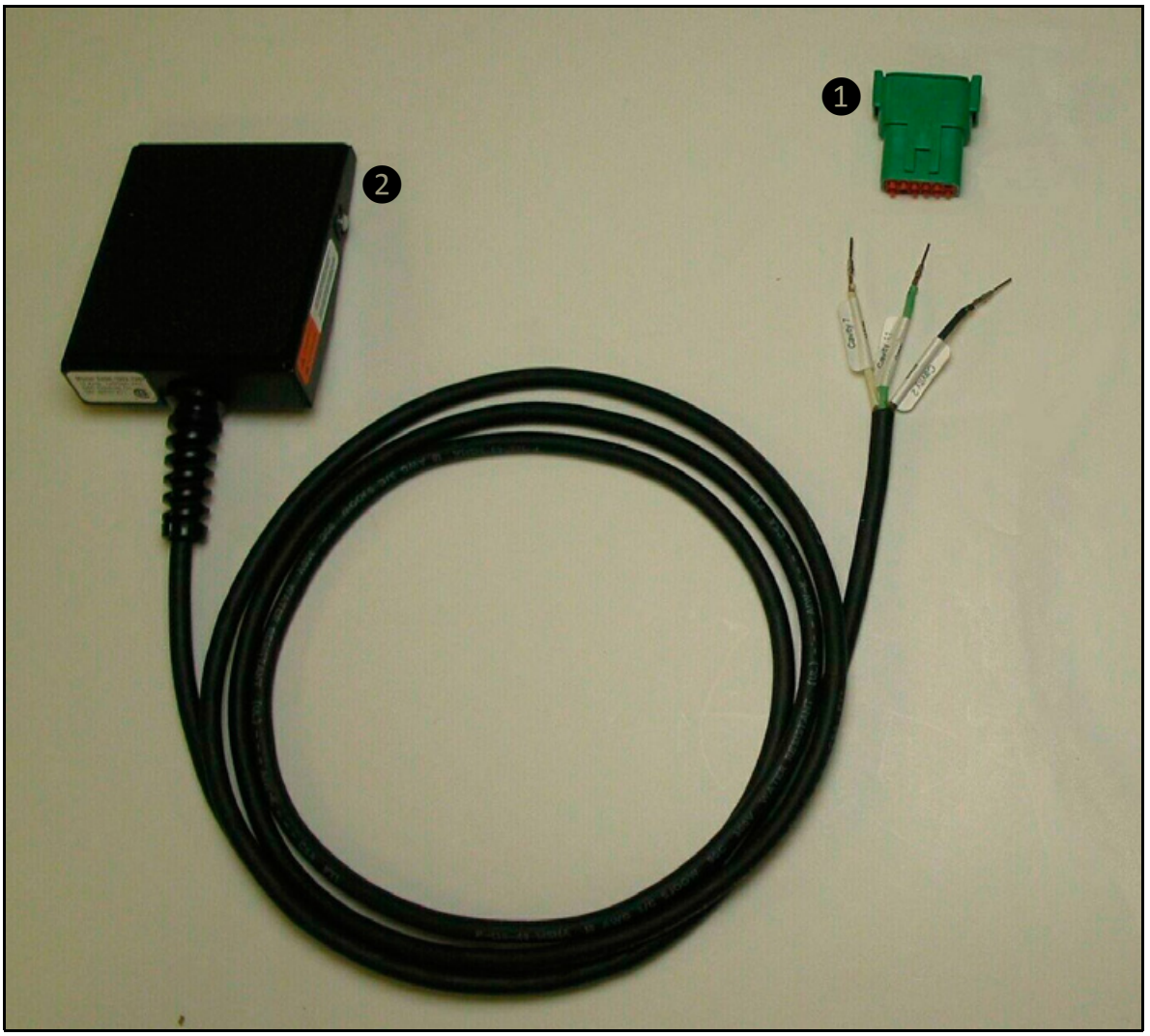

This chapter describes how to install the remote engage switch.

# Remote engage switch components: Rocker switch




| Item | Description |
|---|---|
| ❶ | DTM receptacle |
| ❷ | Remote engage rocker switch |

# Remote engage switch components: Foot switch

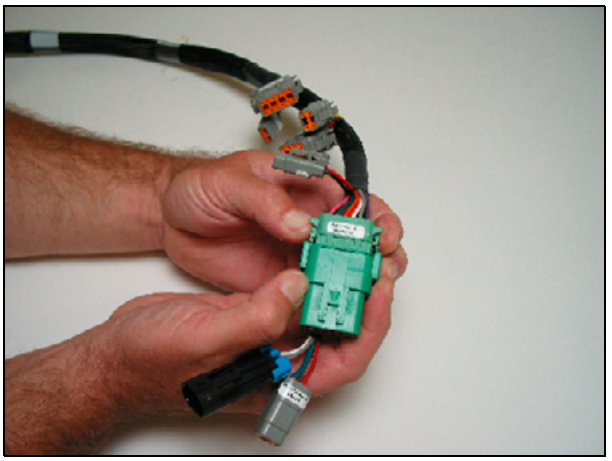



| Item | Description |
|---|---|
| ❶ | DTM receptacle |
| ❷ | Remote engage rocker switch |

# Preparing the remote engage cable

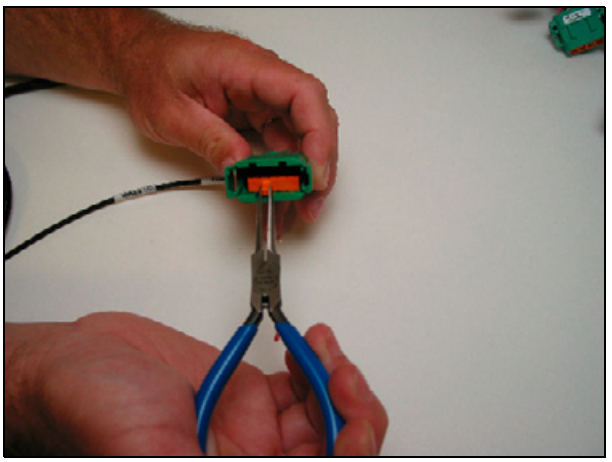
### Step 1

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



### Step 2

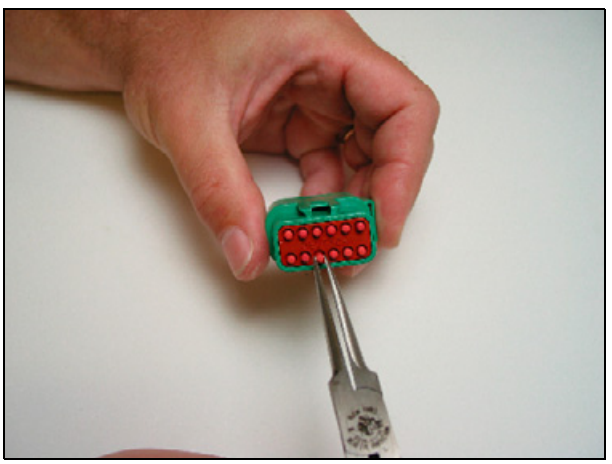
Remove the wedge from the connector.



### Step 3

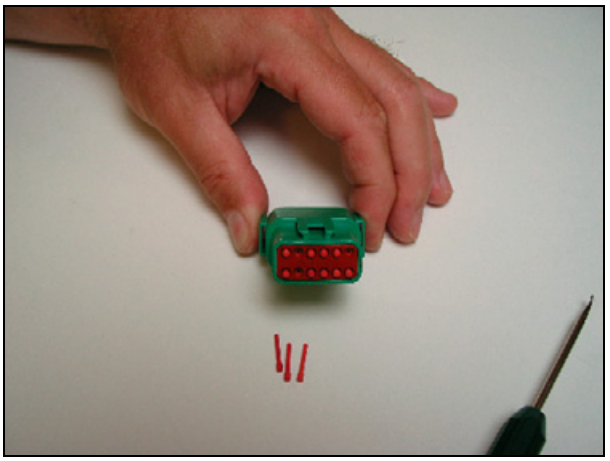
**Rocker switch only**

Remove the plugs from cavity 2 and cavity 7.



**Foot Switch Only**

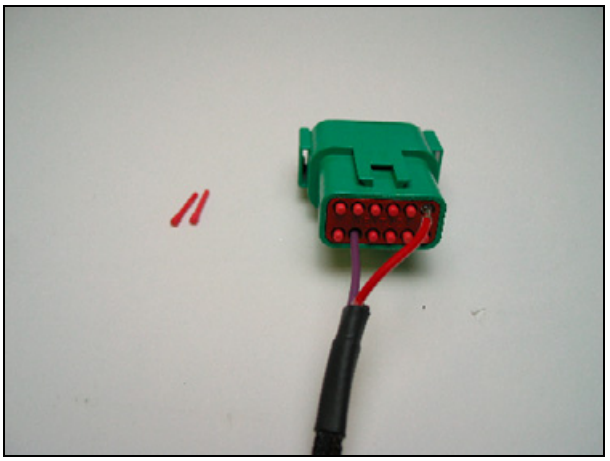
Remove the plugs from cavity 2, cavity 7, and cavity 11.



## Step 4

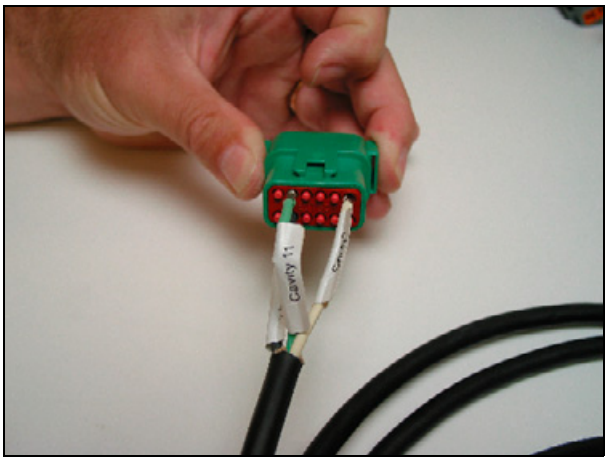
**Rocker switch only**

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



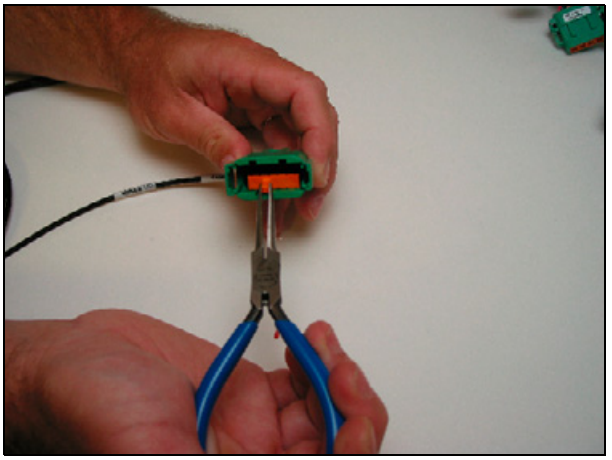
**Foot switch only**

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



### Step 5

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



### Step 6

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

### Step 7

**Rocker switch only**

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



**Foot switch only**

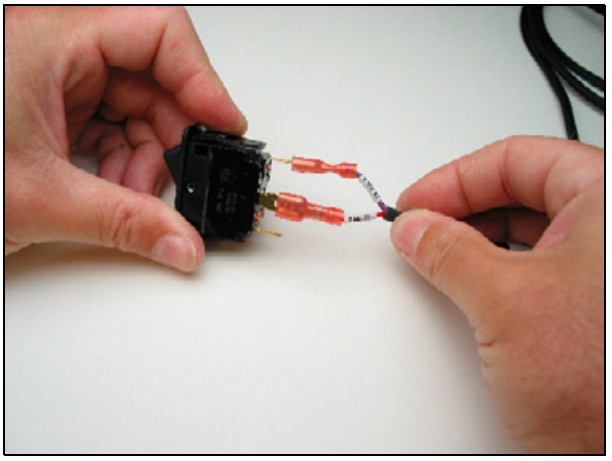
Run the cable to a clear location on the floor board. Use double-sided tape to secure the pedal. Route the cable under the floor mat.



### Step 8

**Rocker Switch Only**

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



### Step 9

**Rocker Switch Only**

Place the switch in the console.



## Using the remote engage switch

To use NavController II to engage the system:

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

The system engages when you release the switch.

CHAPTER 8

# Controller Installation

**In this chapter:**


- Installing the controller
- Controller connections


This chapter describes how to install the controller unit.

# Installing the controller

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

### Step 1

The NavController II will be installed in the area below the seat base. To do this, test fit the unit into this location.

Mark the hole locations using the NavController II mounting plate as a template—make sure that the unit clears the front support brace shown here.



Once the hole location are marked, remove the seat and drill the mounting holes for mounting the controller mounting plate to the machine.

***Note –*** *Be sure to check for seat base / NavController II interference at the location where the holes are marked.*

**CAUTION –** When drilling into the floor take care that you do not damage items under the cab.

### Step 2

Once you have drilled the four 5⁄16" mounting holes, attach the controller mounting plate to the floor using the provided ¼" hardware.



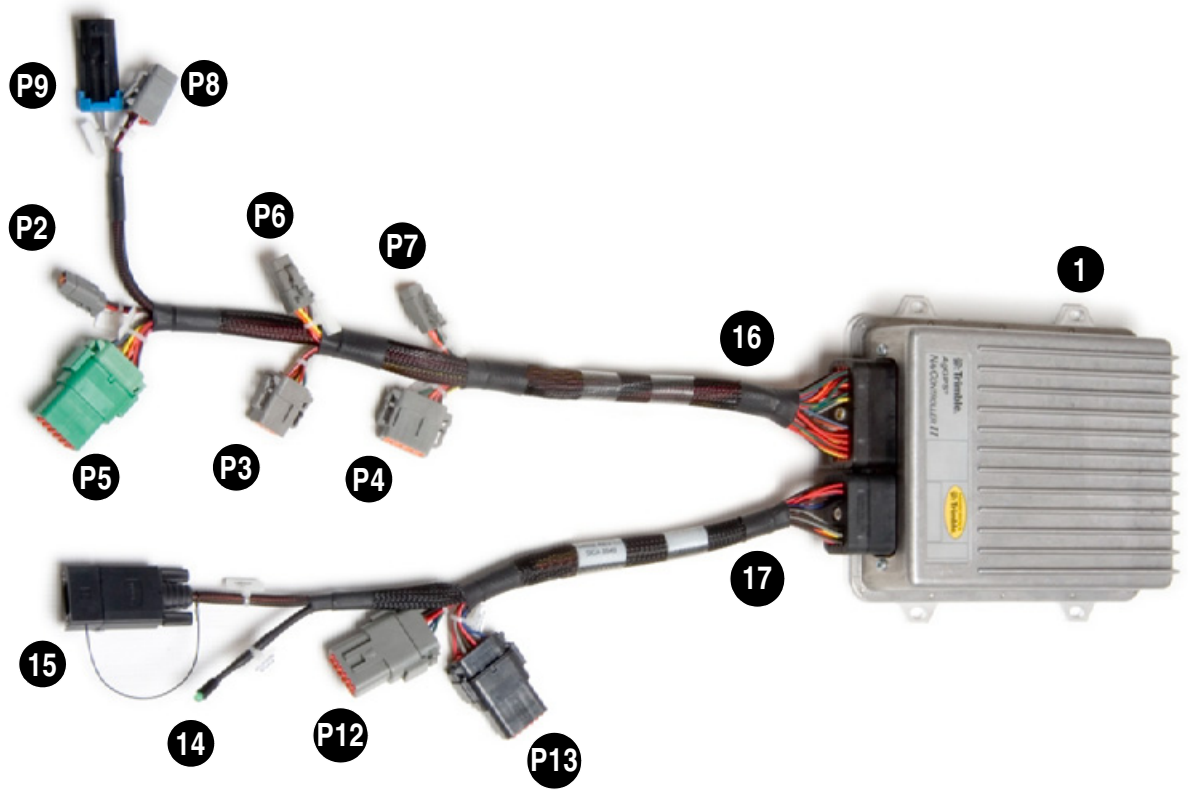
### Step 3

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

Reinstall the seat and seat base of the machine.



# Controller connections



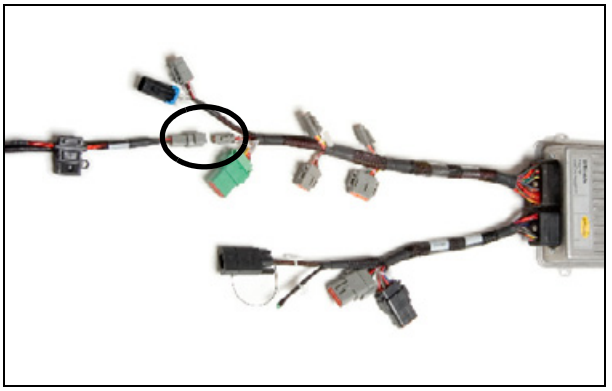

| Item | Description |
|---|---|
| 1 | NavController II controller |
| P2 | Power connector |
| P3 | GNSS connector |
| P4 | Display connector |
| P5 | Vehicle sensors connector |
| P6 | Steering sensor connector |
| P7 | Manual override connector |
| P8 | Hydraulic valve connector |

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

### Step 1

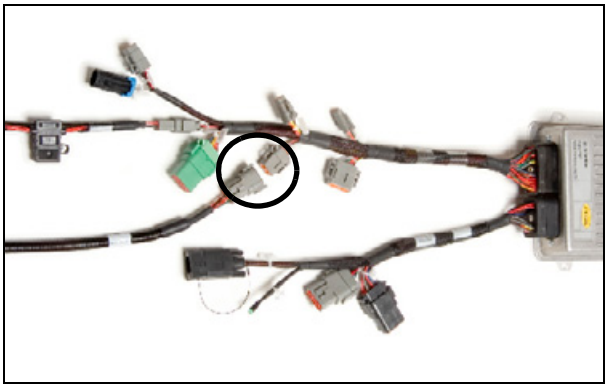
Connect the power cable connection to P-2, which is labeled “Power”. P-2 is located on the main wiring harness.

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



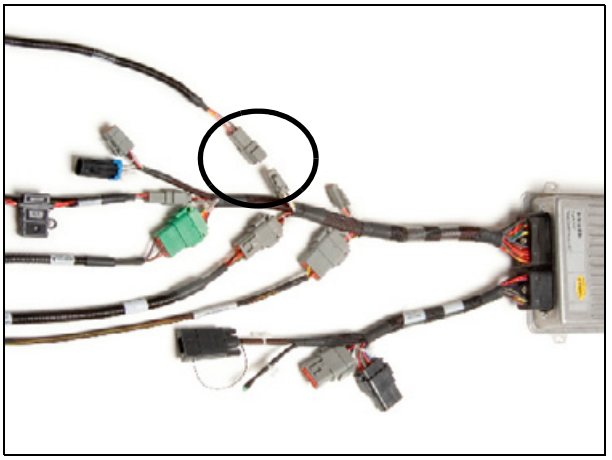
### Step 2

Connect the CFX-750 display or FmX integrated display to P-3, which is labeled “GPS”. P-3 is located on the main wiring harness.



### Step 3

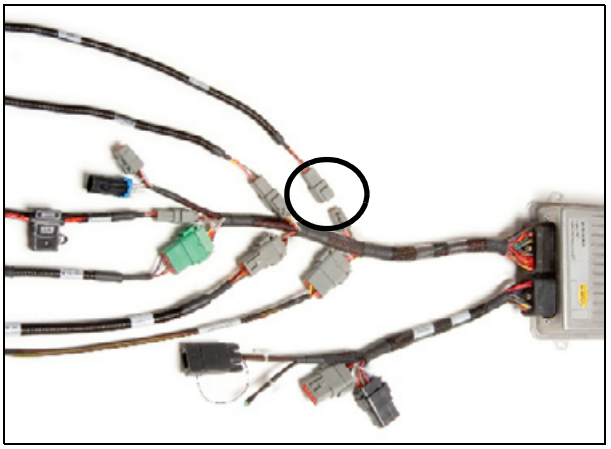
Connect the steering sensor cable connection to P-6, which is labeled “Steering Sensor”. P-6 is located on the main wiring harness.



### Step 4

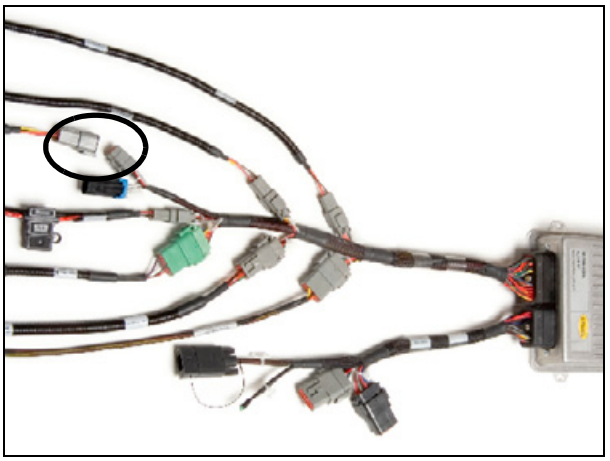
Connect the manual override cable connection to P-7, which is labeled “Manual Override”. P-7 is located on the main wiring harness.

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



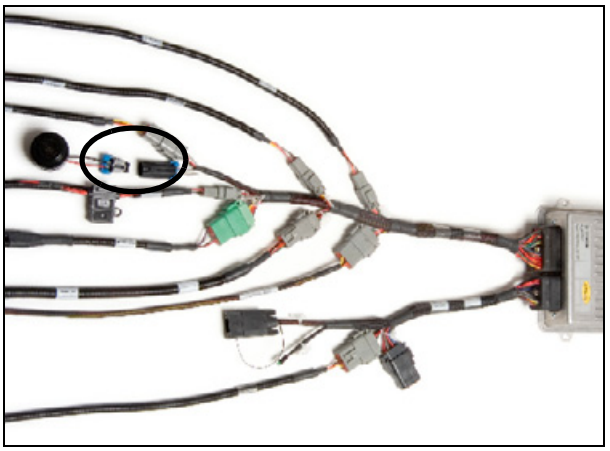
### Step 5

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



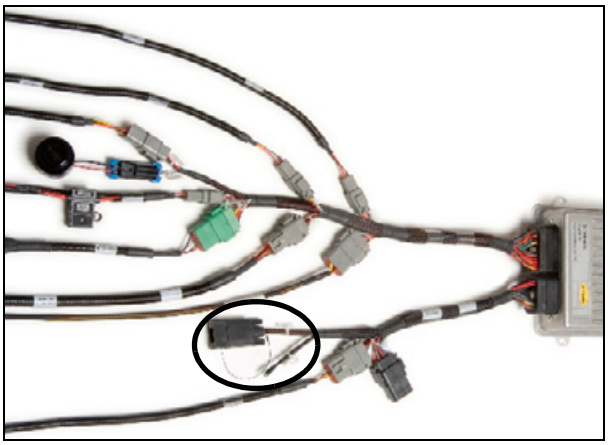
### Step 6

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



### Step 7

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



### Step 8

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

CHAPTER 9

# Final Machine Check

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

To perform the final machine check:

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

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

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

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