Autopilot

AUTOMATED STEERING SYSTEM

INSTALLATION INSTRUCTIONS

Kubota M Series Tractors

- M100X
- M110X
- M126X
- M135X

Version 8.00
Revision A
February, 2020
P/N 54035-1116-E08

Trimble

Legal Notices

Agriculture Business Area

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This is the February 2020 release (Revision A) of the *Autopilot Automated Steering System Installation Instructions*, part number 54035-1116-E08. It applies to version 8.00 of the Autopilot automated steering system.

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Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

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Or

Mail a request for recycling instructions to:

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c/o Menlo Worldwide Logistics
Meerheide 45
5521 DZ Eersel, NL



Safety Information

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

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

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

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

Warnings

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

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

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

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

Cautions

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

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

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

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

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

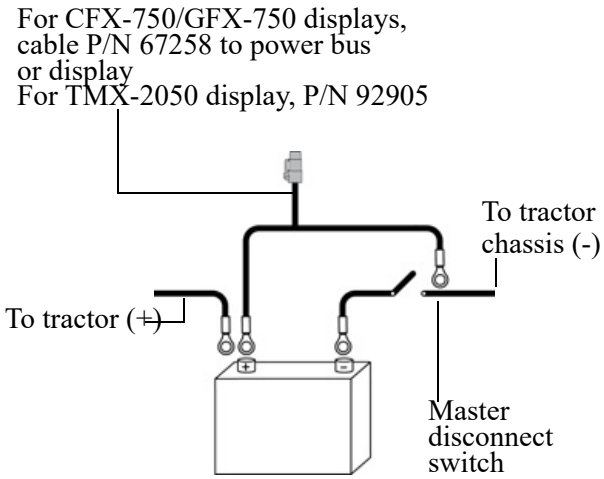
⚠ **CAUTION –** Do not direct pressurized water at:
- Electronic or electrical components or connectors
- Bearings
- Hydraulic seals
- Fuel injection pumps
- Any other sensitive parts or components



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

⚠ **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.

⚠ **CAUTION –** If the vehicle has a master electrical disconnect, make sure the basic power cable (P/N 67258 / 92905) 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.



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1

Introduction

- Technical assistance
- Manual system upgrade to Autopilot
- 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

Trimble displays

Retain
CFX-750™ display: P/N 94110-xx
Power cable CFX-750 display: P/N 77282
Antenna for display: P/N 60600-02 (DGPS) or 77038-00 (OmniSTAR®/RTK)
Antenna to receiver cable: P/N 50449
Basic cable: P/N 67258
TMX-2050™ display: P/N 96700-00
TM-200 Module: P/N 95060-00
TM-200 Module to display cable: P/N 93843
TM-200 Module power I/O cable: P/N 92676
TM-200 Module battery cable: P/N 92905
GFX-750™/XCN-1050: P/N 121000-XX
Power cable GFX-750/XCN-1050: P/N 110551
Base power cable: P/N 67258
NAV-900 guidance controller: P/N 108993-05
GFX-750 to NAV-900 Comms cable: P/N 110540

Required components

Kits required	Special tools
Platform kit: P/N 54035-1116	Drill
Hydraulic hose kit: P/N 86858-2000	$^{5}/_{16}$" drill bit
	$^{3}/_{8}$-16 tap
	2" hole saw
	Allen wrenches (metric and standard)
	Right angle drill or right angle extension

Antenna mounting kits

Kits required
Antenna spar mount: P/N 53676
John Deere quick release for vehicles with early style Starfire mount: P/N 84804
Antenna V plate mount – see Chapter 4, Antenna / External Receiver (if used) Installation).
Optional spar mounts (must measure application for proper part number):
• P/N 64898: Bracket, GPS Spar 16.5"– 28.5"
• P/N 55349: Bracket, GPS Spar 27.5"– 37.5"
• P/N 53676: Bracket, GPS Spar 36.5"– 46.5"
• P/N 55348: Bracket, GPS Spar 45"– 55"
• P/N 66774: Bracket, GPS Spar 54"– 64"
NOTE – For quick release mounting of the NAV-900 to a Spar mount, use P/N 110308: Bracket, NAV-900, Spar Quick Release Adapter

Accessory kits

Kits required
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
Remote engage push button: P/N 101250

Autopilot hardware organization: As shipped

Hardware	Component	See...
Platform kit: P/N 54035-1116	Hydraulic valve	Chapter 2
	Hydraulic manifold	
	Transducer flow switch	
	Manual override cable	
	Hydraulic brackets and bolt kits	
	Hydraulic valve cable	
	AutoSense™/IMD-900 steering device and cabling	Chapter 3
	AutoSense /IMD-900 mounting bracket and hardware	
	Power switch	Chapter 6
	Bolt kit controller	Chapter 8
Hydraulic hose kit: P/N 86858-2000	Hydraulic hoses	Chapter 2
	Hydraulic adaptors	
Antenna kits: • Bracket, GPS Spar 36.5" - 46.5": P/N 53676 • Ag15 antenna mounting plate (included with CFX-750 display): P/N 62034 • 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
	TMX-2050 display, GFX-750 display	
	Display cable	
	Mounting bracket	
Common parts	Controller	Chapter 8
	Controller mounting bracket	
	Cable kit: Main wiring harness Power bus auxiliary wiring harness Sonalert alarm	

Preparing the vehicle for installation

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

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

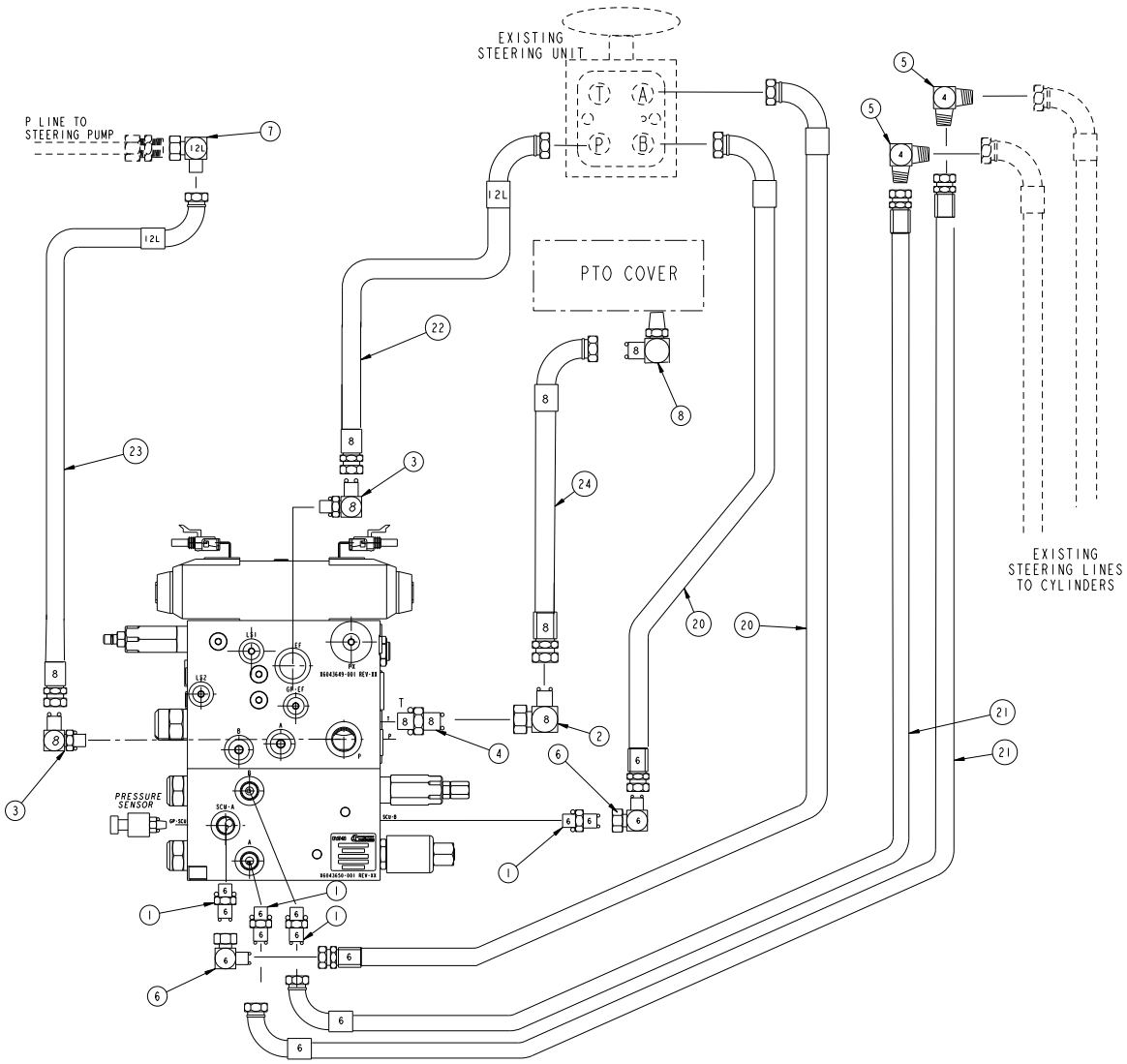
2

Hydraulic Control Valve Installation

- Hydraulic components
- Assembling the hydraulic control valve
- Mounting the hydraulic manifold
- Installing the hydraulic hose kit
- Checking the hydraulics

Hydraulic components

86858-2000 hose kit



Fittings

Item	Part number	Quantity
1	6 F5OLO	4
2	8 C6OLO	1
3	8 C5OLO	2
4	8 F5OL0	1
5	4 EMK4	2
6	6 C6LO	2
7	EW12L	1
8	8-8C4OMLO-S	1

Hoses

Item	Length (Inches)	Part number	Line	Quantity
20	124" hose	451TCJSB2-06-04-04-124	SCU-A, SCU-B	2
21	117" hose	451TC92J9-04-06-04-I 17	A, B	2
22	100" hose	451TCJSCF-8-12-6-I00	EF	1
23	90" hose	451TCJSCF-8-12-6-90	P	1
24	45" hose	451TCJSJ9-08-08-08-45	T	1

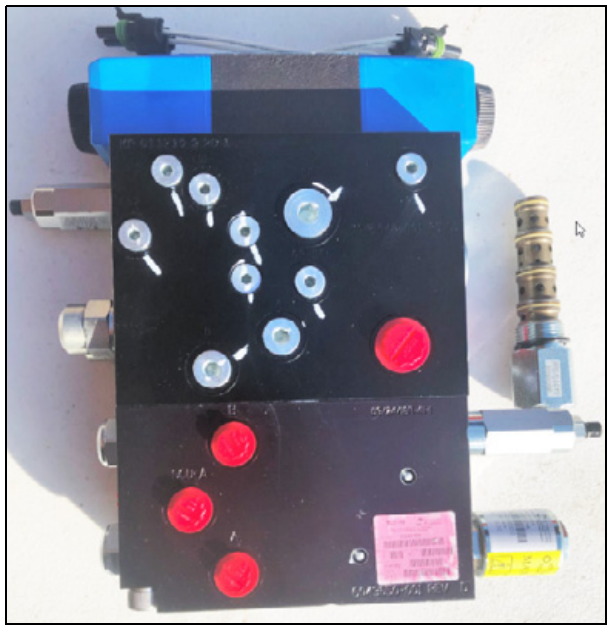
NOTE – Part numbers are Parker numbers and are for reference only.

Assembling the hydraulic control valve

Step 1

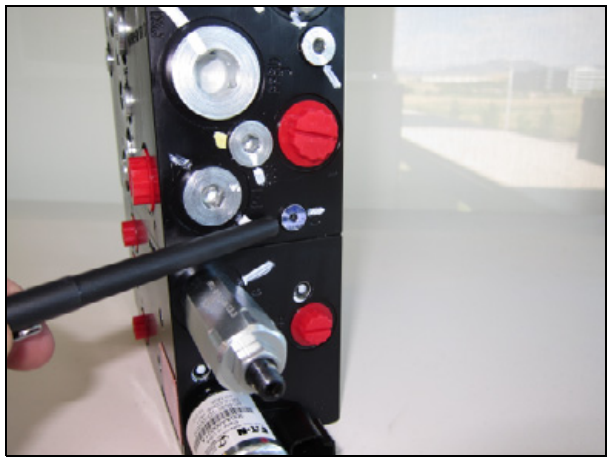
On a clean work surface gather the Autopilot manifold, PFRD cartridge and fittings.

Remove the plastic plugs from the A, B, P, T, EF, SCU-A and SCU-B.



Step 2

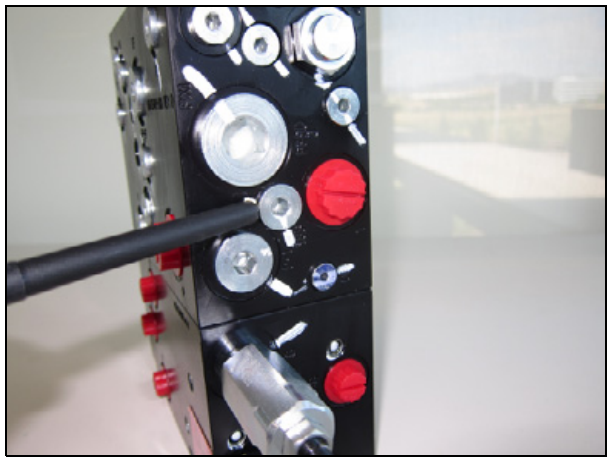
Locate and remove the orifice plug from its parking location shown here.

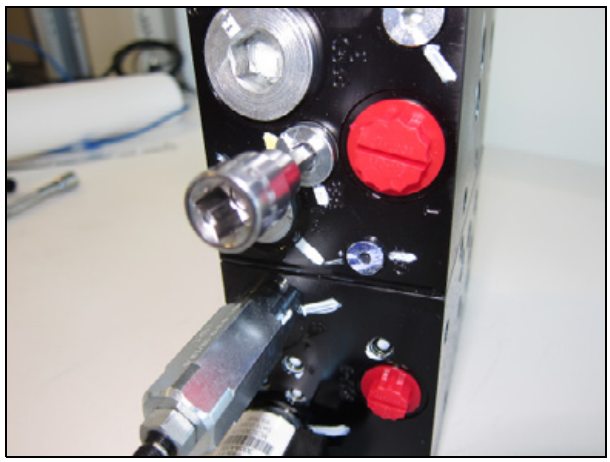


Step 3

Remove the plug from the 18B location (shown).

The orifice plug should be installed behind this plug.





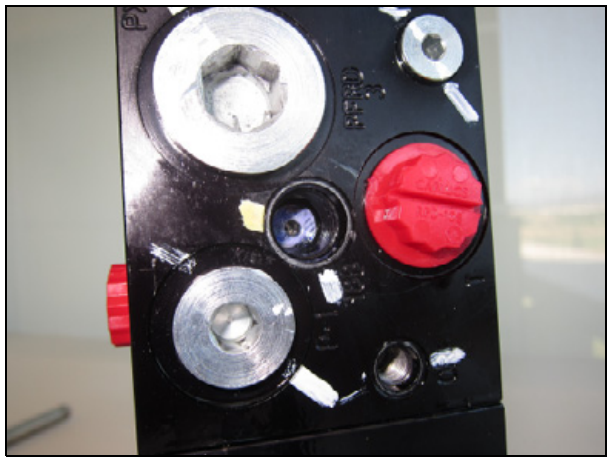
Step 4

Remove the solid plug located behind the 18B plug previously removed.



Step 5

Install the orifice plug in the location behind the 18B plug.



The solid plug may be stored in the parking location.



Step 6

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

Remove the plug from the PFRD port in the H4 manifold.



NOTE – Tape on the outside of the plug with a hammer to loosen the plug prior to removing the plug. This will make it easier to remove the plug.







Step 7

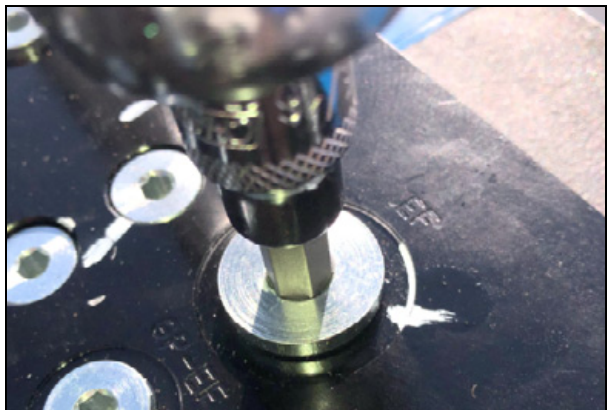
Assemble the provided 6-6 ORFS 90° fittings into the A, B, SCU-A and SCU-B ports of the Autopilot manifold.



Step 8

Remove the plug from the GP-EF port and then assemble the provided -8 ORFS 90° fitting into the GP-EF port of the Autopilot manifold.

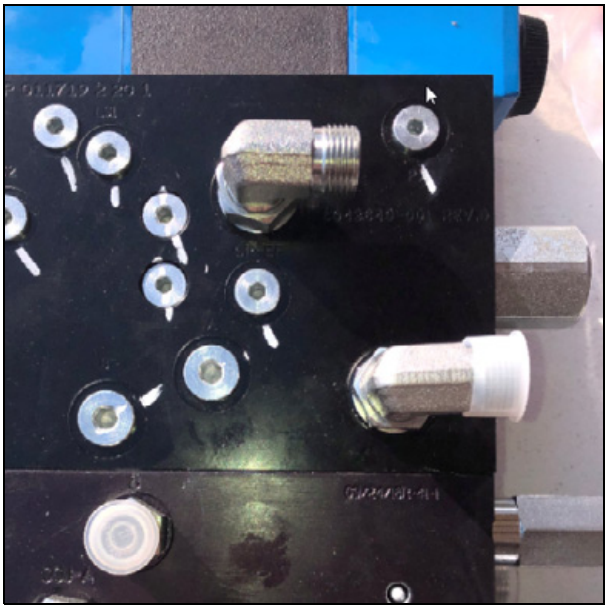
NOTE – Tape on the outside of the plug with a hammer to loosen the plug prior to removing the plug. This will make it easier to remove the plug.



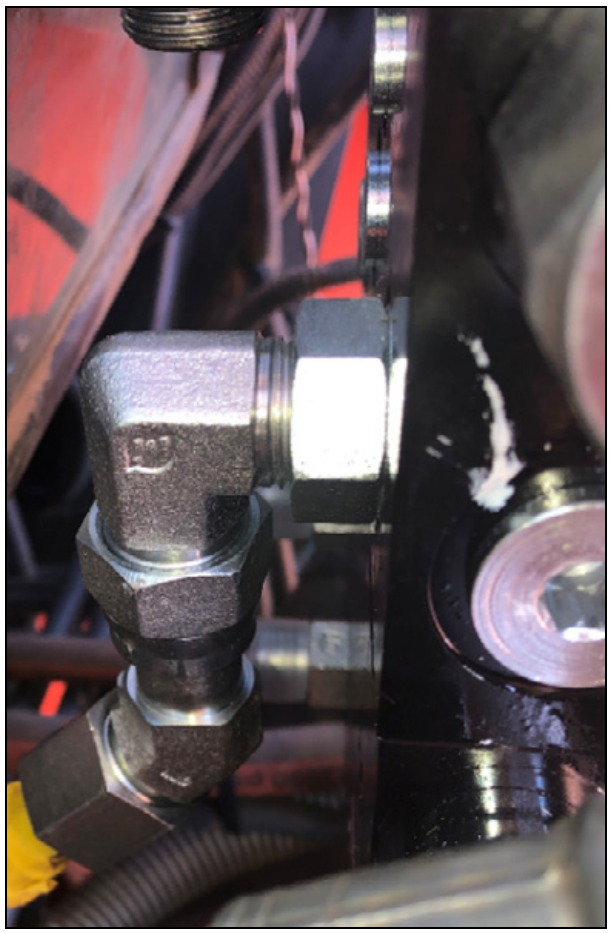


Step 9 .

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



Install a -8 ORFS 45° fitting on the P port fitting prior to connecting the hose.



Step 10

Assemble the provided -8 ORFS straight fitting into the T port of the Autopilot manifold.



Step 11

Remove the red plug from the GP-SCU port on the Autopilot manifold.

Install the provided manual override pressure transducer into the GP-SCU port.



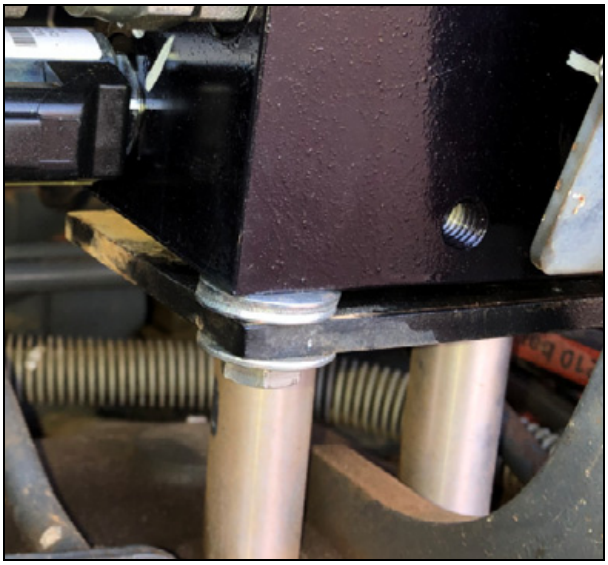
Mounting the hydraulic manifold

Step 1

Use the supplied ⅜" bolts to attach the Autopilot manifold mounting plate to the Autopilot manifold.

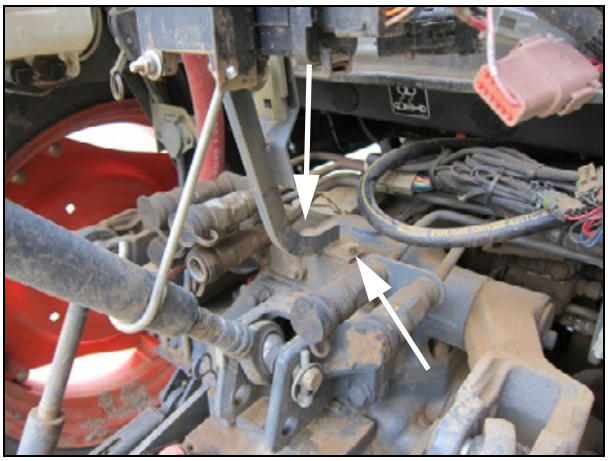


NOTE – Additional washers may need to be added between the manifold and the bracket to allow the manifold to be mounted level.



Step 2

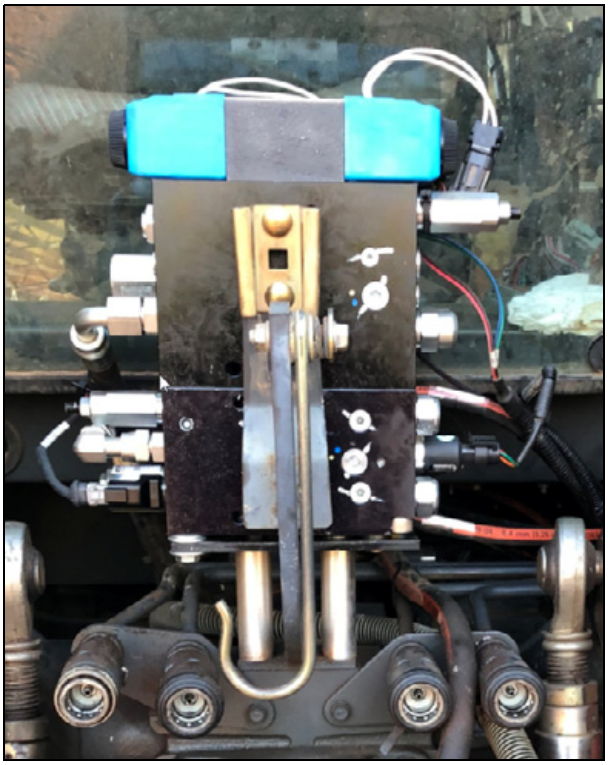
Remove the two bolts that attach the slow moving vehicle sign to the machine.



Step 3

Use the supplied m12 bolts and the supplied spacers to attach the Autopilot manifold to the machine.

Use one spacer of each length on each of the two bolt locations.



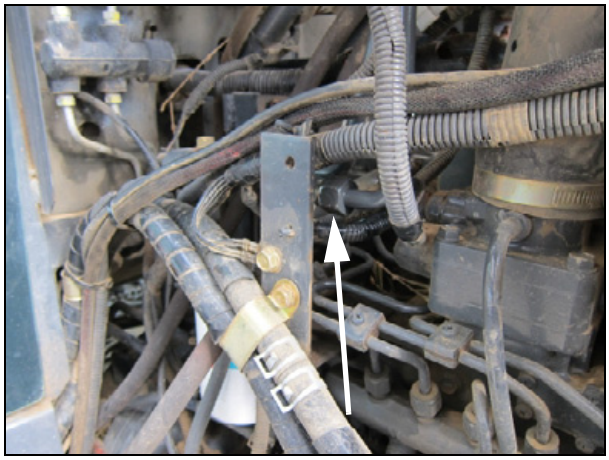
Installing the hydraulic hose kit

Pressure and EF connections

Step 1

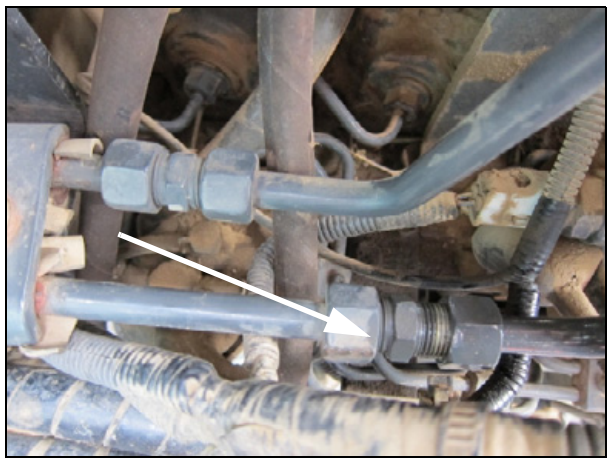
Locate the Hydraulic pressure line that goes to the steering hand pump on the side of the machine.





Step 2

Disconnect the hard line from the union fitting shown in the image on the right.



Step 3

Disconnect the other end of the hard line from the steering hand pump.



Step 4

Attach the supplied -12L swivel 90° to the pressure line with the fitting orientated upward.





Step 5

Connect the P line to the swivel 90° fitting, and then route the line under the cab to the P port of the Autopilot manifold.



Step 6

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

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



Hose connections at the Autopilot manifold

Step 1

Connect pressure line to the fitting on the P port of the Autopilot manifold.

The -8 ORFS 45° fitting is used on the P port.



Step 2

Connect the EF line to the fitting on the EF port of the Autopilot manifold.



Step 3

Connect the Tank line to the T port on the Autopilot manifold.



Step 4

Connect the 90° ends of the A and B lines to the A and B ports of the Autopilot manifold.

Connect the straight end of the SCU-A hose to the SCU-A port on the Autopilot manifold.

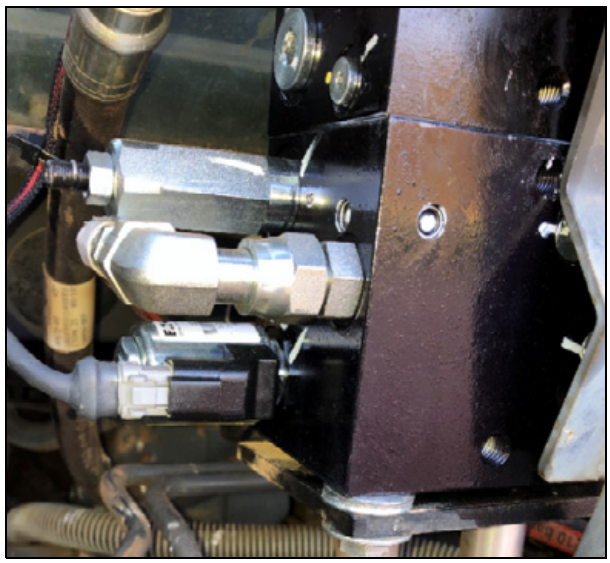
NOTE – Mark the opposite end of the hoses with colored tape or something similar so the hoses can be connected to the correct location described in the steps below.



Step 5

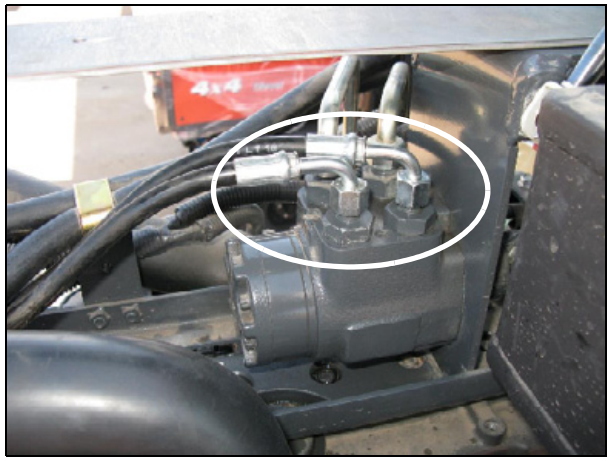
Connect the straight end of the SCU-B line to the 90° fitting on the SCU-B port of the Autopilot manifold.

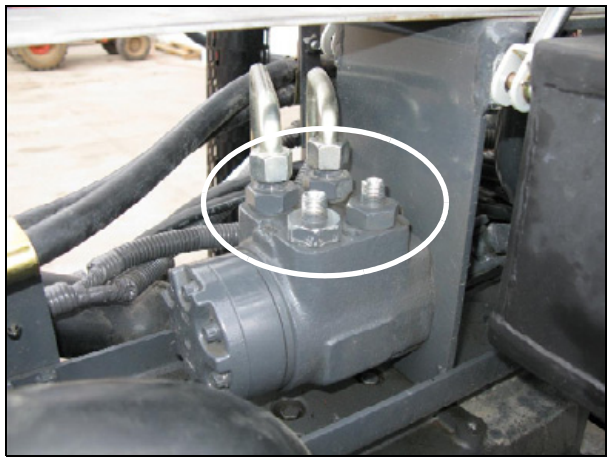
NOTE – Mark the opposite end of the hoses with colored tape or something similar so the hoses can be connected to the correct location described in the steps below.



Step 6

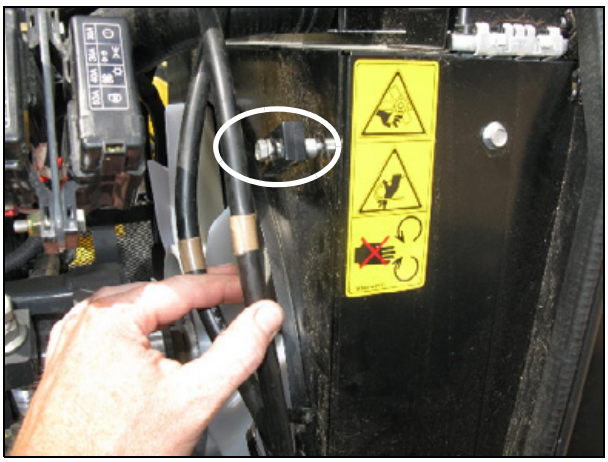
Disconnect the L and R steering lines from the hand pump and temporarily relocate both hoses.

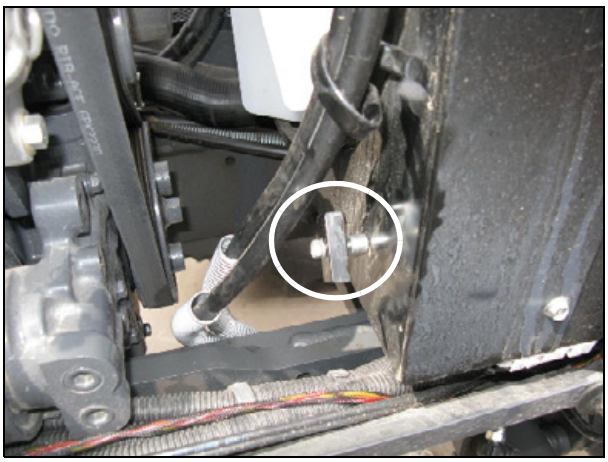




Step 7

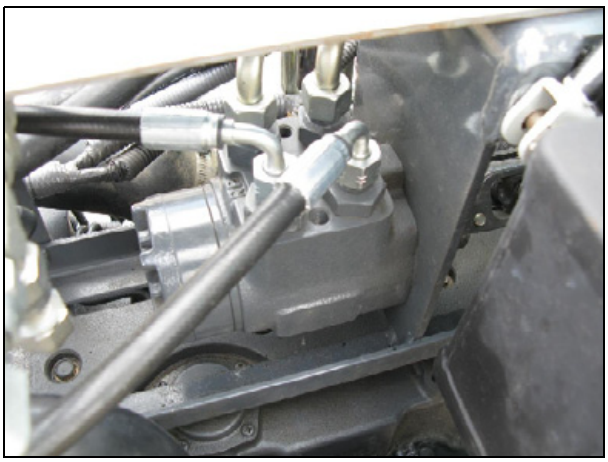
Disconnect the hold-down blocks for the L and R steering hoses on the right side of the radiator.





Step 8

Connect the supplied 124" SCU-A and SCU-B soft lines to the hand pump as shown.



Step 9

Connect the straight end of the A and B 117" soft lines to the existing tractor lines removed in the previous step. Use the supplied 4EMK4 90° fitting to attach the hoses to the 90° fitting on the tractor steering line.



Step 10

Connect the pressure sensor cable (P/N 54618) to the pressure transducer located on the manifold and then route the opposite end of the cable to the right rear of the tractor near the Autopilot manifold.

⚠ **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.



Step 11

Connect the control valve cable (P/N 54617) to the Autopilot valve solenoids.



Step 12

Remove the cable entrance plate on the right rear corner of the cab.





Cover plate removed

Step 13

Route all four cables (control valve, battery power, pressure sensor, and steering sensor), into the cab through the cable entrance.

Connect the cables to the Autopilot controller. See Chapter 8, Controller Installation.



Outside the cab



Inside the cab

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 to the manufacturer's specified level.
3. Check for hydraulic leaks. Connect the battery and then start the machine. Once you complete the leak check, disconnect the battery.

3

IMD-900 Steering Device Installation

- IMD-900 steering device components
- Installing the IMD-900 steering device
- Connecting the IMD-900 harness to the 54602 harness

This chapter describes how to install the *Ag*GPS AutoSense/IMD-900 steering device.

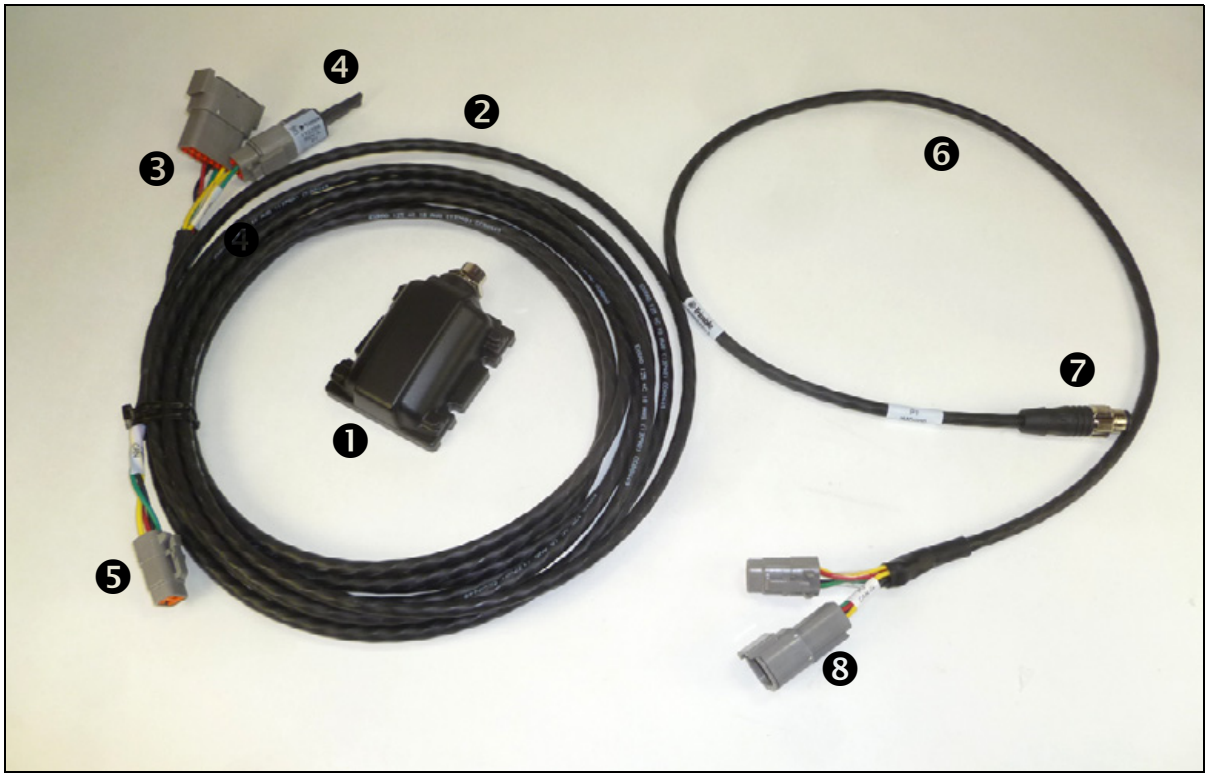
If the described mounting location is not accessible, chose a different place. To ensure proper function, the AutoSense device must be located where it is free of obstructions and can rotate with the wheels when they turn.

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, but as flat as possible is preferred.

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

IMD-900 steering device components



Item	Description
1	IMD-900 steering sensor (P/N 109256-00)
2	Cable (P/N 114675)
3	R1-CAN connector
4	CAN terminal (× 2)
5	P3 CAN connector
6	Cable (P/N 112759)
7	P1-IMD-900
8	P3/R3 CAN out/CAN in

Installing the IMD-900 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.

The IMD-900 steering device is shown on the right. Install it using the following steps.

Identify the location where you will install the IMD-900 device.

If bolts are currently installed in the location, remove them.

NOTE – Pictures in the steps below show the AutoSense sensor. The IMD-900 installs in the same location as the AutoSense.



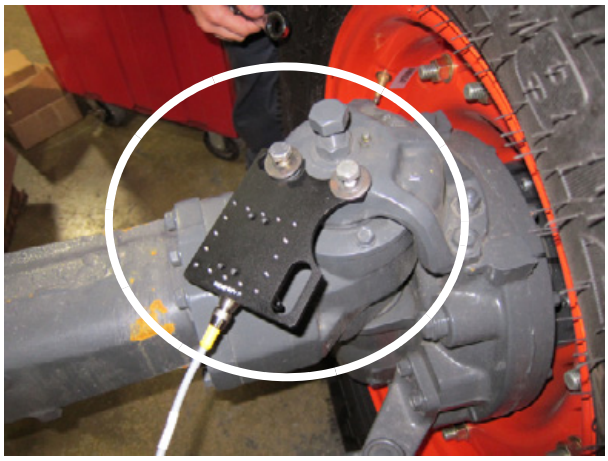
Step 1

The IMD-900 sensor will be installed at the right front of the machine.



Step 2

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



Step 3

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



M6 tractor

Step 4

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

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

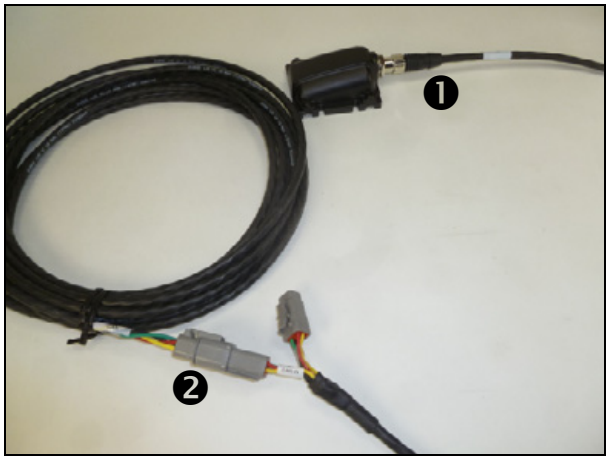


Connecting the IMD-900 harness to the 54602 harness

Step 1

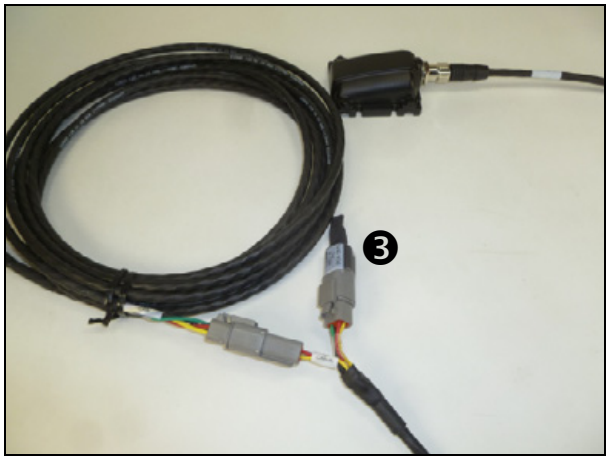
Connect the P1 connector of the 112759 cable to the IMD-900 ❶.

Connect the R3 connector to the 114675 cable ❷.



Step 2

Connect the CAN terminal to the P3 connector of the 112759 cable ❸.



Step 3

With the cable routed to the NavController, the R1 connector will connect to the P12 connector on the 54602 harness on the NavController as shown.

NOTE – There should be a terminator next to the P12 connector as well as on the 112759 cable.



4

Antenna / External Receiver (if used) Installation

- Antenna and receiver installation options
- Mounting an adjustable spar to roof bolts
- Installing the NAV-900 guidance receiver using a spar mount
- Optional: Using the P/N 110308 for quick release mounting of the NAV-900 from the spar
- NAV-900 guidance receiver: Connecting the cables - both methods
- NAV-900 guidance receiver: Connecting an external radio (as required)

To install the antenna for the 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:

- **Spar mount** – This bracket mounts directly to the roof bolts and is required for all high accuracy applications such as RTK and OmniSTAR.
- **VHB mount** – Attach a 4" x 6" plate or a V plate directly to the roof with VHB (Very High Bond) adhesive for magnetic mounting. See page 48.
- **Starfire quick release mount** – Attach the required receiver or receiver mount plate as described in the Starfire adaptor section. See page 34.
- **Magnetic mounting** – Magnetic mounting for quick release is available for both VHB and spar type mounting.

Possible mounting methods

GPS receiver	V plate on spar (removable)	VHB plate on roof (removable)	Starfire mount (removable)
CFX-750 display TMX-2050	✓	✓	✓

NOTES:

- 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.

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.

Step 1

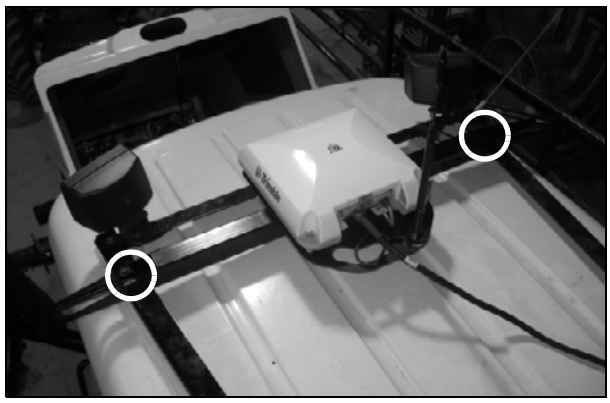
Locate the cab bolts on the roof of the vehicle.

Measure the length between the bolts on the roof of the vehicle and order the appropriate spar:

- Spar 36.5" - 46.5": P/N 53676
- Spar 54" - 64": P/N 66774

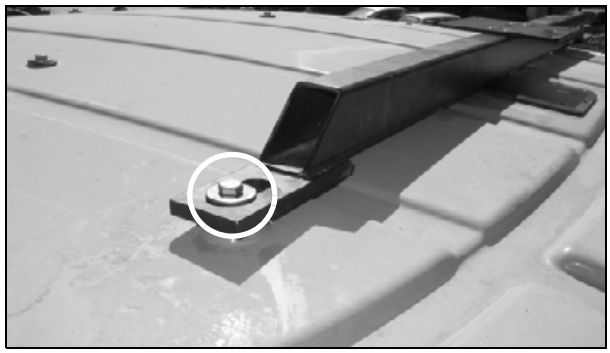


If a light bracket already occupies the roof studs, mount the spar directly onto the light bracket.

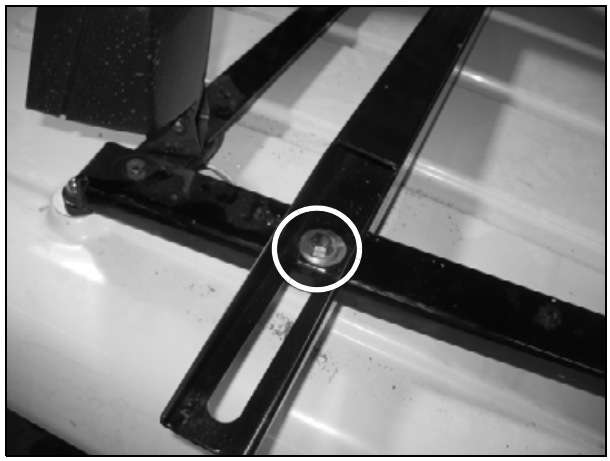


Step 2

If required, replace the existing bolts with longer bolts.



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





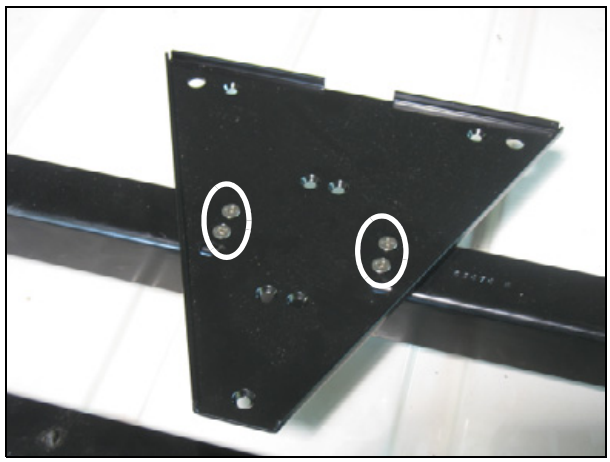
Step 3

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.

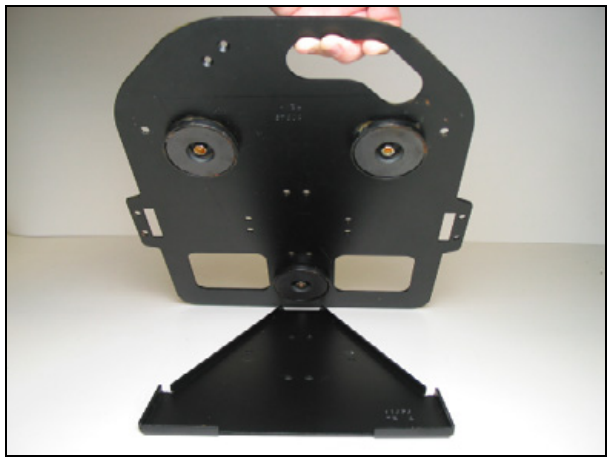
NOTE – If the receiver is offset to the left or the right of the vehicle, Autopilot system performance may be affected. Before you tighten the cab bolts, make sure that the GNSS antenna is aligned with the center of the vehicle.

Step 4

For a single magnet antenna mount, attach a V plate with four ¼" flathead screws. The narrow end points to the front of the vehicle.



V plate on the spar



Magnetic mount on the V plate

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

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

Step 1

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

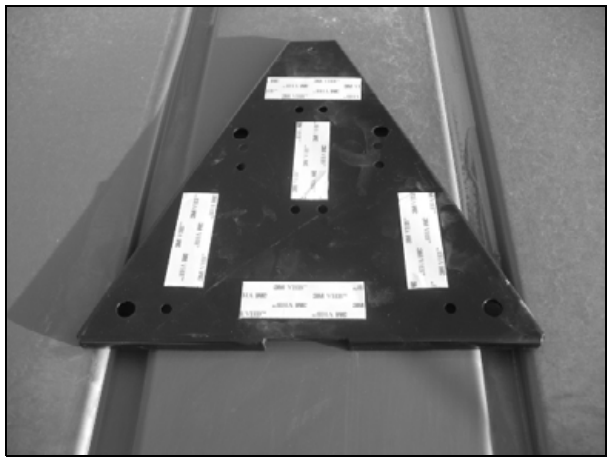


Step 2

V plate only

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

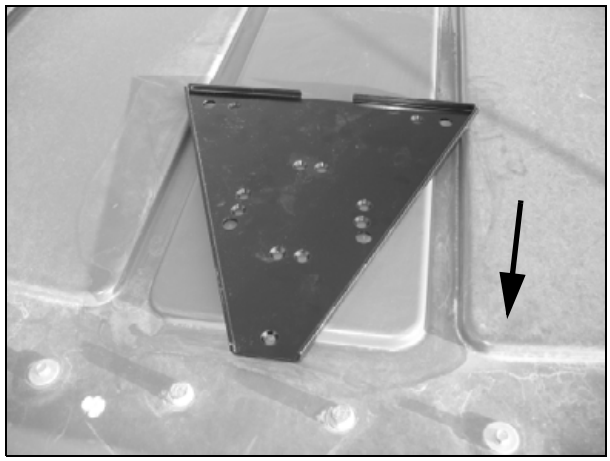
NOTE – The VHB strips are pre-applied to the 4" x 6" plate.



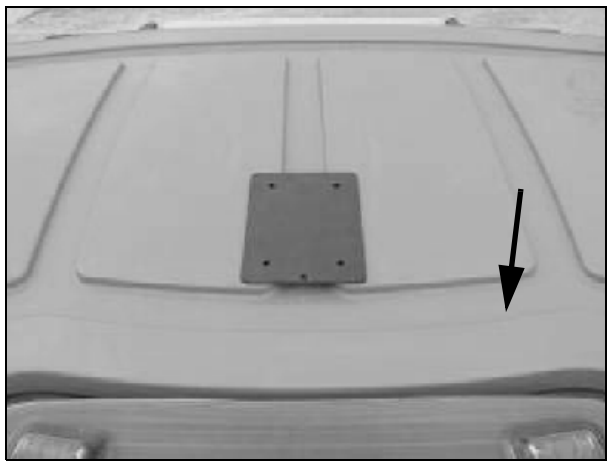
Step 3

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

NOTE – The arrow points to the front of the vehicle.



V plate



4" x 6" plate

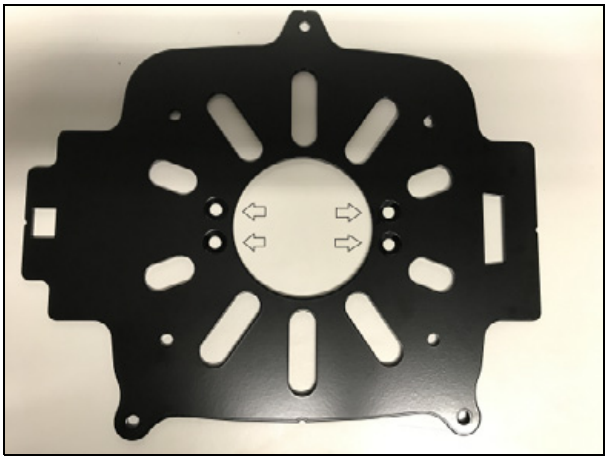
Installing the NAV-900 guidance receiver using a spar mount

For vehicles that do not have factory mounting methods or the factory mounting method is already in use, spar mounts are available to span between rigid bolts on the roof.

Lengths available are:

- P/N 64898: 16.5" – 28.5"
- P/N 55349: 27.5" – 37.5"
- P/N 53676: 36.5" – 46.5"
- P/N 55348: 45" – 55"
- P/N 66774: 54" – 64"

The guidance controller plate has a four-bolt pattern that directly attaches to the spar mounts:



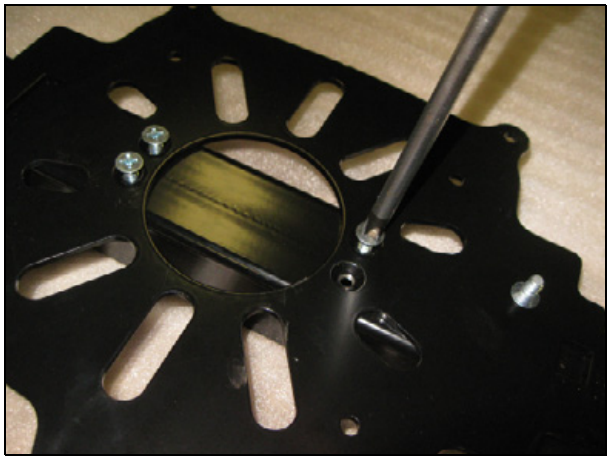
Step 1

Remove the spar from the box and lay out the hardware.



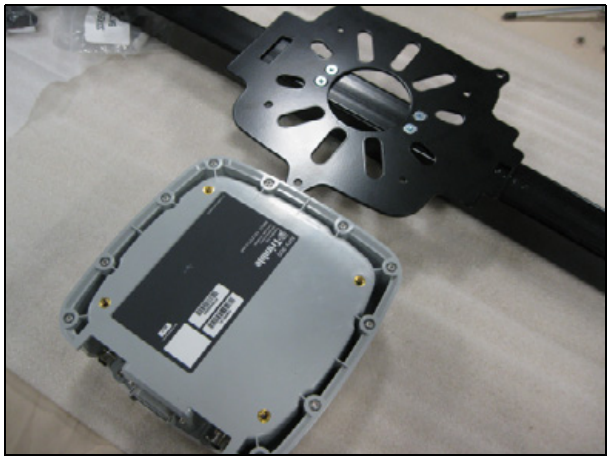
Step 2

Align the four holes on the base mounting plate with the four holes in the spar. Install the supplied ¼-20 × ½" countersunk bolts and tighten appropriately.



Step 3 .

Lay the guidance controller on its top.



Step 4

Lay the mounting plate with spar attached over on top. Attach the plate to the guidance controller with the four 6 mm bolts and lock washers. Tighten the bolts. Take care not to over-tighten the bolts as damage may result.







Step 5

Loosen and remove the large bolts on the cab that are to be used to fasten down the spar.



Step 6

Place the supplied spacer on the cab mounting point. The thickness of the spacer will vary by kit.



Step 7

Locate the provided longer bolts to be use for securing the spar. Put both the original washer and the larger provided washer on the bolt.



Step 8

Place the spar on the space and insert the bolt.



Step 9

Insert the bolt on the other side of the cab. Center the spar on the cab using a measuring tape. Then tighten the bolts.

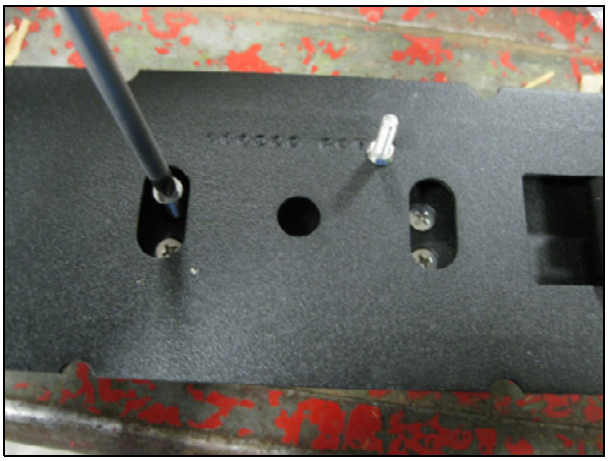




Optional: Using the P/N 110308 for quick release mounting of the NAV-900 from the spar

Step 1

Using the 4 bolts in the GFX-750 display kit, mount the Quick release bracket to the spar.



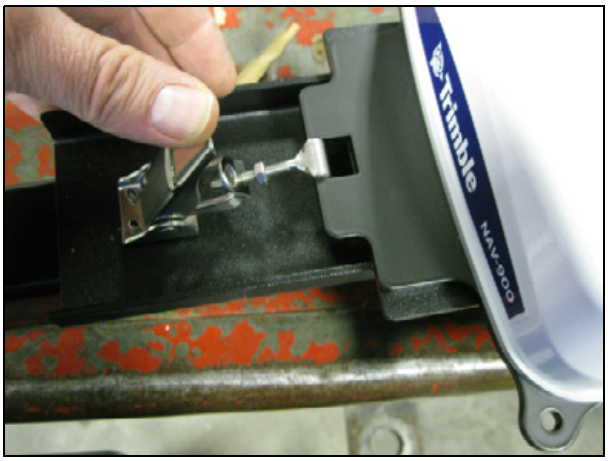
Step 2

Attach the NAV-900 base plate to the NAV-900 controller.

Step 3

Slip the slot of the base plate over the tang on the bracket and then use the latch to secure the receiver.





NAV-900 guidance receiver: Connecting the cables - both methods

Step 1

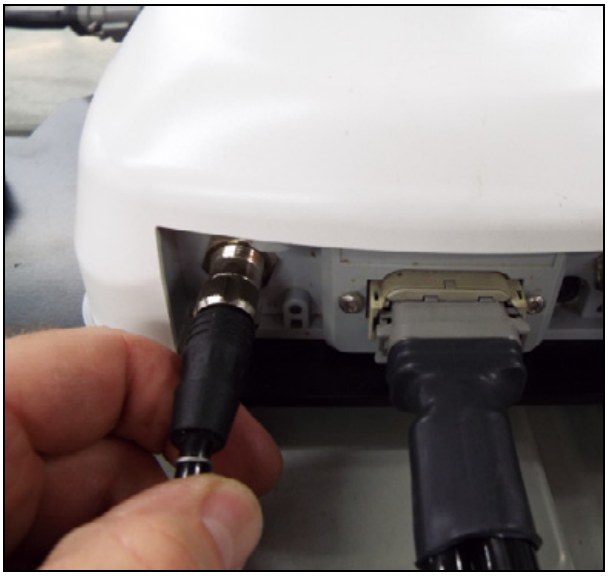
Plug the P1 connector on cable P/N 110547 into the back of the NAV-900 guidance receiver.





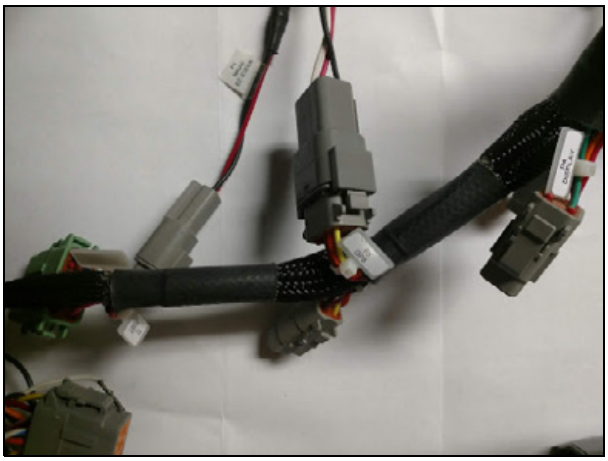
Step 2

Connect P2 of the P/N 110540 cable to the 4-pin M12 connector on the left side of the NAV-900 controller.

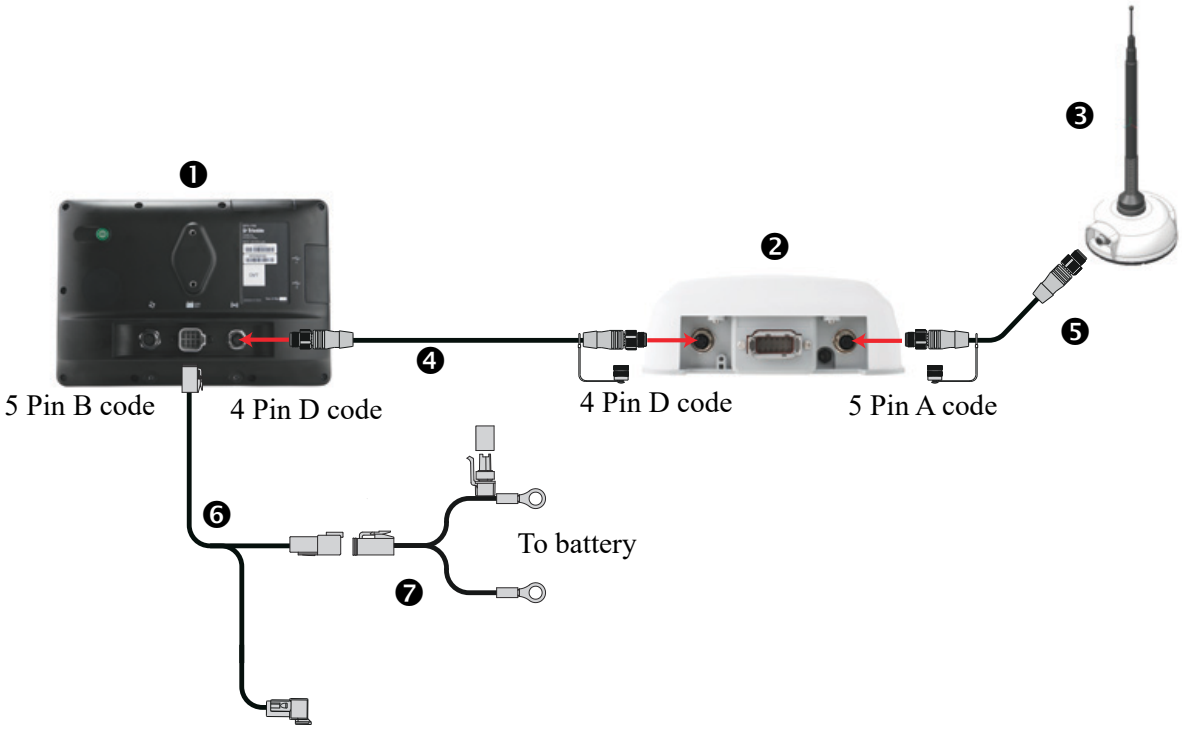


Step 3

Plug the R3 connector of P/N 110547 cable into P3 of the NavController II/III.



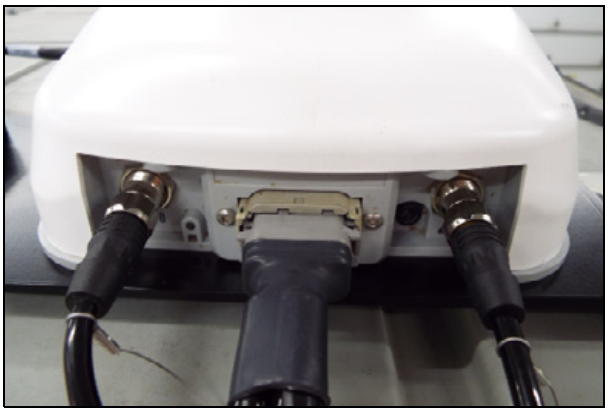
NAV-900 guidance receiver: Connecting an external radio (as required)



Item	Description	Trimble part number
1	GFX-750/XCN-1050 display, with PIQ App	121000-XX
2	NAV-900 Guidance Controller	108993-05
3	Ag-820 radio kit, 430-450 MHz Ag-820 radio kit, 450-470 MHz Ag-820 radio kit, 900 MHz	123500-44 123500-46 123500-90
4	Cable Assy, NAV-900 to in-cab RTK Radio, DTM06, 4.5 m	110540
5	Cable Assy, NAV-900 to Ag-820	113295
6	Cable Assy, GFX-750/XCN-1050, Power to display, CAN, 2.5 m	110551
7	Cable Assy, GFX-750/CFX-750/FM-750/XCN-1050/FmX/FM-1000 Basic Power, 4 m	67258

Step 1

Connect the radio interface cable (P/N 113295) to the right 5-pin M12 connector on the NAV-900 controller.



Step 2

Attach the radio to the roof or bracket in a secure fashion.

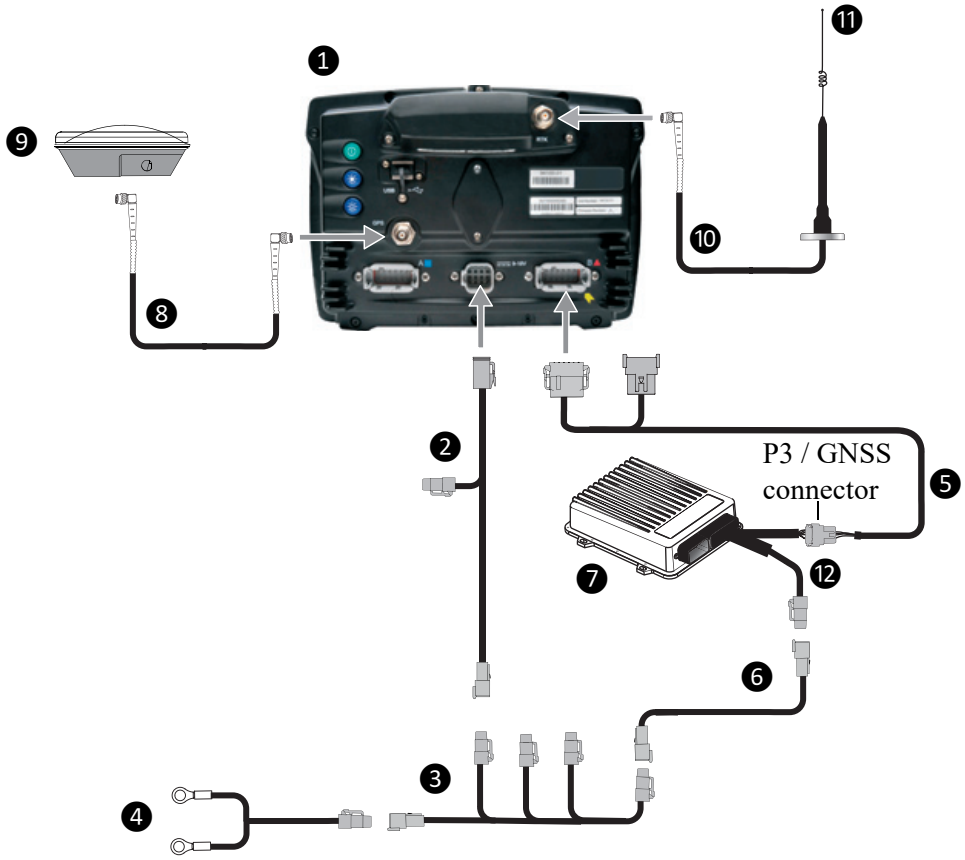


5

Display Installation

- CFX-750 display: Components
- CFX-750 display: Preparation
- CFX-750 display: Installation
- CFX-750 display: Installing the wiring harness
- CFX-750 display: Connecting accessory options
- TMX-2050 display: Components
- TMX-2050 display: Preparation
- TMX-2050 display: Installing the wiring harness
- CFX-750 and TMX-2050 displays: Installing the GNSS antenna and plate
- CFX-750 and TMX-2050 displays: Installing the RTK radio antenna
- GFX-750/XCN-1050 display: Components
- GFX-750/XCN-1050 display: Preparation
- GFX-750/XCN-1050 display: Installation
- GFX-750/XCN-1050 display: Installing the wiring harness

CFX-750 display: Components



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

Item	Description	Trimble part number
1	CFX-750 display **NOTE –** RTK password required.	93100-02
2	CFX-750 power cable	66694
3	CFX-750 power cable with relay and switch (power bus)	67259
4	Basic power cable	67258
5	to NavController cable with port replicator	75741
6	2 pin DTM to 2 pin DT power adaptor	67095
7	NavController	55563-00
8	8 m GNSS TNC/TNC RT angle cable	50449
9	AG25 GNSS antenna	77038-00
10	NMO to TNC 20ft antenna cable and base	72122
11	900 MHz radio antenna kit	22882-10
12	Main NavController cable	54601

CFX-750 display: Preparation

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.



CFX-750 display: Installation

⚠ **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.



CFX-750 display: Installing the wiring harness

Step 1

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

Step 2

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



CFX-750 display: Connecting accessory options

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.

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

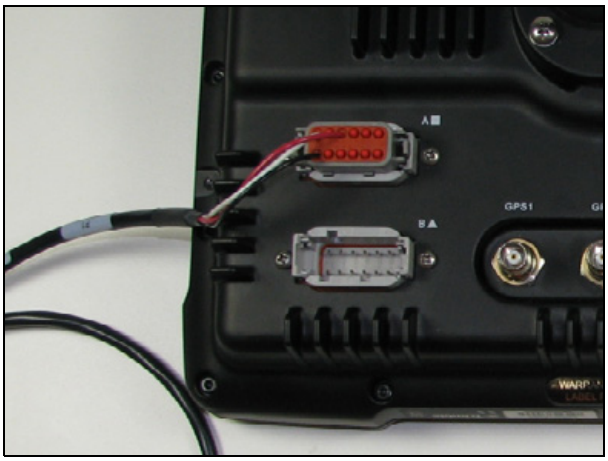
Step 3

Connect the AgCam cable to the display adaptor cable.



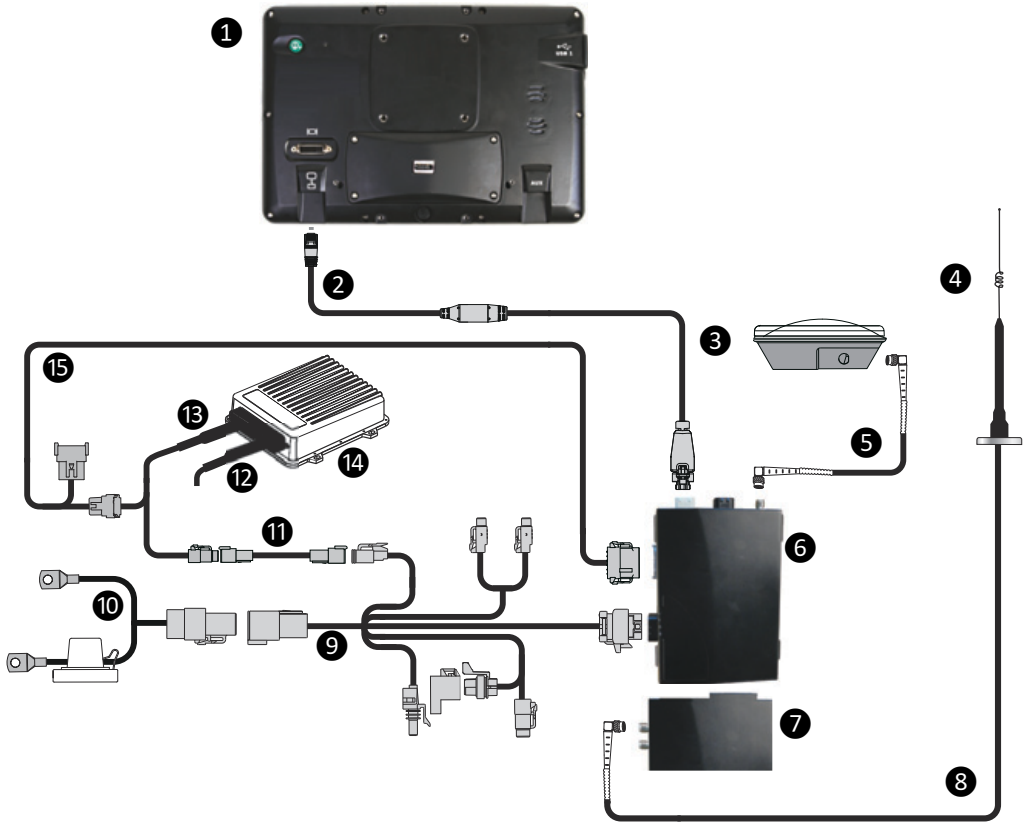
Step 4

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



TMX-2050 display: Components

This graphic shows how to connect the TM-200 Module and the Autopilot system for after-market installations.



Item	Description	Trimble part number
1	TMX-2050 display	96700-00
2	TM-200 Module to display cable	93843
3	AG-25 GNSS antenna	77038-00
4	900 MHz radio antenna kit	22882-10
5	8 m GNSS TNC/TNC RT angle cable	50449
6	TM-200 Module	95060-00
7	AG-815 radio	
8	NMO-to-TNC 20 ft antenna cable and base	72122
9	TM-200 Module power and I/O cable	92676
10	Cable, battery	92905
11	2-pin DTM to 2-pin DT power adapter cable	67095
12	Cable, NavController diagnostic	54602
13	Main NavController cable	54601
14	NavController	55563-00 55566-00
15	TM-200 Module to NavController cable with port replicator	75741

TMX-2050 display: Preparation

The display mount attaches to a rail in the cab of the vehicle. The TMX-2050 display connects to the display mount.

The TM-200 Module connects to the display with a single cable.

Additional components to install depend on your connection and correction services, and the features you are using.

⚠ **CAUTION –** Make sure the vehicle power is off when you are connecting system components.

Installing the display and mount

Use the mounting hardware supplied in the display kit to mount the display in the vehicle cab.

⚠ **CAUTION –** Make sure the vehicle power is off when you are connecting system components.

Before completing installation steps, select a position in the cab where the bar mount (4) can be attached to a rail. Hold the display in the selected location and make sure that it:

- Is easy to see, but does not block the driver's view.
- Is within the driver's reach so that the USB drive is easy to remove and replace.
- Does not interfere with the driver getting in or out of the cab, or any other activities.

Item	Description
1	Mounting plate
2	Zirkona mount
3	Tightening arm
4	Bar mount



Step 1

Locate the TMX-2050 display and the Zircona mount and mounting hardware.



Step 2

Use the provided hardware to attach the Zircona mount to the display as shown





Step 3

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



Step 4

The Zircona mount has a tightening arm ❸. Loosen the arm to let the display move on the mount.

Step 5

Adjust the TMX-2050 display until it is positioned where you want it.

Turn the tightening arm clockwise to tighten the Zircona mount and lock the display in the desired position.

Step 6

Connect the display cable to the display.



Step 7

Route the other end of the display cable to the TM-200 Module and then connect it to the TM-200 Module.



TMX-2050 display: Installing the wiring harness

⚠ **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 P5 and P2 connectors on the harness, P/N 106111, to the TM-200 Module.

Step 2

On the TM-200 Module locate the display connection point.



Step 3

Connect the display cable P/N 93843 to the TM-200 Module.



Step 4

Route the cable between the TMX-2050 display and the TM-200 Module.



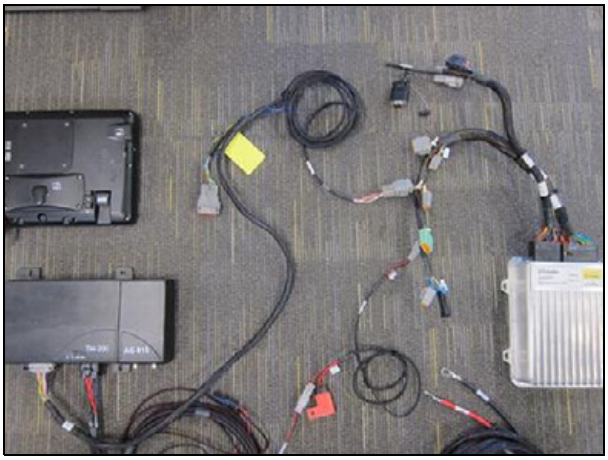
Step 5

Locate the Port labeled **A** on the TM-200 Module and then connect NavController connection cable, P/N 75741.



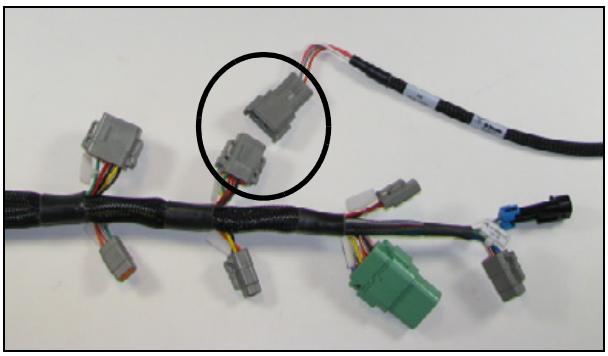
Step 6

Route the other end of the P/N 75741 cable to the plug on the P/N 54601 harness labeled **GPS**.



Step 7

Connect the cable to the P3 connector on the NavController main harness.



CFX-750 and TMX-2050 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 12.

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 and receiver installation options, page 45.

Use a $^{5}/_{8}$" bolt to attach the AG25 antenna to the spar, as shown.

Measure the length between the bolts on the roof of the vehicle and order the appropriate spar:

- Spar 36.5" - 46.5": P/N 53676
- Spar 54" - 64": P/N 66774



VHB adhesive method

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

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

Step 1

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

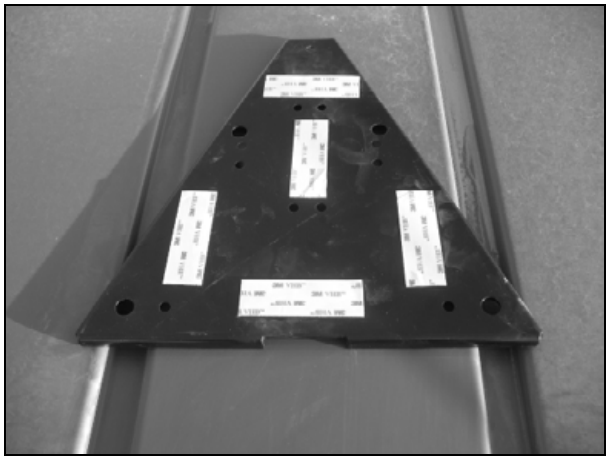


Step 2

V plate only

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

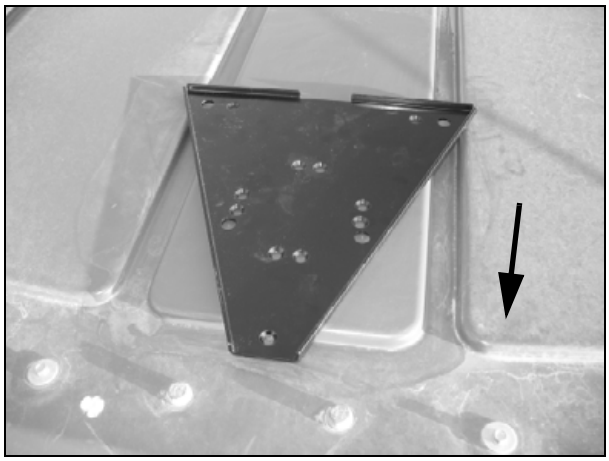
NOTE – The VHB strips are pre-applied to the 4" x 6" plate.



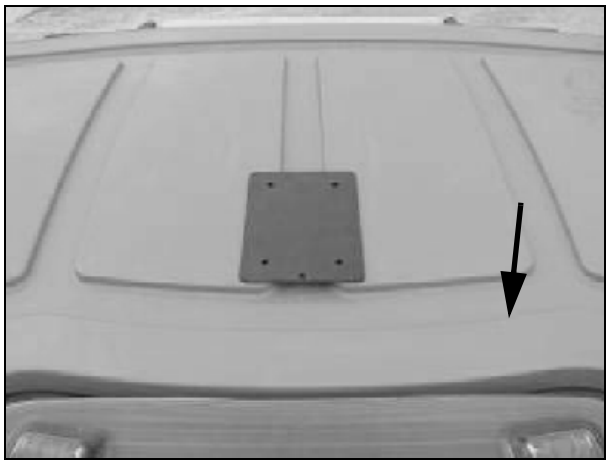
Step 3

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

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



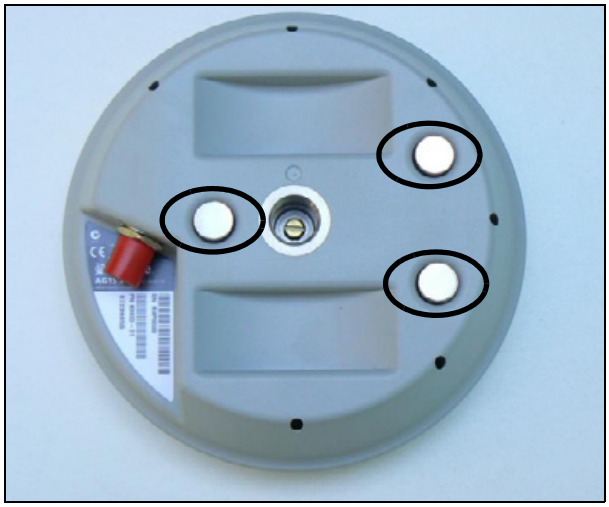
V plate



4" x 6" plate

Step 4

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



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



Step 5

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 4" x 6" plate.



Step 6

Both models

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



CFX-750 and TMX-2050 displays: Installing the RTK radio antenna

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

Step 1

Connect the radio antenna to the magnetic antenna base



Step 2

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

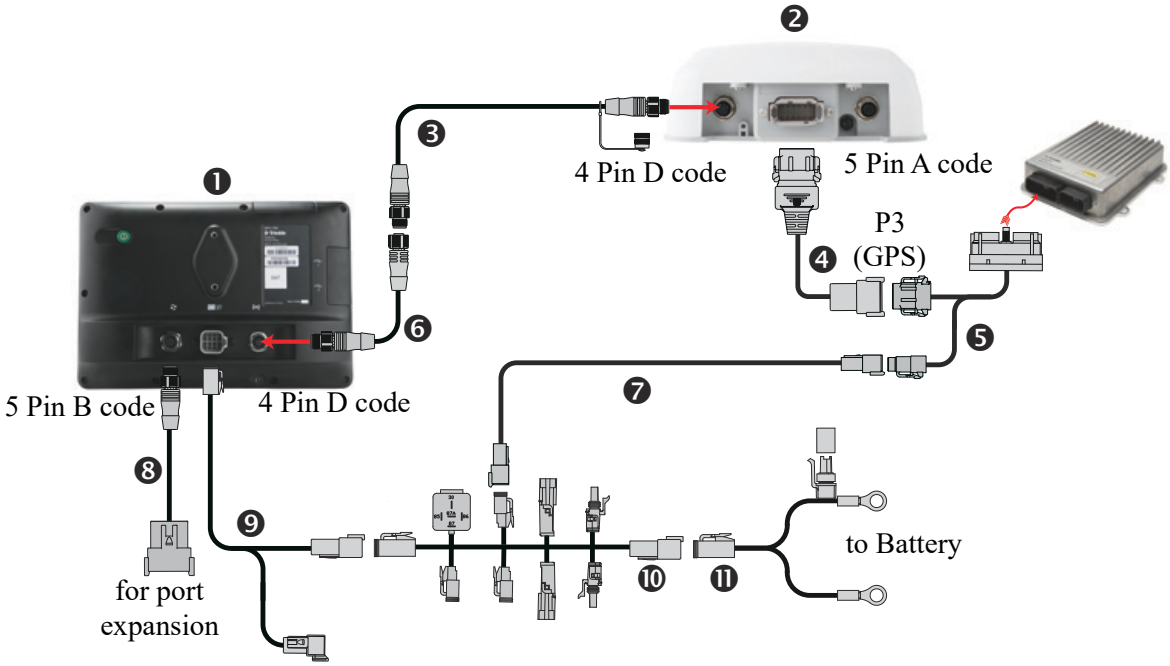


Step 3

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

GFX-750/XCN-1050 display: Components

This graphic shows the Autopilot system using NAV-900 as an external guidance device.



Item	Description	Trimble part number
1	GFX-750/XCN-1050 display, with PIQ App	121000-XX
2	NAV-900 Guidance controller	108993-05
3	Cable Assy, GFX-750/XCN-1050 to NAV-900, Power/Ethernet (BRR), 5 m	110540
4	Cable Assy, NAV-900 to Nav II/III, AutoPilot™	110547
5	Cable, NavController II/III, Main	54601
6	Cable Assy, GFX-750/XCN-1050 to NAV-900, Power/Ethernet (BRR) Extension, 2.5 m. Optional extension for large vehicles	112082
7	Cable Assy, 2 PIN DTM to 2 PIN DT Power Adapter	67095
8	Cable Assy, GFX-750/XCN-1050, Expansion Port Basic, RS-232, Dig I/O, 2.5 m	110545
9	Cable Assy, GFX-750/XCN-1050, Power to display, CAN, 2.5 m	110551
10	Cable Assy, GFX-750/CFX-750/FM-750/XCN-1050/FmX/FM-1000 Power with Relay and Switch (Acc)	67259
11	Cable Assy, GFX-750/CFX-750/FM-750/XCN-1050/FmX/FM-1000 Basic Power, 4 m	67258

GFX-750/XCN-1050 display: Preparation

The GFX-750/XCN-1050 display utilizes the RAM mount system.



Attach the diamond-based ram mount to the back of the display using the provided fasteners.



GFX-750/XCN-1050 display: Installation

Step 1

Use the provided V bolts or other hardware (not provided) to attach the RAM base to a mounting bar or bracket.



Step 2

Use the provided arm clamp to secure the RAM ball base mount to the display backplate RAM mount ball.

Adjust the display for easy viewing and interaction.





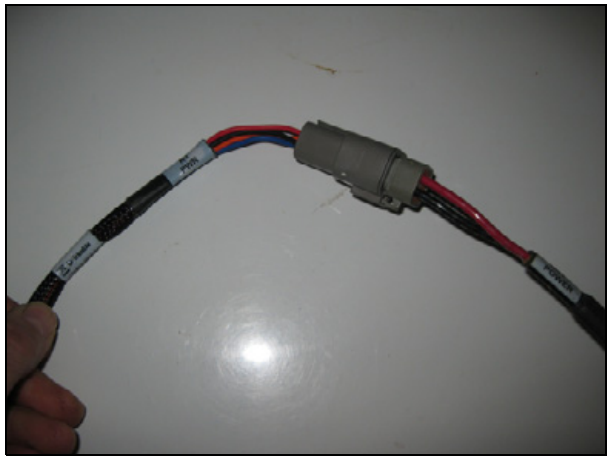
GFX-750/XCN-1050 display: Installing the wiring harness

The GFX-750 display requires a nominal 12 volt power source. The P/N 67258 cable has ring terminal leads for connecting to a battery or other cable mount point.

⚠ **WARNING –** If the machine has a master electrical disconnect, ensure that the display/receiver will be disconnected from the battery when the master disconnect is used. Failure to do so may result in hardware damage and void warranty. Additionally, it is suggested to utilize power terminals located within the cab of the vehicle that ground in the same location as the cab components to avoid ground shifts between the display and any vehicle ECUs.

Step 1

Connect the other 4-pin Deutsch connector of cable P/N 110551 to the P/N 67258 base power cable.



Step 2

Connect the 6-pin DT power/CAN cable P/N 110551 to the middle port of the display.



Step 3

Connect the 4-pin M12 connector to the 4-pin receiver connector. Note the Keying and number of pins.



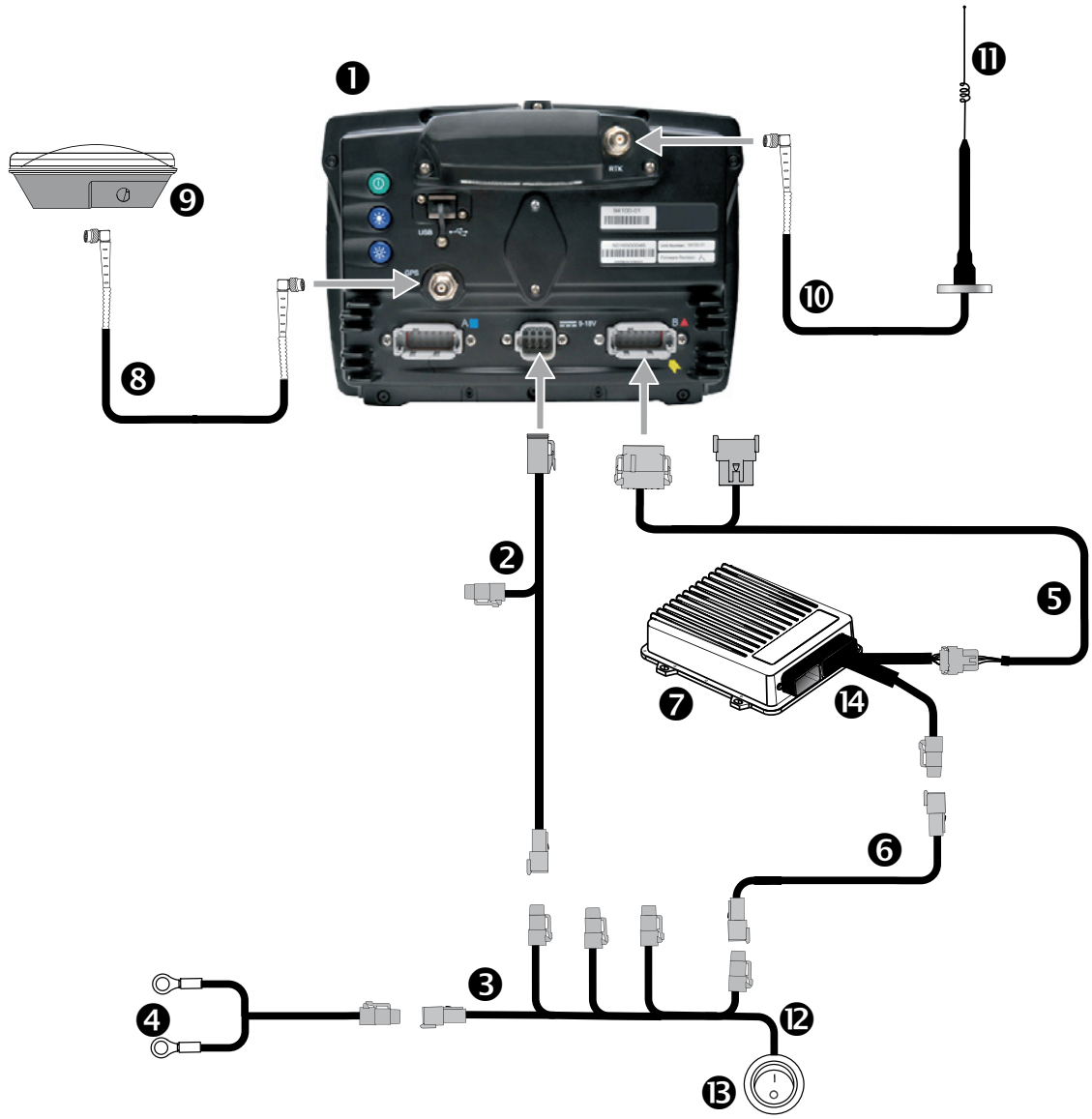


6

Power Harness Installation

- CFX-750 display: Components
- CFX-750 and GFX-750 displays: Installing the power harness
- CFX-750 and GFX-750 displays: Configuring the power bus options
- TMX-2050 display: Components
- TMX-2050 display: Installing the power harness
- TMX-2050 display: Configuring the power options

CFX-750 display: Components



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

Item	Description	Trimble part number
1	CFX-750 display **NOTE –** RTK password required.	94100-02
2	CFX-750 power cable	77282
3	CFX-750 power cable with relay and switch (power bus)	67259
4	Basic power cable	67258
5	CFX-750 to NavController cable with port replicator	75741

Item	Description	Trimble part number
6	2 pin DTM to 2 pin DT power adaptor	67095
7	NavController	55563-00
8	8 m GPS TNC/TNC RT angle cable	50449
9	AG25 GNSS antenna	77038-00
10	NMO to TNC 20ft antenna cable and base	62120
11	900 MHz radio antenna kit	22882-10
12	External switch cable included with kit	Part of P/N 67259
13	External switch included with kit	Part of P/N 67259
14	Main NavController cable	54601

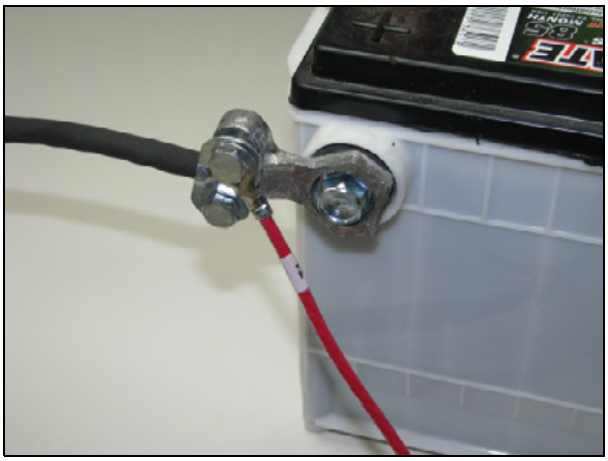
CFX-750 and GFX-750 displays: Installing the power harness

NOTE – Unless otherwise stated, instructions for "the display" refer to either the CFX-750 display or the GFX-750 display.

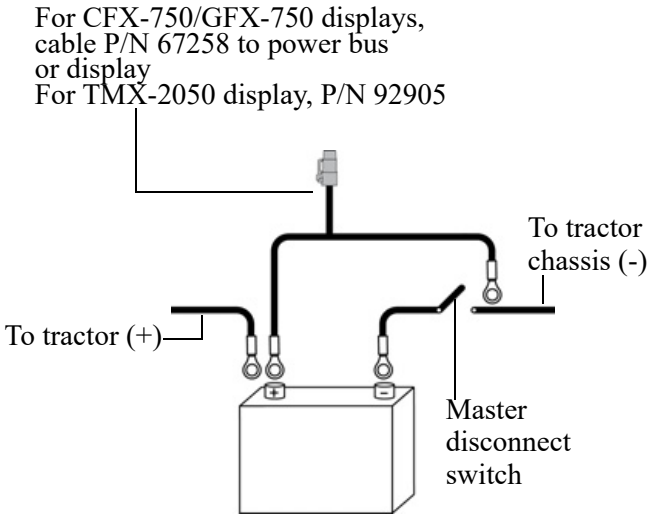
⚠ **WARNING –** To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information chapter.

Step 1

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

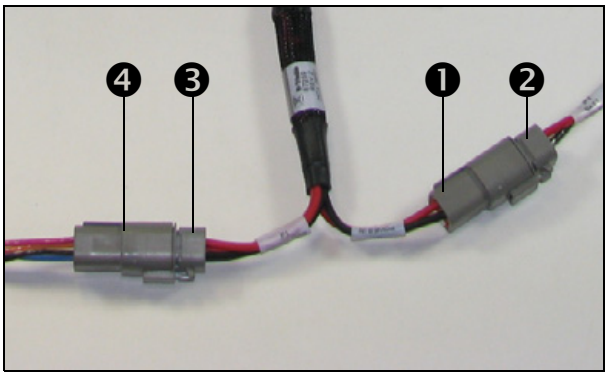


⚠ **CAUTION –** If the vehicle has a master electrical disconnect, make sure the basic power cable (P/N 67258 / 92905) is *not* directly attached to the battery terminal that is disconnected by the master switch - the negative pole in this example.
Attach this terminal side just past the main disconnect 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

CFX-750 and GFX-750 displays: Configuring the power bus options

NOTE – Unless otherwise stated, instructions for "the display" refer to either CFX-750 display. or the GFX-750 display.

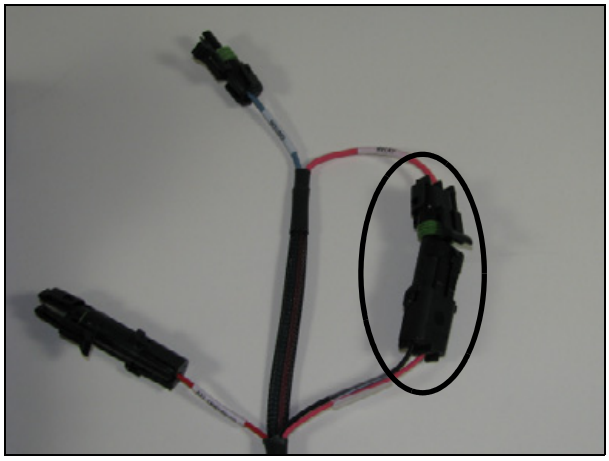
⚠ **WARNING –** To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information chapter.

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.

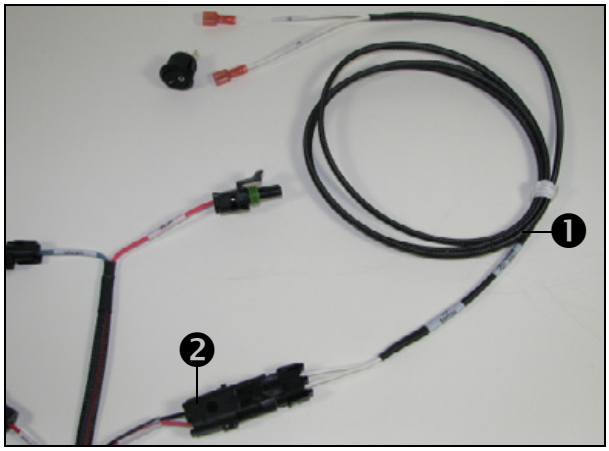


External switch is used to turn on the Autopilot system

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.

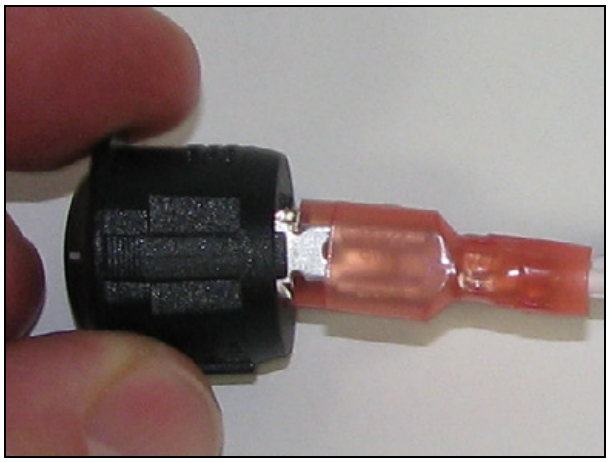
NOTE – To install the switch provided, drill a ¾" hole.



Step 2

Connect the cable labeled **R7** to the switch pins.

NOTE – Polarity is not important.

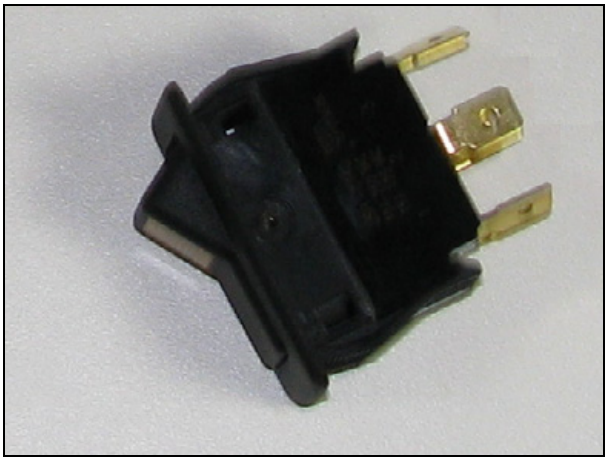


Installing the optional illuminated full or standard Euro switch

Step 1

Find an available knockout location on the vehicle console.

NOTE – An alternative location is required for the switch provided.

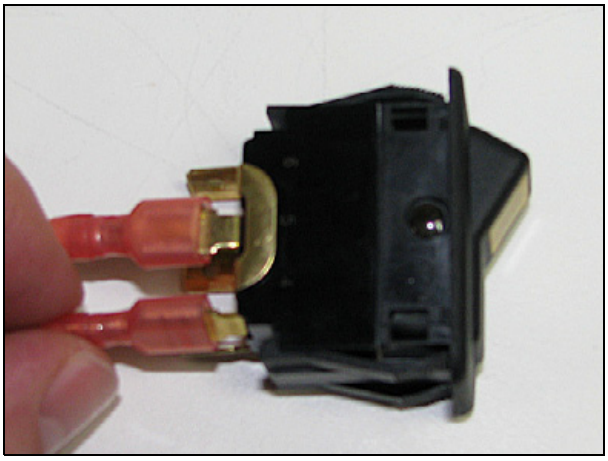


Step 2

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

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

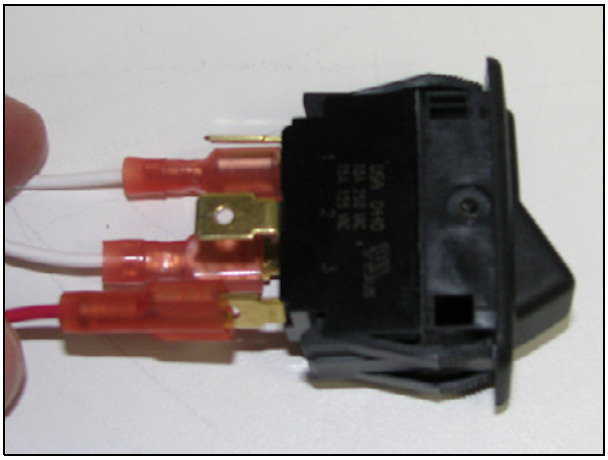
NOTE – Polarity is important.



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.

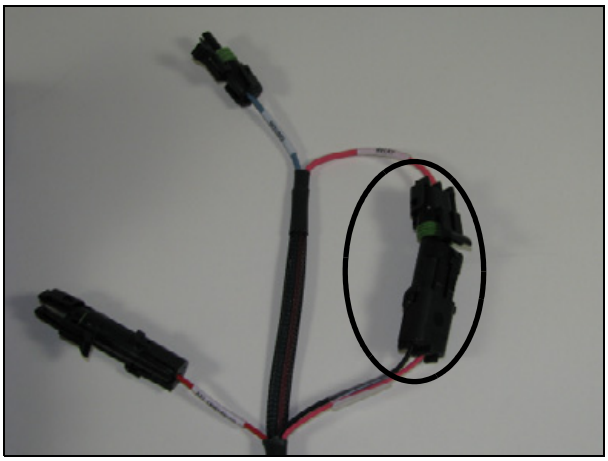
NOTE – This additional wire is required to allow the switch to illuminate.



Ignition is used to turn on the Autopilot system

Step 1

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

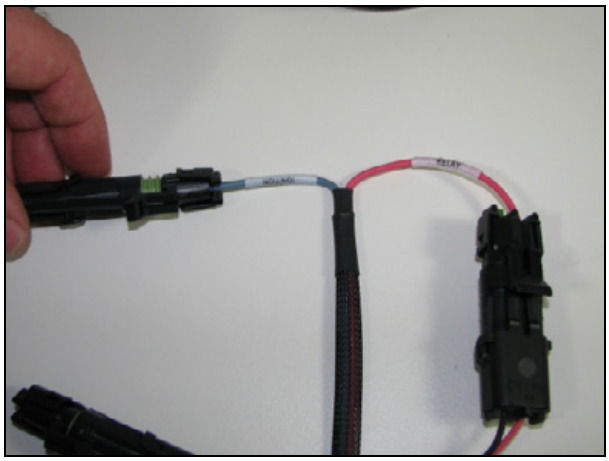


Step 2

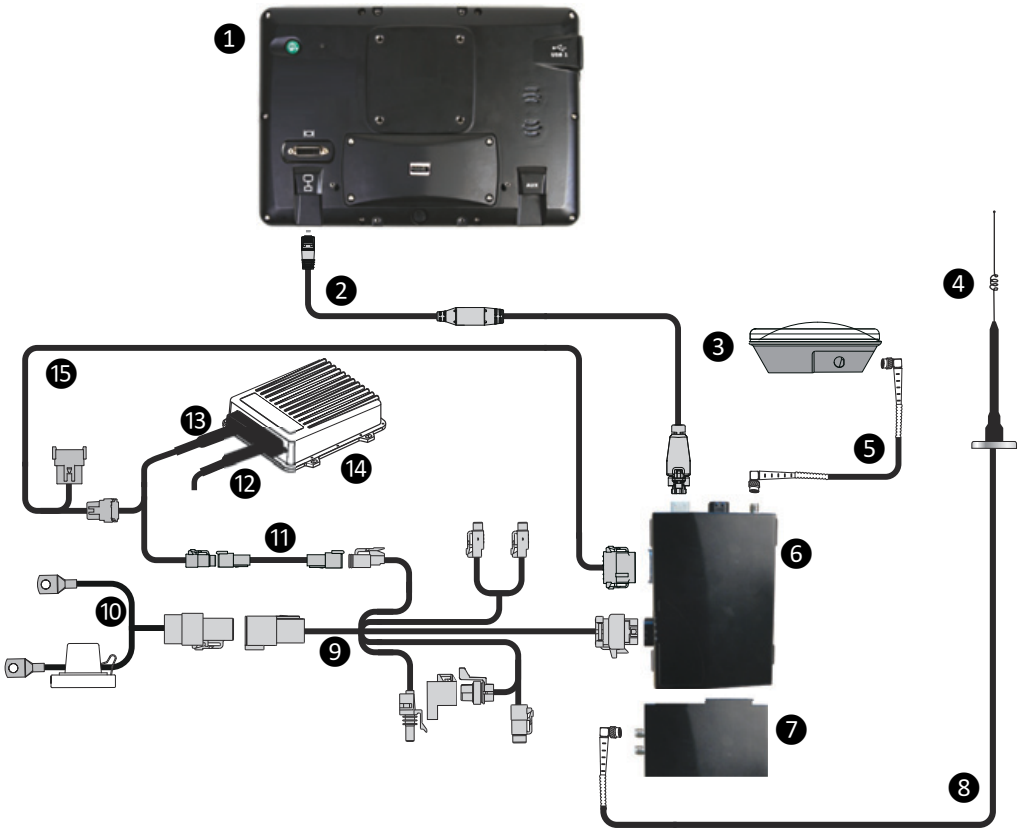
Connect the cable labeled **R8 Ignition** (included with the power bus) to connector **P3 Ignition** on the power bus.

Step 3

Route the cable to the vehicles ignition.



TMX-2050 display: Components



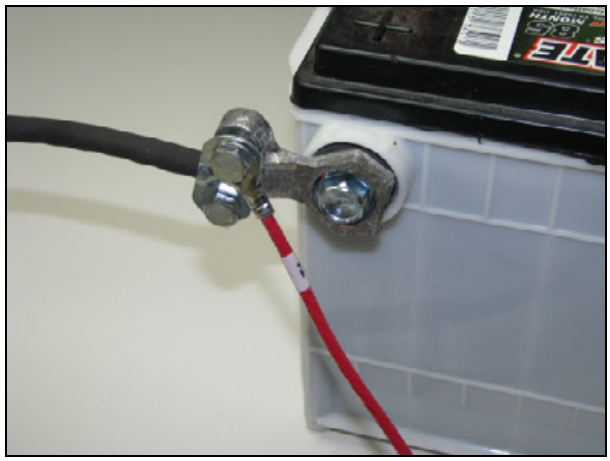
Item	Description	Trimble part number
1	TMX-2050 display	96700-00
2	TM-200 Module to display cable	93843
3	AG-25 GNSS antenna	77038-00
4	900 MHz radio antenna kit	22882-10
5	8 m GNSS TNC/TNC RT angle cable	50449
6	TM-200 Module	95060-00
7	AG-815 radio	
8	NMO-to-TNC 20 ft antenna cable and base	72122
9	TM-200 Module power and I/O cable	92676
10	Cable, battery	92905
11	2-pin DTM to 2-pin DT power adapter cable	67095
12	Cable, NavController diagnostic	54602
13	Main NavController cable	54601
14	NavController	55563-00 55566-00
15	TM-200 Module to NavController cable with port replicator	75741

TMX-2050 display: Installing the power harness

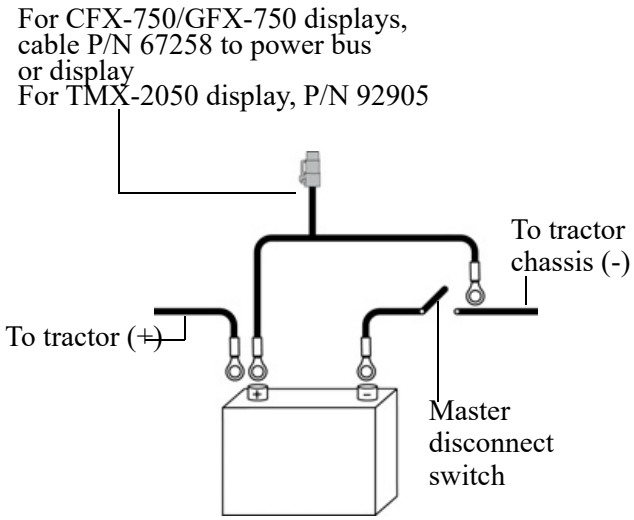
⚠ **WARNING –** To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

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 / 92905) 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.



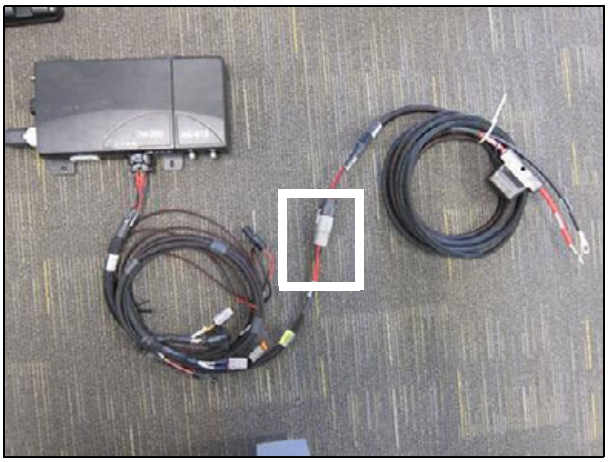
Step 2

Connect the power I/O cable P/N 92676 to the power port on the TM-200 Module.



Step 3

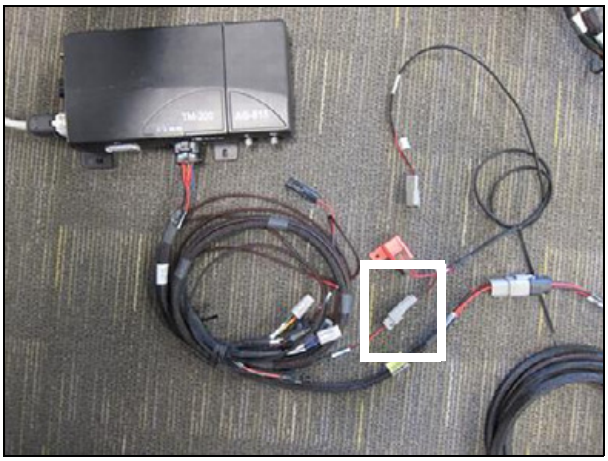
Route the power cable P/N 92905 that you previously connected to the battery and connect it to the R3 power in plug on the P/N 92676 cable.



Step 4

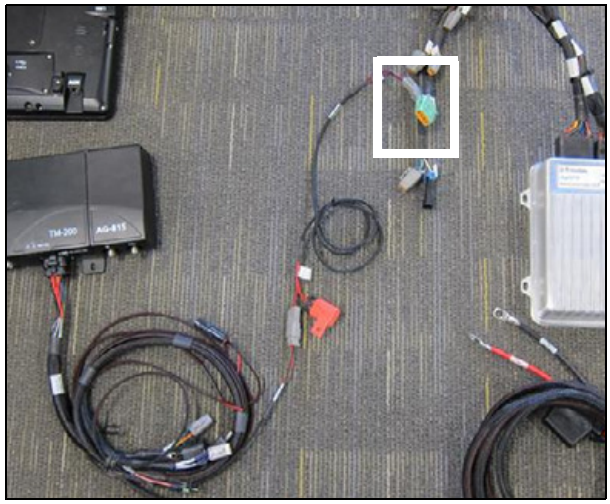
Connect the 2-pin DTM to 2-pin DT power adaptor P/N 67095 to the P2 power out connector on the P/N 92676 cable.

Route the other end to the NavController harness P/N 54601.



Step 5

Connect the other end of the P/N 67095 cable to the P2 power plug on the P/N 54601 cable.



TMX-2050 display: Configuring the power options

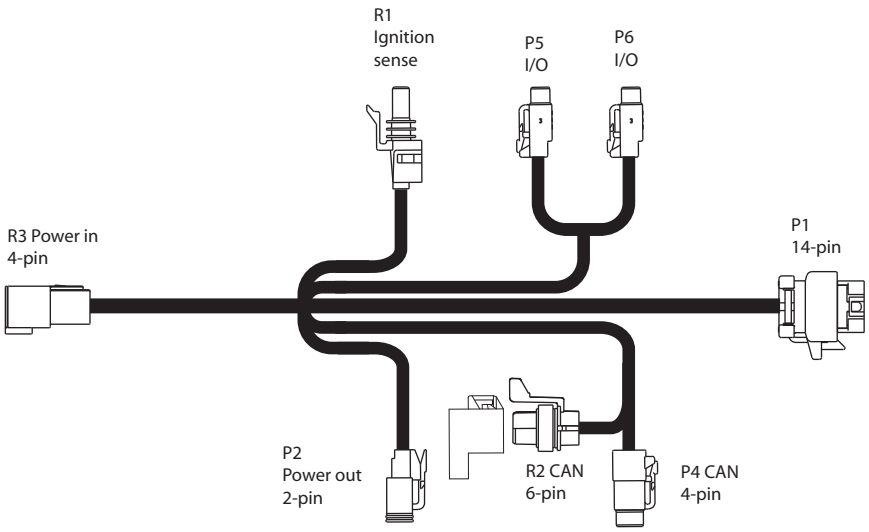
⚠ **WARNING –** To avoid potentially serious personal injury or illness, and to prevent damage to equipment, make sure that you read and understand the Safety Information.

When you use the power bus cable, use one of the following methods to turn on the Autopilot system on the Trimble
TMX-2050 displays:

- The display power button. No further changes need to be made to the power cables.
- Ignition sensing. See below.

Ignition sensing

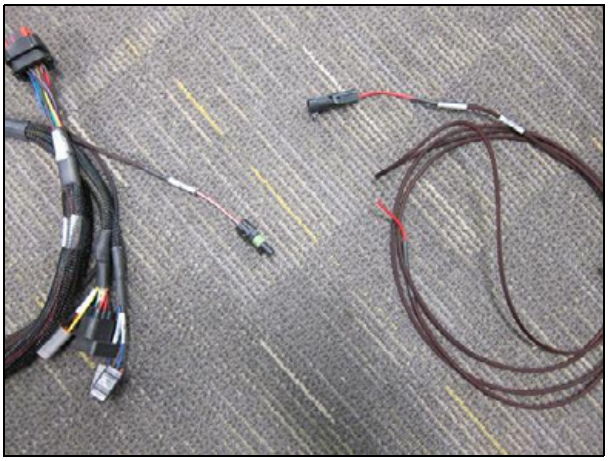
For ignition sensing with the TMX-2050 display, connect the ignition on the power supply to the R1 connector on the harness, P/N 92676.



For more information on how to use the ignition sensing option, refer to the *TMX-2050 Display User Guide*.

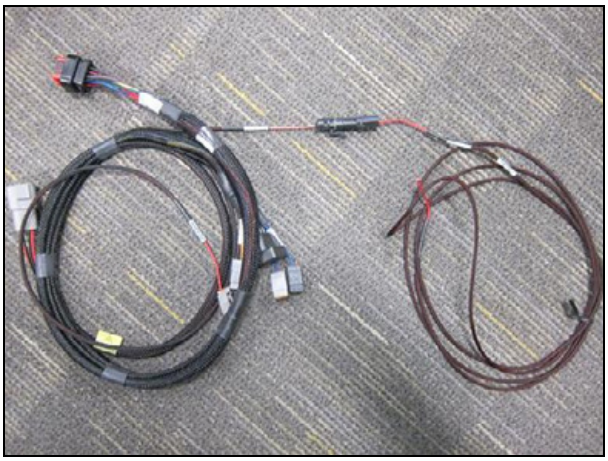
Step 1

Locate the R1 ignition sensing plug on the P/N 92676 cable; also locate the ignition sensing wire provided with the P/N 92676 cable.



Step 2

Connect the red ignition sense wire to the vehicle ignition source then route to the plug on the harness and then connect it.



7

Remote Engage Switch Installation

- Remote engage switch components: Rocker switch
- Remote engage switch components: Foot switch
- Preparing the remote engage cable
- Installing the Remote Engage push button (P/N 101250)
- Using the remote engage switch

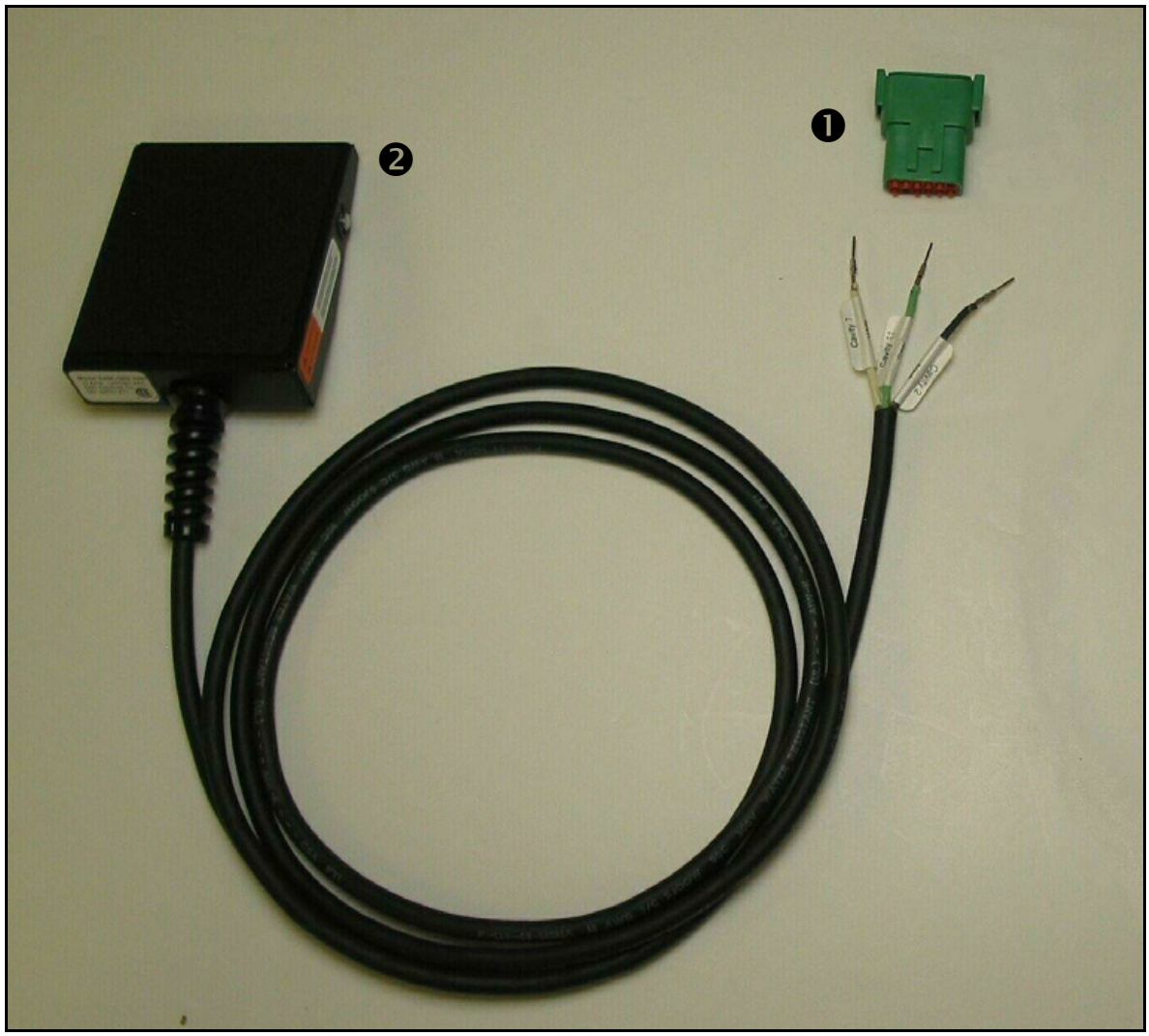
Remote engage switch components: Rocker switch



Item	Description
1	DTM receptacle
2	Remote engage rocker switch

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

Remote engage switch components: Foot switch

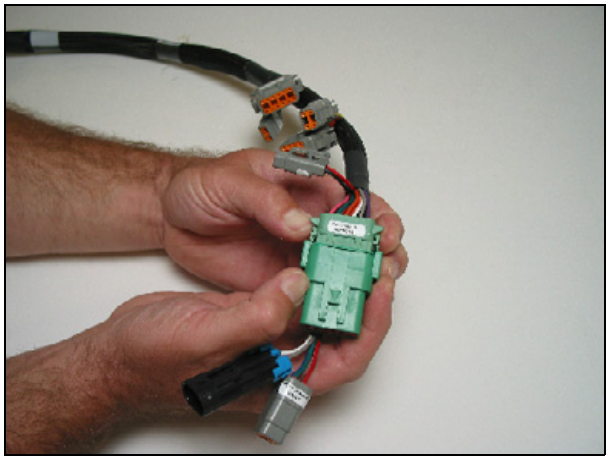


Item	Description
1	DTM receptacle
2	Remote engage foot switch

Preparing the remote engage cable

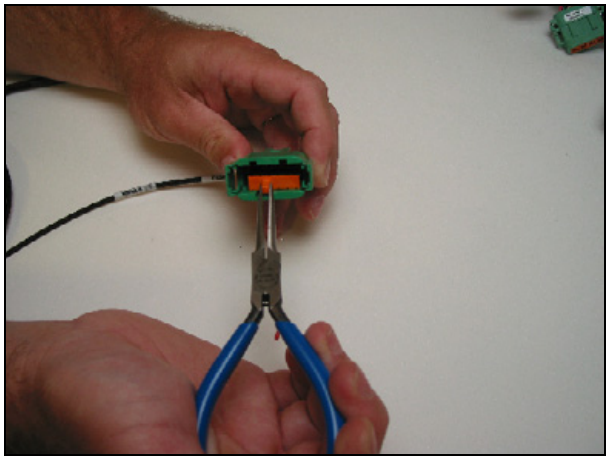
Step 1

Locate the green 12-pin Deutsch receptacle on the P5 leg of the main controller harness. For more information, see Chapter 8, Controller Installation.



Step 2

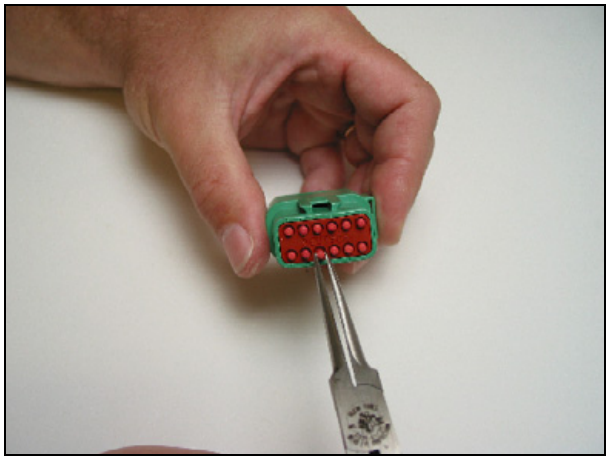
Remove the wedge from the connector.



Step 3

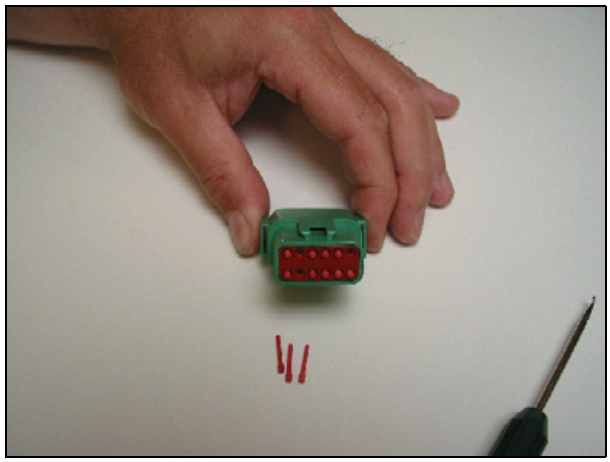
Rocker switch only

Remove the plugs from cavity 2 and cavity 7.



Foot switch only

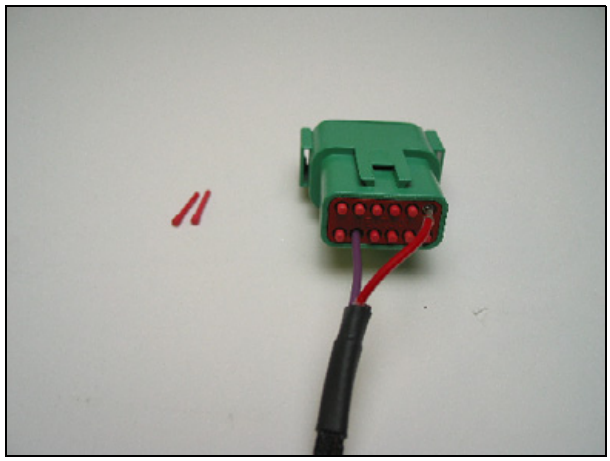
Remove the plugs from cavity 2, cavity 7, and cavity 11.



Step 4

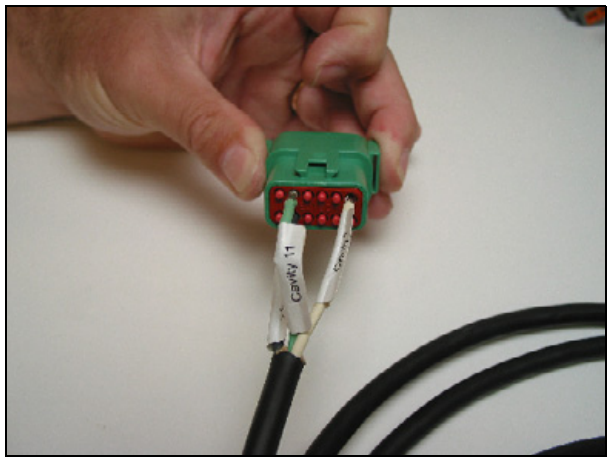
Rocker switch only

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



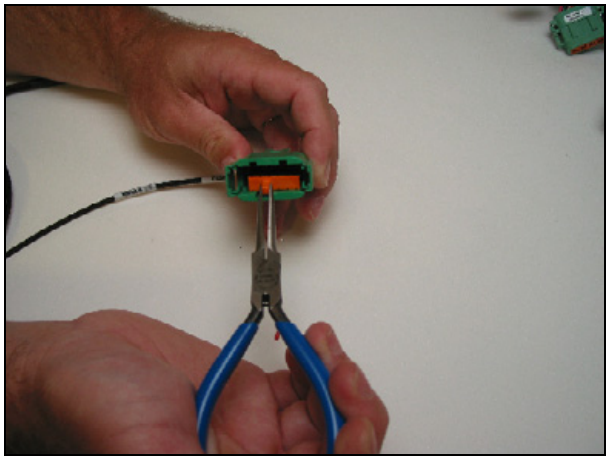
Foot switch only

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 harness.

Step 7

Rocker switch only

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



Foot switch only

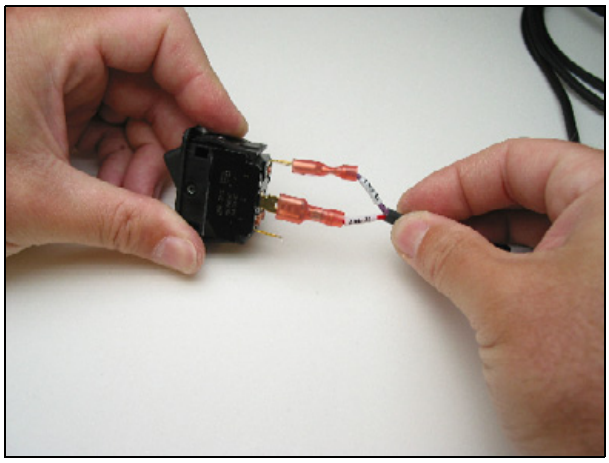
Run the cable to a clear location on the floor board. Use double-sided tape to secure the pedal. Route the cable under the floor mat.



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

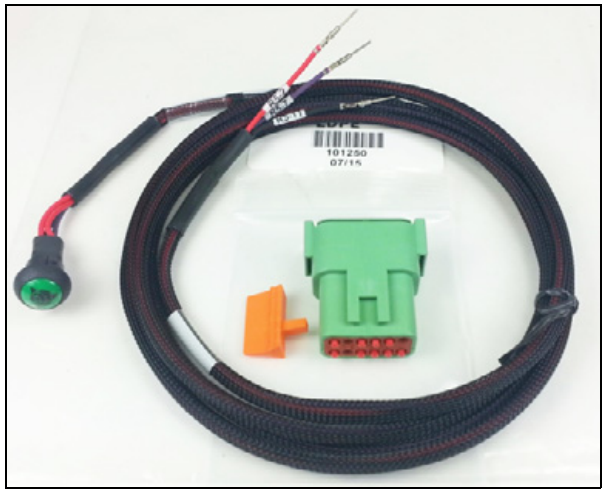
Place the switch in the console.



Installing the Remote Engage push button (P/N 101250)

Step 1

Locate the push button cable assembly (P/N 101250) and verify that the 12-pin green Deutsch connector, wedgelock, and seal are included in the small Ziploc bag.



Step 2

Locate a convenient location on the machine to install the switch. It should be easily accessible while driving but should not interfere with any other machine controls.



Step 3

Remove the panel from the desired installation location to verify that there is adequate clearance for the switch and cable. Take care that the cable will not interfere with any gear levers.



Step 4

Drill a ½" hole for the switch.



Step 5

Thread the cable through the clear round seal, and slide it up until it reaches the switch.



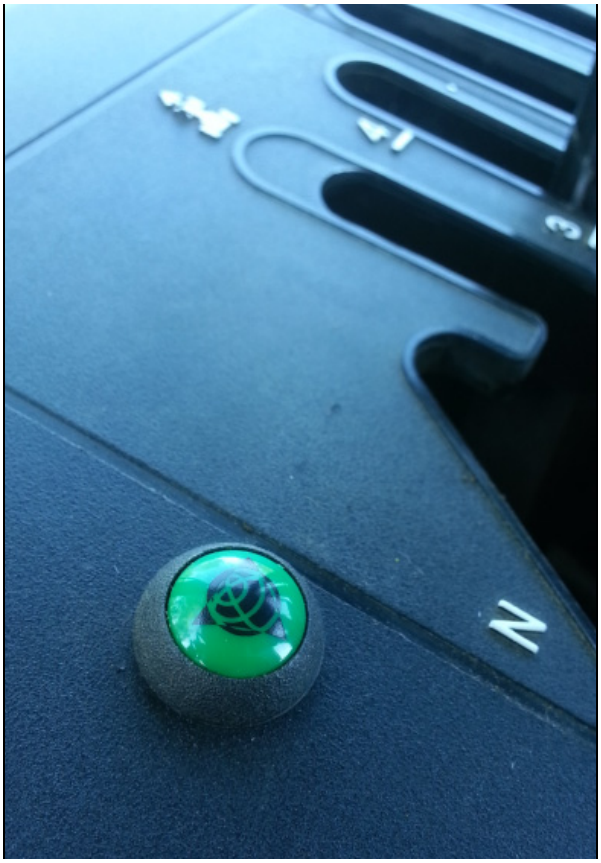
Step 6

Thread the cable through the hole in the instrument panel.



Step 7

Push the button down until it seats. The locking tabs will hold it securely in place.



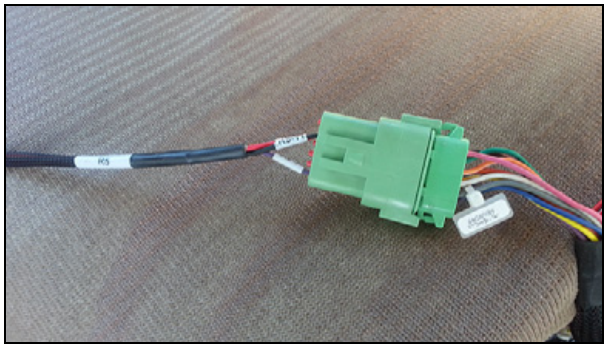
Step 8

Route the cable as desired, and insert the contacts into the 12-pin connector as labeled.



Step 9

Plug the 12-pin receptacle into the mating green plug (P5) on the NavController main harness (P/N 54601). Verify that the button works properly before proceeding. In dim lighting, the button has an LED backlight which will be visible whenever the NavController is powered on.



Step 10

Reinstall the panel and secure loose cables with wire ties.



Using the remote engage switch

To engage a system using NavController do one of the following:

- 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.

8

Controller Installation

- Installing the controller
- Controller connections

Installing the controller

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

Step 1

Mount the controller to the back wall of the machine, below the rear window.



Step 2

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

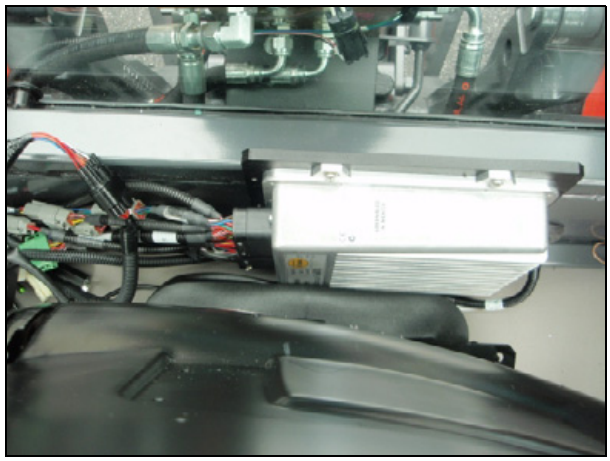


Step 3

Use the controller mounting plate to mark and drill four $^{5}/_{16}$" holes for mounting the controller mounting bracket.

Use the supplied ¼" hardware to attach the controller mounting bracket to the machine.

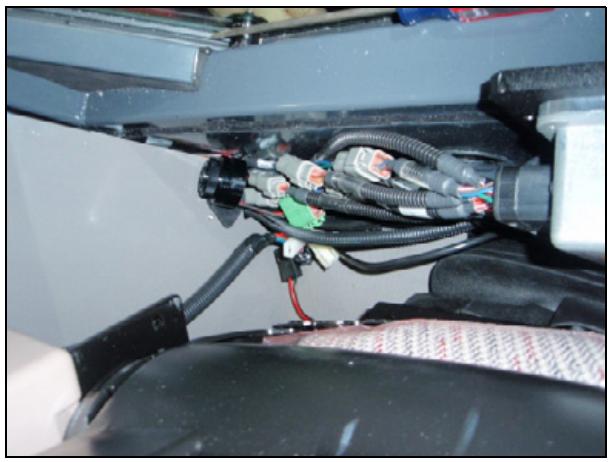
Use the four supplied 10-32 screws to attach the NavController III to the controller mounting bracket.



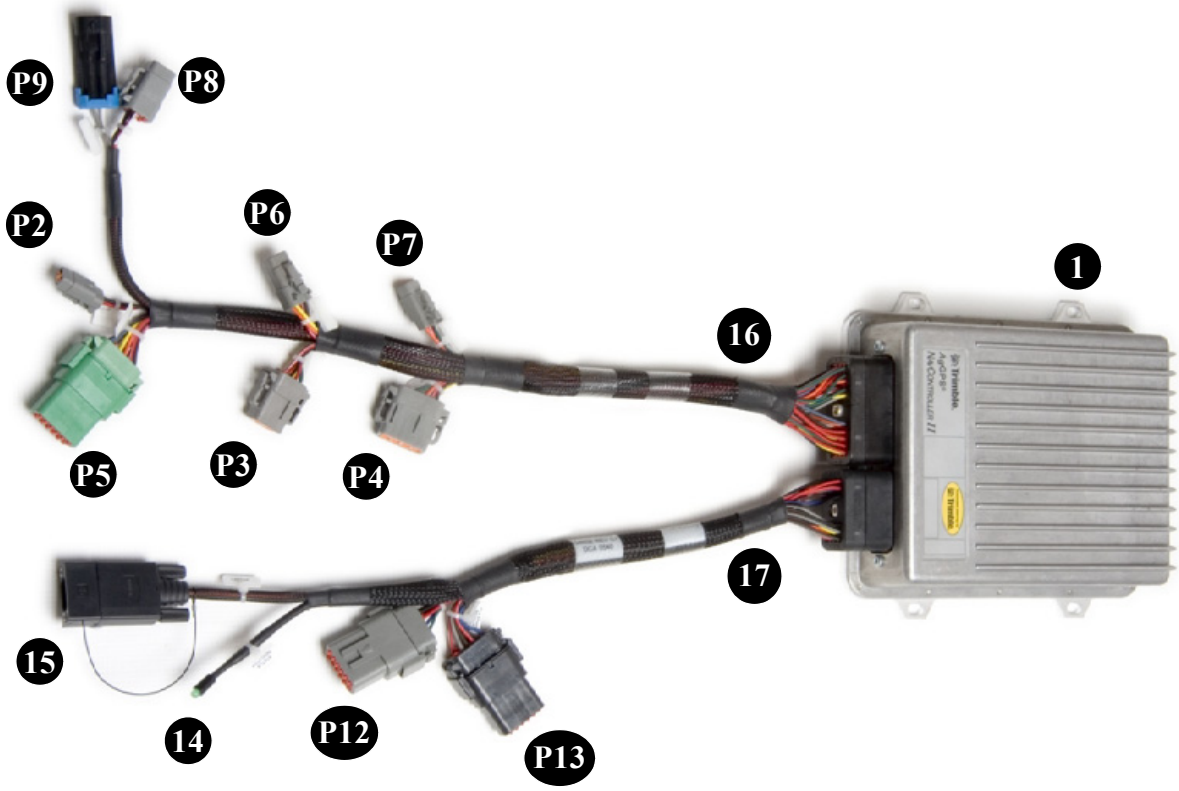
Step 4

Make sure that the controller orientation is set as follows:

- Yaw: 270
- Pitch: 0
- Roll: 65



Controller connections

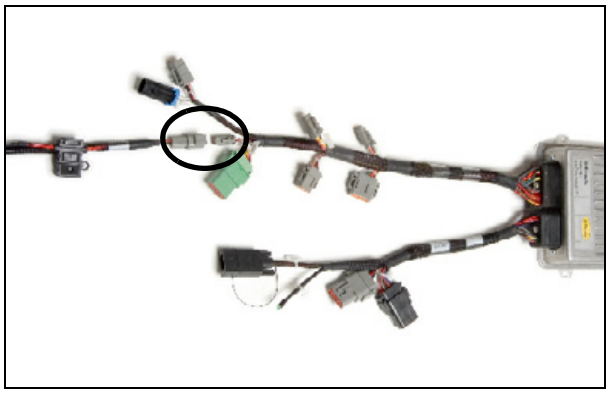


Item	Description	Item	Description
1	NavController II/III controller	**P9**	Sonalert connector
P2	Power connector	**P12**	Lightbar/spare connector
P3	GNSS connector	**P13**	Spare sensors connector
P4	Display connector	**14**	Status indicator
P5	Vehicle sensors connector	**15**	Laptop connector
P6	Steering sensor connector	**16**	Main harness
P7	Manual override connector	**17**	Auxiliary harness
P8	Hydraulic valve connector		

Step 1

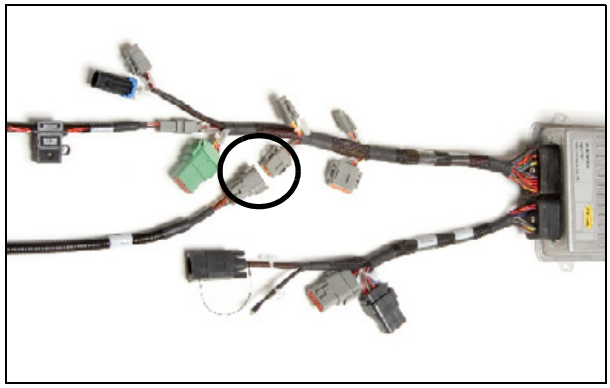
Connect the power cable connection to P2, which is labeled **Power**. P2 is located on the main wiring harness.

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



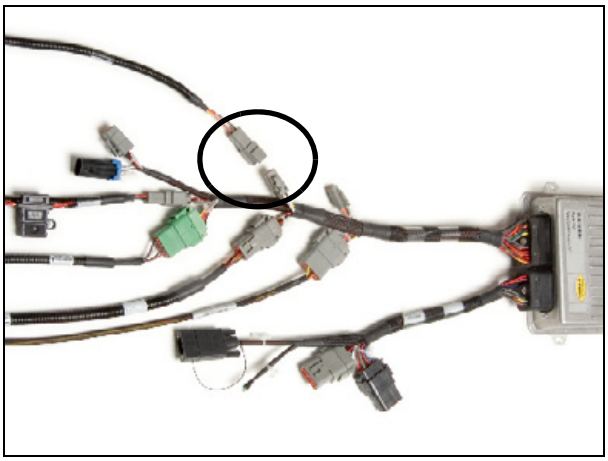
Step 2

Connect the CFX-750 display to P3, which is labeled **GPS**. P3 is located on the main wiring harness.



Step 3

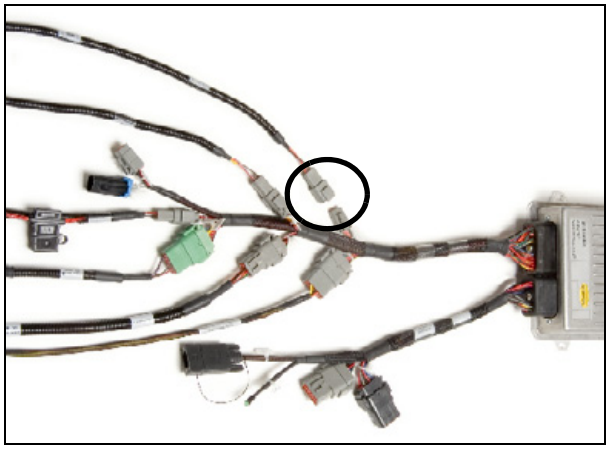
Connect the steering sensor cable connection to P6, which is labeled **Steering Sensor**. P6 is located on the main wiring harness.



Step 4

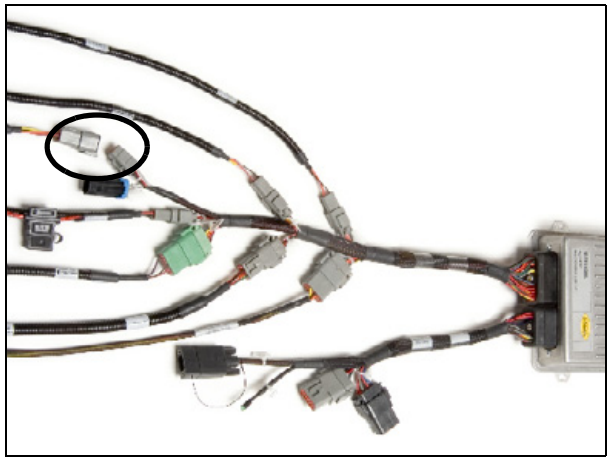
Connect the manual override cable connection to P7, which is labeled **Manual Override**. P7 is located on the main wiring harness.

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



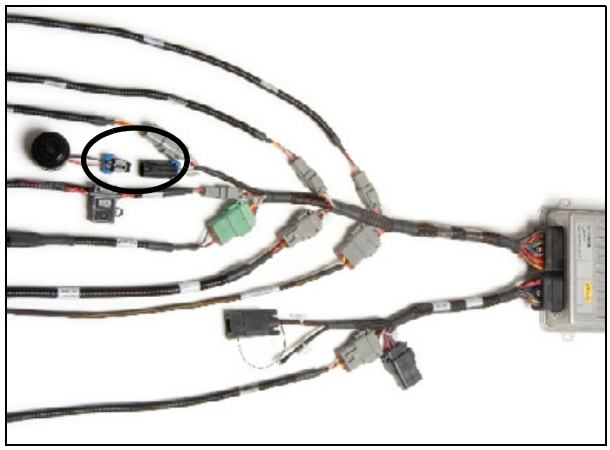
Step 5

Connect the hydraulic steering valve cable connection to P8, which is labeled **Hydraulic Valve**. P8 is located on the main wiring harness.



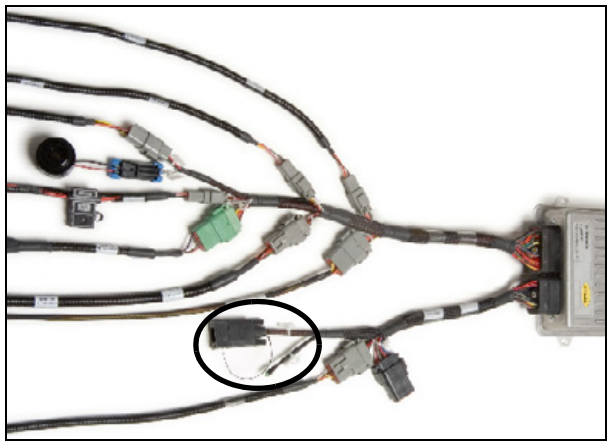
Step 6

Connect the Sonalert P9 to the 2-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.

9

Isolation Models Setup Instructions

- Connecting the isolation solenoid cable
- Configuring the NavController III to turn on the electronic isolation manifold
- Setting the load sense relief pressure
- Adjusting the isolation manifold pressure reducing valve (PRV)

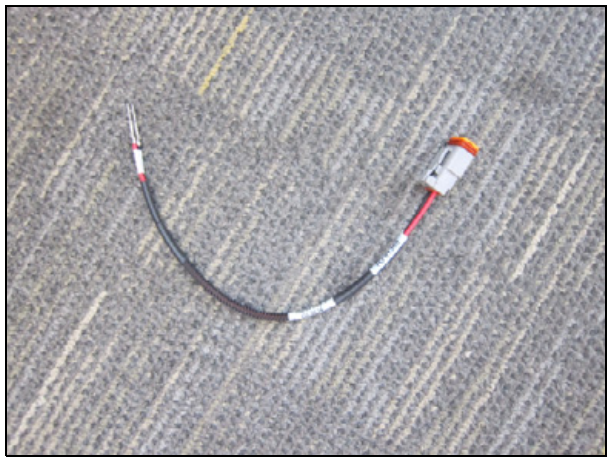
These instructions must only be completed by users familiar with operation of H4 manifold.

Connecting the isolation solenoid cable

Connect the P/N 100199 and 103378 cables to provide power to the Autopilot cut-off coil.

Locate the supplied P/N 103378 and 100799 isolation manifold cable in the isolation manifold kit.





Isolation manifold power connection (available only with NavController III)

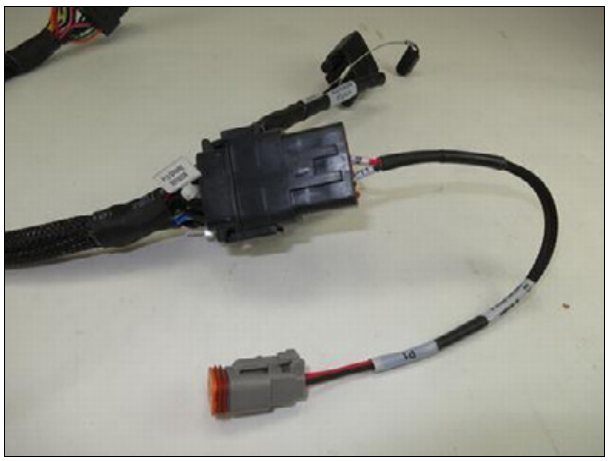
NOTE – This feature is not available with the NavController II.

NOTE – This connection type activates the isolation manifold automatically, using the third solenoid drive function of the NavController III.

Follow this procedure to connect the P/N 100199 cable to the NavController III harness, P/N 54602.

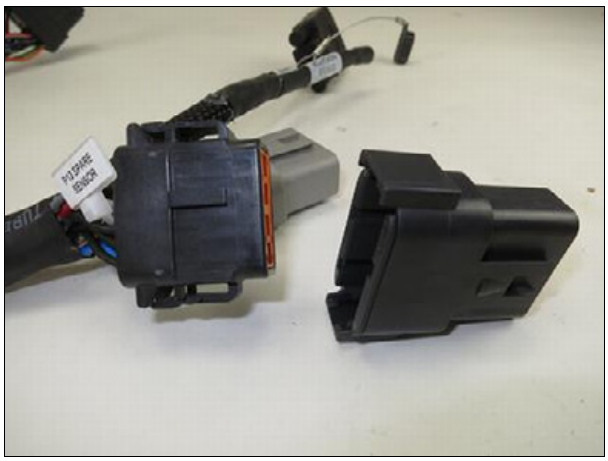
Step 1

Locate the supplied P/N 100199 cable in the isolation manifold kit.



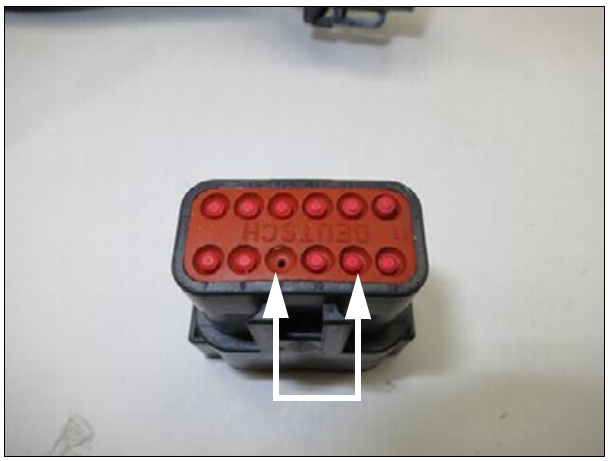
Step 2

Locate and remove the connector plug from the P/N 54602 P13 connector.



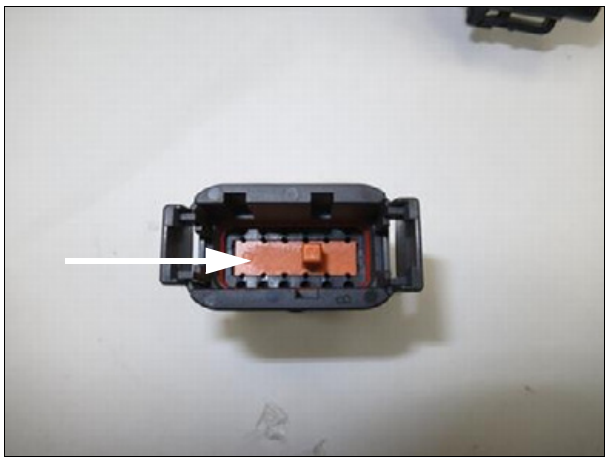
Step 3

On the rear of the plug, remove the sealing pins from the 9 and 11 sockets.



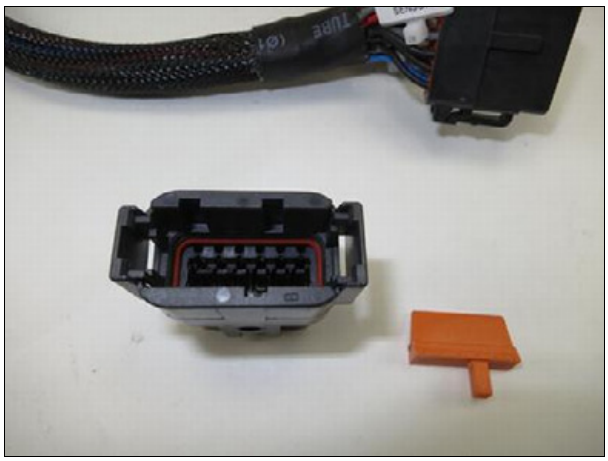
Step 4

On the inside of the connector, locate the orange wedge lock.



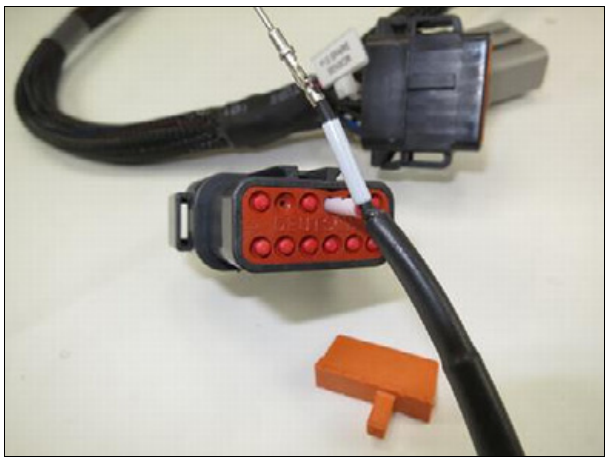
Step 5

Use needle-nose pliers to remove the wedge lock by pulling it straight out of the plug connector.



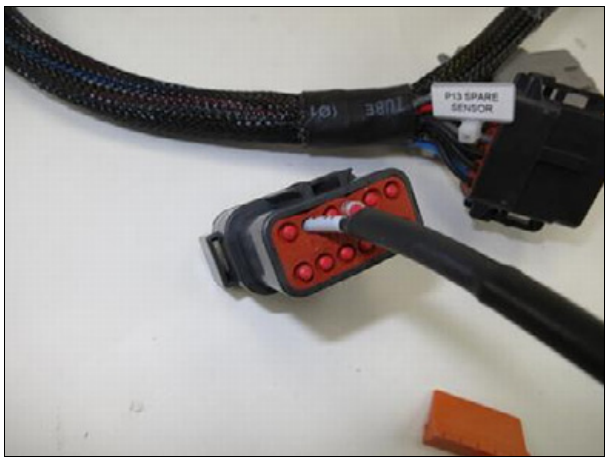
Step 6

Insert the pin labeled **to p13-9** into the 9-pin location on the connector plug.



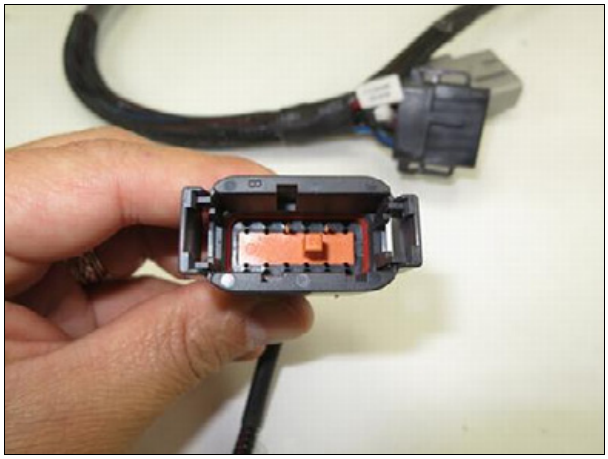
Step 7

Insert the pin labeled **to p13-11** into the 11-pin location on the connector plug.



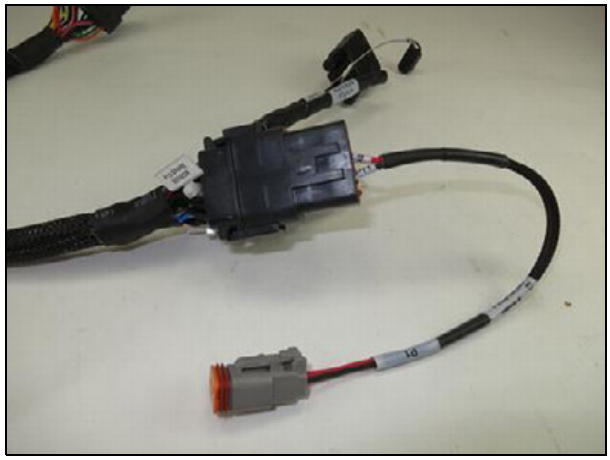
Step 8

Re-install the orange wedge lock into the connector plug.



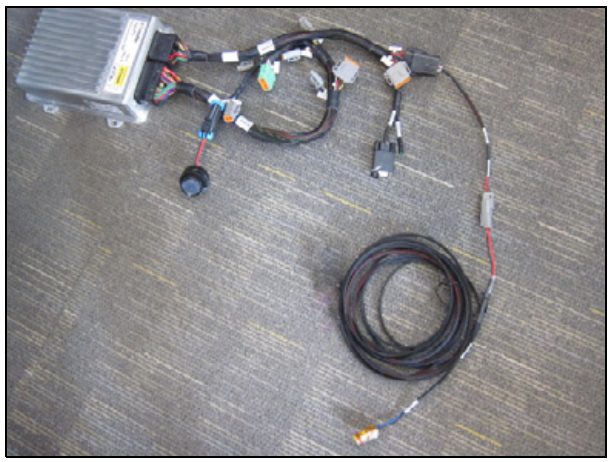
Step 9

Connect the P13 plug to the P/N 54602 harness on the NavController III.



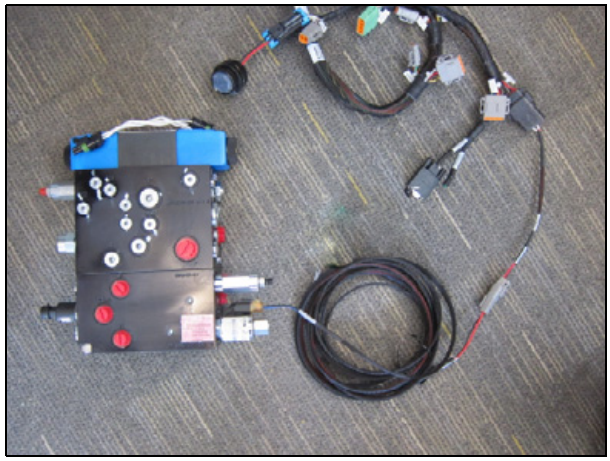
Step 10

Connect the R1 connector on cable P/N 103378 to the P1 connector on cable P/N 100799.



Step 11 - Connecting to the solenoid

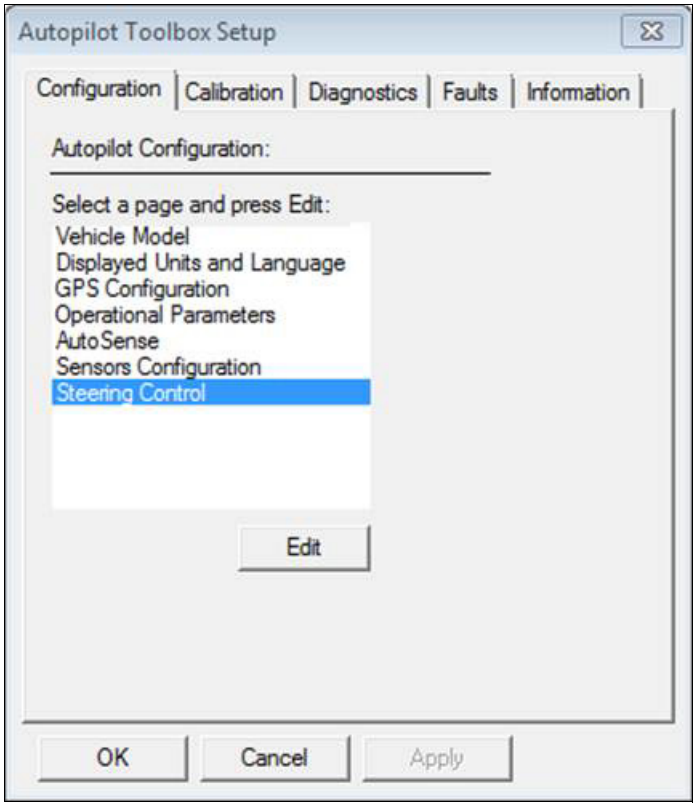
Route the P2 plug of cable P/N 103378 to the Autopilot manifold isolation solenoid and connect it as shown.



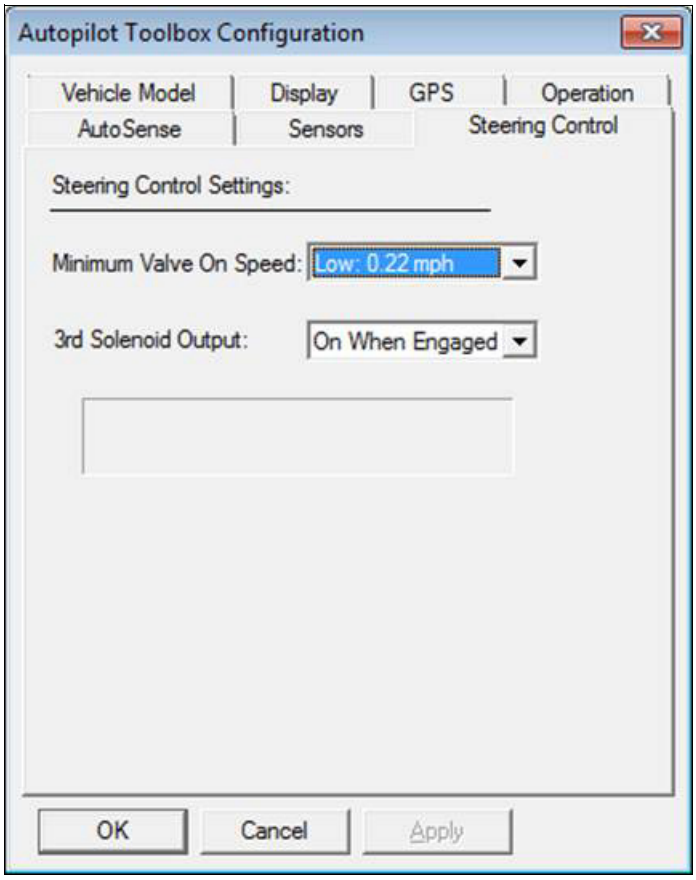


Configuring the NavController III to turn on the electronic isolation manifold

1. In Autopilot Toolbox version 3.3 or later, in the Setup screen, click the **Configuration** tab, select **Steering Control** and then click **Edit**:



2. From the **3rd Solenoid Output** drop-down list, select **On When Engaged** and then click **OK**:



NOTE – The **Minimum Valve On Speed** applies also to the third solenoid valve. The third solenoid will not be active until the set speed is reached. If the vehicle drops below the selected speed, the third solenoid will no longer be active.

The UI for FmX+ and PIQ in version 5.61 and later has the capability to enable the third solenoid.

Setting the load sense relief pressure

The Load sense relief pressure should be set approximately 100 psi lower than the system relief pressure to allow margin in the adjustment and to fully protect the system. The default setting of the LS relief valve is 2700 psi. If a lower pressure is required, these instructions will provide a procedure for adjusting the LS relief pressure. The relief pressure should not be increased above 2700 psi.

Preparing to set the relief pressure

Step 1

Install a pressure gauge into the LS2 port; if no DSV2 cartridge is present, the PX ports can also be used.

Step 2

Connect the P line of the manifold to a 3000 psi pressure source such as a remote on a tractor.

Step 3

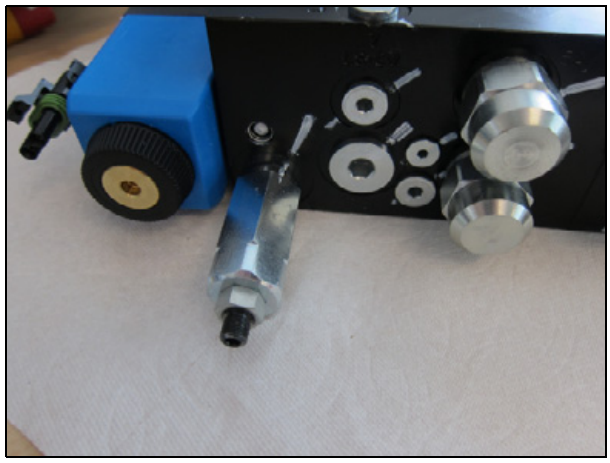
Connect the T line of the manifold to an oil tank or return line on the remote of a tractor.

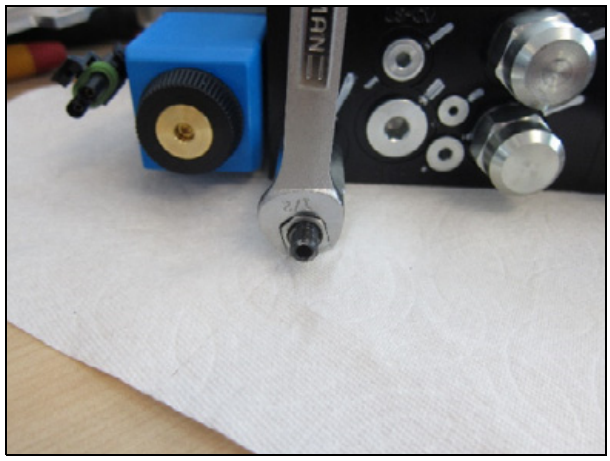
Step 4

The A and B / SCU-A, SCU-B lines: May be either connected to the steering cylinders / orbitrol or capped off for this test.

Step 5

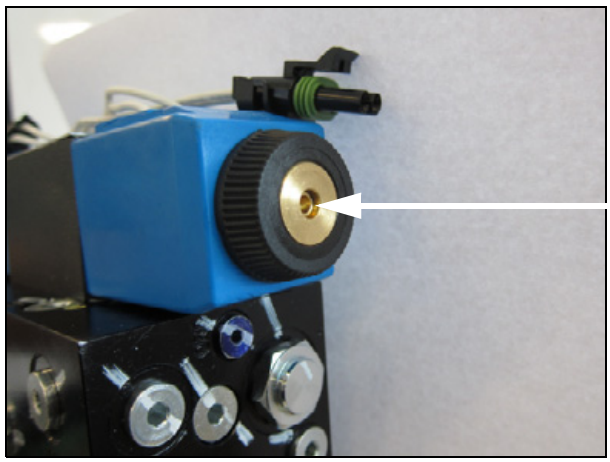
Loosen the jam nut on the LS relief valve'





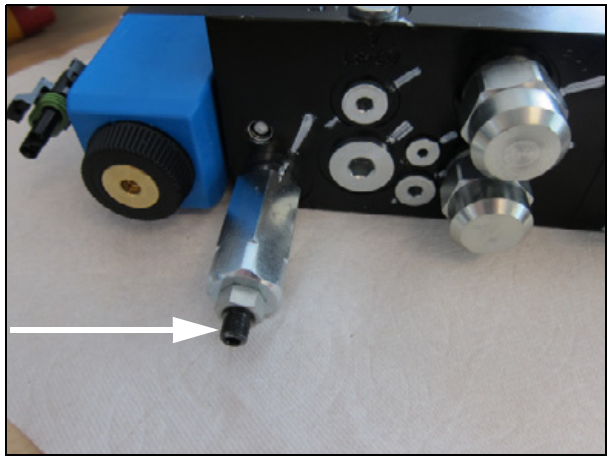
Step 6

With pressure applied to the P port, press on one of the Detent overrides on the electro hydraulic valve. If the steering cylinders are present in the system, make sure to run the override until you hit and end stop to ensure you are at peak pressure.



Step 7

With the override pressed, turn the relief valve in or out and watch the gauge to set the LS relief pressure.



Adjusting the isolation manifold pressure reducing valve (PRV)

⚠ **CAUTION –** Increasing the pressure setting of the PRV can lead to the loss of ability to mechanically override the autopilot steering.

The isolation sandwich on the H4 manifold uses spring-biased pilot to shift cartridges to toggle between manual steering and Autopilot steering. The manual steering pressure adds to the spring cavity to pilot the cartridges open even in situations where the isolation solenoid were to remain on.

A Pressure reducing valve is present in the system to ensure that the isolation valve pilot pressure can always be overcome by the spring force **+** the manual steering pressure.

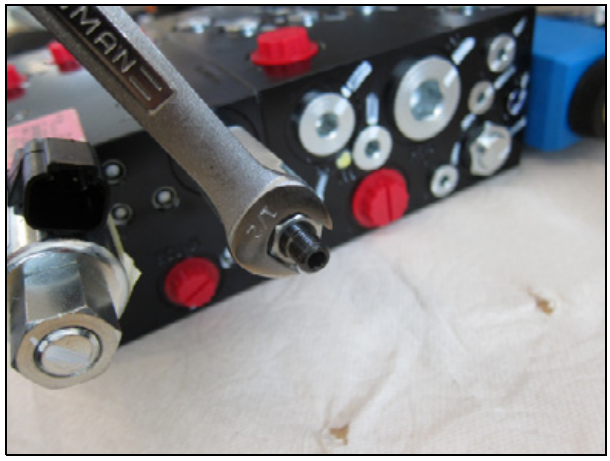
In some machines, it may be necessary to adjust the PRV setting in order to bias the cartridges more towards the manual steering or towards the Autopilot steering.

For the system to function as intended, manual steering should always overcome Autopilot steering. To test this function the P/N 103378 cable can be connected to the power bus or other 12 V source, with the switch on and 12 V being supplied to the cut-off coil. Manually steering the machine should result in movement of the wheels.

In the state where the isolation valve is powered when you are not steering manually, the Autopilot should be able to steer the machine; this means that if you were to press on the detent valve overrides you should be able to actuate wheel movement.

Step 1

Locate and loosen the jam nut on the PRV cartridge.



Step 2

Adjust the PRV valve by turning the screw with a hex wrench.

NOTE – Screwing the screw clockwise / inward will *add* pressure to the PRV setting, resulting in an increased bias towards Autopilot steering. This should be done if the Autopilot is sometimes not steering the machine.

Screwing the screw counterclockwise / outward will *reduce* pressure from the PRV, biasing the system more towards the manual steering side. The PRV setting should be decreased if the isolation solenoid is powered and manual steering is sometimes not possible.

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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 4.02 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 4.02 or later. Depending on your machine type, the following items must be calibrated before you can use the Autopilot system:
   - NavController mounting orientation
   - Manual override
   - IMD-900 mounting orientation
   - Valve deadzone
   - Autopilot P-gain
   - Antenna height/Antenna axle offset, and Roll offset