Autopilot

AUTOMATED STEERING SYSTEM

INSTALLATION INSTRUCTIONS

Versatile Tractors

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

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

– Large frame (including DeltaTrack): 705533

– Small frame: 307823

Version 8.00
Revision A
August 2022
P/N 54036-5112-E08

Trimble

Legal Notices

Agriculture Business Area

Trimble Agriculture Division
10368 Westmoor Drive
Westminster, CO 80021-2712
USA
www.trimble.com

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Release Notice

This is the August 2022 release (Revision A) of the *Autopilot Automated Steering System Installation Instructions*, part number 54036-5112-E08. It applies to version 8.00 of the Autopilot automated steering system.

The following limited warranties give you specific legal rights. You may have others, which vary from state/jurisdiction to state/jurisdiction.

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Such remedy may include reimbursement of the cost of repairs for damage to third-party equipment onto which the product is installed, if such damage is found to be directly cause by the Product as reasonably determine by Trimble following a root cause analysis. Where Trimble elects to replace a Product or parts, repair parts and replacement Products will be provided on an exchange basis and will be either new, equivalent to new, or reconditioned.

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Class B Statement – Notice to Users. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

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

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

Notice to Our European Union Customers

For product recycling instructions and more information, please go to: https://www.trimble.com/en/our-commitment/responsible-business/product-compliance/environmental-compliance.



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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1

Introduction

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

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

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

Technical assistance

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

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

Manual system upgrade to the Autopilot system

Displays

Retain
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 communications cable: P/N 110540

Required components

Kits required	Special tools
Platform kit: P/N 54036-5112	Standard hand tools
VDM-912 hydraulic valve driver controller: P/N 55570-100	

Autopilot hardware organization: As shipped

Hardware	Component	See...
Platform kit: P/N 54036-5112	In-cab controller/display cable set	Chapter 4
	External valve and sensor cable set	Chapter 3
	Bolt kit controller	Chapter 3
GNSS receiver	GNSS receiver	Chapter 5
	RTK radio, cable, and radio antenna	
Display	GFX-750/XCN-1050 display	Chapter 2
	Display cable	
	Mounting bracket	
Common parts	VDM-912 hydraulic valve drive controller	Chapter 3
	In-cab controller/display cable set	
	Cable kit: • In-cab controller/display cable set • External valve and sensor cable set	

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.

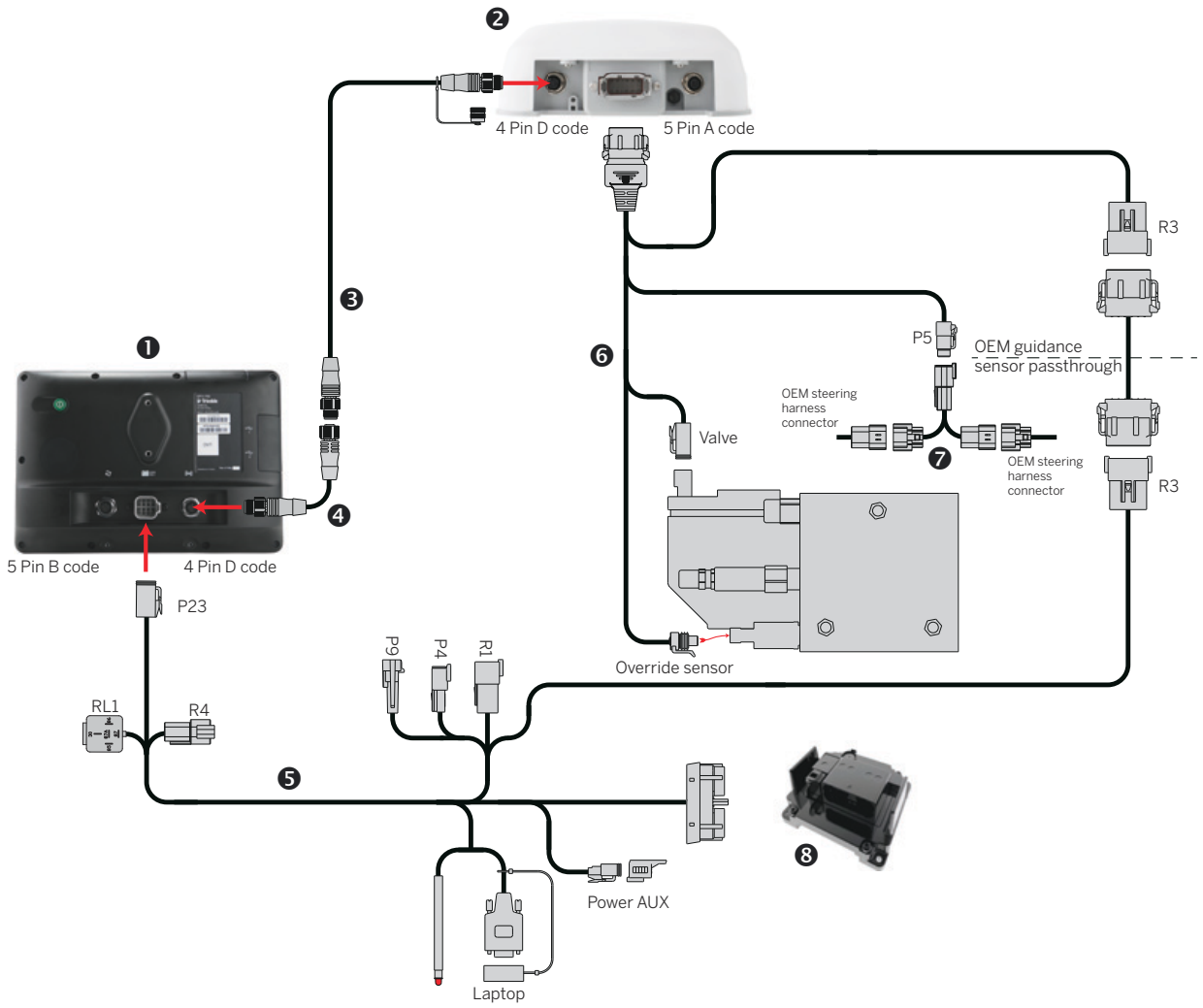
1. Park the vehicle on a hard, level surface. Block the front and rear wheels.
2. Align the steering straight ahead. On an articulated vehicle, install the articulation locks.
3. Remove all dirt and debris from the areas of the vehicle where the Autopilot system will be installed.
4. Open all kit boxes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

2

Display Installation

- 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

GFX-750/XCN-1050 display: Components



Item	Description	Trimble P/N
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, GFX-750/XCN-1050 to NAV-900, Power/Ethernet (BRR) Extension, 2.5 m. Optional extension for large vehicles.	112082
5	Cable Assy, Main Autopilot, VDM-912/ GFX In-Cab, Versatile	128865
6	Cable Assy, Main Autopilot, VDM-912/Nav900 / GFX External, Versatile	128898
7	Cable Assy, Steering Sensor, Versatile 4WD	100544-02
8	VDM-912 hydraulic valve driver controller	55570-100

GFX-750/XCN-1050 display: Preparation

The GFX-750/XCN-1050 display uses 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

Attach the Ram mount base to the bracket in the cab.



Take the Ram mount arm and connect the display to the base.



Step 2

Connect cable P/N 110551 to the GFX-750 display. Securely zip-tie the excess cabling.



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

Step 1

Connect the P23 on cable P/N 128865 to the middle port of the display.



Step 2

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





3

VDM-912 Hydraulic Valve Driver Controller Installation

- VDM-912 valve driver controller installation
- External sensor harness
- External valve and sensor cable installation
- Connecting the OEM steering sensor

VDM-912 valve driver controller installation

Step 1

Attach the VDM-912 to the VDM-912 adapter plate using the hardware provided.



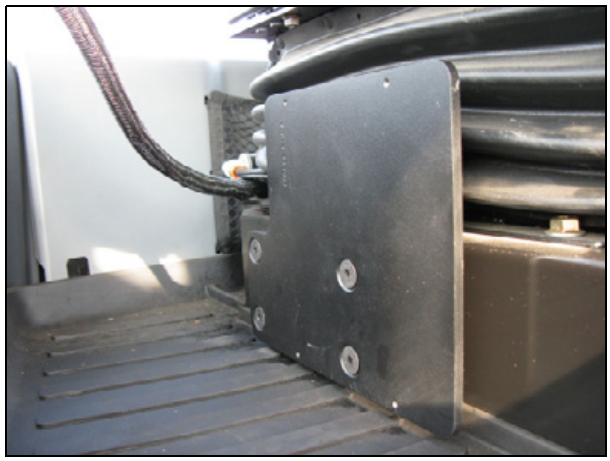
Step 2

Mount the VDM-912 unit to the right-side of the seat base. Four-threaded holes are provided for attaching the mounting bracket.

Step 3

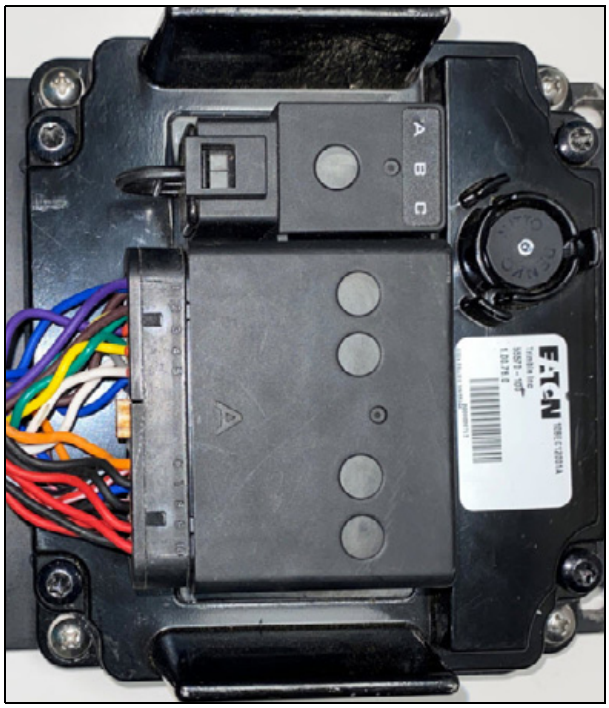
Use the four supplied M10 flat head bolts and four spacers to mount the plate to the seat base. The spacers provide additional clearance for the seat at its lowest adjustment. If the threaded holes are available, tighten the bolts securely.





Step 4

Before you install the controller, attach the P1 connector on the in-cab harness, P/N 128865, to the VDM-912 unit. Use an Allen wrench to secure the connectors to the VDM-912.

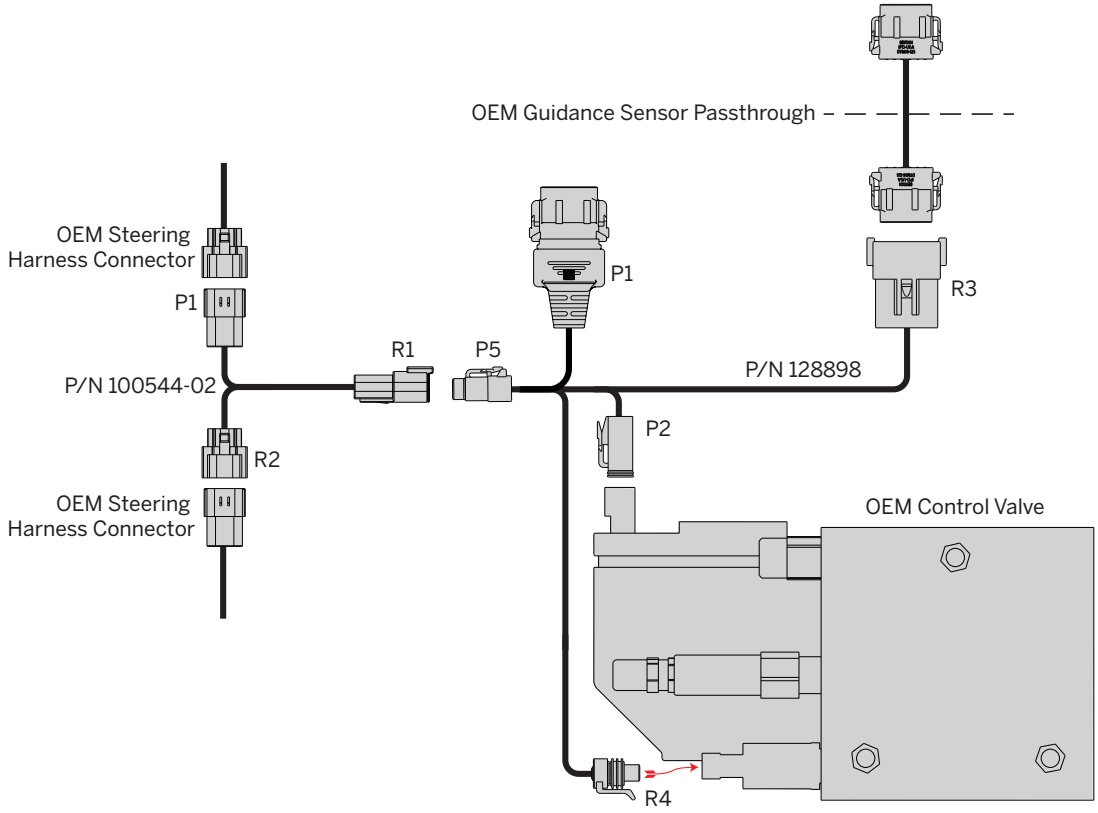


Step 5

Use the four #10 Phillips screws provided in the bolt kit to mount the VDM-912 adapter plate and VDM-912 unit to the bracket.



External sensor harness



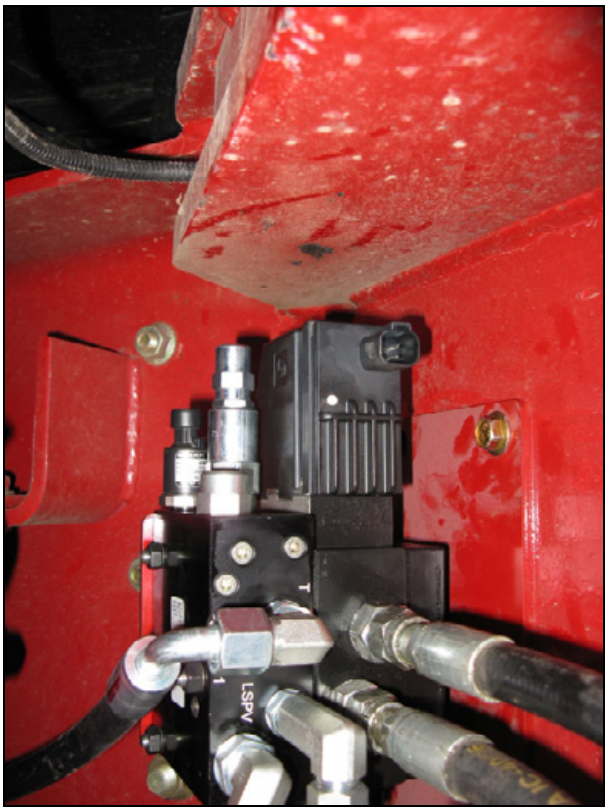
Connector	Description
P1	Connects to the OEM sensor harness at the front axle
P2	Connects to the OEM valve controller
P5	Connects to R1 of cable P/N 100544-02
R1	Connects to P5 of cable P/N 128898
R2	Connects to the OEM sensor harness at the front axle
R3	Connects to 12-pin OEM sensor bulkhead passthrough
R4	Connects to the manual override transducer

External valve and sensor cable installation

Step 1

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





Step 2

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



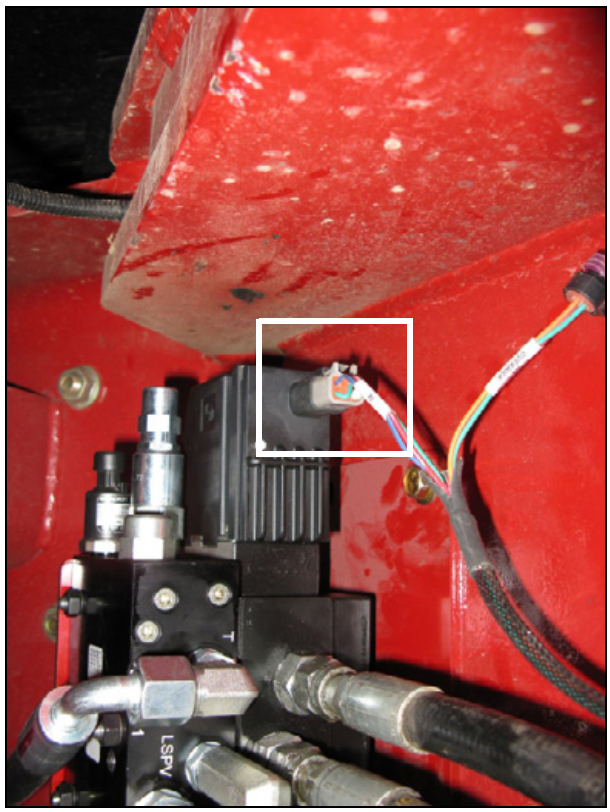
Step 3

Connect the R3 connector of the external cable, P/N 128898 (included), to the 12-pin Deutsch connector on the guidance cable harness you located in the previous step.



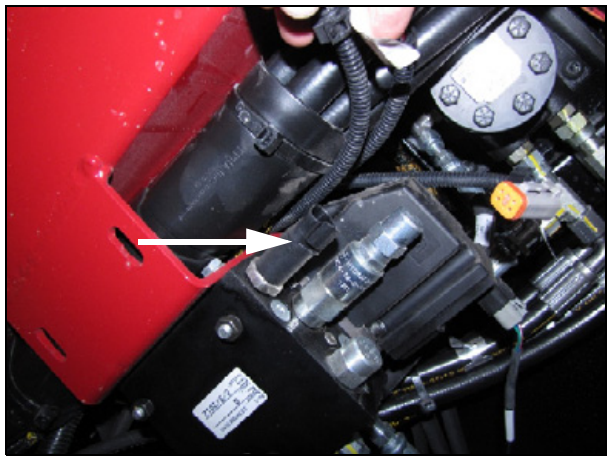
Step 4

Remove the existing valve control cable and connect the connector labeled **Valve A**/**B** on the Trimble P/N 128898 harness to the valve controller.



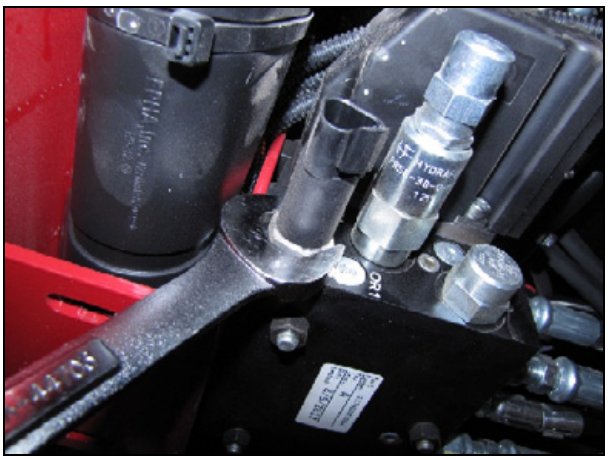
Step 5

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



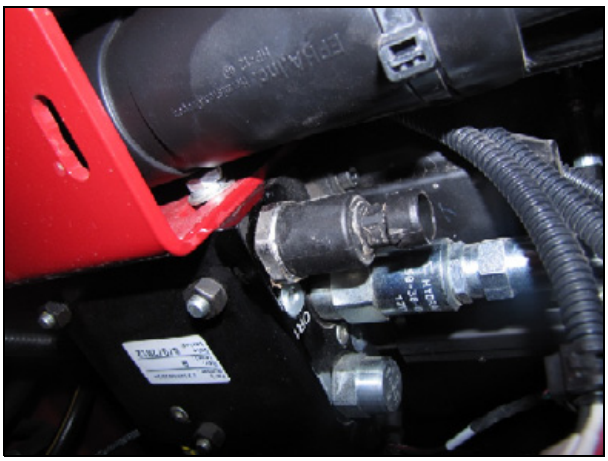
Step 6

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



Step 7

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



Step 8

Connect R4 on the P/N 128898 harness to the connector on the manual override transducer.

Verify that the P/N 128898 harness is routed away from any pinch points.

Secure both the P/N 128898 harness and the OEM harness ends to prevent damage to the wires.

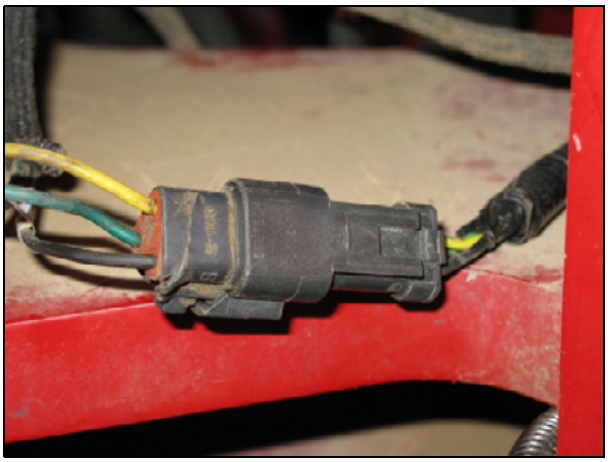


Connecting the OEM steering sensor

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

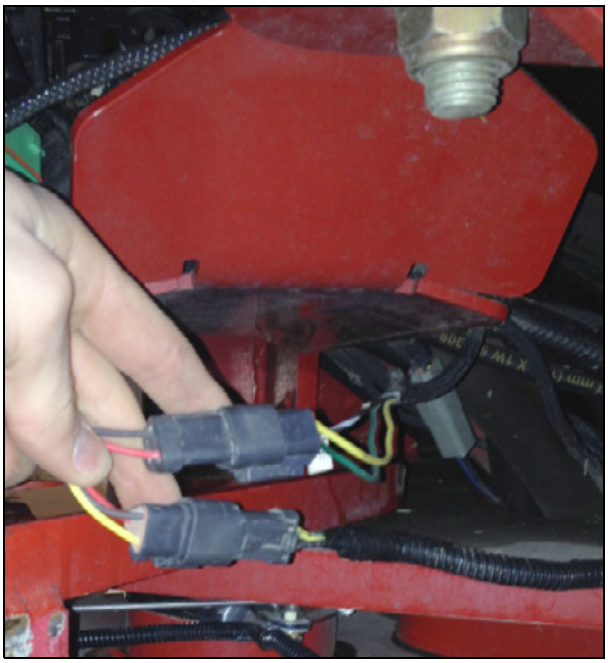
Step 1

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



Step 2

Separate the connectors and connect the mating ends of the Trimble P/N 100544-02 sensor cable to the connectors.



Step 3

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

Connect R1 on the sensor cable to the connector labeled **P5** on the P/N 128898 harness.



4

In-Cab Harness Installation

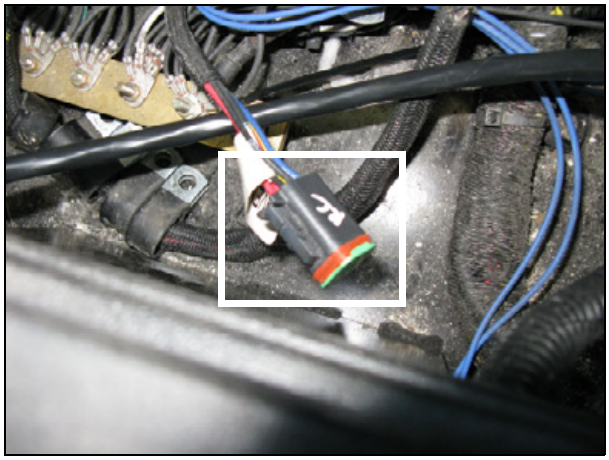
- Connecting the system power
- Connecting the sensor harness

Connecting the system power

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

Step 1

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



Step 2

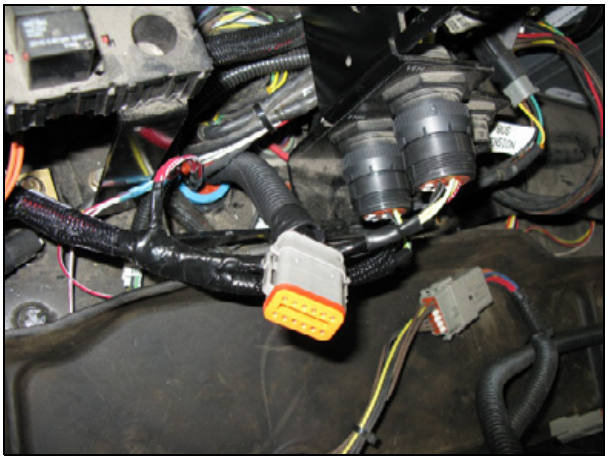
Connect the R1 socket on the P/N 128865 harness to the 6-pin power connector.



Connecting the sensor harness

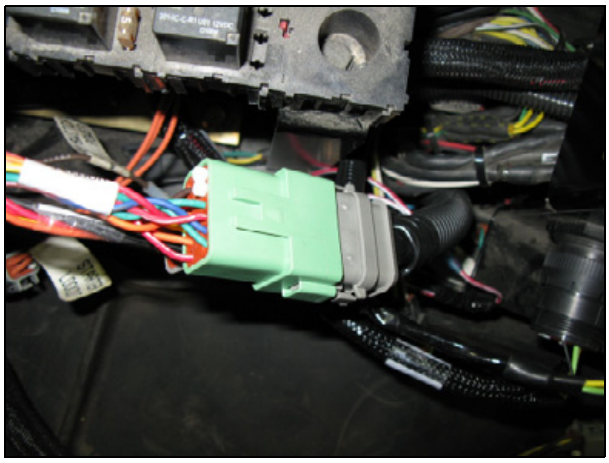
Step 1

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



Step 2

Connect the R3 connector on the P/N 128865 harness to the 12-pin Deutsch connector from the in-cab side of the guidance cable pass-through harness.





5

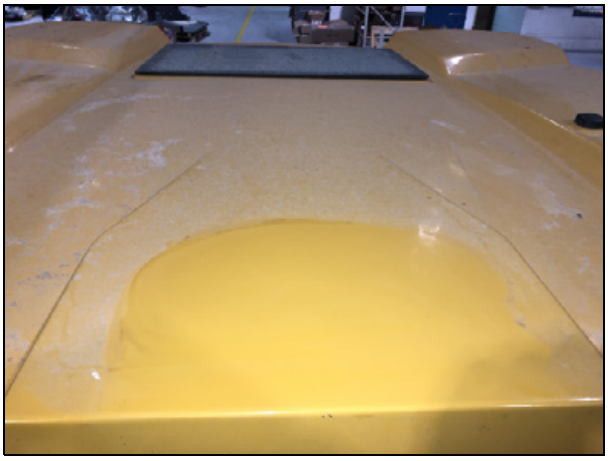
Antenna / Receiver Installation

- NAV-900 guidance controller mounting instructions
- Connecting an external RTK radio

NAV-900 guidance controller mounting instructions

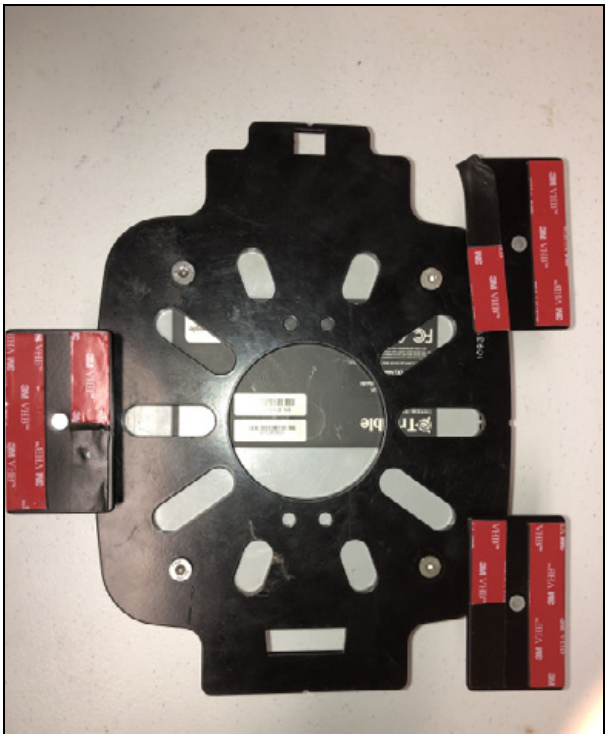
Step 1

Clean a large area of the cab roof near the front of the cab.



Step 2

Attach the NAV-900 guidance controller to the supplied mounting bracket.



Step 3

Attach the three VHB plates to the mounting plate using the hardware provided.



Step 4

Place the NAV-900 controller on the center line of the tractor and at the front of the cab.

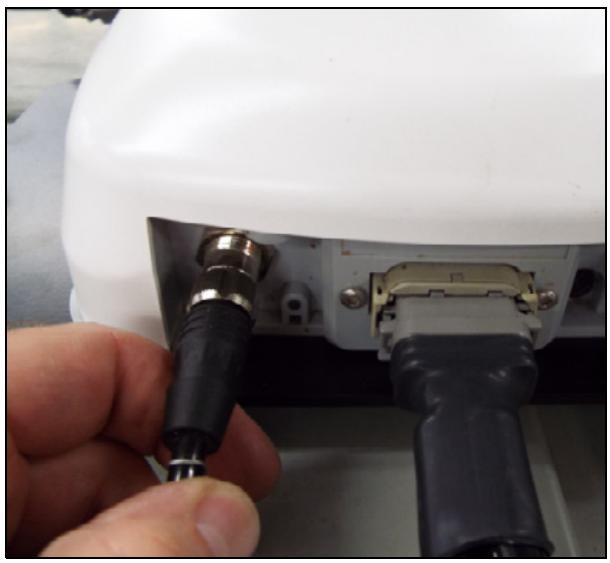


Step 5

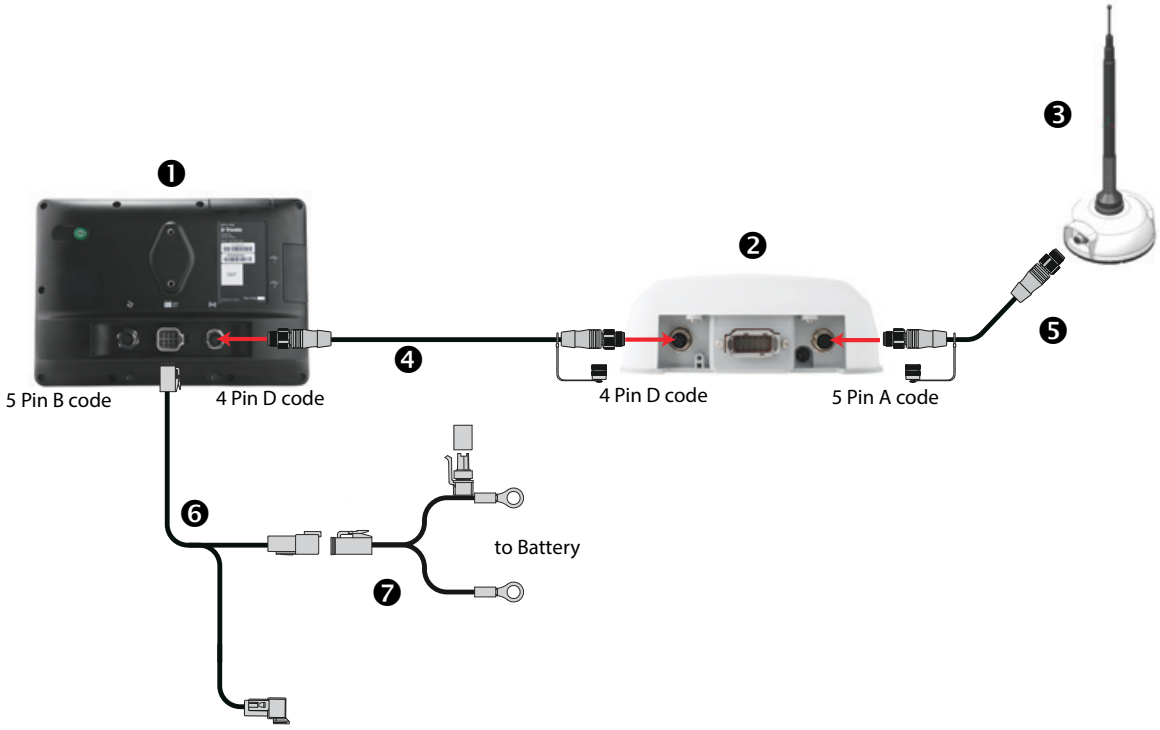
Connect the P1 connector from cable P/N 128865 to the NAV-900 controller.

Connect cable P/N 110540 to the NAV-900 controller.

Route the remainder of the cable into the cab through the pass-thru on the right lower side of the rear window and then connect it to the display.



Connecting an external RTK radio



Item	Description	Trimble P/N
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.



6

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 NAV-900 guidance controller to the latest firmware from http://agpartners.trimble.com.
4. Configure the vehicle using the Trimble display and selecting the correct configuration for the vehicle model being used.
5. Calibrate the Autopilot system using the Trimble display. Depending on your machine type, the following items must be calibrated before you can use the Autopilot system:
   - NAV-900 mounting orientation
   - Manual override
   - Valve deadzone
   - Autopilot P-gain
   - Antenna height/Antenna axle offset, and Roll offset