Autopilot

AUTOMATED STEERING SYSTEM

INSTALLATION INSTRUCTIONS

Versatile Tractors ▶ 260-320 MFWD AGR

NOTE – For serial number 508788 and later, this kit supports standard MFWD AutoGuidance Ready (AGR) platforms.

⚠ **CAUTION –** Due to the OEM firmware implementation of the **Guidance Active** indicator LED, the indicator may not always show the correct state for the system. The installer should verify the function of the light by engaging auto guidance with the remote engage button and disengaging by turning the wheel. If the indicator does not respond to the actual state of the system, the installer should consider disconnecting or covering the indicator. Contact your Versatile dealer for possible firmware updates.

Version 8.00
Revision A
September 2019
P/N 54035-5110-E08

Trimble

Legal Notices

Agriculture Business Area

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

Copyright and Trademarks

©1999–2019, Trimble Inc. All rights reserved.

Trimble, the Globe & Triangle logo, and FmX, are trademarks of Trimble Inc., registered in the United States and in other countries. Autopilot, CFX-750, FM-750, FM-1000, and GFX-750, are trademarks of Trimble Inc. Developed under a License of the European Union and the European Space Agency.

All other trademarks are the property of their respective owners.

Official Language

THE OFFICIAL LANGUAGE OF THESE TERMS AND CONDITIONS IS ENGLISH. IN THE EVENT OF A CONFLICT BETWEEN ENGLISH AND OTHER LANGUAGE VERSIONS, THE ENGLISH LANGUAGE SHALL CONTROL.

Release Notice

This is the September 2019 release (Revision A) of the *Autopilot Automated Steering System Installation Instructions*, part number 54035-5110-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.

Product Limited Warranty

Trimble warrants that this Trimble product and its internal components (the "Product") shall be free from defects in materials and workmanship and will substantially conform to Trimble's applicable published specifications for the Product for a period of one (1) year, starting from the earlier of (i) the date of installation, or (ii) six (6) months from the date of product shipment from Trimble. This warranty applies only to the Product if installed by Trimble or a distributor authorized by Trimble to perform Product installation services.

Software Components and Enhancements

All Product software components (sometimes hereinafter also referred to as "Software") are licensed and not sold. Any Software accompanied by a separate End User License Agreement ("EULA") shall be governed by the terms, conditions, restrictions and limited warranty terms of such EULA notwithstanding the preceding paragraph. During the limited warranty period you will be entitled to receive, at no additional charge, such Fix Updates and Minor Updates to the Product software as Trimble may develop for general release, subject to the procedures for delivery to purchasers of Trimble products generally. If you have purchased the Product from an authorized Trimble distributor rather than from Trimble directly, Trimble may, at its option, forward the software Fix Update or Minor Update to the Trimble distributor for final distribution to you. Major Upgrades, new products, or substantially new software releases, as identified by Trimble are expressly excused from this enhancement process and limited warranty. Receipt of software updates shall not serve to extend the limited warranty period.

For purposes of this warranty the following definitions shall apply: (1) "Fix Update" means an error correction or other update created to fix a previous software version that does not substantially conform to its published specifications; (2) "Minor Update" occurs when enhancements are made to current features in a software program; and (3) "Major Upgrade" occurs when significant new features are added to software, or when a new product containing new features replaces the further development of a current product line. Trimble reserves the right to determine, in its sole discretion, what constitutes a significant new feature and Major Upgrade.

Warranty Remedies

Trimble's sole liability and your exclusive remedy under the warranties set forth above shall be, at Trimble's option, to repair or replace any Product that fails to confirm to such warranty ("Nonconforming Product"), and/or issue a cash refund up to the purchase price paid by you for any such Nonconforming Product, excluding costs of installation, upon your return of the Nonconforming Product to Trimble in accordance with Trimble's standard return material authorization process.

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.

Warranty Exclusions and Disclaimer

These warranties shall be applied only in the event and to the extent that (i) the Products and Software are properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Trimble's relevant operator's manual and specifications, and; (ii) the Products and Software are not modified or misused. The preceding warranties shall not apply to, and Trimble shall not be responsible for defects or performance problems resulting from (i) the combination or utilization of the Product or Software with hardware or software products, information, data, systems, interfaces or devices not made, supplied or specified by Trimble; (ii) the operation of the Product or Software under any specification other than, or in addition to, Trimble's standard specifications for its products; (iii) the unauthorized, installation, modification, or use of the Product or Software; (iv) damage caused by accident, lightning or other electrical discharge, fresh or salt water immersion or spray; or (v) normal wear and tear on consumable parts (e.g., batteries). Trimble does not warrant or guarantee the results obtained through the use of the Product.

THE WARRANTIES ABOVE STATE TRIMBLE'S ENTIRE LIABILITY, AND YOUR EXCLUSIVE REMEDIES, RELATING TO PERFORMANCE OF THE PRODUCTS AND SOFTWARE. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED HEREIN, THE PRODUCTS, SOFTWARE, AND ACCOMPANYING DOCUMENTATION AND MATERIALS ARE PROVIDED "AS-IS" AND WITHOUT EXPRESS OR IMPLIED WARRANTY OF ANY KIND BY EITHER TRIMBLE NAVIGATION LIMITED OR ANYONE WHO HAS BEEN INVOLVED IN ITS CREATION, PRODUCTION, INSTALLATION, OR DISTRIBUTION INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, TITLE, AND NONINFRINGEMENT. THE STATED EXPRESS WARRANTIES ARE IN LIEU OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF TRIMBLE ARISING OUT OF, OR IN CONNECTION WITH, ANY PRODUCTS OR SOFTWARE. SOME STATES AND JURISDICTIONS DO NOT ALLOW LIMITATIONS ON DURATION OR THE EXCLUSION OF AN IMPLIED WARRANTY, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

TRIMBLE NAVIGATION LIMITED IS NOT RESPONSIBLE FOR THE OPERATION OR FAILURE OF OPERATION OF GPS SATELLITES OR THE AVAILABILITY OF GPS SATELLITE SIGNALS.

Limitation of Liability

TRIMBLE'S ENTIRE LIABILITY UNDER ANY PROVISION HEREIN SHALL BE LIMITED TO THE AMOUNT PAID BY YOU FOR THE PRODUCT OR SOFTWARE LICENSE. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL TRIMBLE OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER UNDER ANY CIRCUMSTANCE OR LEGAL THEORY RELATING IN ANY WAY TO THE PRODUCTS, SOFTWARE AND ACCOMPANYING DOCUMENTATION AND MATERIALS, (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR ANY OTHER PECUNIARY LOSS), REGARDLESS WHETHER TRIMBLE HAS BEEN ADVISED OF THE POSSIBILITY OF ANY SUCH LOSS AND REGARDLESS OF THE COURSE OF DEALING WHICH DEVELOPS OR HAS DEVELOPED BETWEEN YOU AND TRIMBLE. BECAUSE SOME STATES AND JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATION MAY NOT APPLY TO YOU. NOTE: THE ABOVE LIMITED WARRANTY PROVISIONS MAY NOT APPLY TO PRODUCTS OR SOFTWARE PURCHASED IN THE EUROPEAN UNION. PLEASE CONTACT YOUR TRIMBLE DEALER FOR APPLICABLE WARRANTY INFORMATION.

Notices

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: http://www.trimble.com/Corporate/Environmental_Compliance.aspx

Recycling in Europe: To recycle Trimble WEEE, Call +31 497 53 2430, and ask for the "WEEE Associate"

Or

Mail a request for recycling instructions to:

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



Safety Information

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

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

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

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

Warnings

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

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

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

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

Cautions

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

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

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

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

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

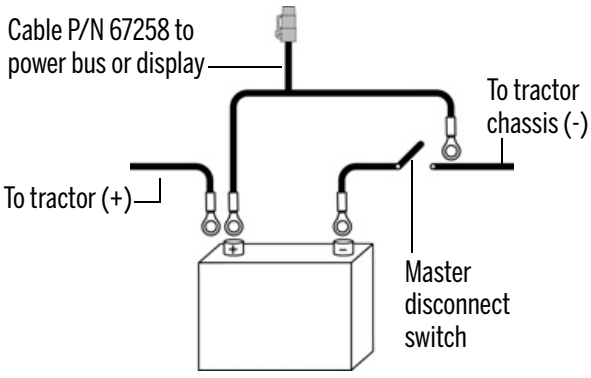
CAUTION – Do not direct pressurized water at:
- Electronic or electrical components or connectors
- Bearings
- Hydraulic seals
- Fuel injection pumps
- Any other sensitive parts or components



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

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) is not directly attached to the battery terminal that is disconnected by the master switch—the negative pole in this example.
Attach this terminal side just past the main disconnect so that it is as close as possible to the battery but still gets disconnected when the master disconnect is turned off. Failure to do so can result in damage to the display.



Contents

Legal Notices 2

Safety Information 4

Warnings 4

Cautions 4

1 Introduction 7

Technical assistance 7

Manual system upgrade to the Autopilot system 8

Displays 8

Required components 8

Autopilot hardware organization: As shipped 9

Notice to the installer 9

Preparing the vehicle for installation 10

2 Display Installation 11

GFX-750/XCN-1050 display: Components 12

GFX-750/XCN-1050 display: Preparation 13

GFX-750/XCN-1050 display: Installation 13

GFX-750/XCN-1050 display: Installing the wiring harness 15

3 Controller Installation 16

NavController III installation 17

External cable installation 19

External valve and sensor cable installations 20

Connecting the OEM steering sensor 23

4 In-Cab Harness Installation 24

Connecting system power 25

Connecting the sensor harness 26

5 Antenna / Receiver Installation 27

NAV-900 guidance receiver mounting instructions 28

Connecting an external RTK radio 30

6 Final Machine Check 32

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 receiver: P/N 108993-05
GFX-750 to NAV-900 Communications cable: P/N 110540

Required components

Kits required	Special tools
Platform kit: P/N 54035-5110	Standard hand tools
Trimble NavController III for Common Trimble Ready Installations, GEN III: P/N 64425-24	

Autopilot hardware organization: As shipped

Hardware	Component	See...
Platform kit: P/N 54035-5110	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
	GNSS receiver power/data cable	
	RTK radio, cable, and radio antenna	
Display	GFX-750/XCN-1050 display	Chapter 2
	Display cable	
	Mounting bracket	
Common parts	Controller	Chapter 3
	In-cab controller/display cable set	
	Cable kit: • In-cab controller/display cable set • External valve and sensor cable set • Sonalert alarm	

Notice to the installer

For serial number 508788 and later, this kit supports standard MFWD AutoGuidance Ready (AGR) platforms.

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.

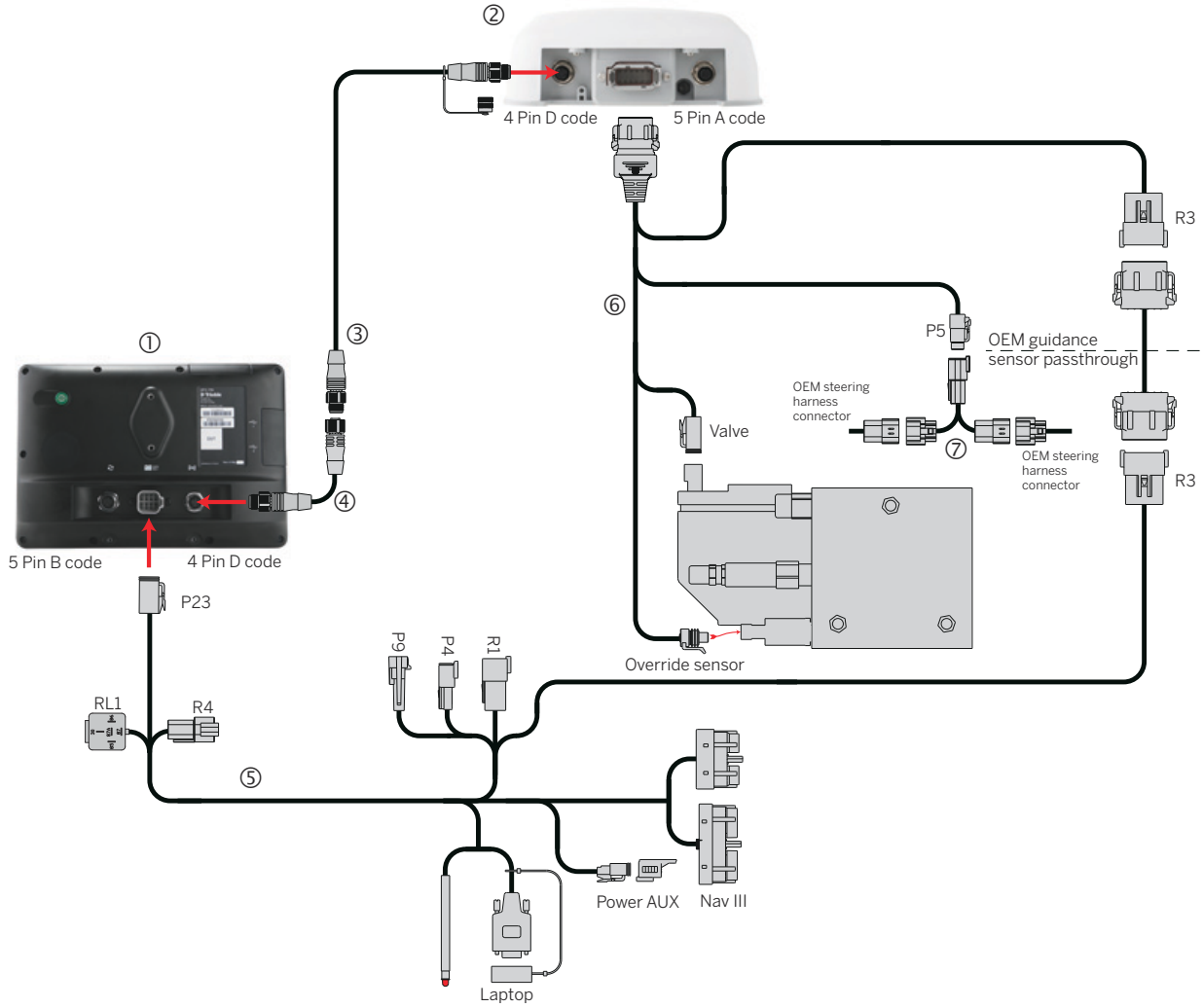
2

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

This graphic shows the Autopilot system using NavController III as an external guidance device.



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, NavIII / GFX In-Cab, Versatile	119713-1
6	Cable Assy, Main Autopilot, NavIII/Nav900 / GFX External, Versatile	119713-2
7	Cable Assy, Autopilot, Steering Sensor, Versatile MFWD	100544-01

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 connector on cable P/N 119713-1 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

Controller Installation

- NavController III installation
- External cable installation
- External valve and sensor cable installations
- Connecting the OEM steering sensor

NavController III installation

Step 1

Locate the controller mounting plate—it is under the cover, to the right of the seat.



Step 2

Attach the P1 and P10 connector on theP/N 119713-1 harness to the Trimble NavController.



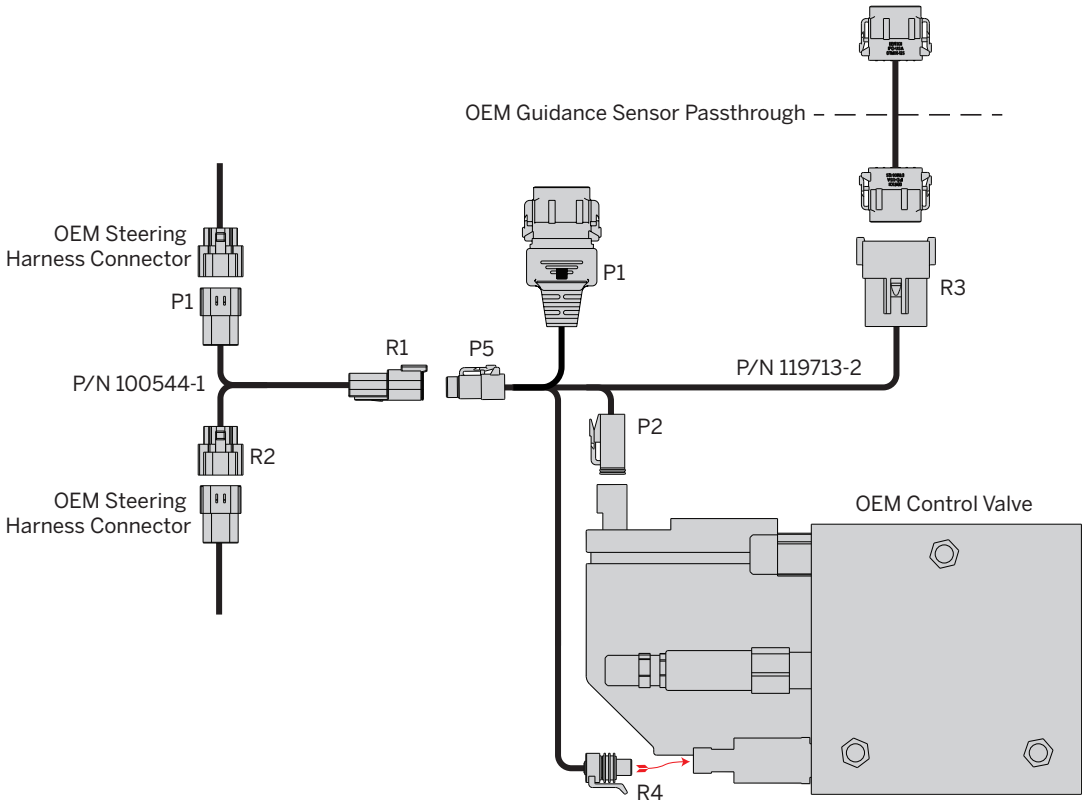
Step 3

Orient the controller with the cables facing the rear of the vehicle.

Use the four supplied M6 x 1 x 12 mm flange head screws to mount the NavController to the plate.



External cable installation



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 100544-1
R1	Connects to P5 of cable P/N 119713-2
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 installations

Step 1

Locate the guidance cable harness connector on the right side of the outside rear cab wall.





Step 2

Connect the R3 connector of the external cable, P/N 119713-2, to the 12-pin Deutsch connector on the guidance cable harness you located in Step 1.



Step 3

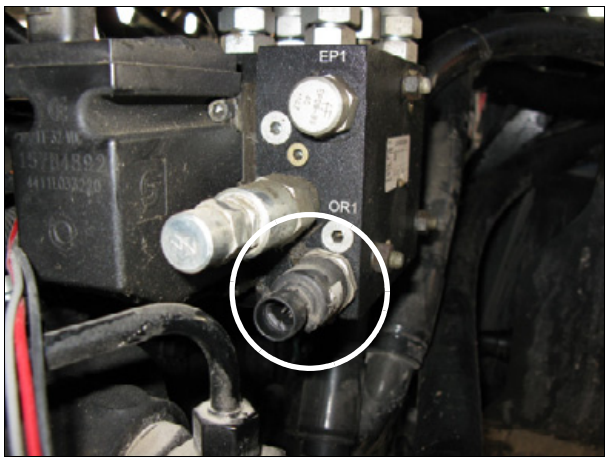
The steering control valve is located beneath the right side of the cab just in front of the rear axle.



Step 4

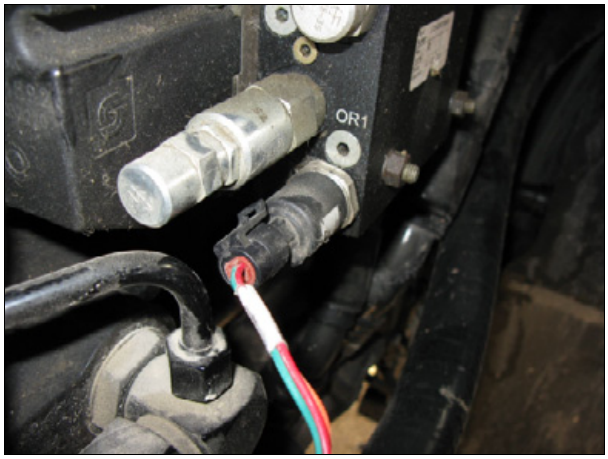
Remove the existing manual override cable connector from the installed pressure sensor.

Remove the installed pressure sensor and replace it with the Trimble manual override pressure sensor, P/N 49669 (included).



Step 5

Connect the R4 manual override connector on the P/N 119713-2 harness to the pressure sensor.



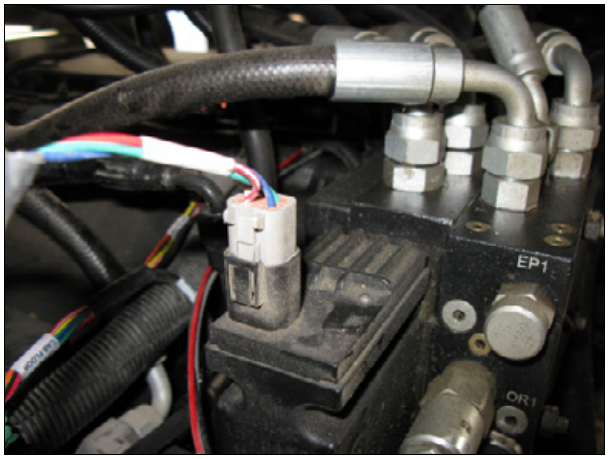
Step 6

Remove the existing cable from the valve pilot head connection and then insert the P2 connector from the Trimble P/N 119713-2 harness.

Step 7

Secure the OEM cables out of the way.

Use zip ties, or an equivalent, to secure the Trimble P/N 119713-2 cable in a protected location.



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 at the front axle, just above and behind the front differential.



Step 2

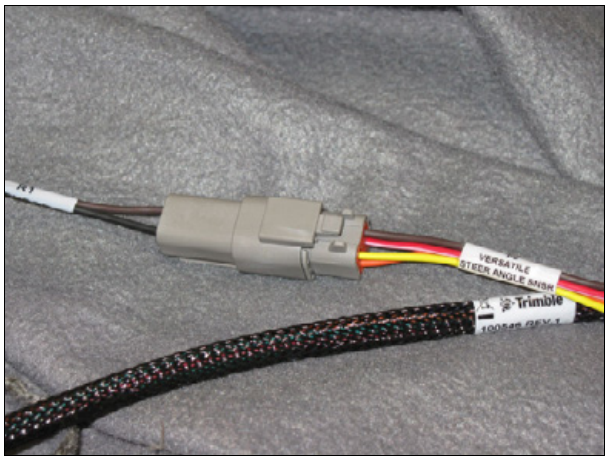
Separate the connectors and insert the Trimble supplied steering sensor harness P/N 100544-1.



Step 3

Route the P/N 100544-1 harness along the frame to the rear of the vehicle, securing it with zip ties or an equivalent.

Connect the R1 connector on P/N 100544-1 to the P5 connector on the P/N 119713-2 harness beneath the cab.



4

In-Cab Harness Installation

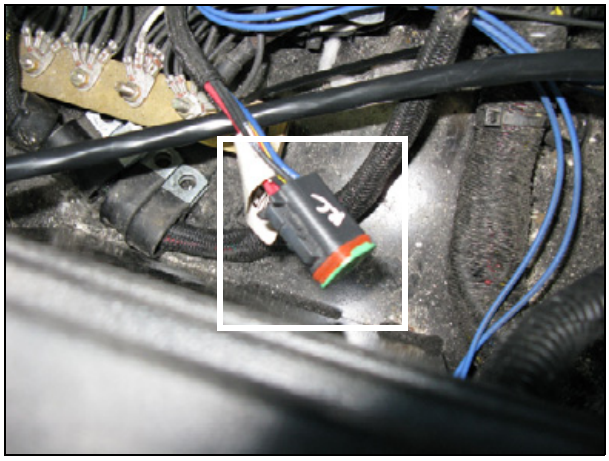
- Connecting system power
- Connecting the sensor harness

Connecting 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 119713-1 harness to the 6-pin power connector.



Connecting the sensor harness

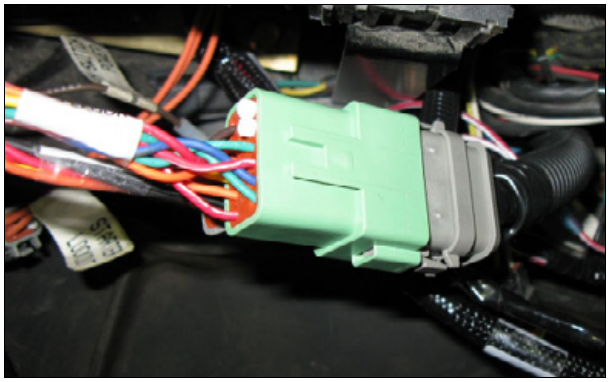
Step 1

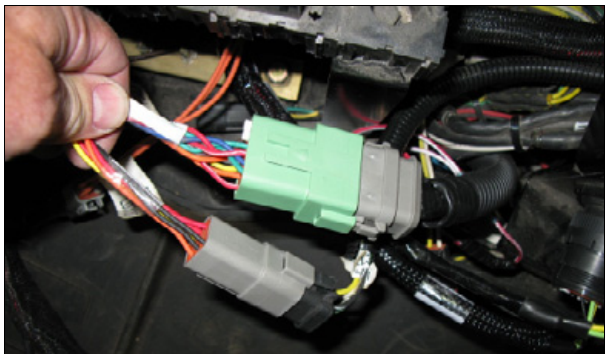
Locate the 12-pin Deutsch connector from the in-cab side of the guidance cable pass-through harness.



Step 2

Connect the R3 connector on the P/N 119713-1 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 receiver mounting instructions
- Connecting an external RTK radio

NAV-900 guidance receiver mounting instructions

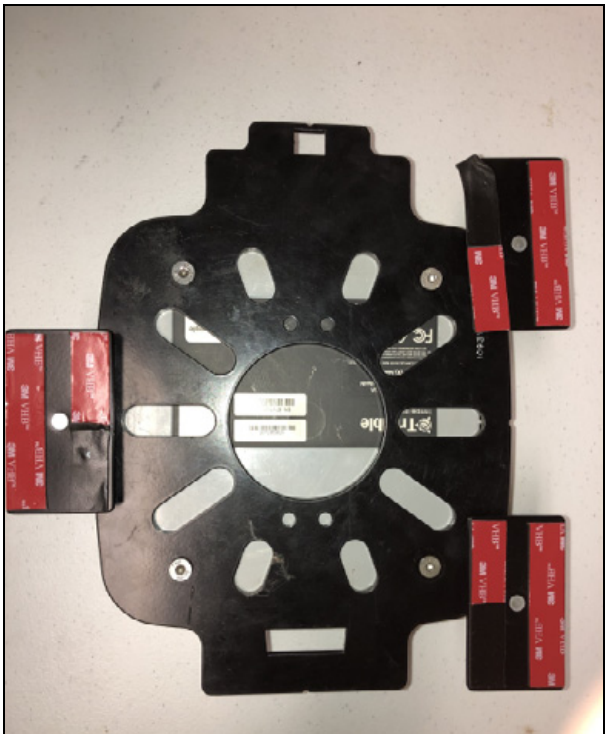
Step 1

Clean a large area of the cab roof near the center rear of the cab.



Step 2

Attach the NAV-900 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 rear of the cab.

Step 5

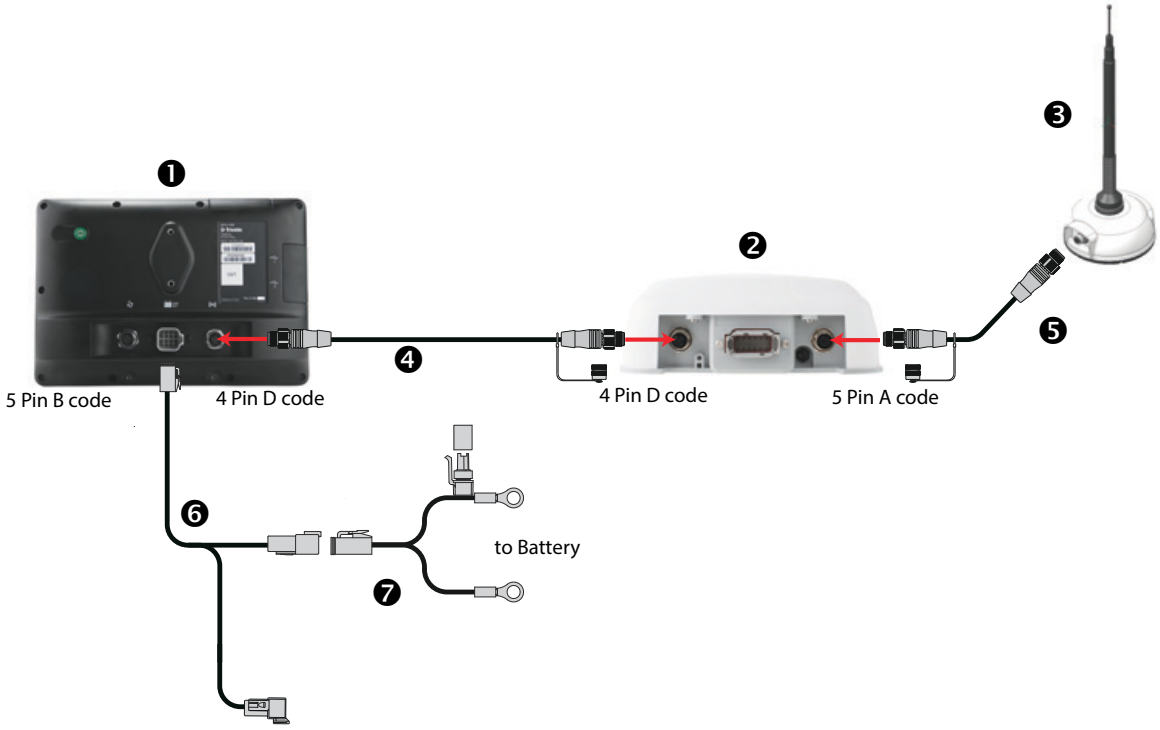
Connect the P1 connector from cable P/N 119713-2 to the NAV-900 controller.

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

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 NavController II/III to the latest firmware from http://agpartners.trimble.com.

   You can use FlashLoader 200 software version 4.03 to update the Autopilot controller: Download it from http://agpartners.trimble.com.
4. Load the correct configuration file into the Autopilot NavController 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 4.01 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. Depending on your machine type, the following items must be calibrated before you can use the Autopilot system:
   - NavController II/III/NAV-900 mounting orientation
   - Manual override
   - Valve deadzone
   - Autopilot P-gain
   - Antenna height/Antenna axle offset, and Roll offse