Autopilot

AUTOMATED STEERING SYSTEM

INSTALLATION INSTRUCTIONS

Fendt Vario

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Version 8.00
Revision A
May 2021
P/N 54035-5140-E08

Trimble

Legal Notices

Agriculture Business Area

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This is the May 2021 release (Revision A) of the Autopilot Automated Steering System Installation Instructions, part number 54035-5140-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.

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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.

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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.

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http://www.trimble.com/Corporate/Environmental_Compliance.aspx
Recycling in Europe: To recycle Trimble WEEE, Call
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Or
Mail a request for recycling instructions to:
Trimble Europe BV
C/O XPO Logistics
De Schakel 39-41
5651 GM Eindhoven
The Netherlands



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. Take care not to short-circuit the battery with tools and/or by the incorrect fitting of cables as fire, burns, and damage can occur.

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
- Basic system diagram
- 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.
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 Comms cable: P/N 110540

Required components

Kits required
Platform kit: P/N 54035-5180
Required components for mounting: NAV-900 Guidance Controller, Autopilot, Trimble: P/N 108993-XX NAV-900 Base Mount Plate: P/N 109315 NAV-900 Base Mount Feet: P/N 109890

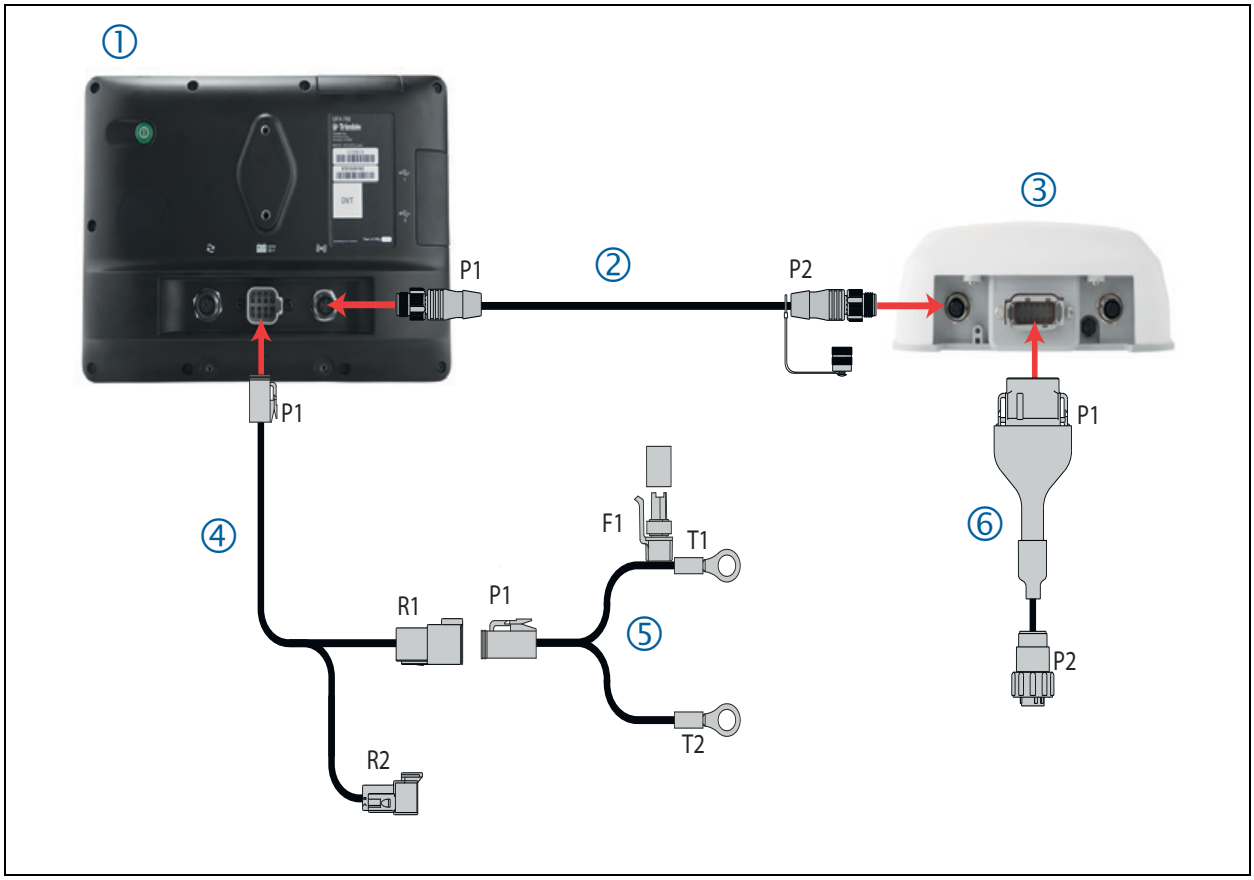
Antenna mounting kits

Kits required
Antenna mount not required

Accessory kits

Optional kits
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

Basic system diagram



	Description	P/N
1	GFX-750 Display	121000-XX
2	GFX-750 Display to NAV-900 Guidance Controller cable	110540
3	NAV-900 Guidance Controller	108993-XX
4	GFX-750 System Power and CAN (1) Display cable	110551
5	GFX-750 System Power (Battery Cable)	67258
6	Cable Assy, Autopilot, NAV-900, Fendt Vario 200 CAN interface	119226

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

Mounting the NAV-900 Guidance Controller

- Orientation of the guidance controller
- Attaching the base mounting plate
- All mounting types – Connecting the cables

This chapter describes how to mount the guidance controller onto the vehicle.

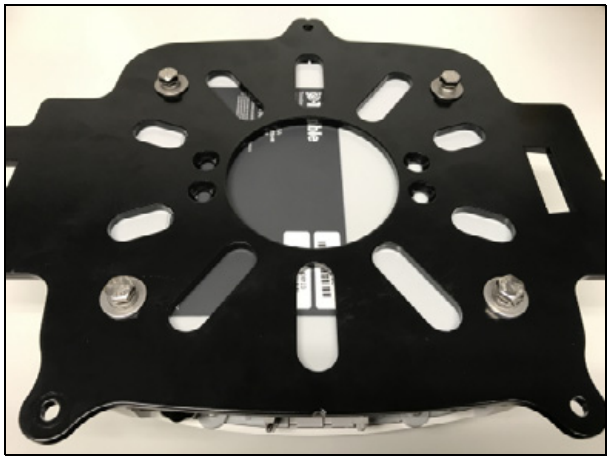
Orientation of the guidance controller

The presence of the Inertial Measurement Device (IMD) requires that the device is installed rigidly with the orientation of the guidance controller being specified in reference to the top/front of the vehicle.

A neutral 0°, 0°, 0° (Roll, Pitch, Yaw) orientation is required, with the dome up and the connectors facing backwards toward the rear of the tractor.

Attaching the base mounting plate

The guidance controller has a base mounting plate (P/N 109315) for adapting to other mounting fixtures. It is attached using four M6 x 14 mm bolts with flat washers and lock washers into the 4 bolts in the base of the housing. Tighten the four M6 fasteners to 7.0 ± 0.4ft-lbs (10.0 ± 0.5 N-m). Take care not to over-tighten the bolts as damage may result.





VHB (double-sided tape) style mounting

The VHB tape option is standard with some display system kits and can be used if no factory-fitted mount or Spar mount option is available.

VHB tape – 3M application guidelines

- **Mating surfaces**: (tractor roof) are best prepared by cleaning with a 50:50 mixture of isopropyl alcohol (IPA) and water prior to applying 3M™ VHB™ tapes.
- **Heavy Oils**: A degreaser or solvent-based cleaner may be required to remove heavy oil or grease from a surface and should be followed by cleaning with IPA/water.
- **Temperature**: Ideal application temperature range is 70°F to 100°F (21°C to 38°C). Pressure sensitive adhesives use viscous flow to achieve substrate contact area. Minimum suggested application temperatures: 50°F (10°C).
- **Pressure**: Bond strength is dependent upon the amount of adhesive-to-surface contact developed. Firm application pressure develops better adhesive contact and helps improve bond strength. Typically, good surface contact can be attained by applying enough pressure to insure that the tape experiences approximately 15 psi (100 kPa) pressure.
- **Time**: After application, the bond strength will increase as the adhesive flows onto the surface. At room temperature approximately 50% of ultimate bond strength will be achieved after 20 minutes, 90% after 24 hours and 100% after 72 hours.
- **Disassembly and removal of residue**: To remove: If the assembled area can cope with an elevated temperature, a hand-held heat gun can soften the tape for ease of removal. Additionally, cutting through the adhesive bond-line is an effective method of removal. Use an appropriate saw or tool. A soapy water solution can be effective to help ease of cutting. Remove adhesive residue using a 3M citrus-based cleaner, Automotive Bug and Tar remover, or other commercial adhesive removers. (Follow manufacturers instructions and safety precautions).

1. Start by putting the height adjustment nuts on the VBH plate stud.



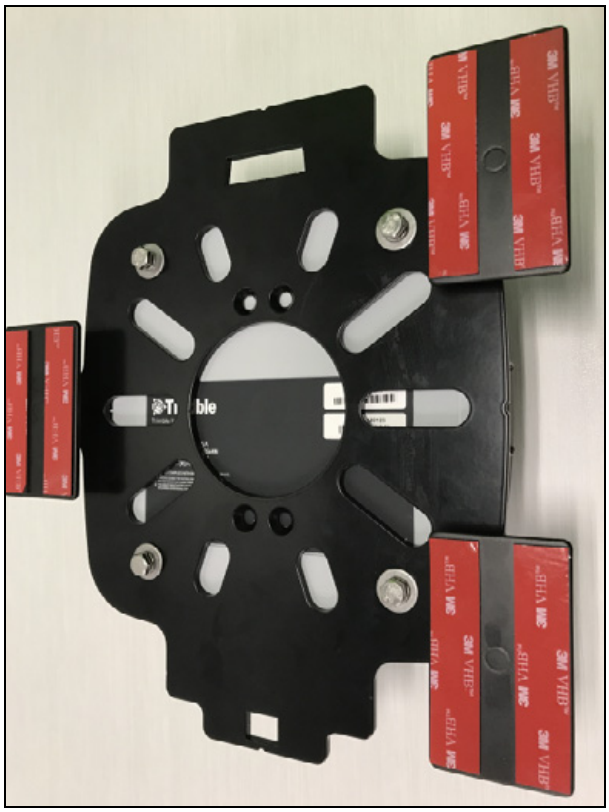
2. Insert the stud through one of the three outer mounting holes on the main mounting plate.



3. Place the flat washer and lock washer on the stud. Loosely thread the remaining nut onto the stud.



4. Repeat for the other two stud mounts.
5. Attach the guidance controller to the main mounting plate.
6. Verify the vehicle is sitting in a level location.
7. Find a suitable location on the top of the tractor cab with minimal flex and height variation.

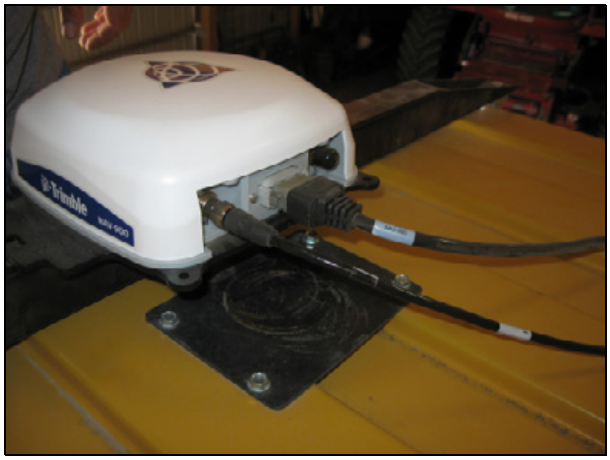


8. Before removing the VHB protective covers, place and mark the location on the cab ensuring it is on the center-line of the vehicle. Mark each VHB foot.
9. Peel the covers from the VHB tape and place the feet in the marked locations.
10. Adjust the height of the nuts on the studs to level the guidance controller.



All mounting types – Connecting the cables

1. Connect the display cable to the 4-pin M12 connector on the left of the NAV-900 guidance controller.
2. Make sure that you align the keying and then tighten the connector.
3. Insert the P/N 119226 cable into the 12-pin Deutsch connector. Route the cable into the cab of the tractor.



4. In the cab on the right-hand side under the cover is the "ISO-BUS" connector.



Cover





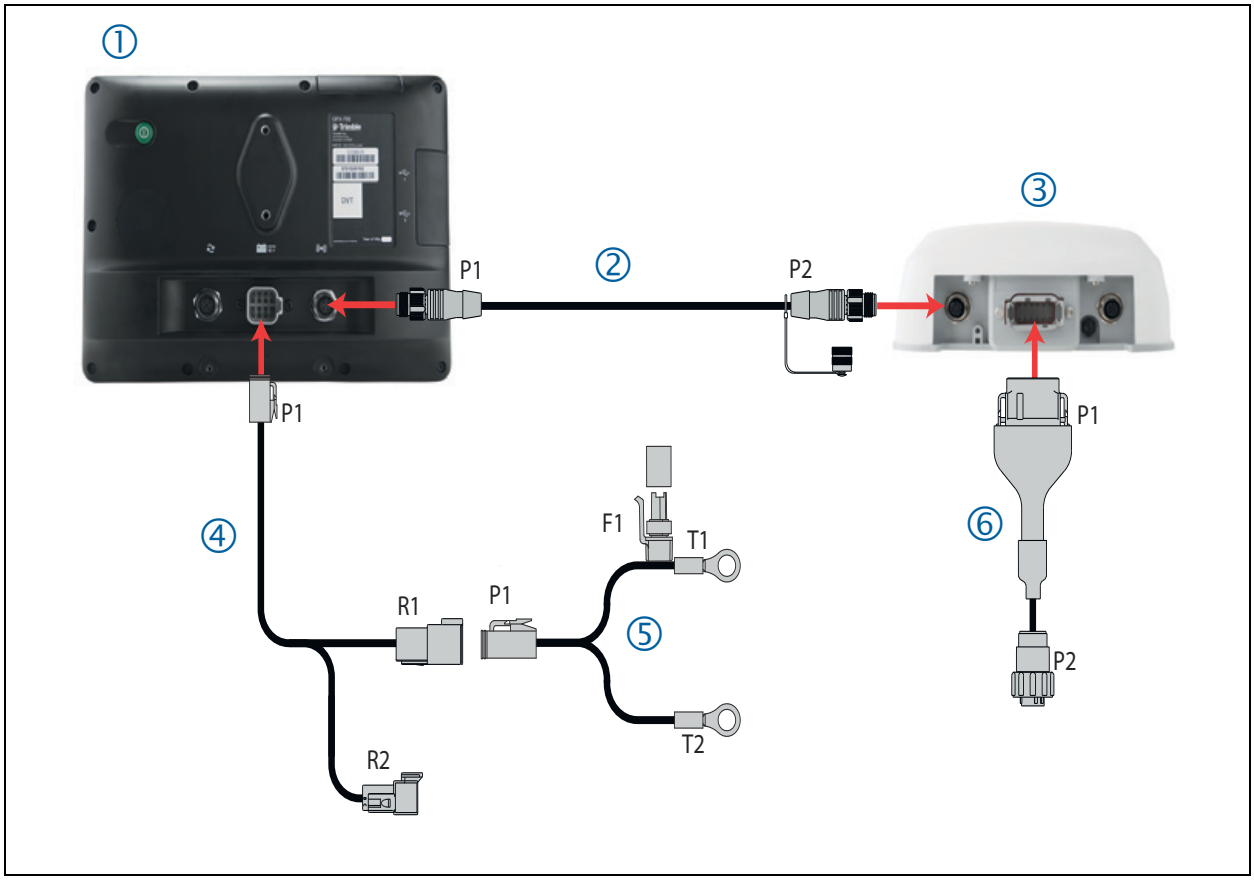
5. Locate cable P/N 110540. Connect it to the NAV-900 controller. Route the other end of the cable into the tractor.

3

Display Installation

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

GFX-750/XCN-1050 display: Components



	Description	P/N
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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: 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 is 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

Locate cable P/N 67258. Attach the ring terminals to the battery of the tractor. Route the other end of the cable into the cab of the tractor.

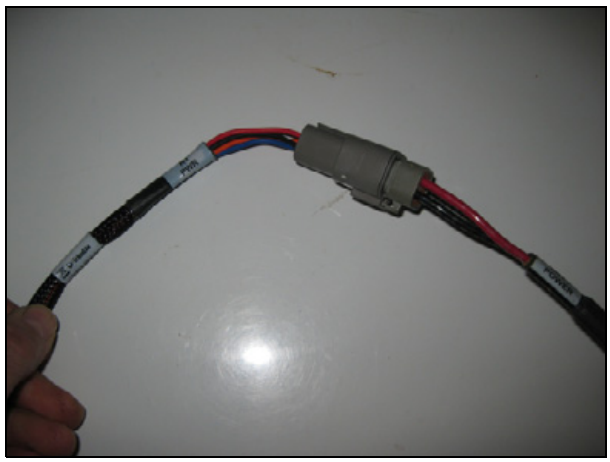
Step 2

Locate cable P/N 110551. Attach P1 connector, labeled **Display PWR**, to the 6-pin connector on the back of the display.



Step 3

Locate the end of cable P/N 67258 and plug P1, labeled **Batt Power**, into cable 110551 R1, labeled **PWR**.



Step 4

Locate the end of cable P/N 110540 and connect to the M12 connector on the back of the display.





4

Firmware

The NAV-900 firmware automatically updates to match the version running on the Trimble GFX-750 display.

You can get updates manually via USB drive or via the Internet using Wi-Fi.

To automatically download the latest software updates:

1. Tap **Settings** and select **WiFi Settings**.
2. Tap **Connect** to connect your tablet to the network of your choice.
3. On the **Android App** screen, tap **App Central** to open the App Central market place. From here, you can initialize any software notification and update.

For more information, go to http://agpartners.trimble.com/agsupport/FirmwareMatrix/.

5

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 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 2.92 or later. Depending on your machine type, the following items must be calibrated before you can use the Autopilot system:
   - NavController II/III mounting orientation
   - Antenna height/Antenna axle offset, and Roll offset
6. Make sure the machine steering has been calibrated by the Fendt/Challenger dealer for the best performance.