Autopilot

AUTOMATED STEERING SYSTEM

INSTALLATION INSTRUCTIONS

- Versatile Tractors
- Kubota Tractors
- Nemesis AutoGuide Ready
- M8 AutoGuide Ready

Version 8.00
Revision A
May 2019
P/N 54035-5211-E08

Trimble

Legal Notices

Agriculture Business Area

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This is the May 2019 release (Revision A) of the *Autopilot Automated Steering System Installation Instructions*, part number 54035-5211-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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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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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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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.

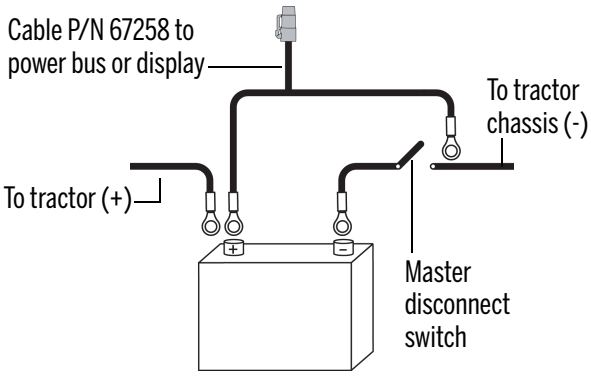
CAUTION – Do not direct pressurized water at:
- Electronic or electrical components or connectors
- Bearings
- Hydraulic seals
- Fuel injection pumps
- Any other sensitive parts or components



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.



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1

Introduction

- Technical assistance
- Manual system upgrade to the Autopilot system
- Required components
- 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 54035-5211	Standard hand tools
Trimble NavController III for Common Trimble Ready Installations, GEN III: P/N 64425-24	

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.

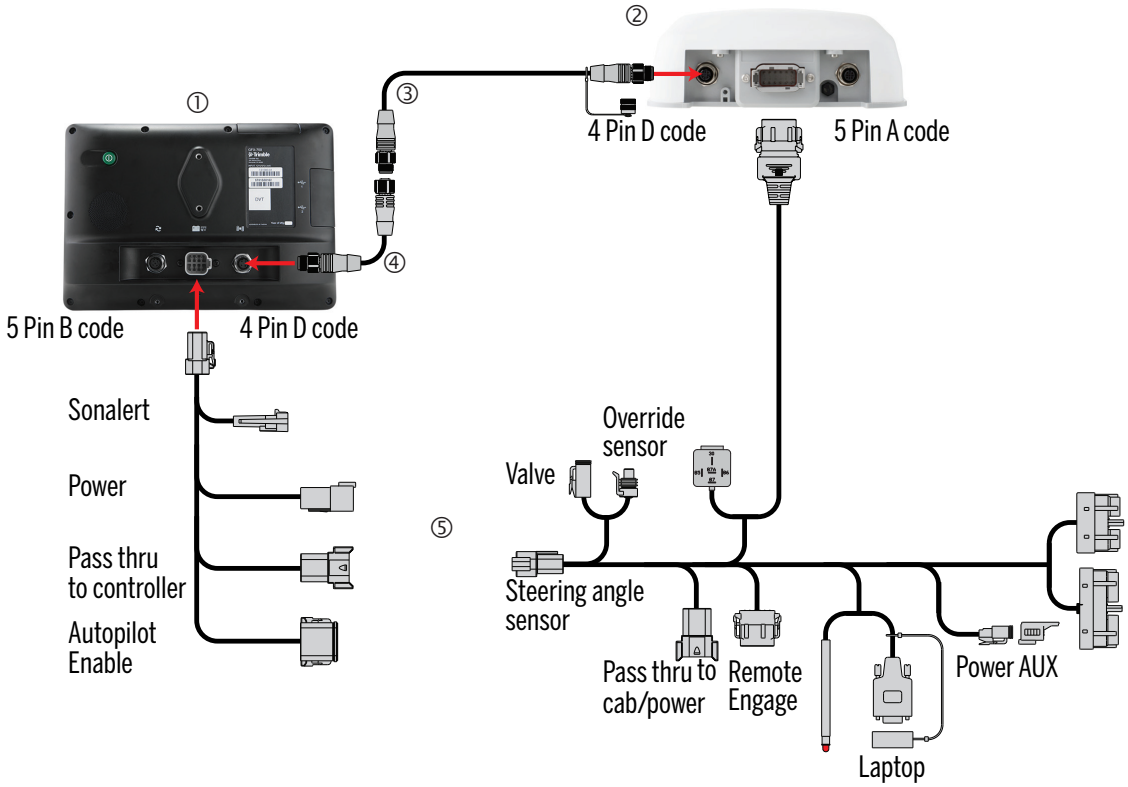
2

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	Platform Kit, Versatile Nemesis NAV-900 w/NavIII OEM (2 parts)	118242

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 6-pin DT power/CAN cable P/N 110551 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

NavController III installation

Step 1

Mount the NavController III as shown on the mounting bracket using the provided M6 x 1 x 12 mm hex head screws.



Step 2

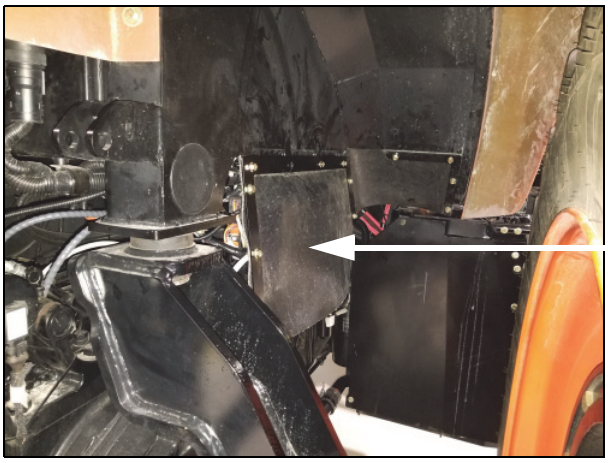
Connect the NavController III connectors on the cable P/N 118242 to the NavController III.



Step 3

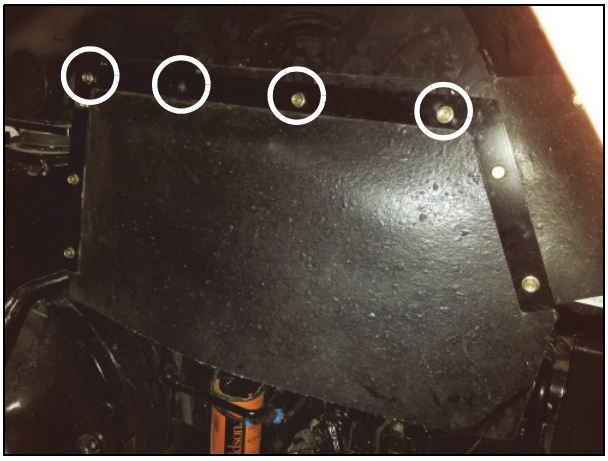
Locate the rubber shield in front of the right rear axle.

NOTE – For easier access the right rear tire may need to be slid out.



Step 4

Remove the top four screws from the rubber shield and then swing the shield towards the front of the tractor.



Step 5

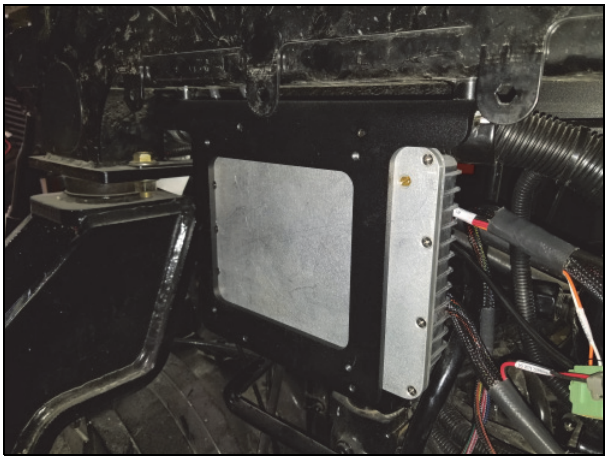
Remove the two screws from the clamp holding the tractor harness in place below the cab.



Step 6

Reuse the screws removed in the previous step to attach the NavController III plate and harness clamps to the tractor.

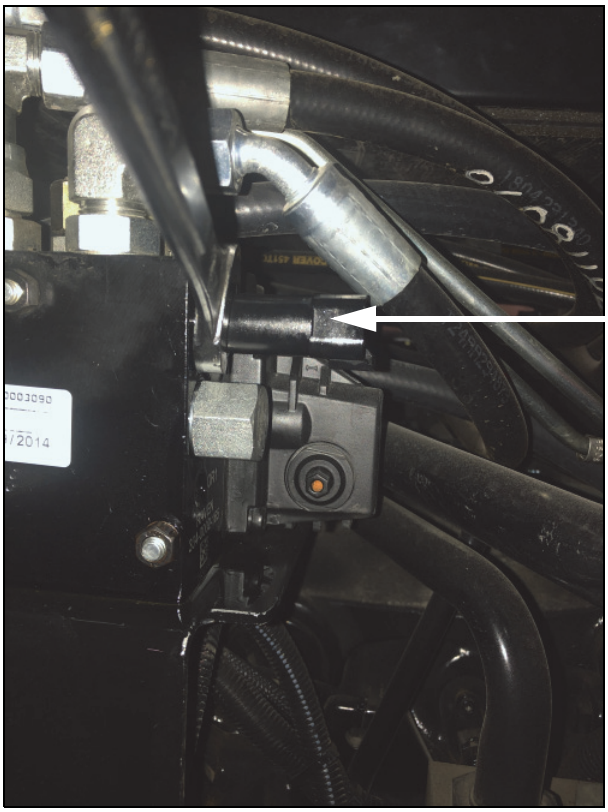
Make sure that the NavController III is installed so the label faces the left side of the tractor and the connectors are facing the back of the tractor.



External Cable Installation

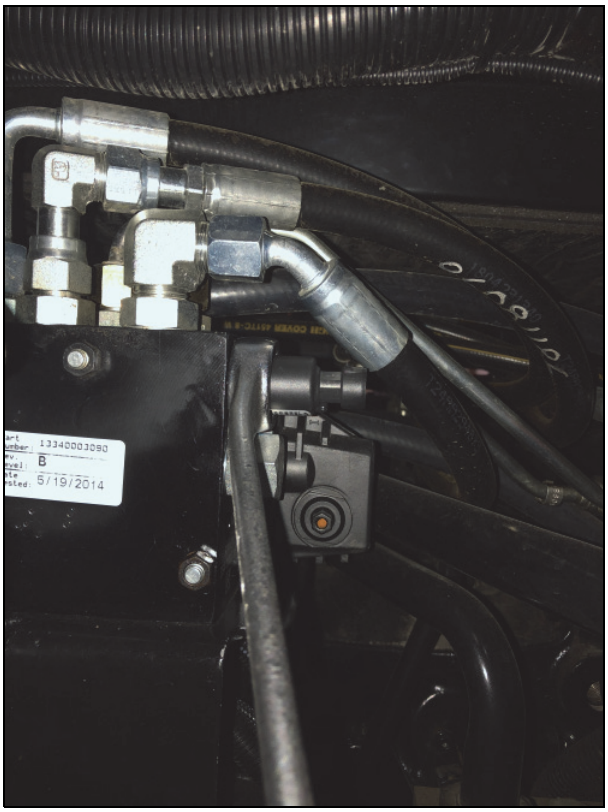
Step 1

Locate the tractor guidance valve in front of the NavController III mounting location and then remove the existing pressure transducer from the front of the valve.



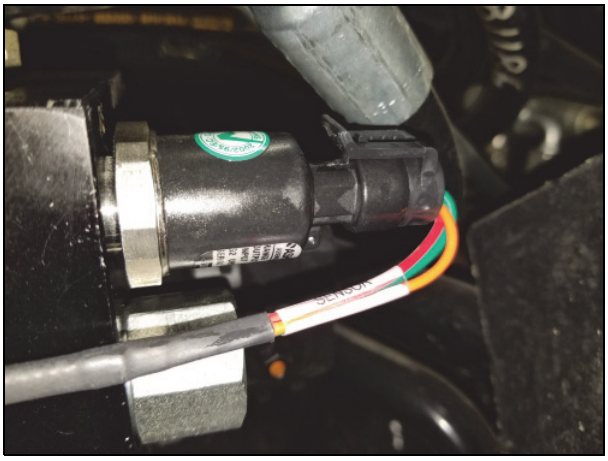
Step 2

Install the provided Trimble pressure transducer P/N 49669 in the port where the transducer was removed in the previous step.



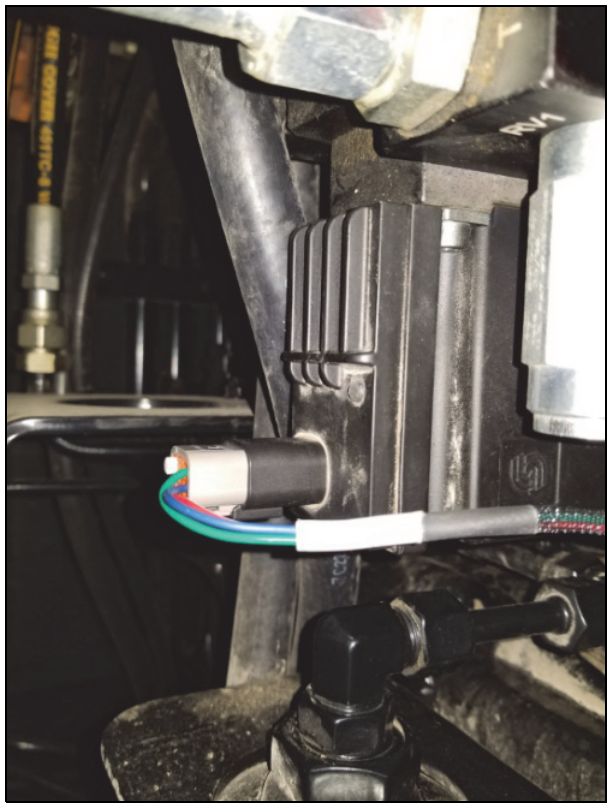
Step 3

Connect P6 on cable P/N 118242 to the pressure transducer.



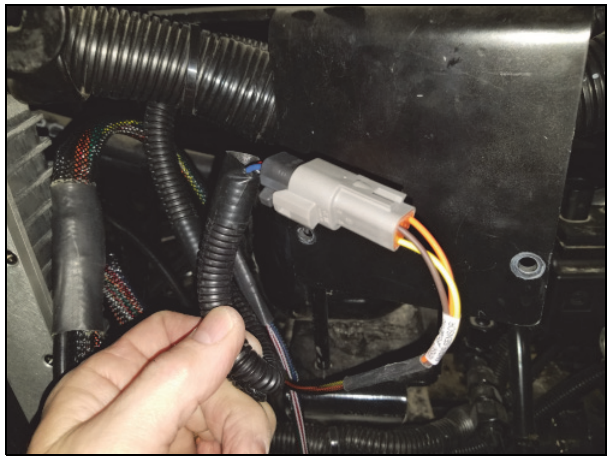
Step 4

Connect P5 on cable P/N 118242 to the steering control valve.



Step 5

Connect R3 on cable P/N 118242 to the steering sensor connector, located on the tractor harness near the NavController III mounting location.



Step 6

Connect R1 on cable P/N 118242 to the sensor pass-thru connector. The connector is an 8-pin Deutsch DT, located behind the NavController III.



4

In-Cab Harness Installation

Step 1

Locate the right rear window lift cylinder and use a screw drive to loosen the clip as shown.

NOTE – Keep the clip safe for later use.



With the clip loosened, pull the end of the cylinder off the end of the rod.

NOTE – Make sure to hold the rear window open while doing this step to prevent possible damage to the window.



Step 2

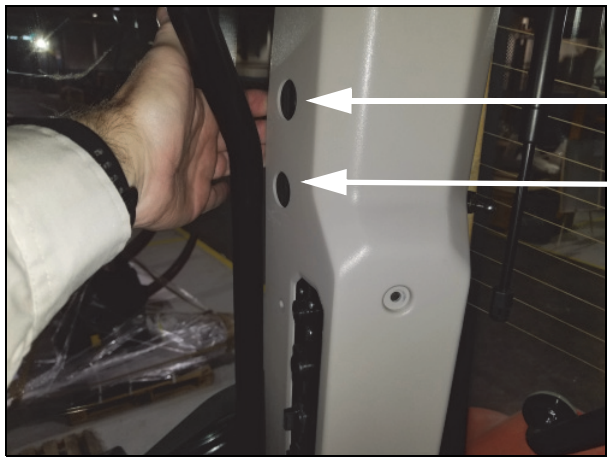
Using a Torques T-30 bit, remove the three screws holding the B post cover in place.



Step 3

Remove the display mounting bar if present

Place your hand behind the right side of the cover and gentle pull to allow the cover to move past the bracket mounts and power outlets.



Remove the cover from the B post.

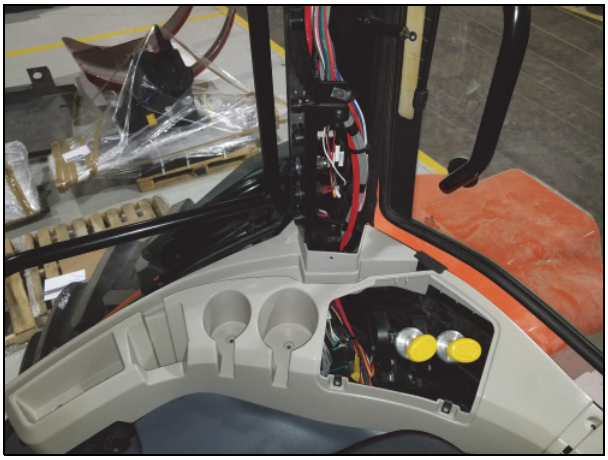


Step 4

Place both of the PTO handles in the center position. Remove the two torques screws from the front of the PTO handle cover.



Remove the cover from around the PTO handles.



Step 5

Remove the torques screws from the remainder of the cover. There is a screw in each cup holder, one on the B post and one on the rear wall.

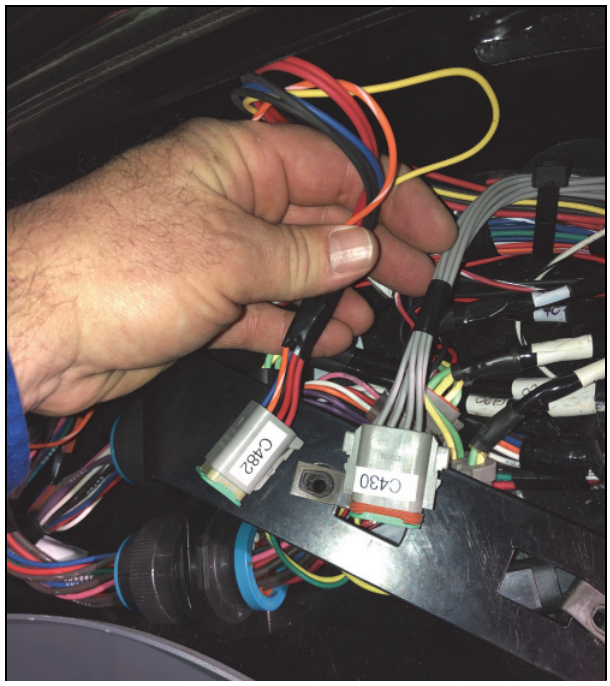


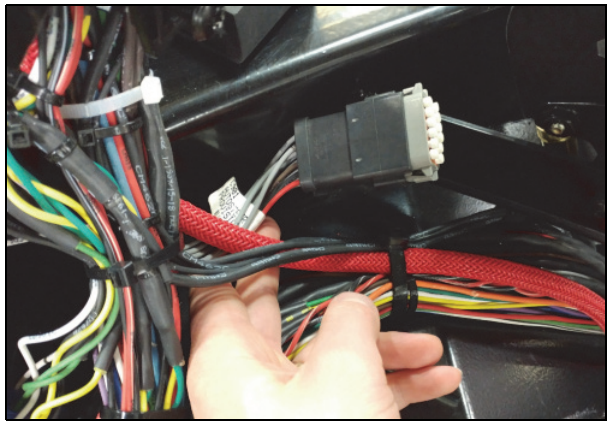
To access the rear wall screw the middle cover behind the seat will need to be temporarily removed.



Step 6

Locate the 6-pin Deutsch DT connector labeled **C482**, the 8-pin Deutsch DT pass-thru connector labeled **C430** and the 12-pin Deutsch DT connector labeled **C901**.



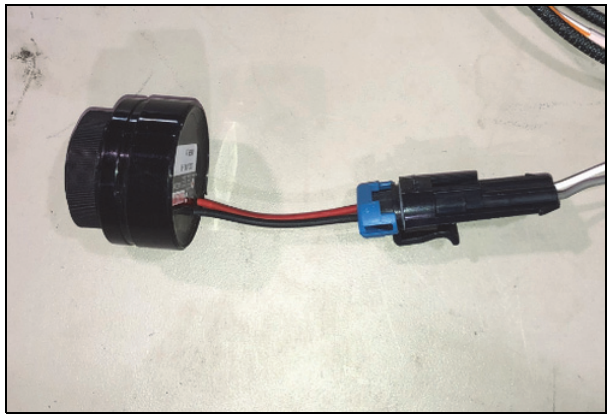


Step 7

Locate the in-cab portion of cable P/N 118242.



Attach the sonalert to the P12 sonalert connector.

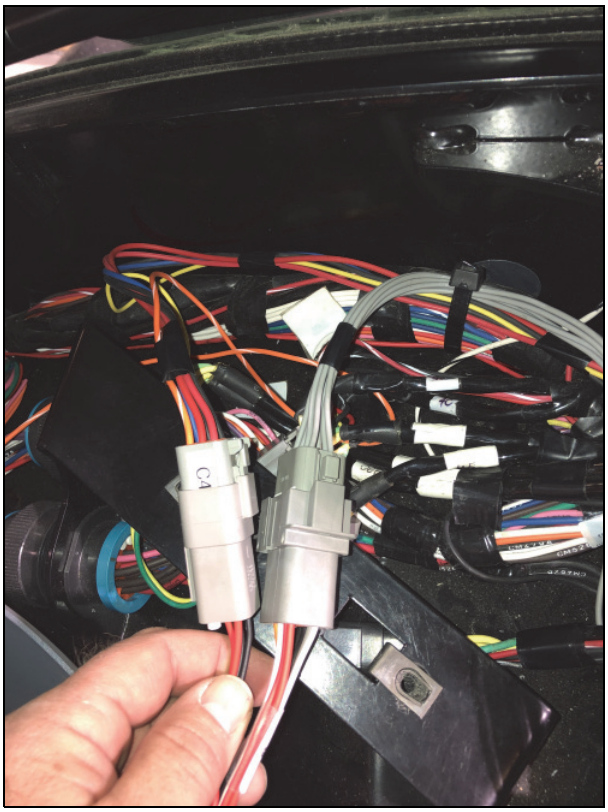


Step 8

Connect the R5 connector on cable P/N 118242 to the C430 connector.

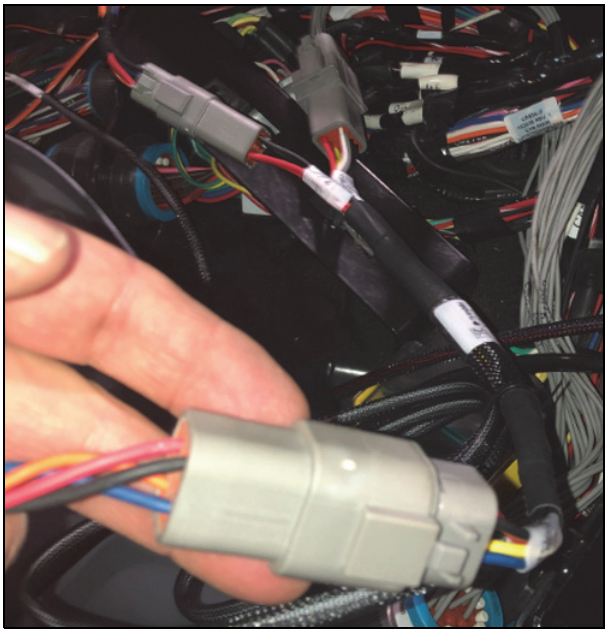
Connect the R4 connector on cable P/N 118242 to the C482 connector.

Connect the P9 connector on cable P/N 118242 to the C901 connector.



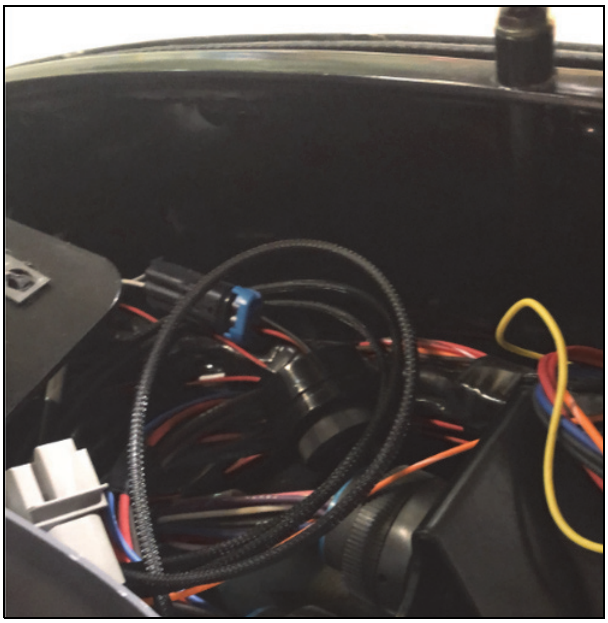
Step 9

Connect the P8 connector on cable P/N 118242 to the 110551 display power cable.



Step 10

Coil the excess cable including the sonalert in the area below the cup holder cover.



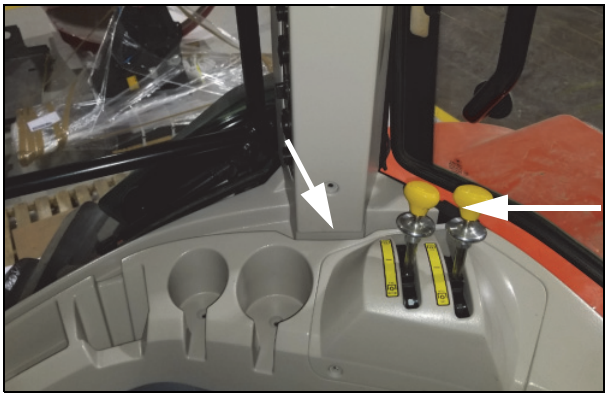
Step 11

Replace the covers in the reverse order as described in the previous steps.



Step 12

Route the NAV-900 cable P/N 110540 through the cable pass-thru on the back of the cab and through the cable tray to the display mounting location.



5

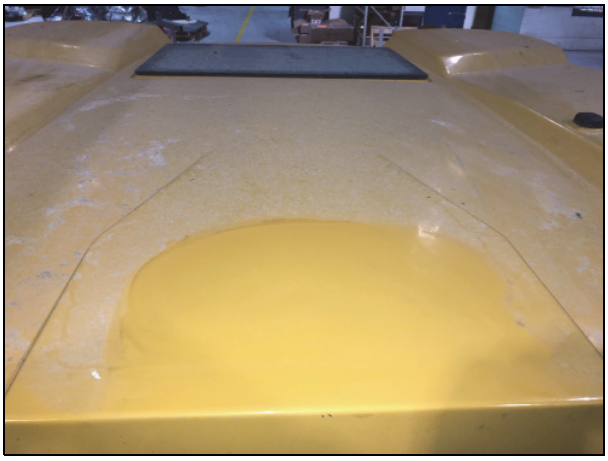
Antenna / Receiver Installation

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

NAV-900 guidance receiver mounting instructions

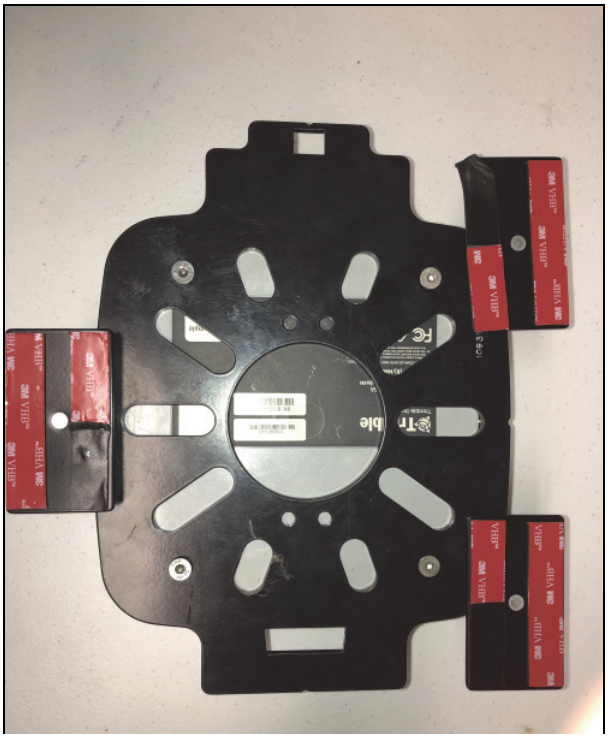
Step 1

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



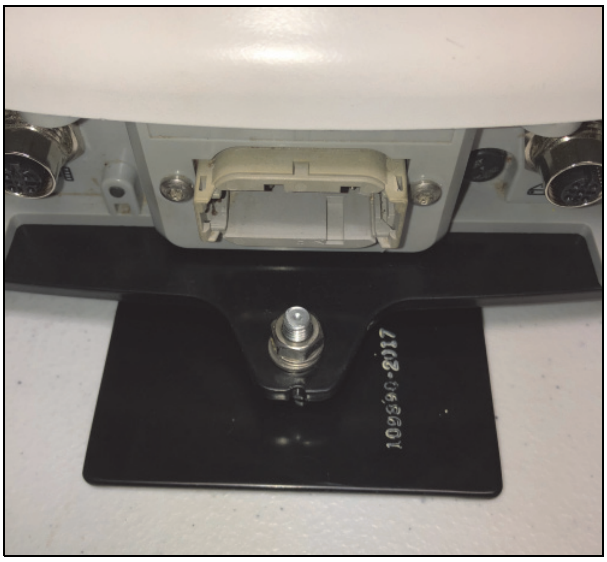
Step 2

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

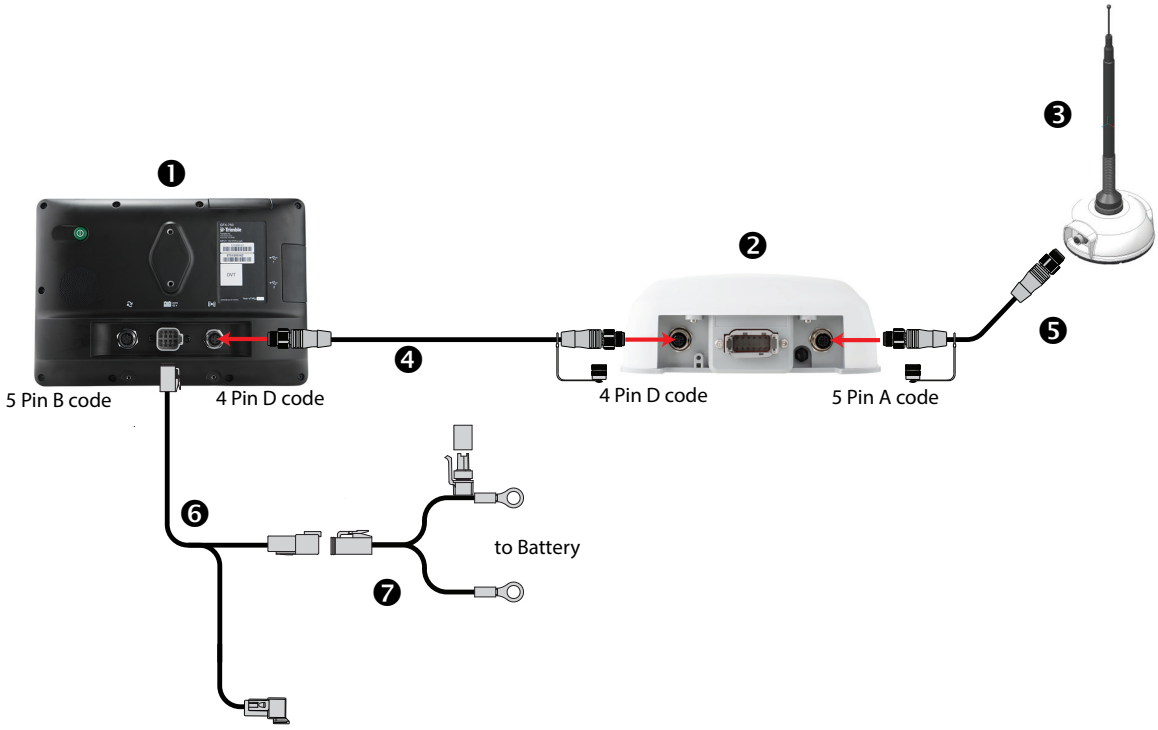
Connect the P2 connector from cable P/N 118242 to the NAV-900.

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. The Autosteer enable switch must be switched to **Auto** prior to calibration or operation. The switch is located near the upper right side of the headliner.



6. 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 offset