Autopilot

AUTOMATED STEERING SYSTEM

INSTALLATION INSTRUCTIONS

AXION 800 HEXASHIFT Stage IV Starting from serial number A6000100 if equipped with OSI ready	▶ 800 / 810 / 830 / 840 / 850
AXION 800 CMATIC Stage IV Starting from serial number A6100100 if equipped with OSI ready	▶ 810 / 820 (NA) / 830 / 840 (NA) / 850 / 860 (NA) / 870 / 880 (NA)
AXION 900 Stage IV Starting from serial number A4400583 if equipped with OSI ready	▶ 920 / 930 / 940 / 950 / 960

NOTE – The vehicle must have the proper Open Steering Interface (OSI) license for a Trimble steering system in order to utilize the Guidance Ready functionality of the machine. This license is purchased from the CLAAS dealer.

Version 7.00
Revision C
June 2021
P/N 54035-5046-E07-C

Legal Notices

Agriculture Business Area

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Westminster, CO 80021-2712
USA
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This is the June 2021 release (Revision C) of the Autopilot Automated Steering System Installation Instructions, part number 54035-5046-E07-C. It applies to version 7.00 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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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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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.

⚠ **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

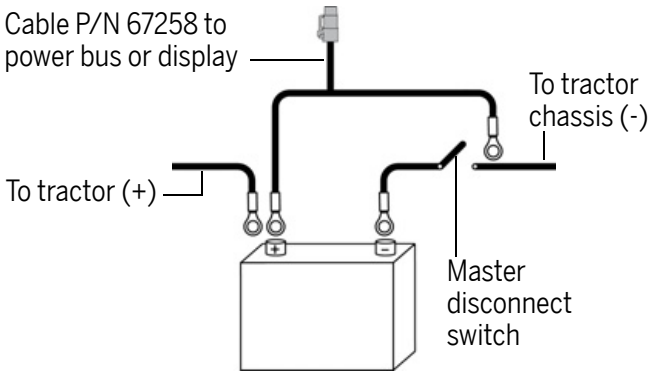


Set the hose pressure as low as practicable, and spray at a 45° to 90° angle. Keep the nozzle of the power washer away from the machine at the distance recommended by the manufacturer.

⚠ **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.
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 Comms cable: P/N 110540

Required components

Kits required	Special tools
Platform kit: P/N 54035-5046	Standard hand tools

Antenna mounting kits

Kits required
P/N 117682, +NAV-900, Mount, CLAAS Quick Release Adapter (included in P/N 54035-5046)
Optional Spar mounts (must measure application for proper part number):
• P/N 64898: Bracket, GPS Spar 16.5"– 28.5"
• P/N 55349: Bracket, GPS Spar 27.5"– 37.5"
• P/N 53676: Bracket, GPS Spar 36.5"– 46.5"
• P/N 55348: Bracket, GPS Spar 45"– 55"
• P/N 66774: Bracket, GPS Spar 54"– 64"

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.

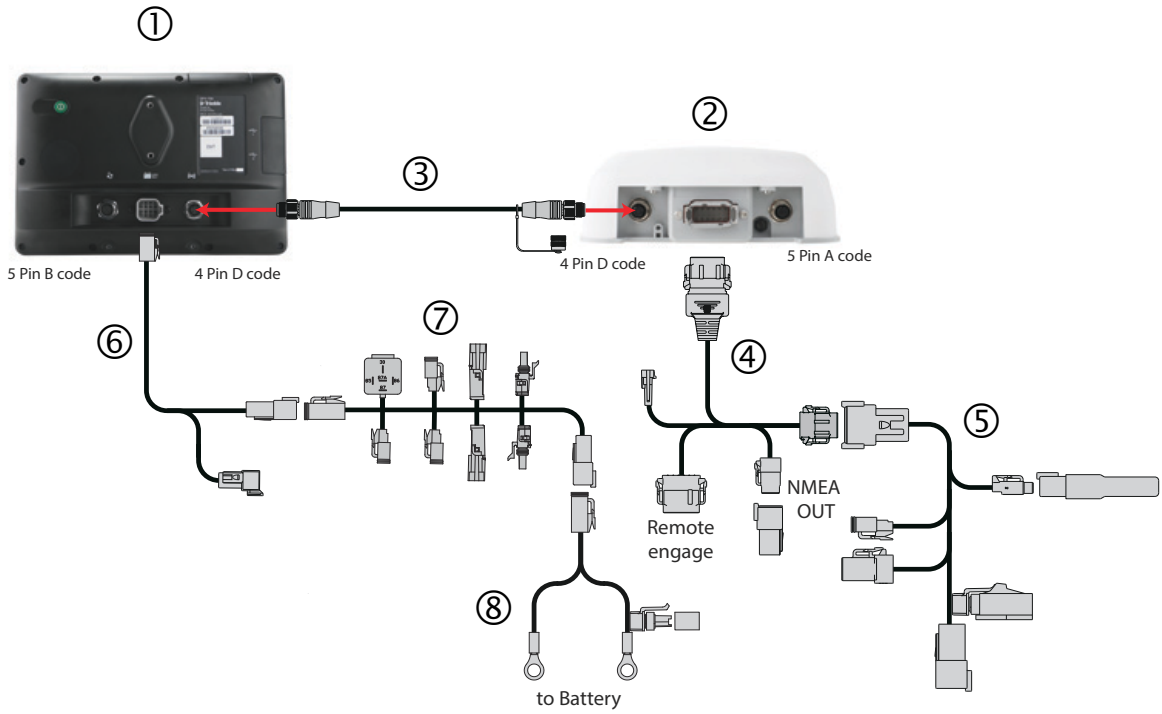
1. Park the vehicle on a hard, level surface. Block the front and rear wheels.
2. Align the steering straight ahead. On an articulated vehicle, install the articulation locks.
3. Remove all dirt and debris from the areas of the vehicle where the Autopilot system will be installed.
4. Open all kit boxes 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, NAV-900, CAN ISO to cab Guidance, 4m	110550
5	Cable Assy, NAV-900, CAN Guidance, CLAAS	113271
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™ Power with Relay and Switch (Acc) - optional	67259
8	Cable Assy, GFX-750/CFX-750/FM-750/XCN-1050/FmX/FM-1000 Basic Power, 4 m	67258

GFX-750/XCN-1050 display: Preparation

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



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



GFX-750/XCN-1050 display: Installation

Step 1

Start by determining where the display will be located in the vehicle and mount the base end ram mount ball.

This example uses the CLAAS rail mount system, which may or may not be available due to vehicle optioning.

Locate the rail mount and affix the RAM mount base ball to it.

NOTE – Steel bracketry is not included.



Step 2

Affix the rail mount to the rail on the upper right side of the cab.

If no rail is available. locate a suitable bar to utilize the V bolts to secure the RAM mount base ball.



Step 3

Loosen the clamp arm sufficiently to get over both the ball on the display, as well as the ball on the RAM base mount.



Step 4

Position the display as desired, with good viewability by the operator, and then tighten the handle to fix in place.





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

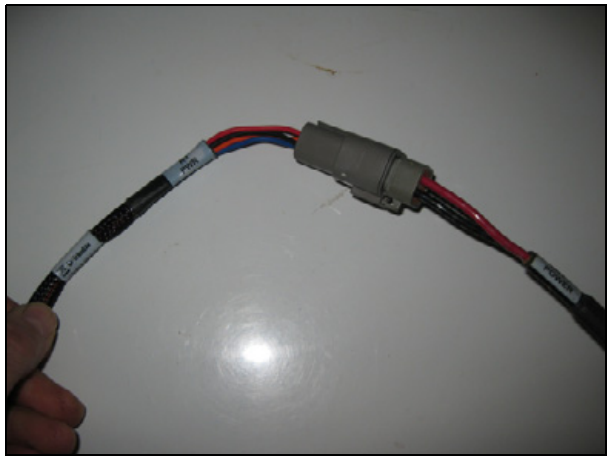
The GFX-750 display requires a nominal 12 volt power source. The P/N 67258 cable has ring terminal leads for connecting to a battery or other cable mount point.

The P/N 67259 is the power buss cable and is optional. P/N 67258 is shown here.

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

Step 1

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



Step 2

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



Step 3

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





3

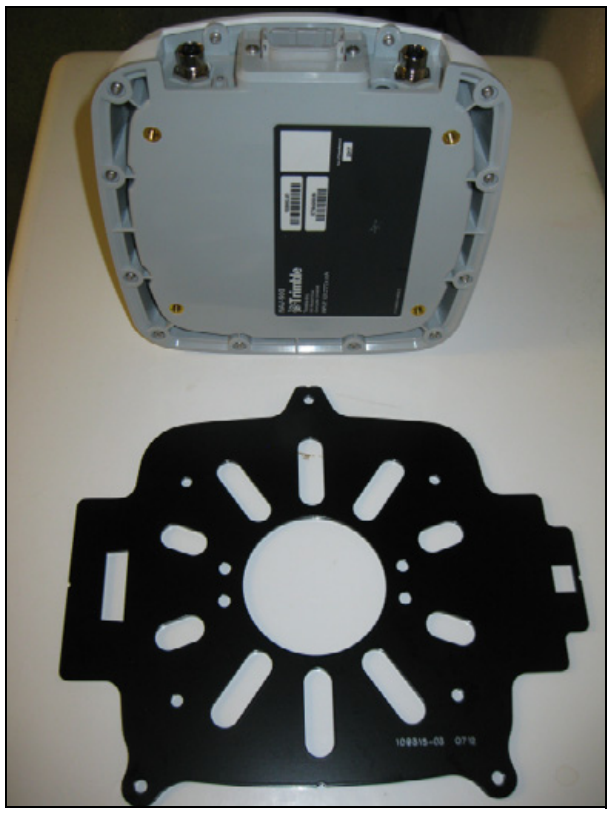
Antenna / Receiver Installation

- Installing the NAV-900 guidance receiver using the CLAAS quick release adapter plate
- Installing the NAV-900 guidance receiver using a spar mount
- Connecting the cables - both methods
- Connecting an external radio

Installing the NAV-900 guidance receiver using the CLAAS quick release adapter plate

Step 1

Locate the NAV-900 controller and the NAV-900 base plate, P/N 109315.



Step 2

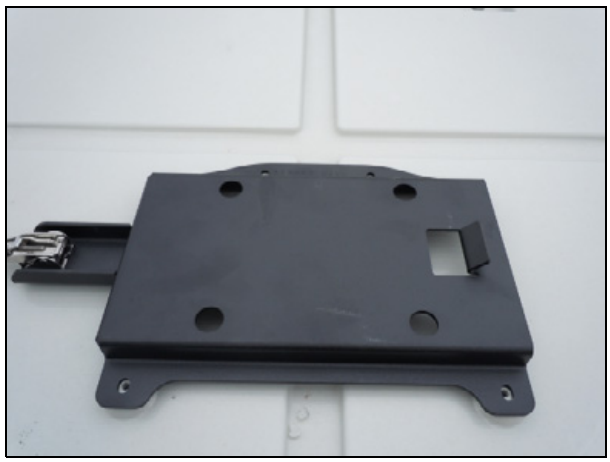
Invert the NAV-900 controller and use the 4 provided M6 bolts in the NAV-900 pack-out to attach the plate to the bottom of the NAV-900 controller. The plate should be attached so that the large slot for the tang is on the right.





Step 3

Locate the CLAAS Quick Release Adapter mount, P/N 117682.



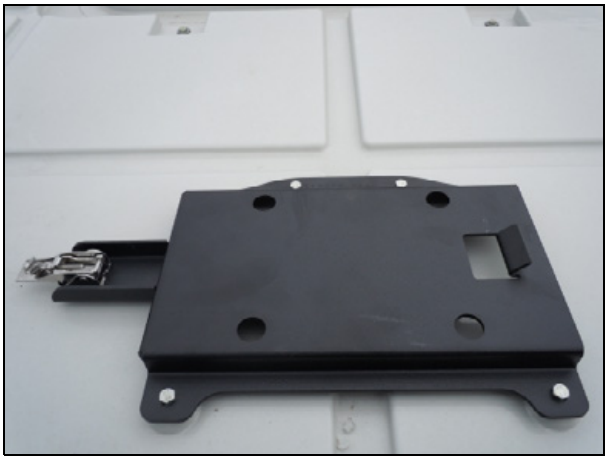
Step 4

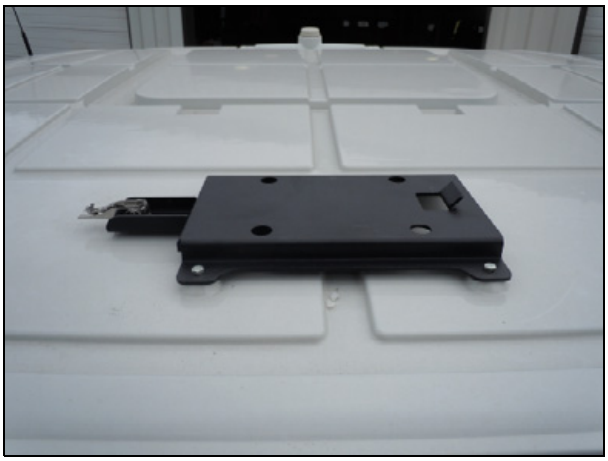
Locate the 4 mounting holes on the top of the cab. Remove the plugs in the mounting holes.



Step 5

Use the 4 bolts provided to affix the quick release adaptor mount to the mounting holes.





Step 6

Lay the base mounting plate onto the quick release adaptor mount tang and then secure with the latch on the other side.





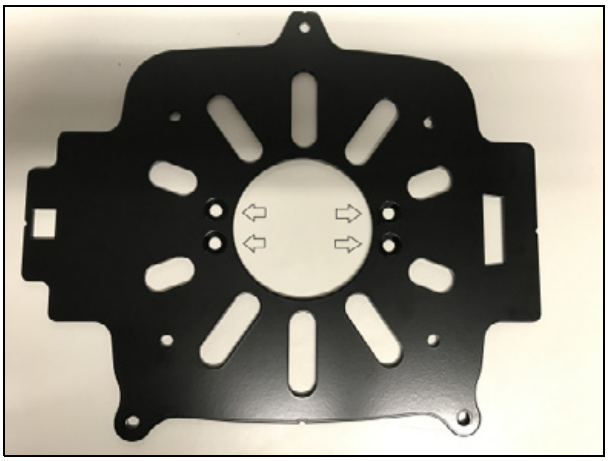
Installing the NAV-900 guidance receiver using a spar mount

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

Lengths available are:

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

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



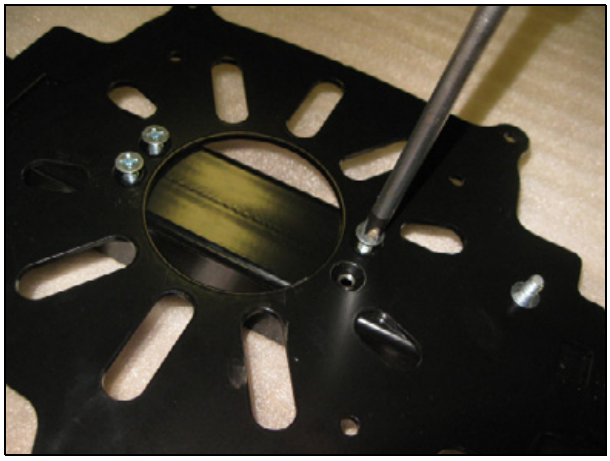
Step 1

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



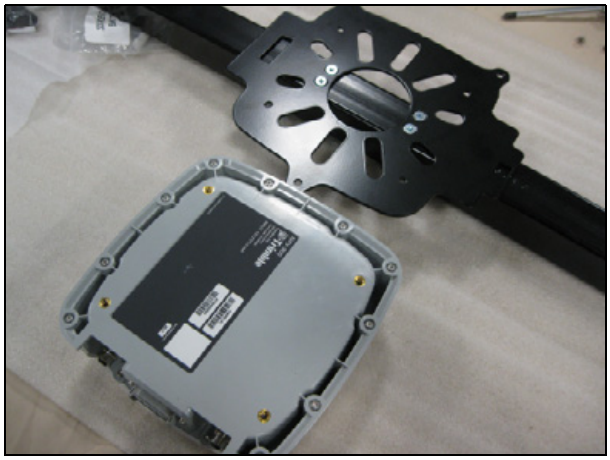
Step 2

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



Step 3

Lay the guidance controller on its top.



Step 4

Lay the mounting plate with spar attached over on top.

Attach the plate to the guidance controller with the four 6 mm bolts and lock washers.

Tighten the 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.







Step 5

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



Step 6

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



Step 7

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



Step 8

Place the spar on the space and insert the bolt.



Step 9

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





Connecting the cables - both methods

Step 1

Locate the P/N 110550 cable and the CLAAS P/N 113271 adapter cable.



Step 2

Plug the P1 connector of cable P/N 110550 into the back of the NAV-900 guidance receiver.

Connect P/N 110540 to the 4-pin M12 connector on the left rear of the NAV-900 guidance receiver.



Step 3

Route the cables to the back of the cab and into the access holes on the right rear.



Loosen the roof panel and route the P/N 110540 and 110550 cable down the B pillar into the machine.



Locate the Interface cable at the bottom right of the cab.



Plug the interface adapter cable 113271 into this connection, and then connect it to the 110550 cable routed down through the B pillar.



Step 4

With the display power cable routed into the B pillar, route the other end of the P/N 110540 cable out of the top of the B pillar and connect it to the display as well.



Step 5

Route the other end of the P/N 110551 cable down the B pillar and connect it to the P/N 67258 base power cable.



Power connection of the ring terminals can be made in the back of the cable to the power supplied to the fuse board (recommended), or routed down through the knockout hole on the bottom right of the cab towards the battery on the right side of the machine.

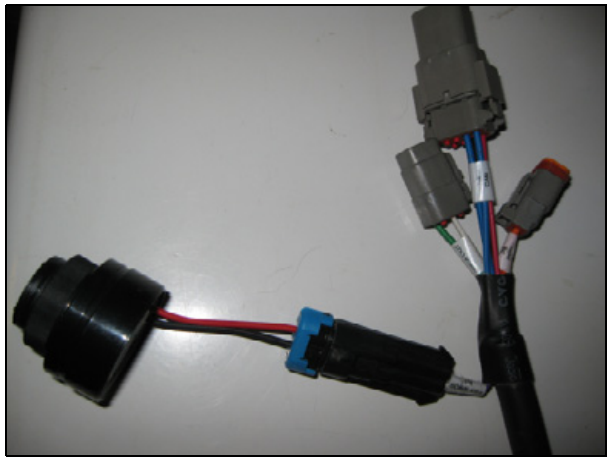


If routing the cables to the battery, make sure to leave adequate slack in the power cable to accommodate for the cab suspension movement.

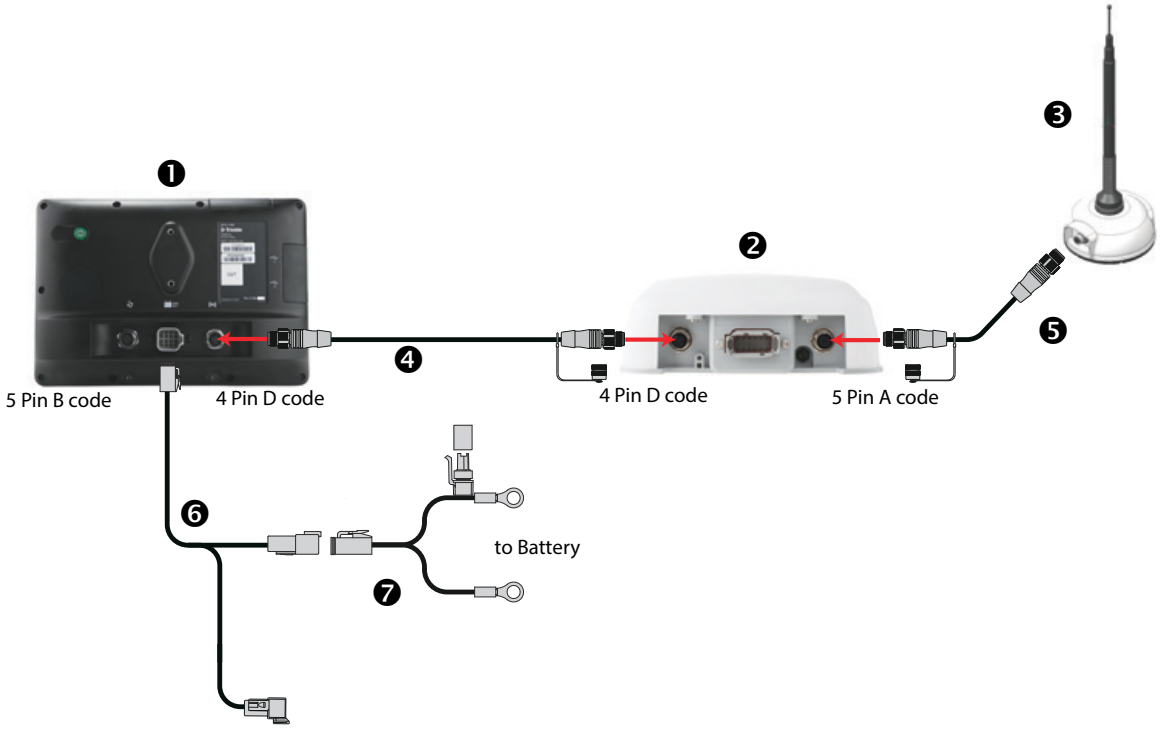


Step 6

Connect the Sonalert to the cable once it is inside the cab. Connect the NMEA output and modem power as needed.



Connecting an external 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.

Step 3

Secure the cables as necessary.



4

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 NAV-900 to the latest firmware from http://agpartners.trimble.com.
4. Load the correct configuration file into the Autopilot NavController II for the vehicle model being used.
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:
   - Make sure the machine has the proper licensing from CLAAS to be steered. This is region and model year dependent–contact the CLAAS dealer for the specific requirements for the installed on year/model.
   - NavController II/III/NAV-900 mounting orientation
   - Valve deadzone (done using the OEM service tool or per tractor operators manual/service manual)
   - Autopilot P-gain (done using the OEM service tool or per tractor operators manual/service manual)
   - Antenna height/Antenna axle offset, and Roll offset

NOTE – The Autosteer enable button must be cycled for each power cycle of the machine.

Engagement is only from the button on the armrest/handle.