# TC1™ Installation Manual for CIH Magnum/Steiger AFS and NH T8/T9 PLM (MY 2020 and Newer)

*016-5032-061 Rev. A*      *4/2022*      *E41161*

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CHAPTER

# IMPORTANT INFORMATION

## 1

## SAFETY

## NOTICE

Follow the operation and safety instructions included with the implement and/or controller and read this manual carefully before installing or operating this Raven system.

- Follow all safety information presented within this manual. Review implement operation with your local dealer.
- Contact a local Raven dealer for assistance with any portion of the installation, service, or operation of Raven equipment.
- Follow all safety labels affixed to system components. Be sure to keep safety labels in good condition and replace any missing or damaged labels. Contact a local Raven dealer to obtain replacements for safety labels.

Observe the following safety measures when operating the implement after installing this Raven system:

- Do not operate this Raven system or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Be alert and aware of surroundings and remain in the operator seat at all times when operating this Raven system.
  - Do not operate the implement on any public road with this Raven system enabled.
  - Disable this Raven system before exiting the operator seat.
  - Determine and remain a safe working distance from obstacles and bystanders. The operator is responsible for disabling the system when a safe working distance has diminished.
  - Disable this Raven system prior to starting any maintenance work on the implement or components of this Raven system.
- Do not attempt to modify or lengthen any of the system control cables. Extension cables are available from a local Raven dealer.

## DISPLAYS AND CONTROL CONSOLES

- If the display will not be used for an extended period, it is best to remove the display from the machine and store it in a climate controlled environment. This may help to extend the service life of electronic components.
- To prevent theft, secure the display and GPS antenna when leaving the machine unattended.

# ⚠ CAUTION

## ELECTRICAL SAFETY

- Always verify that power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the Raven system or other components.
- To prevent personal injury or fire, replace defective or blown fuses with only fuses of the same type and amperage.
- Do not connect the power leads to the battery until all system components are mounted and all electrical connections are completed.
- Always start the machine before initializing this Raven system to prevent power surges or peak voltage.
- To avoid tripping and entanglement hazards, route cables and harnesses away from walkways, steps, grab bars, and other areas used by the operator or service personnel when operating or servicing the equipment.

## TOUCH SCREEN

- Only touch the touch-screen with your finger or by using a special touch-screen stylus/pen. Operating the touch-screen with sharp objects may cause permanent damage to the screen.
- Only clean the screen using a damp cloth. Never use caustic or other aggressive substances.

# RECOMMENDATIONS AND BEST PRACTICES

## HARNESS ROUTING

The word "harness" is used to describe any electrical cables and leads, both bundled and unbundled. Use the following guidelines and recommendations when connecting and routing harnesses while installing or maintaining this Raven system:

- Leave protective caps/covers over harness connectors until needed to avoid dirt and moisture from contaminating electrical circuits.
- Secure the harness to the frame or solid structural members at least every 12 in [30 cm].
- Follow existing harness runs already routed on the implement as much as possible. Proper harness routing should:
    - Secure harnessing and prevent the harness from hanging below the implement.
    - Provide sufficient clearance from moving components and operational zones around shafts; universal joints and suspension components; pulleys, gears, belts, and chains; moving linkages, cylinders, articulation joints, etc.
    - Protect harnessing from field debris and surrounding hazards (e.g. tree limbs, fence posts, crop stubble, dirt clumps or rocks that may fall or be thrown by the implement).
    - Protect harnessing from sharp bends, twisting, or flexing over short distances and normal implement operation.
    - Connectors and splices should not be located at bending points or in harness sections that move.
    - Ensure sufficient length for free movement of the implement during normal operation and prevent pulling, pinching, catching, or rubbing, especially in articulation and pivot points. Clamp harnessing securely to force controlled movement of the harness.
    - Avoid abrasive surfaces and sharp edges such as sheared or flame cut corners, fastener threads or cap screw heads, hose clamp ends, etc.
- Do not connect, affix, or allow harnessing to come into contact with components with high vibration forces, hot surfaces, or components carrying hot fluids beyond the temperature rating of harness components.
    - Harnessing should be protected or shielded if routing requires the hose to be exposed to conditions beyond harnessing component specifications.
- Avoid routing harnesses in areas where damage may occur due to build up of material (e.g. dirt, mud, snow, ice, etc.).
- Avoid routing harnesses in areas where the operator or service personnel might step or use as a grab bar.

**IMPORTANT:**    Avoid applying direct spray or pressure washing of electrical components and connections. High pressure streams and sprays can penetrate seals, cause corrosion, or otherwise damage electrical components. When performing maintenance:

- Inspect electrical components and connectors for corrosion, damaged pins or housings, etc. Repair or replace components or harnessing as necessary.
- Ensure connectors are kept clean and dry. Apply dielectric grease to the sealing surfaces of all connections exposed to moisture, dirt, debris, and other contaminates. Repair or replace harnessing as necessary.
- Clean electrical components with pressurized air, aerosol electrical cleaning agent, or low pressure rinse.
- Remove visible surface water from electrical components and connections using pressurized air or an aerosol cleaning agent. Allow components to dry thoroughly before reconnecting cables.

# CHAPTER 2

# INTRODUCTION

This manual applies to the following machines. For future reference, write your serial number in the space below.

| Make | Year and Model |
|------|----------------|
| Case IH | 2020 and Newer AFS Connect Steer Ready - Magnum and Steiger |
| New Holland | 2020 and Newer PLM Intelligence Steer Ready- T8 and T9 |

## INSTALLATION BEST PRACTICES

⚠ **WARNING**

Carefully read and follow all safety requirements and precautions contained in this manual and the machine-specific Installation Manual. Failure to follow safety instructions may lead to equipment damage, personal injury, or death.

### RECOMMENDATIONS

Before installing the TC1™ system, park the machine where the ground is level, clean, and dry. Bleed pressure from the hydraulic system and leave the machine turned off for the duration of the installation process.

During the installation process, follow good safety practices. Be sure to carefully read the instructions in this manual as you complete the installation process.

Raven Industries recommends the following best practices when installing or operating the TC1™ system for the first time, at the start of the season, or when moving the TC1™ system to another machine:

• Verify that the machine's hydraulic system is using fresh oil and that the filters have been recently changed
• Ensure there are no issues with the machine's hydraulic system (e.g., pump issues, faulty hydraulic motors, fine metal deposits in the hydraulic hoses, etc.).

### POINT OF REFERENCE

The instructions in this manual assume that you are standing behind the machine, looking toward the cab.

# KIT COMPONENTS

This section contains a list of the components that are included in the TC1™ kit. Before beginning the system installation, compare the items in the kit with the components on this list. If you have questions about the kit, contact your Raven dealer.

**FIGURE 1. CNH Magnum/T8, Steiger/T9 Class III TC1™/CR7™ Installation Kit Components (P/N 117-5032-061 Rev. A)**

| QTY | PART # | DESCRIPTION |
|---|---|---|
| 1 | 053-0159-180 | BOX, SHIPPING |
| 1 | 016-0171-649 | SHEET, WARRANTY/HELP (016-5032-061) |
| 1 | 115-4010-247 | CABLE, SC1, ADAPTER, 9 PIN ISOBUS EXPANSION TO SC1 |
| 1 | 115-7300-173 | CABLE, ADAPTER, 9 PIN ISOBUS EXPANSION TO DISPLAY PORT |
| 1 | 115-7300-092 | CABLE, CR7, ISO VT |
| 1 | 107-0172-672 | BRACKET, SC1, CNH SEAT SIDE |
| 1 | 063-0174-070 | ECU, ISO, TC1, LOW SPEED STEERING |
| 1 | 053-0159-074 | ENVELOPE, PLASTIC |
| 2 | 311-4050-138N | HEX BOLT, DIN931, M6X30MM |
| 2 | 312-6001-016N | HEX NUT, NYLOCK, DIN985 M6 |
| 4 | 313-6000-010N | WASHER, DIN125A M6 |
| 3 | 434-2000-005 | 5/8" I.D. APPROX. 13/16" CL TO CL |
| 2 | 311-4056-183N | HEX BOLT, DIN 933, M8 X 40MM |
| 2 | 312-6001-027N | M8 LOCK NUTS |
| 4 | 313-6000-013N | WASHER, M8, CLASS V COATING |

**FIGURE 2. CNH Magnum/T8, Steiger/T9 Class III TC1™/CR12™ Installation Kit Components (P/N 117-5032-062 Rev. A)**

| QTY | PART # | DESCRIPTION |
|---|---|---|
| 1 | 053-0159-180 | BOX, SHIPPING |
| 1 | 016-0171-649 | SHEET, WARRANTY/HELP (016-5032-061) |
| 1 | 115-4010-247 | CABLE, SC1, ADAPTER, 9 PIN ISOBUS EXPANSION TO SC1 |
| 1 | 115-7300-173 | CABLE, ADAPTER, 9 PIN ISOBUS EXPANSION TO DISPLAY PORT |
| 1 | 115-7300-135 | CABLE, CONSOLE, VIPER 4 ISO VT |
| 1 | 107-0172-672 | BRACKET, SC1, CNH SEAT SIDE |
| 1 | 063-0174-070 | ECU, ISO, TC1, LOW SPEED STEERING |
| 1 | 053-0159-074 | ENVELOPE, PLASTIC |
| 2 | 311-4050-138N | HEX BOLT, DIN931, M6X30MM |
| 2 | 312-6001-016N | HEX NUT, NYLOCK, DIN985 M6 |
| 4 | 313-6000-010N | WASHER, DIN125A M6 |
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| 2 | 311-4056-183N | HEX BOLT, DIN 933, M8 X 40MM |
| 2 | 312-6001-027N | M8 LOCK NUTS |
| 4 | 313-6000-013N | WASHER, M8, CLASS V COATING |

## UPDATES

Updates for Raven manuals as well as software updates for Raven consoles, and product controllers are available at the Applied Technology Division web site:

https://portal.ravenprecision.com

Sign up for e-mail alerts to receive notifications when updates for your Raven products are available on the Raven web site.

At Raven Industries, we strive to make your experience with our products as rewarding as possible. One way to improve this experience is to provide us with feedback on this manual.

Your feedback will help shape the future of our product documentation and the overall service we provide. We appreciate the opportunity to see ourselves as our customers see us and are eager to gather ideas on how we have been helping or how we can do better.

To serve you best, please send an email with the following information to

techwriting@ravenind.com

-TC1™ Installation for CIH Magnum/Steiger AFS and NH T8/T9 PLM (MY 2020 & Newer)
-016-5032-061 Rev. A
-Any comments or feedback (include chapter or page numbers if applicable).
-Let us know how long you have been using this or other Raven products.

We will not share your email or any information you provide with anyone else. Your feedback is valued and extremely important to us.

Thank you for your time.

**CHAPTER**

# INSTALLATION

## 3

For calibration and operation information, refer to the *TC1™ Calibration and Operation Manual* (P/N 016-4010-005) included with the kit.

## TC1™ UNIT INSTALLATION

### MOUNT THE TC1™ FOR STEIGER/T9:

1. Using a T35 driver bit, unbolt the air tank on the right side of the seat. Mount the TC1 to the mounting plate using the provided M6 hardware. The node will be on the under side of the bracket when installed. Ensure the connectors are plugged into the node prior to mounting the bracket. Using the provided M8 hardware mount the TC1 mounting plate and the air tank back to its mounting location.

**FIGURE 1.  TC1™ Mounted to Bracket**
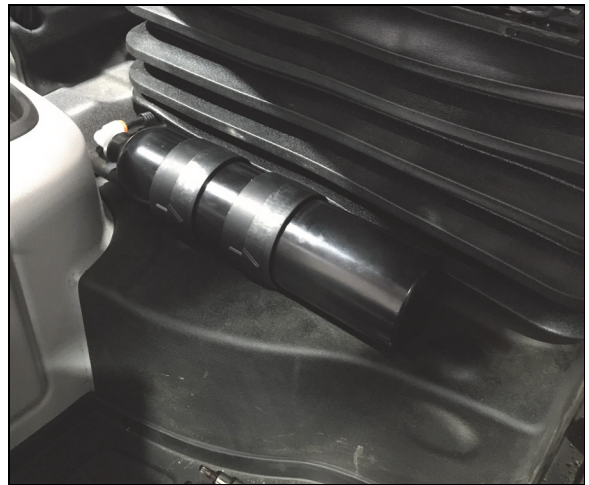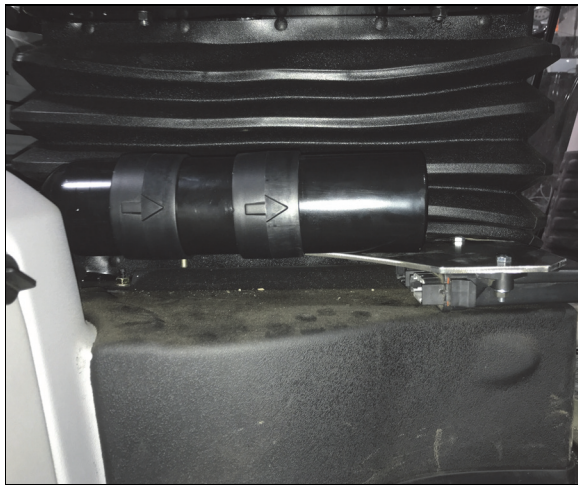
## MOUNT THE TC1™ FOR MAGNUM/T8:

1. Remove the nuts securing the seat to the floor on the right side of the seat. Mount the bracket included with the kit and tighten using the seat bolt nuts removed. Torque per manufacturer's specifications. Install the TC1 to the bracket using the included M6 hardware. Ensure the connectors are facing toward the rear on the TC1.

**FIGURE 2.  TC1™ Mounted to Bracket**
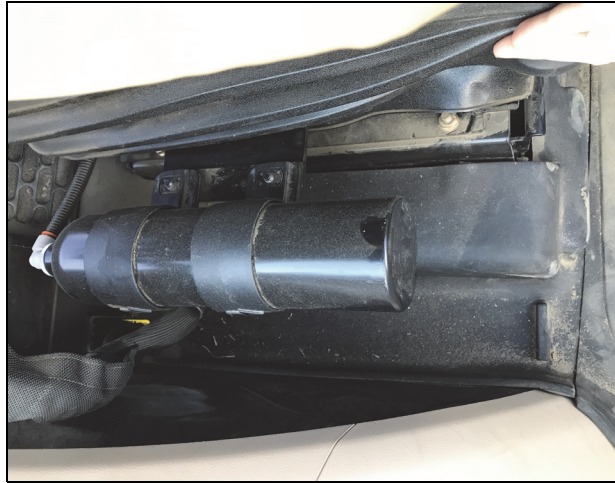


2. Connect the 9-pin connector of the ISOBUS TC1™ adapter cable (P/N 115-4010-247) to the 9 pin ISO bulkhead connector in the cab. Plug the cable (P/N 115-7300-173) to the 9 pin connector (P/N 115-4010-247). Using the power adapters included with the cable (P/N 115-7300-173), plug into a power connector and tee in the power tees on the adapter cable (P/N 115-4010-247).

3. Route the 12 pin connector labeled Port B out the rear window on a Magnum/T8 or under the floor mat and out the near side window on the Steiger/T9 to the receiver on the roof.

**FIGURE 3.  Rear Window Routing**



4. Remove the dust plug and plug this connector into port B on the receiver. Leave port A on the receiver plugged into the factory harness.

FIGURE 4.  ISOBUS Display Mating Cable



5.  Locate the Viper® 4 cable (P/N 115-7300-135) or the CR7™ cable (P/N 115-7300-092).

6.  Connect the round 16-pin connector on the Viper® 4 ISOBUS cable (P/N 115-7300-135) or the CR7™ cable (P/N 115-7300-092) to the mating connector on the cable (P/N 115-7300-173).

7.  Follow the directions provided with the Viper® 4 or CR7™ to install the field computer.

8.  Route and connect the Viper® 4 adapter cable or CR7™ adapter cable onto the mating connectors on the field computer.

## OPERATION

Refer to the *TC1™ Calibration and Operation Manual* (P/N 016-4010-005) for instructions on configuring, calibrating, and operating TC1™. Please note the location of the master switch on the upper right of the cab near the radio and the resume switch on the propulsion handle on the machine because they are needed for operation.

## RECEIVER SETUP

To set up the receiver to work in cooperation with the TC1™ system:

1. Turn on the tractor.
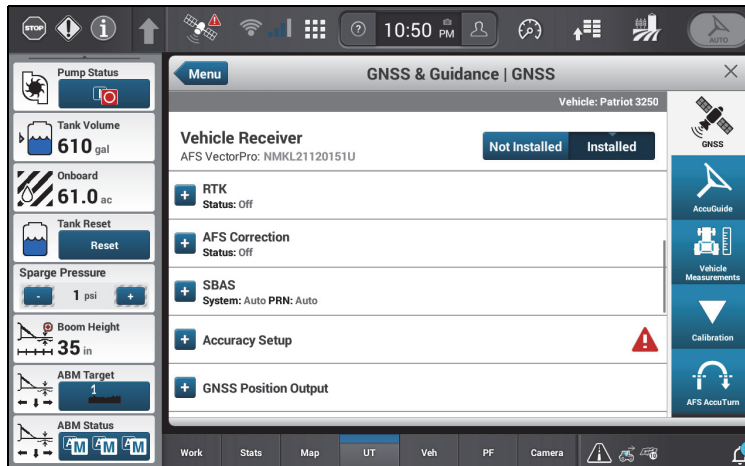
FIGURE 5. Vehicle Receiver Configuration



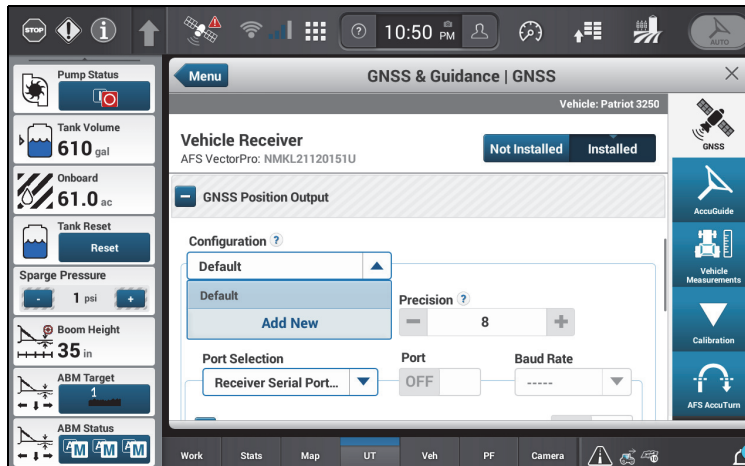FIGURE 6. Vehicle Receiver Configuration

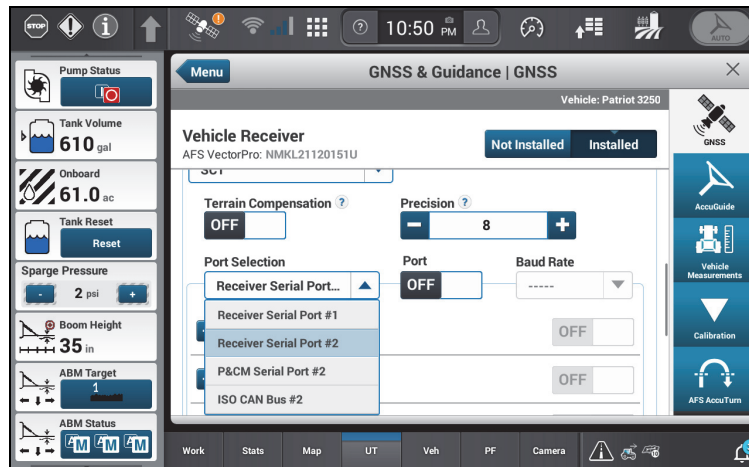FIGURE 7. Vehicle Receiver Configuration



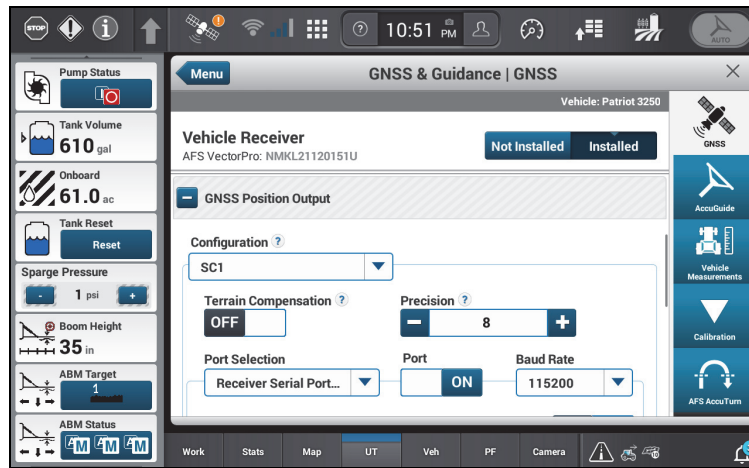FIGURE 8. Vehicle Receiver Configuration



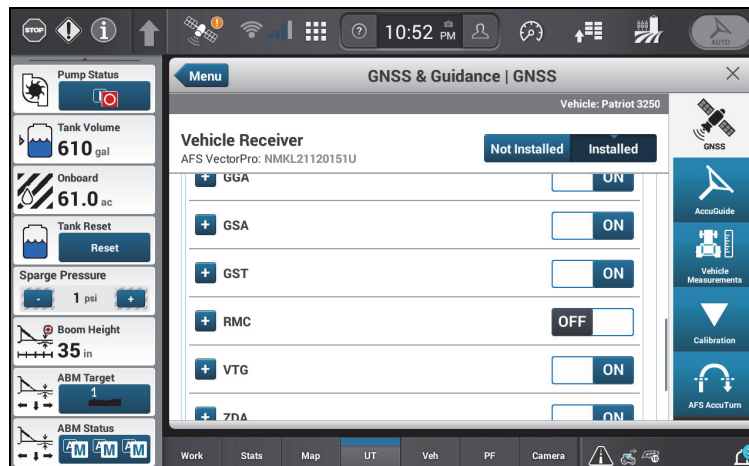FIGURE 9. Vehicle Receiver Configuration

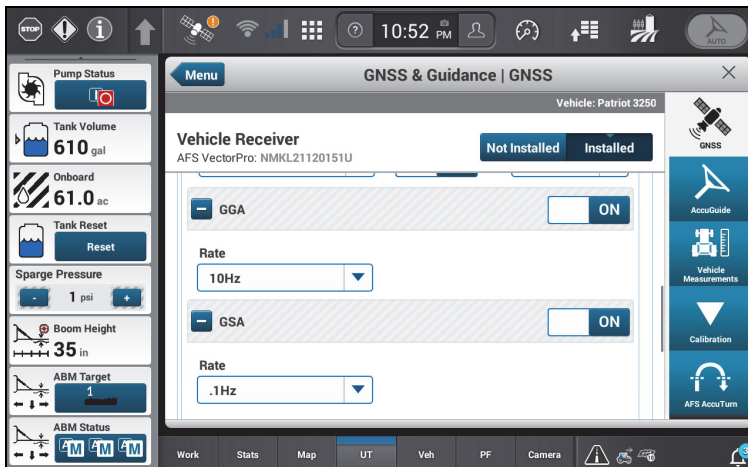FIGURE 10.  Vehicle Receiver Configuration



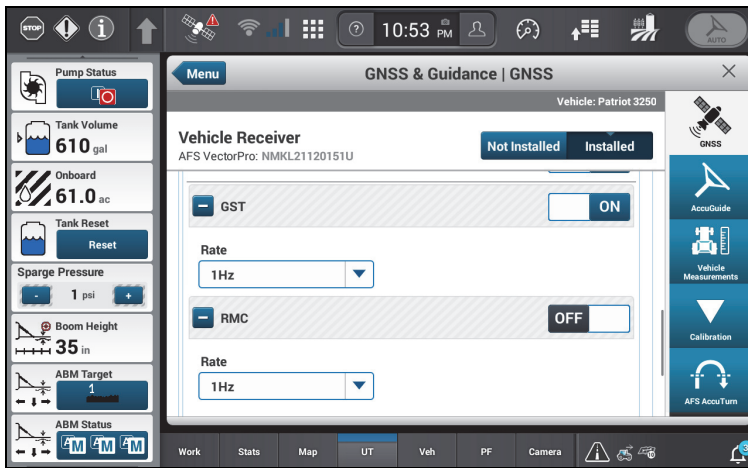FIGURE 11.  Vehicle Receiver Configuration
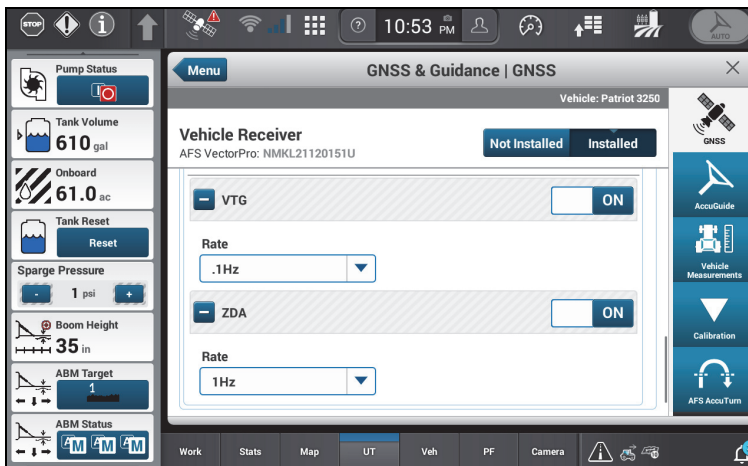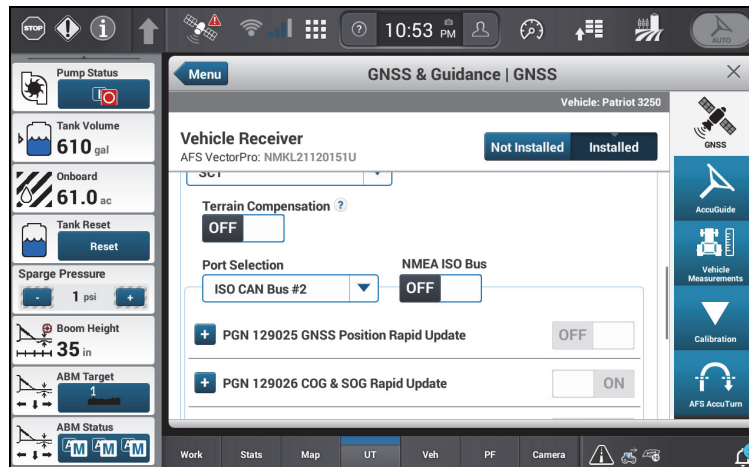


FIGURE 12.  Vehicle Receiver Configuration

FIGURE 13.  Vehicle Receiver Configuration

# TRACTOR DISPLAY SETUP

To set up the tractor display to work in cooperation with the TC1™ system:

1. Turn on the tractor.
2. Turn on the display, turn on the controller, and initiate the external guidance system.
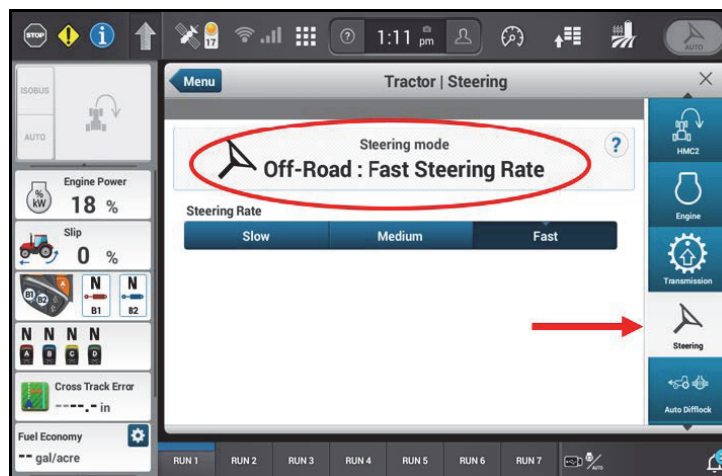3. Press the menu icon.

FIGURE 14.  Menu Icon Location



4. Select the Tractor settings button.
5. Scroll down on the right side to the steering page and check to ensure the steering mode is in off-road mode.

NOTE:        The tractor must be in off road mode for external guidance to work.

FIGURE 15.  Steering Settings Page

6.  If the steering mode is currently in on-road mode, press the roading switch on the headliner to switch to off-road mode.
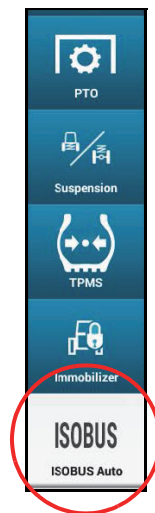
**FIGURE 16.  Headliner Roading Switch**



7.  Scroll down to the ISOBUS diagnostic page.

**NOTE:**     The ISOBUS diagnostic page will not be present on a tractor that is not ISOBUS Class 3 activated.
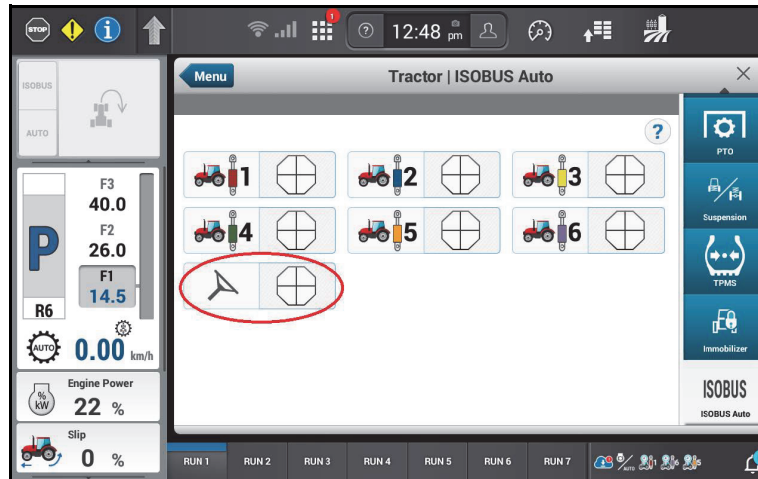
The tractor will have to be activated by a CNH dealer.

**FIGURE 17.  ISOBUS Diagnostic Page**

8. Verify external guidance is activated by looking for the icon with the steering wheel, as shown in Figure 18, "External Guidance Icon," below.

NOTE:     If the icon is not present, ISOBUS Class 3 Steering is not activated. Contact a CNH dealer.

FIGURE 18.  External Guidance Icon



NOTE:     The ISOBUS Diagnostic page could look different from the example shown in this manual.

9. Press and hold the top side of the headliner switch labeled "AUTO" for at least half a second. The press will not register if the button is not held down for half a second.

FIGURE 19.  AUTO Button on Headliner



NOTE:     If the tractor controller is ready to receive guidance commands and the external guidance system is ready to send guidance commands, the status cake should go to three green pieces.

If the external guidance system is not ready, the status cake will go to two orange pieces.

If the tractor controller is not ready, the status cake will go to two orange pieces with an exclamation point.

10. Verify that the steering cake has three green pieces filled in and press the "AUTO" button on the armrest to engage external guidance.

**FIGURE 20. Case IH and New Holland Auto Button on Armrest**

Case IH                                           New Holland



11. There will be an audible beep and the status cake should move to full green with a swirl inside.

12. If the external guidance is canceled, check the status cake:

- If the status cake goes to three green pieces after being canceled, press the AUTO button on the armrest to reengage.
- If the status cake goes to white after being canceled, the headliner AUTO switch will have to be pressed again before engaging with the armrest AUTO button.

# SYSTEM DIAGRAM

**FIGURE 21. TC1™ Case Steiger & Magnum AFS/NH T9/T8 PLM System Diagram (P/N 054-5032-061)**
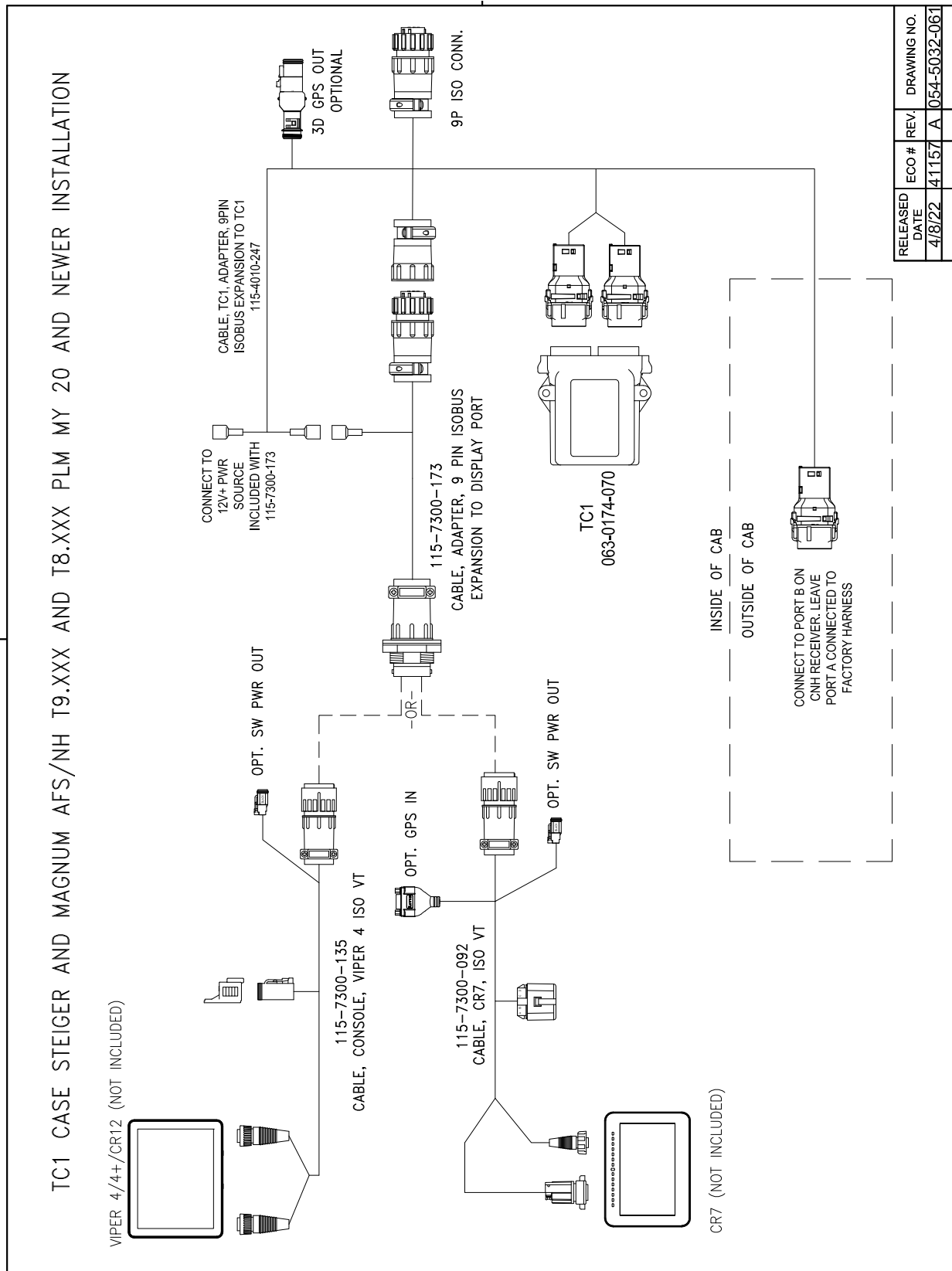
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# LIMITED WARRANTY

## WHAT DOES THIS WARRANTY COVER?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service when used for intended purpose.

## HOW LONG IS THE COVERAGE PERIOD?

Raven Applied Technology products are covered by this warranty for 12 months from the date of retail sale. In no case will the Limited Warranty period exceed 36 months from the date the product was issued by Raven Industries Applied Technology Division. This warranty coverage applies only to the original owner and is non-transferable.

## HOW CAN I GET SERVICE?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including completed RMA form, Certificate of Decontamination, and retail proof of purchase) must be included inside the box to be sent to Raven Industries.

## WHAT WILL RAVEN INDUSTRIES DO?

Upon confirmation of the warranty claim, Raven Industries will (at our discretion) repair or replace this product or any component of the product found to be defective during the warranty period. Replacement will be made with a new or remanufactured product or component. Standard return freight will be paid, regardless of inbound shipping method. Expedited freight is available at the customer's expense.

## WHAT IS NOT COVERED BY THIS WARRANTY?

Raven Industries will not assume any expense or liability for repairs outside our facility without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit, labor, or other damages. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

- Damages caused by normal wear and tear, misuse, abuse, neglect, accident, improper installation and maintenance are not covered by this warranty.
- Worn/Chafed hoses and cables.
- Items in contact with fluids and chemicals including seals and O-rings.
- Software downloads and updates.
- Tamper-Evident label broken or customer disassembly.
- Any customer modification to the original product outside normal calibration and adjustments, without written approval.
- Intentional modification to cables.
- Failures due to lack of cleaning or preventive maintenance, and any condition, malfunction or damage not resulting from defects in material or workmanship.
- Items in contact with fluids or chemicals, returned without proper cleaning, decontamination and documentation.

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# EXTENDED WARRANTY

## WHAT DOES THIS WARRANTY COVER?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service when used for intended purpose.

## DO I NEED TO REGISTER MY PRODUCT TO QUALIFY FOR THE EXTENDED WARRANTY?

Yes. Products/systems must be registered within 30 days of retail sale to receive coverage under the Extended Warranty. If the component does not have a serial tag, the kit it came in must be registered instead.

## WHERE CAN I REGISTER MY PRODUCT FOR THE EXTENDED WARRANTY?

To register, go online to www.portal.ravenprecision.com and select Product Registration.

## HOW LONG IS THE EXTENDED WARRANTY COVERAGE PERIOD?

Raven Applied Technology products that have been registered online are covered for an additional 12 months beyond the Limited Warranty for a total coverage period of 24 months from the date of retail sale. In no case will the Extended Warranty period exceed 36 months from the date the product was issued by Raven Industries Applied Technology division. This Extended Warranty coverage applies only to the original owner and is non-transferable.

## HOW CAN I GET SERVICE?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including completed RMA form, Certificate of Decontamination, and Extended Warranty Registration Number) must be included inside the box to be sent to Raven Industries. In addition, the words "Extended Warranty" must appear on the box and all documentation if the failure is between 12 and 24 months from the retail sale.

## WHAT WILL RAVEN INDUSTRIES DO?

Upon confirmation of the warranty claim, Raven Industries will (at our discretion) repair or replace this product or any component of the product found to be defective during the warranty period. Replacement will be made with a new or remanufactured product or component. Standard return freight will be paid, regardless of inbound shipping method. Expedited freight is available at the customer's expense.

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## WHAT IS NOT COVERED BY THE EXTENDED WARRANTY?

Raven Industries will not assume any expense or liability for repairs outside our facility without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit, labor, or other damages. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

- Damages caused by normal wear and tear, misuse, abuse, neglect, accident, improper installation and maintenance are not covered by this warranty.
- Worn/Chafed hoses and cables.
- Items in contact with fluids and chemicals including seals and O-rings.
- Software downloads and updates.
- Tamper-Evident label broken or customer disassembly.
- Any customer modification to the original product outside normal calibration and adjustments, without written approval.
- Intentional modification to cables.
- Failures due to lack of cleaning or preventive maintenance, and any condition, malfunction or damage not resulting from defects in material or workmanship.
- Items in contact with fluids or chemicals, returned without proper cleaning, decontamination and documentation.

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