

# CRG USER MANUAL



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CA



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Release Notice: This is the March 2024 release of the CRG User Manual. The current CRG firmware version is 1.04.045.

It is assumed that users of the products described herein have technical experience as well as an understanding of the fundamentals of agricultural machinery.

In this manual, “CRG” may refer to the CRG-JD, CRG-CLAAS, CRG-AGCO, or other variants.

This manual and others related to the CRG may be found on the CRG product page:  
[www.agragps.com/product/crg-chameleon-rtk-guidance](http://www.agragps.com/product/crg-chameleon-rtk-guidance)

**NOTICE**

This manual is not intended to replace the manuals for the host machine nor the John Deere GPS system. The operator must read and understand the manuals and instructions of these systems, before using the CRG.

**Disclaimer**

While every effort has been made to ensure the accuracy of this document, Agra-GPS Ltd assumes no responsibility for omissions and errors. Nor is any liability assumed for damages resulting from the use of information contained herein. Agra-GPS Ltd shall not be responsible or liable for incidental or consequential damages or a loss of anticipated benefits or profits, work stoppage or loss, or impairment of data arising out of the use, or inability to use, this system or any of its components.

**DO NOT USE THE CRG IF YOU DISAGREE WITH THE DISCLAIMER.**

## Important Safety Information

Read this manual and the machine operation & safety instructions carefully before installing the CRG. Refer to Appendix A for Product Specifications.

- Follow all safety information presented within this manual.
- If you require assistance with any portion of the installation or service of your equipment, contact Agra-GPS for support.
- Follow all safety labels affixed to the system components. Be sure to keep safety labels in good condition and replace any missing or damaged labels. To obtain replacements for missing or damaged safety labels, contact Agra-GPS.

When operating the machine after installing the CRG, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate the CRG system while impaired.
- Always remain in the operator's position in the machine when the CRG system is engaged.
- Determine and maintain a safe working distance away from other individuals. The operator is responsible for disabling the CRG system when a safe working distance has been diminished.
- Ensure the CRG is disabled prior to starting any maintenance work on the machine or parts of the CRG system.
- Follow all safety instructions from the host machine as well as the John Deere system.
- The CRG must only be used in the field, never on public roads.

## Electrical Safety

- Always verify that the power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the equipment.
- Verify that all cables and connectors are not in contact with sharp edges or anything that could cause chafing, as this could result in power shorts and/or other malfunctions.
- Power is supplied to the CRG even when the key is off. Power can be removed in 3 different ways: 1) Remove the connector from the CRG, 2) Remove the fuse supplying circuit power, or 3) Remove a battery lead while the machine is off.

## Risk of Fire

- The circuit supplying 12 volt DC power for this product requires a fuse. The maximum fuse rating is 5 amps, and the minimum is 1 amp.

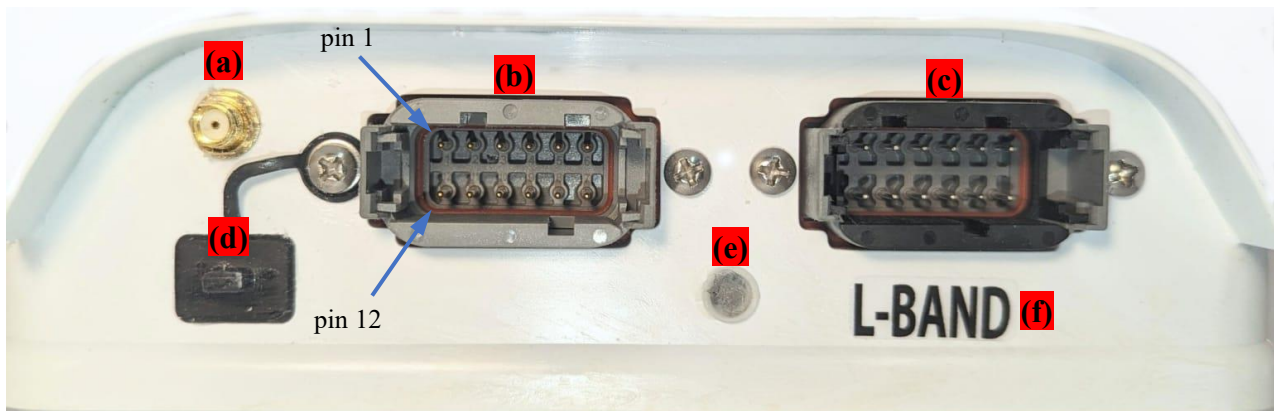
## Introduction

Congratulations on your purchase of the CRG! The CRG is designed to bridge the communication between agricultural machinery (of various makes) and a John Deere (JD) display (1800, 2600, 2630, 4240, 4640, or Gen-5). This allows a JD display to create maps in the John Deere format, and also provides autosteer functionality. The operator uses the JD display to create AB-lines or field documentation, or to handle any other GPS system input.

The CRG contains a) an RTK-capable GPS receiver, **AND** optionally b) an internal Bridge, which is a full steering controller capable of steering a non-JD machine! The specific machine that can be controlled by the CRG is dependent on the variant that was purchased: for example, a CRG-AGCO variant can control a Fendt tractor, but cannot control a Claas tractor. To control a Claas tractor, you would need to purchase a CRG-CLAAS. However, any CRG variant is capable of steering JD equipment.

This manual contains information generic to CRG setup and usage. For installation instructions and specific settings for your particular machine, please consult the relevant Installation Manual.

## Back Panel



- a) Cellular antenna connector (SMA)
- b) Non-JD connector (grey)
- c) JD connector (black)
- d) USB cover
- e) LED (color status – see Troubleshooting section on page 20)
- f) Equipped with auxiliary L-Band receiver (for future use)

Refer to Appendix B for pin description.

## ISObus Virtual Terminal (VT) Apps

The CRG comes with one or two ISObus VT applications (ISO apps) that will be loaded onto the John Deere monitor. The apps will automatically install themselves into the monitor in the first few minutes of the initial start-up. On subsequent power-ups the apps will load themselves from monitor memory much more quickly. The ISO apps include:

1. CRG ISO app
  - RTK configuration
  - NMEA serial output configurations
  - TCM calibration
2. Bridge ISO app (this app is not required on JD machinery)
  - Bridge/steering configurations
  - Option to change work recording mode
  - Option to change the machine type

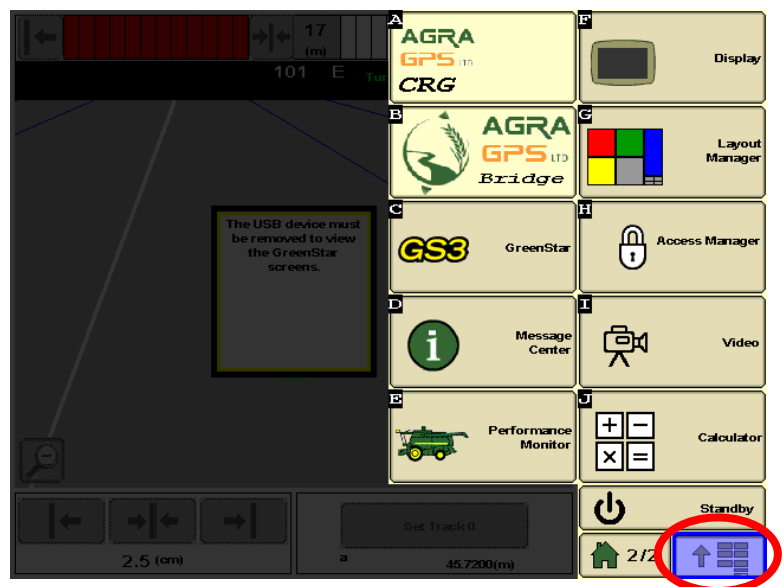


Depending on the model of JD monitor, the CRG ISO apps may be found in different locations.

On a John Deere Gen-4 monitor the application will be loaded in the ISObus VT section on the main page of the display (circled above).

On John Deere 1800, 2600, & 2630 the application will be shown in the side menu of the John Deere display. The side menu (shown below) is opened by pressing the button on the bottom right.

**NOTE:** John Deere 1800 and 2600 monitors do not show a loading bar for ISO applications, while 2630 and 4640 monitors do.



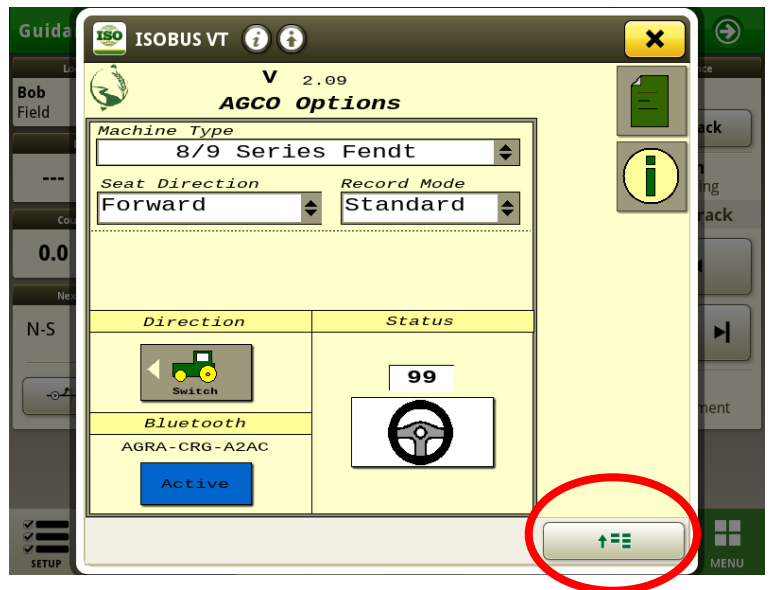
If the ISO application does not load:

- Try clearing the monitor's memory. On 2630 monitors this can be done in the Message Center in the side menu. Go to the Cleanup tab, check controllers, then Begin Cleanup. On 4640 monitors this can be done in the info page of the ISObus VT. Navigate to the ISObus VT window and press the info (i) button at the top of the page, then press Clean Up ISObus VT.
- Do a hard reset of the John Deere monitor (Unplug it, then plug it back in).
- Do a full restart of the machine. Remember, the app may take a few minutes to load.
- If there are multiple monitors in the cab, check if the ISO app loaded on the other monitor

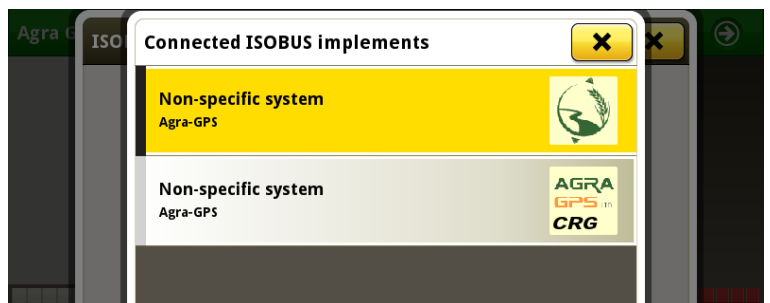
### Switching Between ISO Apps

When accessing ISObus VT, the first page viewed may be the CRG-Bridge app. Before setting up the Bridge parameters, it is necessary to setup the CRG-Receiver app. To do this, pull up the app page using the button circled.

Refer to page 15 for more information on configuring the internal Bridge app.



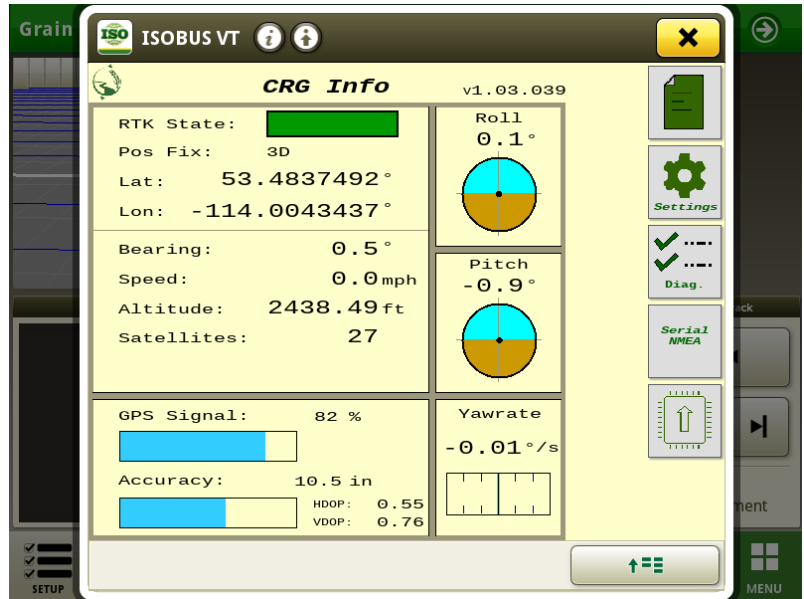
In the image, the top item (yellow) selects the CRG-Bridge app, and the bottom item (light grey) switches to the CRG-Receiver app.



## Configuring the CRG

The main page of the CRG-Receiver app is “CRG Info”, as shown.

The minimum initial setup requirements include specifying the mount placement & completing the calibration procedure (refer to Mount Settings on page 6).



Refer to the following sections for more information:

### SETTINGS

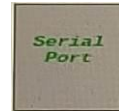
- Page 5 ..... General Settings
- MINIMUM SETUP → Page 6 ..... Mount Settings
- Page 8 ..... GPS Settings
- Page 9 ..... NTRIP/Modem



- Page 12 DIAGNOSTICS



- Page 13 SERIAL PORT



### UPDATES

Refer to the CRG Firmware Update Manual



Use this button to switch between the CRG app and the Bridge app





## General Settings

**Minutes On After Power Off:** Delay for CRG to power down after machine is turned off. This will allow GPS satellite tracking to continue and allows for getting back to work quickly.

**Bridge:** Must be enabled to provide auto-steering on any non-JD machine. Set disabled if using the CRG as a receiver only. If using the CRG on a JD machine, the internal Bridge is not required, so the Bridge ISO app of the CRG is disabled automatically, even if this selection shows “Enabled”.

**Default GPS Correction:** Multi-Constellation allows the CRG to use signals from any satellite system (GPS, GLONASS, Galileo, Beidou). SBAS restricts the receiver to WAAS (for North America) or EGNOS (for Europe).

**Modem:** If the CRG was purchased with an optional cellular modem, the make of the modem is selected here. The “NTRIP Settings” and “Modem Settings” buttons are invisible if no modem is selected. If External/Bluetooth is selected, RTCM may be supplied with either an external radio modem (via 4-pin CRG adapter connection), or with Bluetooth. Use the Agra-GPS phone apps to supply RTCM over Bluetooth.

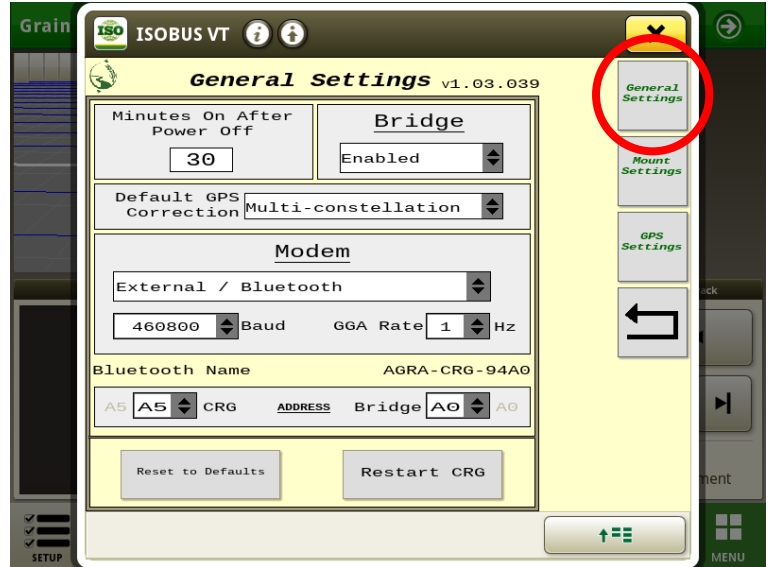
**Baud / GGA Rate:** These parameters are only used when Modem is set to External/Bluetooth. The baud rate is for external modems only (RS-232 8-N-1). The GGA rate specifies how often the CRG sends its position data back to the modem or mobile phone (1Hz = 1 message per second)

**Bluetooth Name:** This name appears on your mobile phone

**Address:** The default ISObus (CANbus) address. The CRG will first attempt an address claim using this value. If there are other devices on the bus (for example, other implement controllers) that require a certain address, then the CRG addresses can be set to avoid conflict.

**Reset to Defaults:** A factory reset. All parameters within the CRG are reset. The default settings take effect after the CRG is rebooted. Any activation codes entered are not affected.

**Restart CRG:** The CRG device is rebooted. **WARNING:** Restarting the CRG while steering is engaged will cause loss of machine control.





## Mount Settings

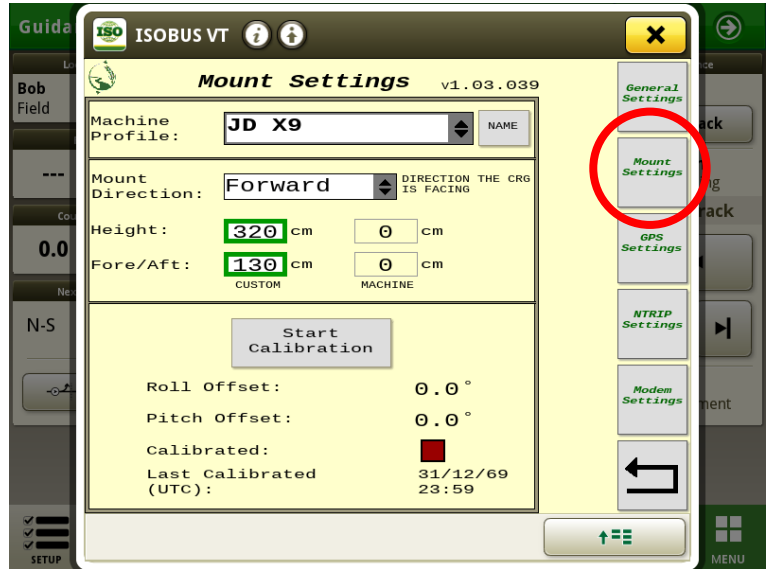
**Machine Profile:** since the CRG can be moved between machines, up to 10 profiles can be saved, which saves calibration data and other settings on this page. It is usually useful to name the Profile to match the machine name.

**Mount Direction:** the direction of the front of the CRG. For example, when facing forward in the driver’s seat, if the CRG connectors are to the left, the Mount Direction should be specified as Right. For most machines, Forward is the correct choice. An exception would be newer Fendt tractors where the CRG can be mounted inside the roof panel.

**Height:** the height from the ground to the bottom of the CRG. On most JD machines, the Height and Fore/Aft will be detected automatically. However, the option is supplied to choose between the detected values, or to manually specify them.

**Fore/Aft:** the horizontal distance from the turning point to the CRG, which is usually the fixed/rear axle for a tractor. For a combine or articulated tractor, the fixed axle would be the front axle; and for the articulated tractor, the CRG mount on top of the cab would be behind the front axle, so the setting will be negative. For most tractors, with the CRG mounted at the front of the cab roof, the value is positive because it is in front of the fixed (rear) axle.

**NOTE:** TCM calibration can be effectively turned off by setting Height=0 and Fore/Aft=0.

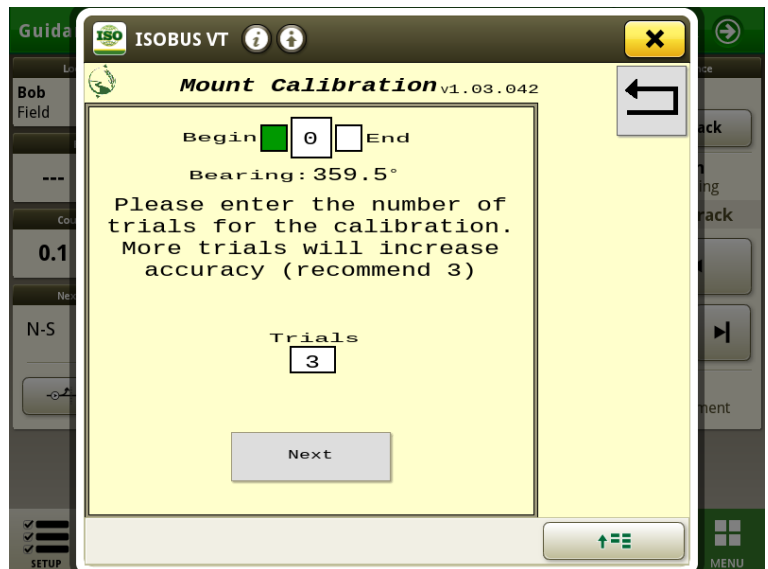


## Calibration

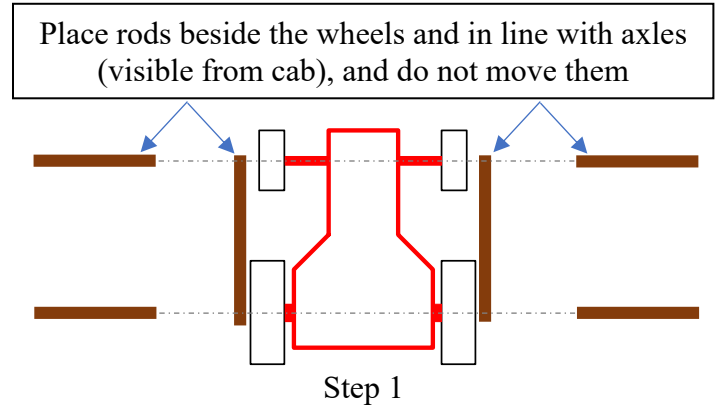
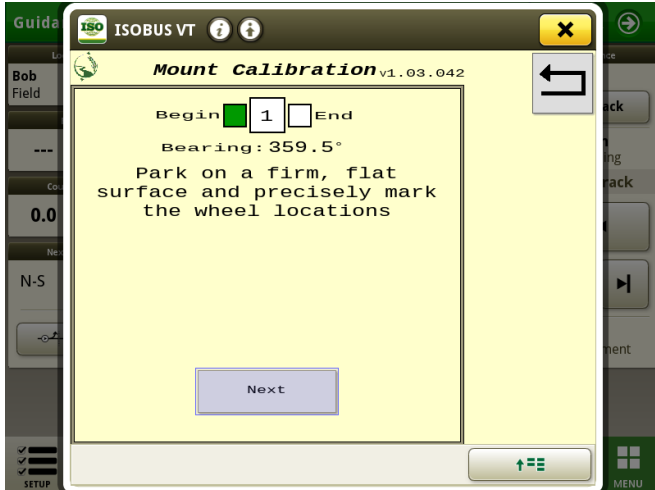
The tractor should be parked on a FLAT spot such as a concrete pad. Calibration in a field is usually not suitably flat. However, the flat spot chosen does not have to be perfectly level. After pressing “Start Calibration”, you will see the Mount Calibration (TCM calibration) page with instructions.

Each “Trial” consists of parking the machine in a spot, and then reversing machine direction and parking in the exact same spot.

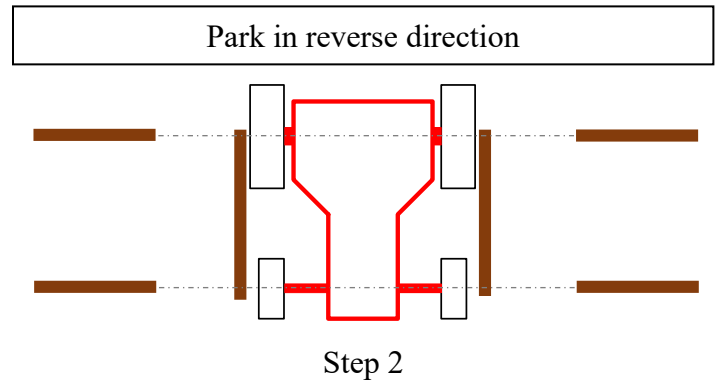
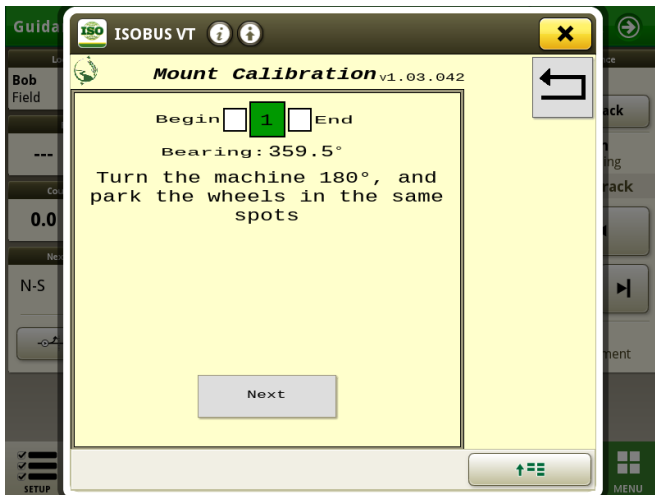
**NOTE:** Setting the number of Trials to 1 is NOT recommended! This greatly increases the likelihood that the resulting Roll and Pitch offsets will be inaccurate, and will cause position errors in the field.



To begin, mark the locations of each of the wheels precisely. It is useful to use long rods (2x4 lumber would work, for example) that are visible from the cab. There should be rods near the tires, and rods lined up with axles and visible from the cab to assist with machine placement when reversing direction.



After readings are taken, you will be required to turn the tractor around (180°) and park it on exactly the same spot. The tractor must be stationary before pressing the ‘Next’ button.



**It is important to be as precise as possible!**

Each “Trial” must complete Step 1 and Step 2. The current trial number is shown in green (“1” in the image above). If the page is exited at any time during the trials, all trials must be repeated to complete the calibration.

## GPS Settings

### Mode Simulation

Allows customization of the GPS mode that the monitor obtains from the CRG. For example, if a monitor has only an SF1 license, then RTK quality guidance is still available if the modes are set to SF1 (in this case, the RTK symbol will not be displayed in the monitor, but RTK precision guidance is still achieved).

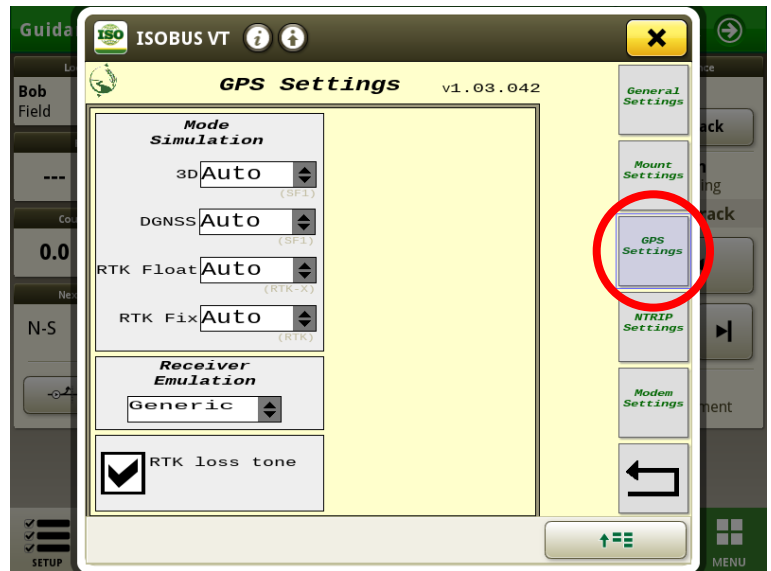
The mode displayed in the monitor when set to Auto is shown here in light grey.

### Receiver Emulation

This setting should be left to “Generic”, unless using the CRG in Implement Steering mode, which requires the setting to be “SF6000”.

### RTK Loss Tone

This setting provides a 2-tone sound to the operator when RTK Fix is lost, which can occur for a variety of reasons (such as poor cellular signal, poor GPS signal, a problem with the NTRIP caster, etc.). The tone is not played if the checkbox is cleared. Checking the box also plays the tone a single time so the operator can hear what it sounds like.



## NTRIP and Modem Settings

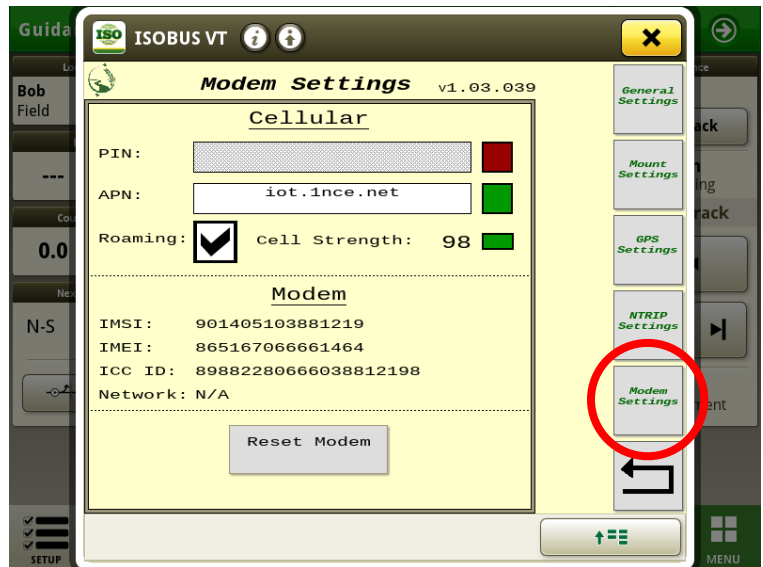
There are 3 options for connecting to an NTRIP caster of your choice:

- You may have purchased the CRG with an internal cellular modem. This modem requires a SIM/data card to be installed. If desired, Agra-GPS optionally supplies a new CRG with a data-only SIM, which simplifies the modem setup process. Please contact us for details.
- If you don't have a cellular modem in your CRG, you may use our Agra-GPS app on your phone to connect to the CRG via Bluetooth® and get the RTCM correction data from an NTRIP caster. In this case, the IP address and other details of the caster are specified within the phone app.
- You may connect an external radio modem, useful for areas without cellular coverage. Consult with Agra-GPS for options.

The NTRIP and Modem Settings ISO app pages allow you to connect to RTCM correction data via cellular connection. To connect via Bluetooth, please refer to the Bluetooth App section in this manual.

If your CRG is equipped with an internal cellular modem, setup within ISObus VT is required for most SIM cards. If Agra-GPS has supplied the CRG with a SIM card installed, the Modem Settings page will not need modification. To install a custom SIM card, refer to the **CRG Modem Guide** for further instructions.

For custom SIM cards, obtain the APN and PIN (if required) from the cellular service provider. "Roaming" is only selected if your service provider does not have network access in your area, and so allows the CRG to connect to various cellular networks.



If the SIM card was installed correctly, the modem will connect to the local cell network and numbers will automatically appear for IMSI, IMEI, and ICCID.

The CRG also works without correction data; however, accuracy is not nearly as good as with an RTCM correction source.

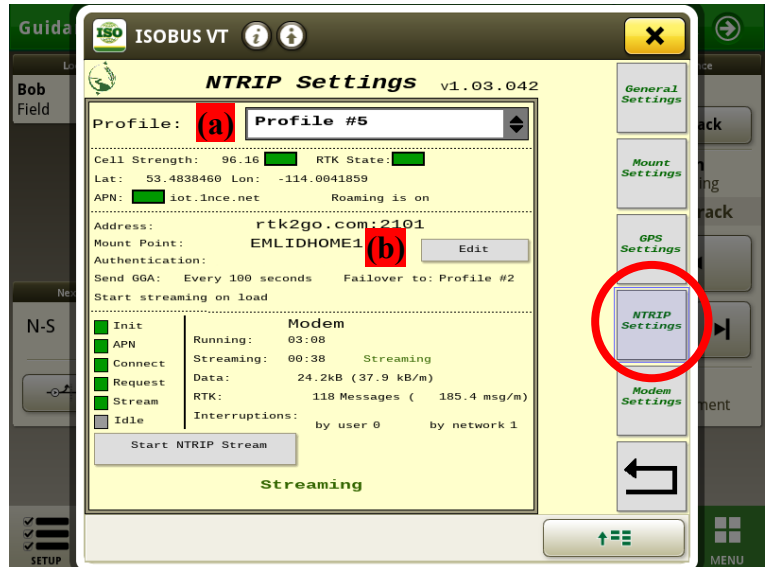
## NTRIP Setup

Fill in your NTRIP profile(s). Different profiles may be required for different physical locations, since the base station providing RTCM corrections should be located within 35 km (20 miles) of the CRG location for best results. RTK Fix may be achieved with further distances, but bear in mind that accuracy will decrease as distance from the base station increases.

For more information on base stations and the NTRIP caster, please refer to the NTRIP Overview section on page 21.

- a) Profile: First, select the profile number.

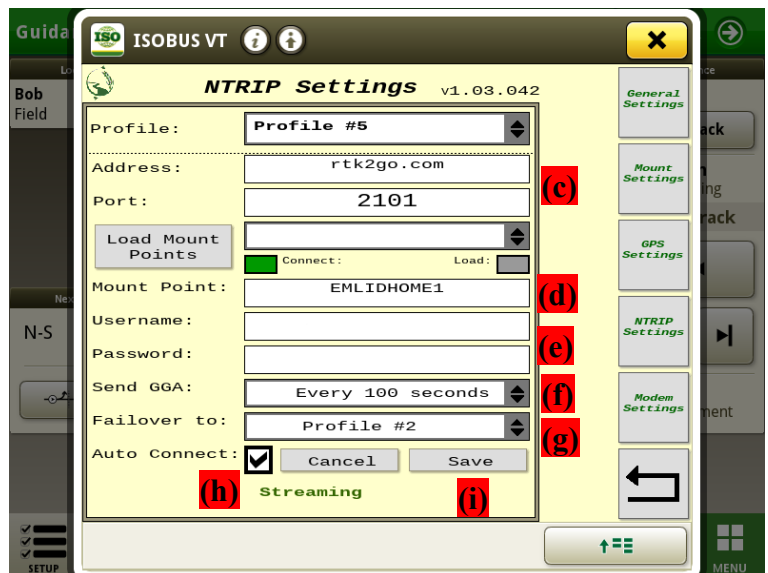
If the profile information has been filled in previously, the connection process will begin immediately. Different profiles represent different “mount point” locations, which are essentially different base stations from which the correction data is obtained. Select the profile for which the base station is closest to your physical work location. The distance to the base station is displayed on the Diagnostics page, once streaming has started.



- b) Edit: Press this button to change the NTRIP Settings required to connect to the base station.

- c) Address and Port number: The NTRIP service provider supplies this information, along with the Mount Point, Username, and Password.

- d) Mount Point: Type in the name of your mount point. **Optional**: Press the “Load Mount Points” button. This populates the adjacent drop-down list. 100 different possible mount points may be listed, but some NTRIP casters (i.e. servers) such as caster.emlid.com or rtk2go.com have too many mount points to load, so in these cases it is best to type in the Mount Point manually.



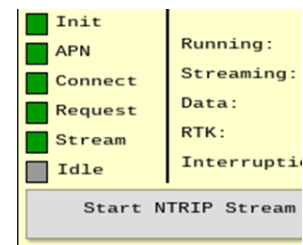
- e) User name and Password: as supplied by the NTRIP service provider

- f) Send GGA: this is the rate at which the CRG sends its position back to the caster (server). The caster may use this to determine if the CRG is in a valid location. Different casters will have different policies for this, so please obtain this info from your NTRIP service provider.
- g) Failover to: if streaming fails for an extended period, the CRG will automatically switch to a different profile (with a different mount point) as specified.
- h) Auto Connect: when the CRG powers on, it will automatically contact the caster and begin streaming. This is often desirable, but if you are not using RTK for an extended period and wish to prevent unnecessary cellular data usage, then switch this off. (Note: only the selected profile will auto-connect, so other profiles that have it selected will be ignored.)
- i) Save: **DON'T FORGET TO SAVE** once changes are complete

**COLOR INDICATORS**

Colors on the NTRIP page indicate the connection stage using the cellular modem, and green is displayed when a stage is complete. Grey means incomplete.

- 1) Init
  - Blinking yellow: while initializing & configuring modem
  - Red: if modem is not found or the wrong modem type is specified in General Settings
- 2) APN
  - Blinking yellow: while contacting the cellular network
  - Red: - missing SIM card  
- APN invalid or not received
- 3) Connect
  - Blinking yellow: while contacting the NTRIP caster
  - Red: Bad IP or port settings
- 4) Request
  - Red: Bad username or password
- 5) Stream
  - Grey: Not streaming. If all other indicators are green, it is likely that the base station is not connected (or not streaming) to the caster
- 6) Idle
  - Green if all other settings are good, but not streaming. Press “Start NTRIP Stream” to start.



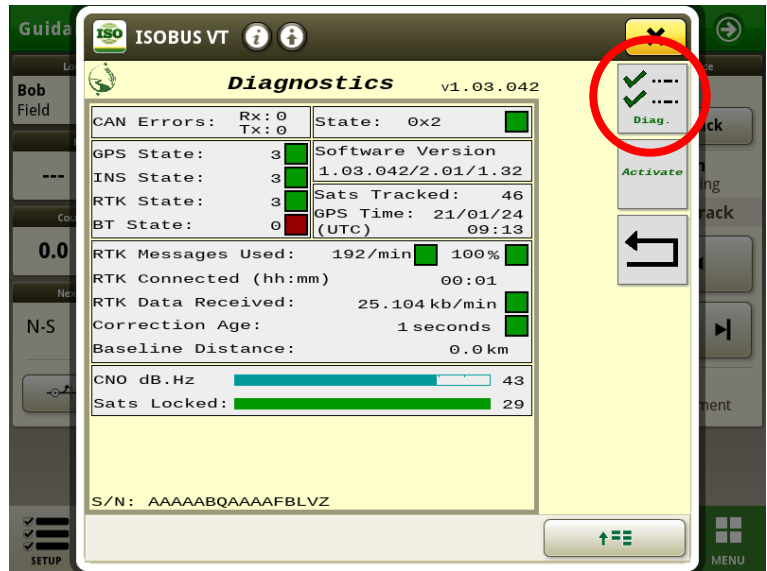
When the Stream indicator shows green, you are streaming! With a good satellite signal, you should now have RTK Fix quality precision, typically with sub-inch (under 25mm) accuracy. Go to the CRG Diagnostics page to verify that all RTK settings show green. Streaming rates that successfully achieve RTK fix can typically measure between 10 to 40 kB per minute, depending on how the mount point is configured by the NTRIP service provider.

### Diagnostics

The diagnostics page is useful for determining proper operation of the CRG.

The Software Version field provides the firmware version. It is defined as:  
 {main} / {INS} / {GPS}

Refer to page 2018 for notes on normal indications and/or troubleshooting.

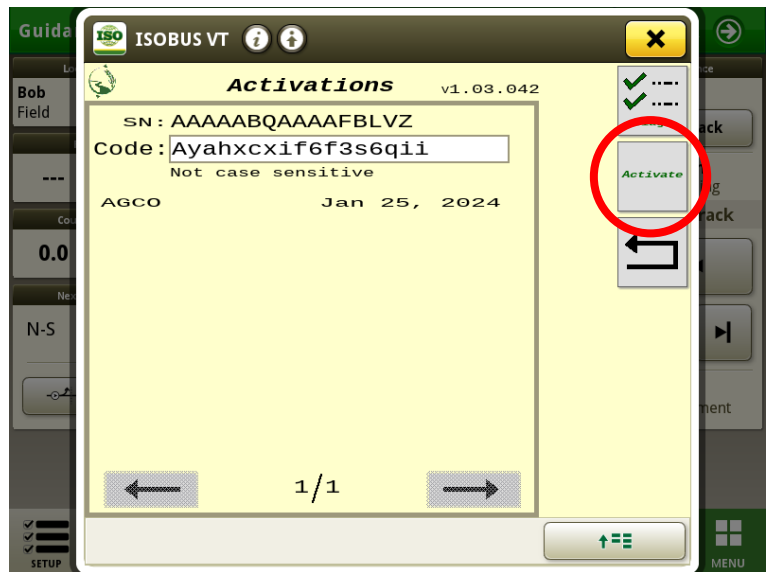


### Activation

Activation is only required for CRGs that use the internal Bridge (for non-JD equipment). It is not required for use with JD equipment. Activation is one-time only, and will remain activated thereafter.

If you purchased a CRG-JD, it can be activated later for a single variant type. For example, if you then acquire a Case combine, you can purchase an activation code from Agra-GPS and then update the CRG firmware to be compatible with the Case combine, and it will still remain compatible with your JD equipment.

The activation is non-transferrable, and is only valid for 1 variant (type). For example, a single CRG cannot be used with both AGCO and Claas at the same time. It can, however, be used with AGCO and JD; OR with Claas and JD; OR with CNH (Case-New-Holland) and JD; etc.





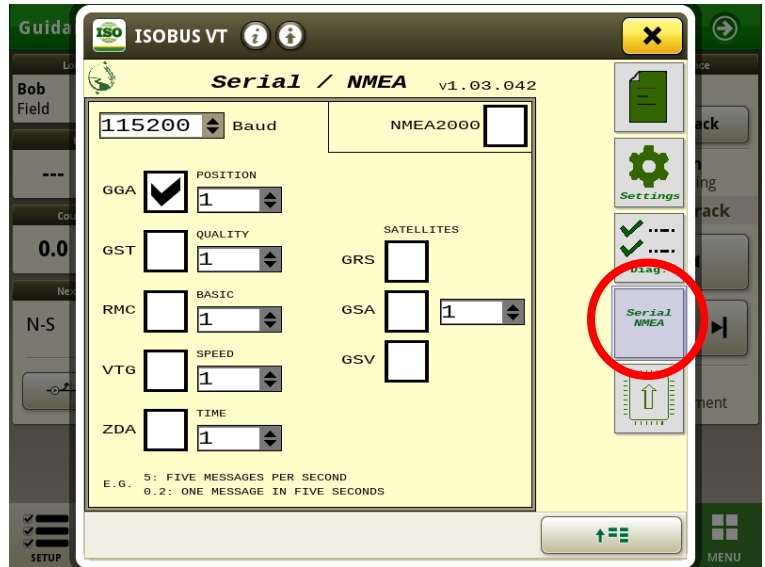
### Serial Port Output

The CRG can send out serial NMEA sentences (text-based messages), which may be used by various devices and implements for tasks such as section control or application rate control.

Serial format:

- 8 data bits, no parity, 1 stop bit (8-N-1)
- Baud Rate as specified

Various NMEA sentence formats such as GGA and VTG may be selected for transmission. Multiple formats may be selected at one time, and each type may be sent at a different rate. The sentence rates range from 10/second to 1 sentence every 10 seconds. Please consult your device manual to determine the sentence and rate requirements.



**WARNING!** Selecting high output rates, combined with a low baud rate, may overload the NMEA output stream, causing data errors. Select ONLY the sentence types and output rates that are specified by your device manual.

The machine plug on which the NMEA signals are available will vary. For example, on the newer Fendt tractors, it is available at the 9-pin D-sub connector to the upper right of the operator seat. For JD machines, it will be available in the same location as the Starfire NMEA output. However, if direct signal access is required, the relevant CRG pins are:

	CRG “JD” mini-deutsch plug (right-hand side, black)	Starfire standard plug (deutsch-12 plug)
outgoing data, orange wire	pin 2	pin 3
incoming data, blue wire	pin 11	pin 10

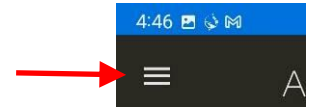
NMEA2000: This activates the transmission of NMEA data over CANbus. Data is sent at constant intervals, and different message types cannot be selected. Lat/lon is sent every 100ms, speed/heading is sent every 200ms, and other position data (e.g. altitude, accuracy, time, etc) is sent every 1000ms. The serial NMEA settings have no effect on NMEA2000 output.

## Bluetooth App

The Agra-GPS app provides RTCM correction streaming via Bluetooth, through your mobile phone. Be aware that you will require a reliable cellular network signal at your work site.

**NOTE:** Streaming data through your phone may cause extra data charges from your mobile phone network provider, depending on your data limits. However, the data rate is fairly low: for example, a typical 30kb/min streaming rate means that it will take almost 600 hours to consume 1 gigabyte (GB) of data.

- 1) Ensure the Bluetooth service on your mobile phone is enabled.
- 2) Android: Go to the Google Play Store  
iPhone: Go to the App Store
  - Search for the Agra-GPS app and install it.
- 3) Start the app, and using the upper left menu, go to the Settings page.
- 4) Under Settings → NTRIP, specify the caster parameters, for example:
  - Host                                   caster.emlid.com:2101
  - Mount Point                       MP9999 (the mount point represents a particular base station)
  - Login                                   u12345
  - NMEA Source                       Receiver



- The Host can also be specified with an IP address, e.g. 159.89.221.86:2101
  - 2101 refers to the “Port Number” and must be separated from the address with a colon.
  - A list of Mount Points may also be obtained by typing the Host name (along with port number) into a web browser like Google Chrome or Safari.
  - The Login username must be obtained from your NTRIP service provider.
  - The NMEA Source may also be specified manually in terms of Lat/Long/Altitude position. This must be the precise location of the stationary base station receiver.
- 5) Under Settings → Receiver, select the CRG device such as “AGRA-CRG-xxxx”, where xxxx is a unique identifier for your CRG. The CRG must be powered on in order to be found by your mobile phone. If you have multiple CRGs on different machines, you will need to reset this parameter each time you move to a different machine.
  - 6) User Profile: this is a way to store different NTRIP settings. If you work in multiple different locations, you may need to change to a different mount point or even a different caster. By saving a different profile for different locations, it makes changing the setup easier.
  - 7) Return to the Home screen and press Connect. RTCM data from the caster should start streaming to the CRG. In ideal conditions an RTK fix can be achieved in under 10 seconds. Your phone screen can be turned off and streaming will continue. For long workdays, it is recommended to keep your phone plugged into a charger so there is no interruption due to the phone battery dying.

## The CRG-Bridge ISO App

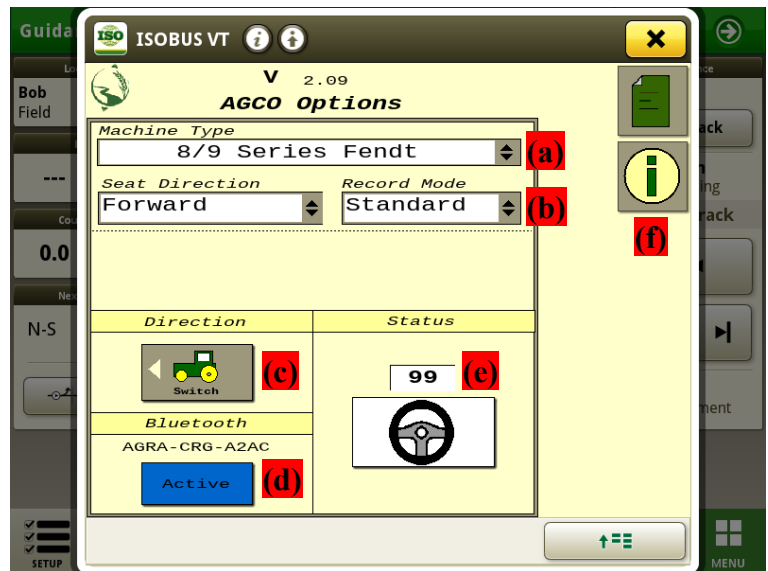
Each non-JD CRG comes with an internal Bridge ISO app tailored to a particular make of machine. If the CRG is connected to a John Deere machine, this Bridge app will not be visible or selectable. If on a non-JD machine, the Bridge app will only appear if Bridge = Enabled on the General Settings page. The internal Bridge also requires Activation (code entry is accessible from the CRG Diagnostics page), but if not activated, the Bridge will still run for 10 minutes after power-up for evaluation only.

Refer to your installation manual for Bridge setup options for your particular machine.




There are also likely other settings within the machine itself that may need adjustment, and these will be described in your machine-specific installation manual.

Nevertheless, many options are very similar between different Bridge types. Here are a few examples of common options:

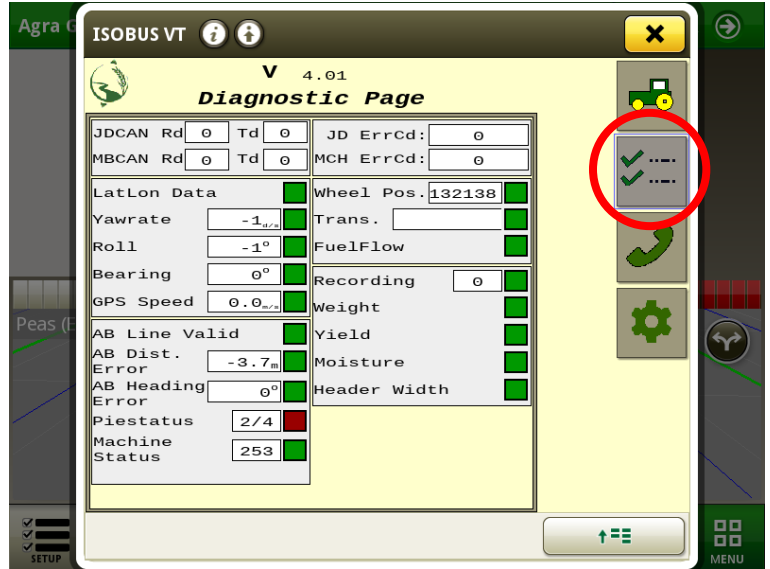
- a) Ensure the Machine Type and Seat Direction are appropriate for your machine.
- b) Record Mode refers to the recording of the work area of the field completed by the implement. Record Mode selects between “Standard” and “On Resume”, where “On Resume” can be triggered by hydraulics (for example, it only records work area when the implement in the ground and not when raised).
- c) While driving, if the direction of the machine is detected incorrectly, you can force it to change it here.
- d) On the CRG, Bluetooth is active by default. Press this button to de-activate it.
- e) Press the steering wheel button to cause auto-steering to engage if all other steering conditions are met. The number indicates the steering angle reading.
- f) Press the button indicated by ⓘ to access other information pages



Example: Bridge home page for AGCO types

Within the Bridge app, other commonly available information pages include Help , Contact , and Firmware Update  (refer to the *CRG Firmware Update Manual*)

The button for accessing the Diagnostic page is circled.

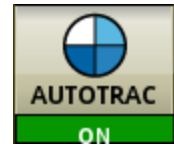


## Auto-Steer Operation

Note the AutoTrac Pie indicator on the JD monitor screen. With the CRG attached, you will usually see 2 quarters of the Pie displayed if everything is normal (Installed and Configured).



To move the Pie to 3 quarters (Enabled), try pressing the Pie on screen. On some machines, you may have to select a physical enabling switch or button, often located on the armrest or overhead. There are also requirements on some machines for minimum speed, detection of steering wheel movement, and on some combines threshing must be engaged. For further instructions, refer to the Installation document for your particular machine.



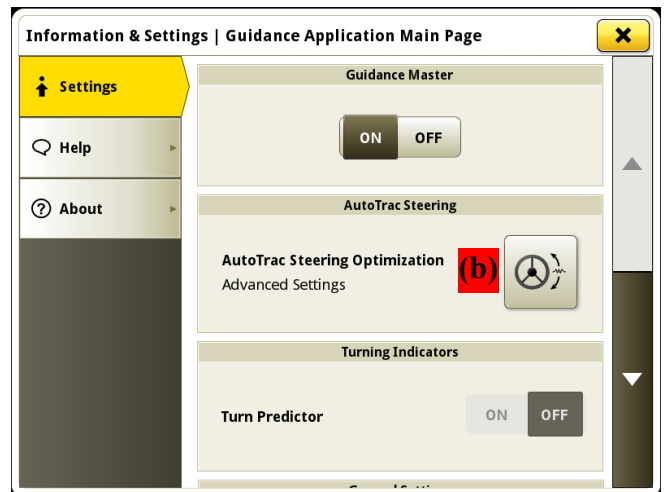
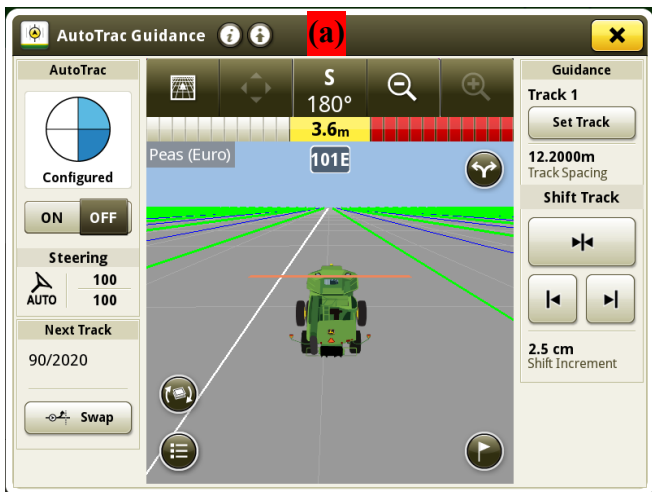
To engage auto-steering, you will find an Engage (also known as Resume) button to activate it (bringing the Pie to 4 quarters), usually located on the control stick or armrest. It will engage only if all other conditions are met, such as minimum speed, etc.

You can press the Engage button again to disengage, or simply turn the steering wheel. On all machines, forcing the steering wheel will automatically disengage auto-steering.

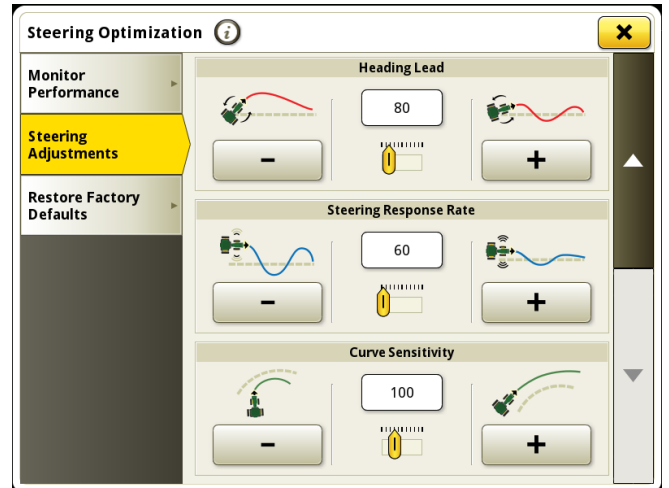
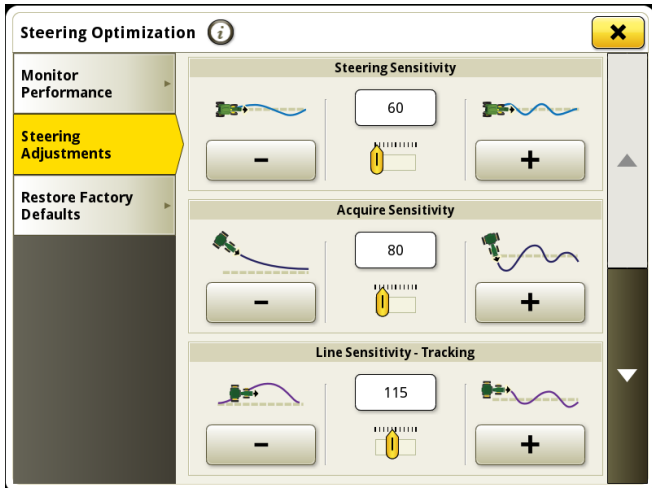
## Auto-Steer Optimization

Using the JD display you may adjust your steering performance. The steering optimization screen may be accessed as follows:

- a) Press on the top bar of the AutoTrac Guidance screen
- b) Access Steering Optimization settings



Most machines will perform optimally with all JD settings centred. If a change is required, find an open area where you can travel at target speed and adjust one parameter at a time until you are satisfied with the steering performance.



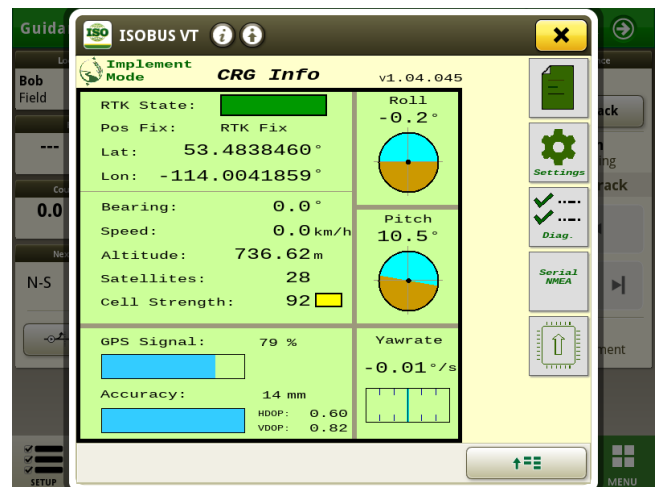
### Implement Steering

The CRG fully supports implement steering. Two CRGs are required, with one mounted to the implement, and one mounted to the tractor. An implement steering harness is also required, with integrated CANbus termination. Please ensure the implement harness has proper CANbus termination. With the implement harness unplugged, the CANbus resistance should be 120 ohms. When it is plugged into the tractor, it should be at 60 ohms.

The CRG mounted to the implement must have two pins electrically connected, which puts it into implement mode. At the CRG's black (JD) mini-deutsch connector: pin 2 and pin 11 must be shorted (zero ohms). This corresponds to pin 3 and pin 10 on the standard Starfire connector, which is normally used for NMEA output.

Refer to the pin-out diagram at the back of this manual.

The implement-mode CRG will create a separate ISO app from the tractor CRG. This ISO app can be identified by its green color.



## AutoTrac and AutoTurn

The CRG fully supports AutoTrac and AutoTurn.

AutoTurn: First the user will need to satisfy all JD requirements, such as enabling ITEC and creating a field/boundary/etc. Then follow these steps:

- 1) Go to the AutoTrac turn automation page and enable turn automation.
- 2) Turn off SpeedControl. (If the SpeedControl section is not there, please update your monitor. You can still operate without updating, but will need to fill in speed automation sections and deal with speed warnings.)
- 3) In order for headland sequences to work, the user must properly create the appropriate headland sequences. It is **HIGHLY** recommended that all users do this, as it will prevent errors from showing in the monitor; however, it is only absolutely necessary if they want to control sequences on machine side (only supported on certain Fendt models currently).
  - a) Setup headland ENTRY. Click on the “Enter headland” field on the AutoTrac turn automation page, then press New Sequence, then Add Step. On the select function there should be only one option, SCV 1. Select SCV 1 and select EXTEND. After this hit Next and save the sequence. That sequence should now show up as the 'Enter' headland sequence in the AutoTrac turn automation page.
  - b) Setup headland EXIT. Repeat the steps from (a), except this time for the “Exit headland” field, SVC 1 needs to be set to RETRACT (instead of extend).

## SF1 & RTK Indicators

In order to communicate with a John Deere monitor, the CRG identifies itself as having an SF1 signal at all times, even when no satellite signals are available. This does NOT mean you are actually receiving an SF1 signal, and also does NOT mean you have an SF1 license.



When receiving a correction stream and in RTK Fix mode, the JD monitor will show that RTK is enabled (this may not be the case if you have changed Mode Simulations settings in the “GPS Settings” page of the ISO app).



When in RTK Float mode, the JD monitor will show RTK-X.

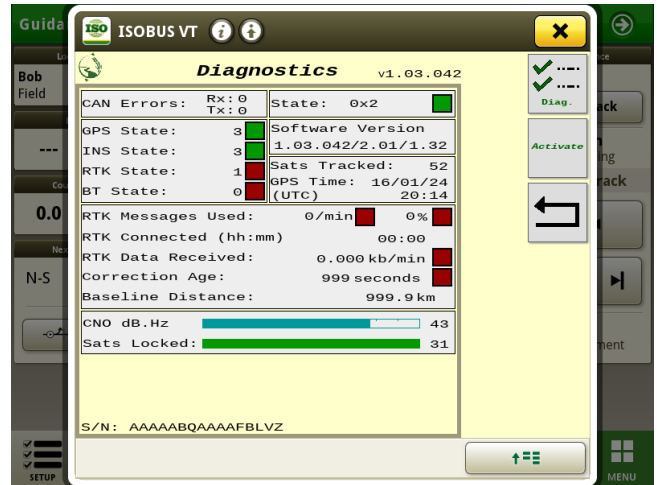


NOTE: When the CRG switches from RTK Float to RTK Fix mode, auto-steering will disengage. This is normal and expected behaviour, and prevents a sudden unexpected path change. Press the Engage (or Resume) button to re-engage.



## Troubleshooting

- Normal values for RTK Data Received should be between 15 to 40 kb/min, depending on the base stations (i.e. mount point) configuration. If RTK message indicators are yellow, this means data has stopped flowing within the past minute. Once 1 minute has elapsed without a valid RTCM correction stream, indicators will show red.
- RTK State will show yellow in Float mode.
- If an inappropriate mount point is chosen (for example, from a receiver that is too far away), the RTK State may not be able to obtain a Fix, but will stay in Float mode. The accuracy in float mode is not reliable, and in some cases, non-RTK positioning might even be better than Float.
- If “RTK Messages Used” shows purple, this is because an information message was received from the caster, which is usually an error message. This can happen if the caster believes you are outside of the service area for the selected mount point.
- C/N0 refers to “Carrier to Noise” ratio, which is a measure of satellite signal strength. Anything over 36 is normally acceptable for an RTK fix.



## Status Light

The back side of the CRG (the connector side) contains a coloured status LED. The LED should always be showing at least one colour, usually in a fading pulse. If multiple colours are flashing, then multiple failures have occurred.

- Red flash (fast): ISO/Implement bus failure (typical symptom: ISO app fails to load)
- Red pulse (slow): INS failure
- Purple pulse: GPS failure
- Light blue pulse: GPS signal is too weak
- Green pulse: All systems normal

During firmware upgrade, the LED will display different colours when the CRG reboots. While the firmware is updating, various colours will appear in a fast flash. **DO NOT REMOVE POWER UNTIL THE FIRMWARE UPDATE IS COMPLETE.** To determine if the update is complete, wait for the LED to show a green “fading pulse” colour. Refer to the *CRG Firmware Update Manual* for more details.

## NTRIP Overview

The NTRIP caster is a remote internet server that provides an RTCM correction stream, which allows an RTK Fix to be achieved. The caster will usually offer many “mount points”, each of which may represent a GPS receiver with its location known precisely. Alternate mount points may also represent different flavours of correction stream (for example, the CMR standard, which the CRG cannot use). For best results, the receiver (base station) should be located within 35km (20 miles) of your work site in order for RTK to work adequately. Accuracy decreases as your position moves further from the base station.

To connect to a caster, you will need to find a local NTRIP service provider who will give you an IP address, port number, mount point identifier, and mount point login name and password. There may be privately owned casters with base stations in your area that will charge a subscription fee, or there may even be publicly available casters, sponsored by industry groups or government (for example, the CORS system in the United States).

Alternatively, you can choose to setup your own base station by purchasing a product like Emlid Reach RS2 or similar ([www.emlid.com](http://www.emlid.com)). The Emlid Reach is also sold and supported by Agra-GPS. As part of Emlid’s product offering, you can create a mount point for your base station at [caster.emlid.com](http://caster.emlid.com). It is also possible to register your Emlid base station with a different caster service such as [rtk2go.com](http://rtk2go.com).

### Refer to our Base Station Setup Manual for more information:

[www.agragps.com/basestation\\_setup](http://www.agragps.com/basestation_setup)

### The Emlid Reach is also available for purchase from Agra-GPS:

[www.agragps.com/product/emlid-reach-rs2-base-station](http://www.agragps.com/product/emlid-reach-rs2-base-station)

### Custom setup

Setting up your own caster is possible, but this is more technically challenging. Software such as that found at [www.use-snip.com](http://www.use-snip.com) can be used freely, or with a paid license for unlocking extra features.

Typical RTCM message streams may be set up as follows:

(A)

1004, 1012 at 1 message/second; and 1005, 1033 at 1 msg every 5 seconds (data rate: 15 kb/min)

- This setup only includes corrections for GPS and GLONASS

(B)

1006, 1074, 1084, 1094, 1230 all at 1 message/second (data rate: 41 kb/min)

- This setup includes corrections for GPS, GLONASS, and Galileo

## Appendix A: Product Specifications

Operating Voltage Range:	10 to 16 VDC, 12V nominal
Power Consumption:	less than 3W
Operating Temperature:	-20°C to +40°C ambient
Weatherproof:	NEMA 3X, IP65
Supported:	Bluetooth® BLE and Bluetooth Classic 5.0, RTCM-3.x, NTRIP 2.0

NOTE: Circuit protection fuse is required: 1A minimum, 5A maximum

## COMPLIANCE

This product is in compliance with the following standards:

### EMC

- FCC 47 CFR Part 15B: Radio Frequency Devices – Unintentional Radiators
- ICES-003 Issue 7 (2020-10): Information Technology Equipment (including Digital Apparatus)
- EN ISO 14982 (2009): Agricultural and Forestry Machinery – Electromagnetic Compatibility
- ETSI EN 301 489-17 V3.2.4 (2020-09): Electromagnetic Compatibility (EMC) Standard for Radio Equipment and Services (Part 17: Specific conditions for Broadband Data Transmission Systems)
- ETSI EN 301 489-1 V2.2.3 (2019-11): Electromagnetic Compatibility (EMC) Standard for Radio Equipment and Services (Part 1: Common technical requirements)

### SAFETY

- EN 62368-1 (2014): Audio/video, information and communication technology equipment (Part 1: Safety requirements)
- IEC 60950-22 (2016): Information technology equipment – Safety (Part 22: Equipment to be installed outdoors)
- IEC 60529-1 (2001): Degrees of protection provided by enclosures. (IP code)

## ***Electromagnetic Compatibility Statements***

### RF Exposure

The integrated Bluetooth® device operates at an output power level which is within the ISED SAR test exemption limits at any user distance. Maximum output (Class 2 Bluetooth® LE): +10 dBm (+1.5 dBm typical). Frequency range: 2.402 GHz to 2.480 GHz. Maximum gain (integral chip antenna): 1.63 dBi.

### USA: FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in the specified 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 communications. 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 of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and 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.

**\*\*DO NOT MODIFY\*\*** Changes or modifications not expressly approved by Agra-GPS Ltd could void the user's authority to operate the equipment.

### Canada: ISED

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

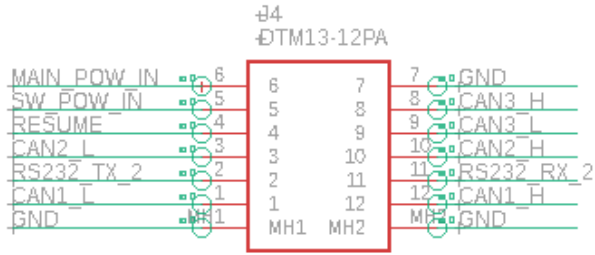
L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage ;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

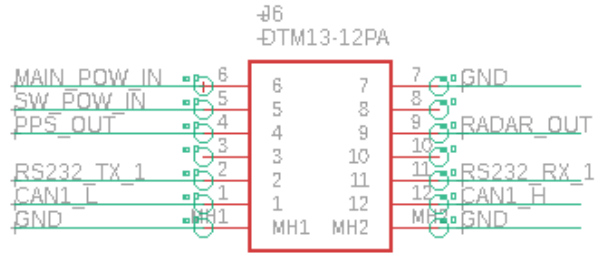
### EU & UK

Hereby, Agra-GPS Ltd, declares that the Bluetooth® module has been installed in accordance with the installation instructions, and in equivalent assessment conditions as tested for compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU, and the essential requirements and other relevant provisions of UK Radio Equipment Regulations 2017.

## Appendix B: Connector Pin-Out



Grey connector (Non-JD)



Black connector (JD)