

# **CNH ROS (Raven Operating System) Basic Operation Manual**



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# Chapter 1:

## Important Safety Information

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### **NOTICE**

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

Follow the operation and safety instructions included with the implement and/or controller. Before installing or operating this Raven system, review and understand the information presented on this site.

- Failure to follow safety instructions may lead to equipment damage, personal injury, or death.
- Review equipment operation with your local dealer and follow all safety information presented on this site.
- 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 while operating this Raven system.
  - 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.
  - Do not operate the implement on any public road with this Raven system enabled.
  - Maintain control of the vehicle at all times during operation. For example,
    - Remain in the operator seat while the system is enabled and disable automated Raven controls before exiting the operator seat.
    - Maintain control of safety devices such as E-Stops at all times during operation.
  - 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.

## Field Computers, 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 GNSS 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 system power cable to the vehicle ignition or 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 or 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

### Aerials and Signal Interference

Due to the relatively low broadcast power from satellites, all GNSS receivers and aerials tend to be susceptible to sources of signal noise and interference as compared to terrestrial signals (i.e. radio or cellular).

**Note:** *Poor GNSS signal reception may cause other systems which rely on GNSS solutions (e.g. auto-steer systems, rate control systems, etc.) to disengage or may cause undesired operation or results.*

The following recommendations are intended to provide an optimal environment for GNSS systems and provide the best up-time results, even as sources of interference may spike throughout the day.

- Mount GNSS antennas with a clear, unobstructed view of the sky.
  - A minimum clearance of 1 m [39 in] is recommended around the GNSS antenna to help avoid common issues with signal interference. Do not mount cellular, radio, or other GNSS antennas within this area.
  - Mount the GNSS antenna to the tallest point of the machine. Avoid mounting the antenna in a location where obstructions (e.g. bins/hoppers, cab roof lines, equipment frame or structural elements, etc.) may rise into the antenna view.

**Note:** *The antenna view typically starts 5° to 10° above horizontal from the base of the antenna and extends over the skyward face of the receiver/antenna.*
- GNSS is a line-of-sight system. A clear path must exist between the satellite and the GNSS antenna.
  - Obstructions such as buildings, tree branches and limbs, as well as components of the vehicle such as a fiberglass or metal roof, and etc. may cause signal multi-path or completely block the GNSS receiver.
- Electrical and magnetic fields can interfere with GNSS or L-Band signals.
  - Avoid mounting GNSS receivers or antennas near components such as radio or cellular antennas, electrical motors, generators, alternators, strobe lights, radio transmitters, radio or cellular antennas, etc.
  - Over-head power lines, microwave dishes, radar, other active antennas, etc. can interfere with GNSS signal.
- Mount the Field Hub cellular and diversity antennas at least 1 m [39 in] apart. Avoid mounting other cellular, radio, or GNSS aerials within this area.

## 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.

**Note:** *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 contaminants. 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.

## Care, Use, and Maintenance

Refer to the following guidelines for proper care and use of the field computer.

- Do not apply liquid or glass cleaner directly to the surface of the touch screen. Harsh chemicals may damage the touch screen. Clean the touch screen and exterior enclosure as needed with a soft cloth dampened with glass cleaner. Apply the cleaner to the cloth and then wipe the screen gently.
- Do not use any type of pointed or sharp instrument on the touch screen. Only a fingertip or an approved stylus should be used.
- While the Viper® 4+ are resistant to limited exposure to the elements, they are not weatherproof. Mount the unit inside of the machine cabin or drivers compartment and not exposed to precipitation, condensation, or other liquids for extended periods. If the vehicle cabin is not enclosed, remove the unit at the end of each days use. Store the Viper® 4+ in a dry environment when not in use.
- When temperatures are expected to be 0° F [-17° C] or lower, remove the Viper® 4+ from the vehicle and store it in a climate controlled environment. At these temperatures, the unit will not sustain damage, however, the Viper® 4+ may not operate as expected until the temperature of the unit is raised above this temperature.
- Mount the Viper® 4+ securely and route cables to prevent tripping hazards and keep the wires from pinching or breaking.
- Always remove the power connections for the Viper® 4+ and any control nodes or ECUs from the machine battery before jump starting or welding on any component of the machine or implement. Jump starting or welding on the equipment will damage the Viper® 4+ and CANbus nodes or ECUs.

## **Regulatory Statements**

### **Anatel Compliance Statement**

Este produto contém a placa CC IMX6 código de homologação Anatel 02268-19-01209.





## Chapter 2:

# ROS Features

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The following sections provide an overview of Raven Operating Software (ROS) capabilities and features.

### Raven Operating Software Platform

Raven Operating System (ROS) is designed to assist with managing multiple operators, various implements, a constantly growing and changing list of agricultural products, and various field operations throughout the growing season.

- Multiple user profiles allow the system administrator to set up multiple operators. Each user profile may configure various user preferences to ensure that the operator is comfortable using the system.
- Machine configurations allow the system user to configure ROS for multiple tractor and implement types. As the ROS device is moved from implement to implement, the device will detect the machine configuration for the equipment with which the device is currently running to simplify operation preparation.
- Preconfigured product and job profiles allow the system user to set up operation or application details which allow the equipment operator to quickly select preconfigured settings for the product loaded and the job or operation to perform and begin field work without setting up the system.

The system administrator may view and use the above information from the job report to make administrative decisions required with as much information as needed for the specific operation.

### Customizable 2D and 3D Guidance Screens and Widget Dashboard

ROS features widget based screens for field operation and guidance. Select from various widgets to customize the information displayed on the screen during field operations and may customize the widget layout to keep important operation information or operation tools available at a glance. Save each screen profile to quickly recall and view additional information as necessary or as different tasks become more critical for the field operation.

**Note:** Refer to "ROS In-Job Widgets" on page 238 or "Create a Screen Layout" on page 257 for additional information about widgets or saving using screen profiles.

During field operations, ROS provides either a two or three dimensional view of the equipment location within the field area. ROS also utilizes the configured equipment geometry to provide a swath guidance line on the ROS display to assist the operator and keep the equipment on track during the field operation.

**Note:** *This guidance path may also be used by automated steering systems such as Raven SmarTrax to automatically steer the equipment onto the displayed swath guidance line, to help reduce operator fatigue and allow the operator to monitor input or application systems.*

### On-Screen Mapping and Job Reporting

During field operations, ROS monitors and tracks the vehicle location and records input or application systems. As active sections or the working equipment width covers field area, ROS creates a live map of previous equipment coverage. When the job is complete, ROS compiles the location and any population, rate, or yield information into a report file for transfer to a home or office PC. The reports may be edited and used for customer billing, tracking product input for government purposes, or to help plan future crop inputs and field operations.

Job reports must be transferred to a Slingshot® user account via either a Slingshot® Field Hub or a USB flash drive. The Slingshot® web service is free and does not require any hardware or monthly subscriptions to utilize the reporting features of the web site. With an Internet connection, files may be transferred to the equipment cab from a home or office PC and completed job reports may be transferred from the cabin to the home or office via the wireless network.

Visit the Slingshot® web site for more information or to locate a local Slingshot® dealer for additional assistance with available Slingshot® services.

<https://portal.ravenslingshot.com>

### Machine Configurations

Machine Configurations allow the system administrator to configure multiple machine profiles. As the ROS device is moved from implement to implement, the device will automatically detect the machine configuration for the implement on which the device is currently running to simplify set up and preparations for field operations.

**Note:** *Refer to "ROS Machine Configuration Panel Overview" on page 28 for additional information about machine configurations.*

## Product Configurations and Job Profiles

Preconfigured product configurations and job profiles allow the system administrator to set up product and job information and allow the operator to quickly select the product loaded and the job or operation to perform to begin field work.

The system administrator may view and use the above information from the job report to make administrative decisions required with as much information as needed for the specific operation.

**Note:** Refer to "ROS Product Configuration Panel" on page 31 and "ROS Job Profile Panel" on page 33 for additional information on product configurations and job profiles.

## Secure User Login

Multiple user profiles allow the system administrator to set up unique Personal Identification Numbers (PIN) to secure the application system from unauthorized use. As well as secure access, each user profile may configure various user preferences such as language and display units to ensure that each operator is comfortable operating the system.

## Universal Terminal and Task Controller Capacity

ROS devices are capable of interfacing with many ISOBUS control systems via the universal terminal capabilities. This feature allows the operator to monitor or control various aspects of the vehicle or implement over an ISOBUS network via the ROS device display without the need for additional displays or control consoles in the vehicle cabin.

## Task Controller

The ISO Section Control activation key allows AccuBoom™ to control implement sections that is connected to the task controller. The task controller is required to allow the ROS UT to automatically control sections based upon field position and previous coverage data collected during the application.

**Note:** The task controller unlock is not included with the free UT capabilities. Contact a local CNH dealer for additional information.

## ROS Power On/Off

To power up the ROS device, press the power button once.




The power button will flash red and then should illuminate green. If the button stays red or does not illuminate, contact a local CNH dealer for additional assistance.

**Note:** Do not connect any USB drives or devices to the ROS during the power up sequence.

## Device Shut Down

When finished using ROS:

1. Select the **Administrator** or **User Panel** at the top of the Main Panel display.
2. Select the **Shut Down**  icon.

Or:

1. Quickly press and release the power button. A *Shutdown Requested* window will open.
2. Select the **Yes** button.

**Note:** For the device to properly shut down, all jobs must be ended. Refer to "End a Job" on page 235 for more information on ending jobs in ROS.

---

## Viper® 4+ Built-in Self Test

If the Viper® 4+ fails to display a picture on the screen, perform a Viper® 4+ self test to diagnose the issue. The built-in self test will help determine if a black screen symptom is caused by a hardware issue or a software issue.

**Note:** *This feature is not available on a Viper® 4.*

To perform a Viper® 4+ self test:

1. Remove power from the Viper® 4+ by disconnecting the four pin power plug.
2. Press and hold the power button on the side of the Viper® 4+.
3. Reconnect the four pin power plug.
4. Release the power button and note the power button color. If the button is:

### Green

Hardware is working properly. The cause of the black screen is likely a software issue. Reload the software on the Viper® 4+

### Yellow

Hardware is functioning properly but the firmware may be corrupt. Use the thumb drive with the appropriate firmware to reinstall the firmware.

### Red

A hardware issue has occurred. Contact a distributor to schedule the Viper® 4+ to be returned to the Raven service department for analysis and repair.

### No Color

If the power button does not display a color, this could indicate that there is no power being applied to the Viper® 4+. Check the power and input with the voltmeter and troubleshoot any external power issues. If power is present at the Viper® 4+ power plug, contact your distributor to return the Viper® 4+ to the Raven service department for analysis and repair.





## Initial Setup

**Note:** *Check all measurements before entering values into the field computer and enter all measurements as accurately as possible. Check that values entered on the field computer are consistent with measurements.*

When powered on for the first time, the ROS device will prompt the operator to configure the machine before proceeding. The following procedure is designed to assist the user or equipment owner with the initial set up and configuration of the ROS device and is recommended to avoiding entering profile calibration information more than once.

Please read the following procedure from start to finish before starting the initial setup. Completing the tasks in the order presented in the following section will help ensure the ROS device and connected systems are ready for operation in the shortest time possible.

## Language and Units



1. Power on the ROS device and complete the configuration prompt. See "ROS Power On/Off" on page 12 for details on powering the device.
2. Select the **Done**  icon to clear the initial machine configuration prompt.
3. Select the **Administrator Panel**  icon in the top left corner of the display.
4. Select the **User Profile**  utility.
5. Select the **Location Information**  tab and set the desired language at the bottom of the tab display.
6. If desired, update the time zone to the local universal coordinated time (UTC).
7. Select the unit preferences tab and select the desired base and pressure units for display. These units will be used to enter the machine configuration and calibrate control systems.  
***Note:** See "Manage User Profiles" on page 40 for additional details on setting up user profiles on the ROS device.*
8. Proceed to the "Initial Machine Configuration" on the facing page page to continue the initial set up of the ROS device.




## Initial Machine Setup

First-time machine configuration on Raven field computers is a streamlined version of the regular machine configuration procedure. This allows a machine to be quickly added to a brand new field computer.

**Note:** This topic picks up from the procedure in "Initial Setup" on page 13. See "Initial Setup" on page 13 before proceeding.

## Initial Machine Configuration

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select the **Add**  button.
3. Use the on-screen keyboard to enter a name for the machine or equipment configuration. The machine configuration includes the vehicle or tractor and any connected implements, carts, or tanks. Choose a profile name that will assist with identifying profiles with similar components as new profiles are added for future operations.
4. Select the **Tractor Name** field and use the on-screen keyboard to enter the name or designation for the vehicle or tractor used with the profile.
 

**Note:** For example, when setting up a configuration for a pull-type sprayer, the operator might enter the configuration name as "Liquid Applicator" and the tractor nickname as "Front Wheel Assist."
5. Select **Done**  on the machine configuration tab to return to the machine panel.
6. Locate and select the **CAN System**  icon in the machine panel editor to view CAN system information.
7. Verify that all CANbus nodes are detected and displayed by the ROS device.
8. **Readdress**  any product control nodes connected to the CANbus at this time.
9. Verify any multi-channel nodes are configured correctly for the control channels necessary for the equipment during field operations. Refer to "Readdressing Control Channels" on page 199 and "Multi-Channel Node or ECU Configuration" on page 198 for details on readdressing product control nodes and configuring multi-channel control nodes.
10. Finish the machine configuration setup. Refer to the "Machine Configuration Overview" on page 101 for details on setting up and completing the machine configurations.



11. If desired, enter product information to set up a product configuration during the initial set up. Refer to the ROS Product Control Calibration and Operation manual for additional assistance with configuring product profiles.
12. If desired, set up **Job Profiles** for various field operations during the initial set up process if desired. Refer to "ROS Job Profile Panel" on page 33.

**Note:** For the full machine configuration procedures, refer to "Machine Configuration Overview" on page 101.

## Capture Screen Shots

Raven field computers can capture and save an image of the current screen for later reference.

## Save Screen Shots

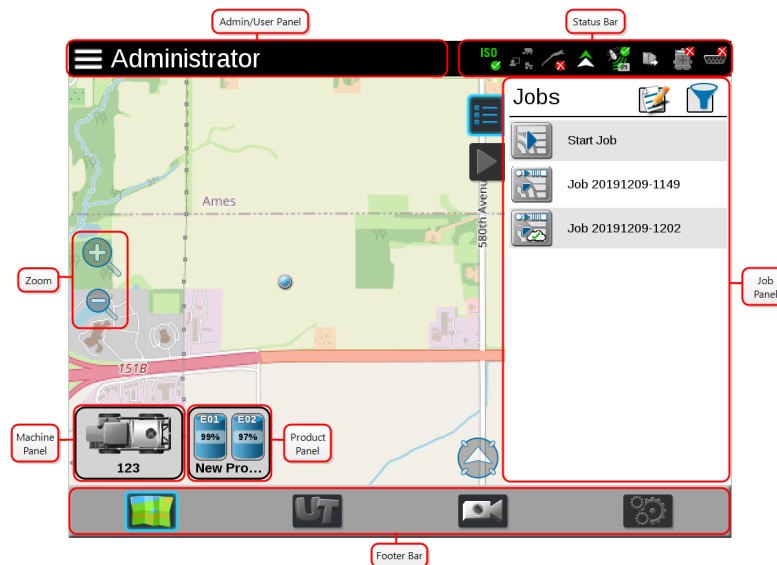
Capturing screen shots is possible while working in and out of jobs.

1. Quickly press and release the power button. The screen shot is saved as soon as the power button is pressed. A *Shutdown Requested* window will open.
2. Select the **Save** or **Save ScreenShot** button.
3. After capturing a screen shot, export the data via file maintenance. Refer to the "Export Other Field Operation Files" on page 95 section of the "File Export" on page 92 page for more information.

## Chapter 3:

# Home Page Overview

The home screen of the Raven field computer allows the user to navigate to several other pages and functions of the device and displays status icons for important systems of the field computer. Refer to the screens below for references to the different navigation or informational options offered in the field computer.



Refer to the following articles for more information on:

- "Status Header Bar" below
- "Navigate with the Footer Bar" on page 20
- "ROS Administrator or User Panel" on page 24
- "ROS Job Profile Panel" on page 33
- "ROS Product Configuration Panel" on page 31
- "ROS Machine Configuration Panel Overview" on page 28

## Status Header Bar

Raven field computers feature a header bar displayed across the top of the screen. The header bar presents status icons for functions of the field computer, giving the operator

quick, important information about the status of the field computer and its functions.

**Note:** *Some status icons may not be available in every field computer.*

## Slingshot®



The status of a Slingshot® connected device is displayed. A red X will display on this indicator if a Field Hub is not connected or not detected. When a Field Hub is connected to the ROS device, this area will display the current signal strength for wireless communication status.

## GPS



This indicator displays the current status of the position solution. This indicator will display:

- Green if the status of GPS is okay
- Yellow if an error or cautionary condition has been encountered
- Red if GPS is non-functional
- Gray if GPS is not detected.

## Software Update Available



A software update is available for the field computer. See "Updates Overview" on page 58 for more information on updating the field computer.

## Forward / Reverse

---



The forward/reverse status indicator shows if the machine is traveling forward or reverse according to the ROS device.

## Field Hub Transfer (ROS)



The status header displays the status of wireless file transfers with an Internet connection. If a file transfer is in progress, the file transfer indicator will display a green “in progress” status.

## Machine Telematics



This indicator displays the status of telematic messages received from the engine, including information such as fuel levels, DEF levels, RPM, and run-time hours. This information is then sent to Slingshot®. This indicator will display:

- Green if any information is being received by ROS
- Gray if no information is being received by ROS

## CANbus Communications



This indicator displays the communication status for a CANbus system. A green indicator will be displayed when communication is detected without errors.

## ISObus Communications



This status display indicates the status of ISObus communication with ECUs, working sets, implements, etc. This status will only be shown if an ISObus ECU is detected by the ROS device.

## Serial Communications



This indicator displays the communication status for serial communication ports. A green indicator will be displayed when all configured communication ports.

## Navigate with the Footer Bar

The buttons at the bottom of the screen provide easy access to settings and features such as the ISO Universal Terminal (UT). Review the following descriptions of the function of the icons displayed in the footer.



## Street Maps View



Street maps provides a view of scouting field boundaries in the area. If desired, the user can filter the scouting field boundaries by grower, farm, and field. The user can also select the scout field boundary directly from the map. Street maps need to be created on the Slingshot® web site.

Refer to "Street Maps" on page 294 for additional information on street maps.

## UT Panel



The UT panel provides access to the ISOBUS working set displays and ECU options or features. Use this panel to access features such as the Raven ISO Product Control, Raven ISO AutoBoom®, or various third party features connected to the ISOBUS communication network.

Refer to "Access the UT Panel" on the next page for additional information.

## Camera Panel



The camera panel allows the user to access cameras connected to the display. Toggle between up to four video sources with on designated as a reverse camera.

Refer to "Configure Camera" on page 184 for additional information.

## Settings Menu



Offers many options for configuring additional settings of the ROS device.

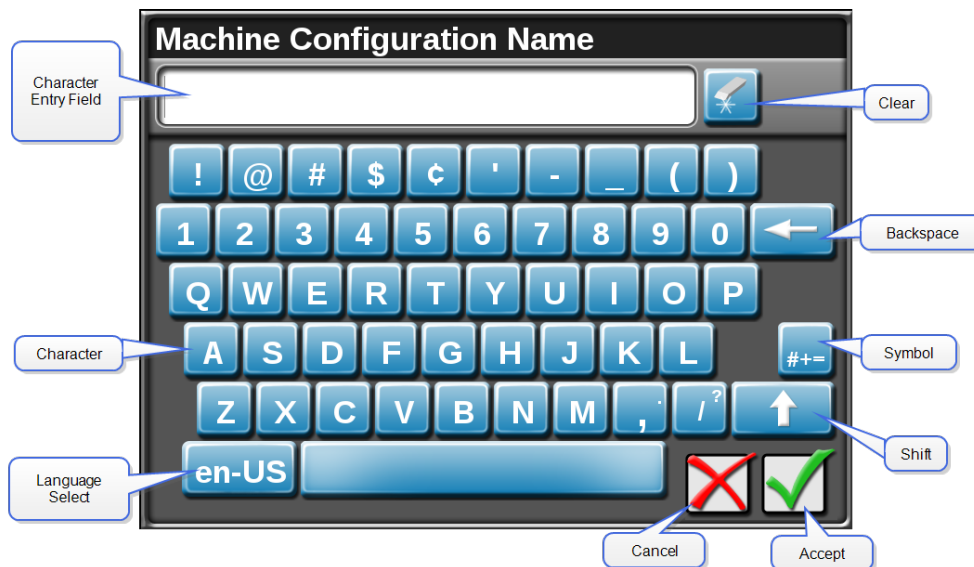
## Access the UT Panel

The UT panel provides access to the ISOBUS working set displays and ECU options or features. Use this panel to access features such as the Raven ISO Product Control, Raven ISO AutoBoom®, or various third party features connected to the ISOBUS communication network.

Navigate to the UT panel by selecting the appropriate icon near the bottom, right corner of the display:



## Use the On-screen Keyboard



Data entry is easy using the full, on-screen keyboard.

This keyboard is displayed when entering or modifying profile, product, or job names. The following features may be used on the keyboard:

### Character Entry

When the keyboard is touched, the character selected will display above the key. If the character displayed is not the character intended for entry, continue touching the screen

while dragging to the correct character to enter. The character will not be entered in the character entry field until the touch is released.

## Shift

The keyboard displays the character set that will be entered in the character field when any of the keys are selected. To shift the character set to lower case, press the shift key. The keyboard automatically capitalizes the first character entered into the character entry field. To cancel the feature, select the shift key before entering characters using the keyboard. Select the shift key to enter the characters using the upper case character set.

**Note:** In ROS, double tapping the shift keys will enable caps lock. Select the shift key again to disable caps lock.

## Symbols and Numbers

Select the symbols and numbers key to input various characters that are not available on the current keyboard. Select the same icon to return to the alphabetic keyboard.

## Backspace and Clear

Select the backspace key to delete the previously entered character in the character entry field.

**Note:** In ROS, the user may select the **Erase**  key to clear all characters in the character entry field.

## Accept/Cancel

Select the accept key to accept the text or characters displayed in the character entry field. The displayed text or characters will be entered in the selected text field on the previous screen.

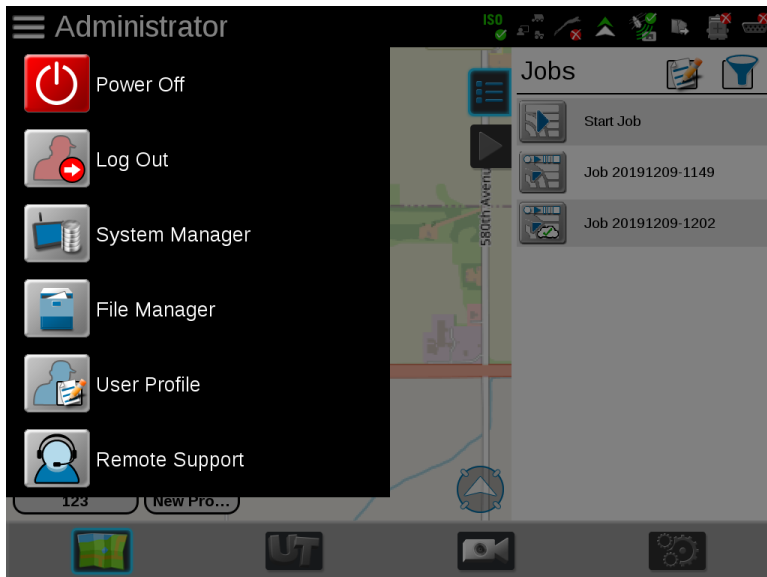
Select the cancel key to return to the previous screen without entering the keyed text or characters.


## Language Select

Pressing the language select button will change the keyboard language between various languages. Changing the language on the keyboard does not change the language for the rest of the screens. Those will remain the default language.



## ROS Administrator or User Panel



Select the **Administrator Menu**  icon in the top left corner of the display to access the Administrator or User Panel and the following utilities:

 **Power Down**

Touch the power down icon to shut down the ROS device using this icon prior to removing power from the ROS device by switching the vehicle ignition off.

 **Log Out**

Touch the log out icon to exit the current user profile. Log out of the ROS device when leaving the equipment for short periods or at the end of the shift or when switching operators to secure the management system from unauthorized access or operation of the control system.

**Note:** *Demonstration mode features are also available via the log out prompt.*

Refer to "Administrator and User Profile Overview" on page 39 for additional assistance with user profiles and security features available with ROS.

 **System Manager**

Access the system manager utility within the administrator or user panel to perform software updates and CAN node firmware updates. Product software and documentation updates may be made available periodically on the Raven Portal web site:

<https://portal.ravenprecision.com>

Refer to "ROS System Manager Overview" on page 53 for more information on performing system and hardware updates.



### File Manager

Access the file manager to perform file maintenance, access utilities for exporting and transferring job files and other data to and from the ROS device, and to view the transfer history for previous job data.

Refer to "ROS File Manager Overview" on page 71 for more information on performing file maintenance.

**Note:** *Do not store job and field information on the ROS device for long term reference or archiving. Perform file maintenance regularly and remove files associated with completed jobs or field operations to ensure memory resources are available for new operations as needed. Archive and back-up job and field information on a home or office PC to ensure the data is secure.*



### User Profile

User profiles may be created for each operator to save user preferences such as language and displayed units to maximize each user's comfort level while operating the equipment with ROS. Each user profile may also be assigned a unique Personal Identification Number (PIN) to secure the ROS device from unauthorized access, modifications, or operations from the operator.

In addition to securing the system from unauthorized use, ROS saves active user profile information with each job report. If multiple operators will be using the same machine during a specific field operation, the job report will contain a list of users that completed the specific field operation. The system administrator may also review the specific field areas in which each operator was logged in and operating the equipment.

Refer to "Administrator and User Profile Overview" on page 39 for more information on setting up and using administrator and user profiles.



### Remote Support

Access assistance from the support team remotely.

Refer to "Remote Support" on the next page for more information on getting support remotely.

## Remote Support



Remote support allows a Raven service specialist to remotely view and control the Raven field computer system.

### Begin a Remote Support Session

**Note:** A Slingshot® connected device must be connected to the ROS device to access remote support.




If a wireless signal is available, the operator may use ROS to request remote assistance from a CNH dealer or technician.

To begin a session from the Administrator or User Panel:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **Remote Support**  utility.
3. ROS will send the request to the Slingshot® server and a Service Code will be provided. Depending upon wireless network connectivity and signal strength, the service code request may take a few minutes to return to ROS.
4. Provide the Service Code to the Raven technician or support representative to allow remote access to ROS.

To begin a session from the Slingshot® widget in a job:


**Note:** The Slingshot® Connection Status widget will be required to initiate a remote support session during a job. Refer to "Add Widgets to a Screen Layout" on page 258 for assistance with adding widgets to the screen layout.

1. Select and hold the **Slingshot® Connection Status**  widget for approximately two seconds to access the in-job prompt.
2. Select the **Remote Support**  tab.
3. Select the **Request Support**  button at the bottom of the prompt.

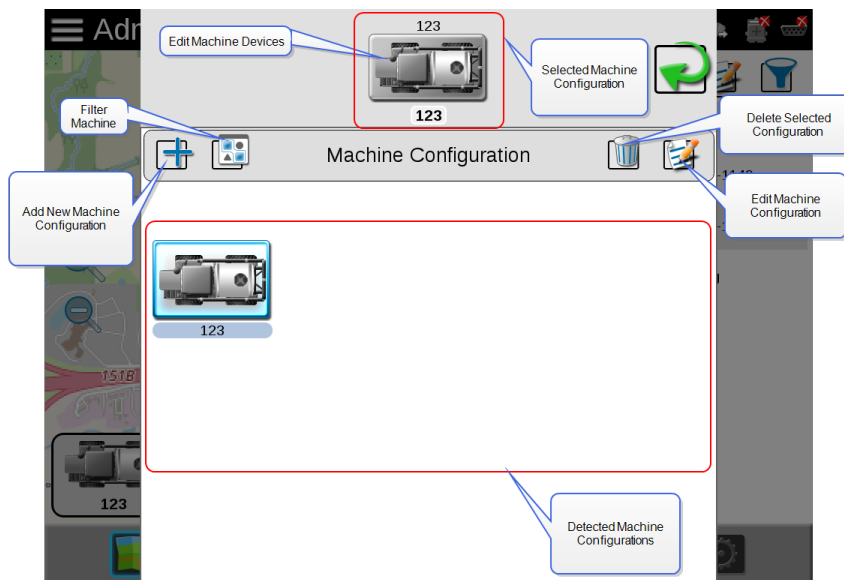
4. ROS will send the request to the Slingshot® server and a Service Code will be provided. Depending upon wireless network connectivity and signal strength, the service code request may take a few minutes to return to the ROS display.
5. Provide the Service Code to the Raven technician or support representative to allow remote access to the ROS device.

## ROS Machine Configuration Panel Overview

**Note:** Refer to "Machine Configuration Overview" on page 101 for additional information on selecting and modifying machine configurations.

Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.

The Machine Panel displays the selected machine configuration and provides access to the following settings which make up the machine configurations:



- Machine (e.g. self-propelled or tractor) profiles
- Implement profiles (used with tractor profiles)
- Equipment section groups
- Machine device configurations

The Machine Panel contains the following utilities for selecting and configuring the various types of vehicles and equipment with which the ROS device will be operated:

**Note:** On initial start up, ROS will require a machine configuration before other system features may be accessible. Refer to "Initial Setup" on page 13, for an overview of the initial settings required and the recommended procedure to complete setup of the ROS device.



## CAN System Configuration

A machine configuration saves vehicle or tractor calibration information, implement geometry for each configured implement, and CANbus system information. If a configuration is completed for a specific implement, the ROS device will automatically identify and select the matching configuration on start up. The ROS device will also alert the operator if a CAN component in the saved profile is not detected.

Refer to "Machine Configuration Overview" on page 101 for detailed information on setting up machine configurations for the various implement types available with ROS.



## Machine Configuration and Implement Garage

In some instances, a machine configuration may match more than one equipment set up such as a tractor used with a plow, swather, hay rake, or a rock picker. If desired, create profiles for each of these implements to allow the ROS device to save geometry and guidance settings for each specific implement. When ROS detects a set up matching these configurations, the device allows the operator to select the saved machine configuration to quickly set up the field computer for the days operations.

ROS also allows a system administrator or operator to access other saved configurations via the machine or implement "garage" to modify or remove profiles to keep the ROS device updated for the equipment currently in the fleet or machine shed.

**Note:** Refer to "Machine Configuration Overview" on page 101 for additional information on selecting and modifying machine configurations.



## Edit Existing Machines and Machine Configurations

If desired, select the **Edit**  button to easily change machine settings and configurations.



## Remove Unneeded Machines

If desired, select the **Delete**  button to easily remove machine that are no longer needed.

## Automatic Machine Configuration Detection

Machine configurations allow an administrator or equipment owner to set up specific configurations for various implements in a fleet or in the machine shed. With completed machine configurations, ROS will attempt to detect and select the machine configuration to which the device is connected. Specific machine configurations also allow an operator to

select various tractor/implement combinations and quickly “reconfigure” ROS for operation on various equipment throughout the season.

If a machine configuration does not exist for the detected system, ROS will select the closest compatible match. Refer to "Create a New Machine Configuration" on page 103 for more information on machine profiles and configurations created using ROS.

**Note:** *A compatible match must have the same active nodes, or defined but not currently active, as the previous machine configuration.*

## Filter Machine Configuration

Use the filter button in the Machine Configuration panel to toggle the panel view.

Toggle the Machine Panel display between all available machine configurations, **Show All**




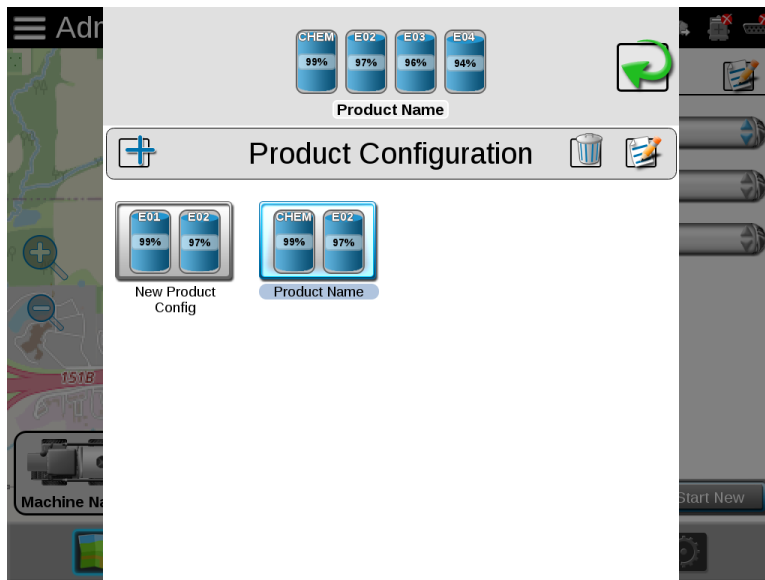
or only machine configurations compatible with the current machine configuration,

**Show Matching** .

## ROS Product Configuration Panel

The product panel allows an operator or system administrator to set up control channel assignments and enter product information for a field operation. A product configuration may be saved for common or recurring field operations to will allow the operator to reselect the product settings from a previous operation to quickly change the Raven OS setup for different configurations used during various field operations.

Select the **Product Configuration**  panel to display any available product configurations.



**Note:** Product configurations will be displayed only for the selected machine configuration.

The product configuration panel provides the following utilities for setting up control channels for common product applications, tank mixes, or seed varieties which the ROS device will be used to control input or application:



### Product Configuration

ROS allows the operator or system administrator to set up a profile for common applications, tank mixes, or for upcoming field operations. The product configuration saves control channel and product or mix information for various application or product types and allows the operator to reselect profiles to quickly resume or restart an application or operation for various fields. New product configurations may be created using existing products entered into ROS or via the agX<sup>®</sup> product database pre-loaded on the ROS device.



Refer to "Product Configuration" on page 209 for more information on setting up various products and product configurations using ROS.




### Product Configuration Selection

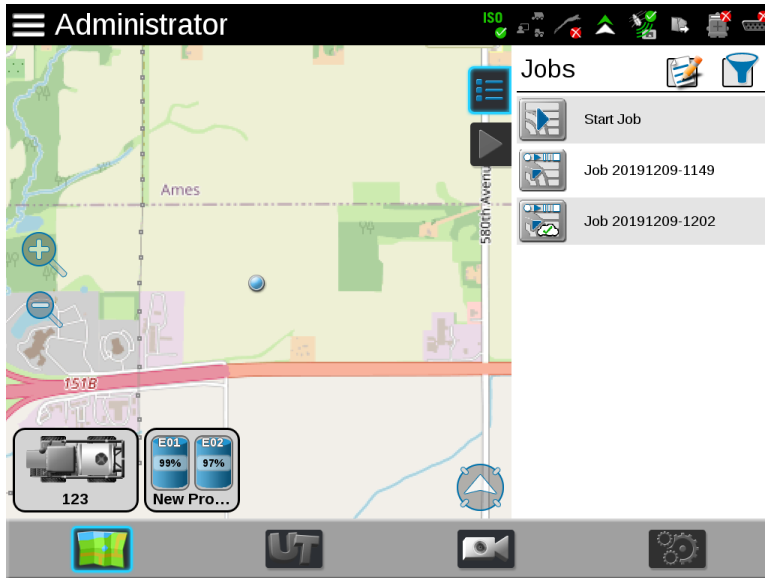
Once a product configuration is setup, the product may be selected to quickly set up ROS for operations and resume operation or repeat the same operation in a different field. Simply select the product configuration, verify and adjust mix ratios as necessary for accurate job reporting, and get to the field tasks at hand.

**Note:** *If the product control nodes are readdressed between field operations, the product configuration must be adjusted to properly control the product assigned to each control channel. Check and verify the product configuration before starting any field operations.*

## ROS Job Profile Panel

The Job Profile panel displays job profiles and previous job files in progress and stored on the ROS device.

Select the **Jobs**  icon toward the right side of the Street Maps view to display the Job Profile panel.



The Job Profile panel contains configured job profiles and any jobs, completed or in progress, and currently stored on the ROS device. Job profiles allow field information such as guidance lines or scouting features to be preconfigured for various fields and assigned to the grower, farm, field (GFF) folder structure.

Jobs previously started on the ROS device are also available in the Job Profile panel until removed. To resume the field operation, select the job file with the previous coverage map to be amended and begin field operation.

**Note:** Perform file maintenance regularly to keep device resources available for active field operations. Transfer completed job files to a home or office PC, or a Slingshot® account, for backup and archiving. Refer to "File Export" on page 92 for more information on transferring job files.

### What is a job profile?

Job profiles allow the operator to select a profile with preset grower, farm, field (GFF) assignments, preferred guidance type, and field scouting information, all with one touch instead of multiple procedures to load each of these options.

Job profiles may be used to provide as much, or as little, of the above information as needed or desired for a grower or custom applicator operation. This function is not required.

The job profile panel provides the operator or system administrator with the following tools to set up, filter, and select profiles for specific field operations or tasks:



### Job Profile Configuration

Configure common or recurring field operations to save job settings such as grower and field data, scouting information, or saved guidance lines for use during upcoming field operations or reuse during future seasons.

Refer to "ROS Job Profile Configuration" on page 221 for assistance setting up various job profiles.



### Job Filter and Sort

Filter and sort features are available in the upper, left corner of the Job Profile panel. Touch the Filter button to select options to filter or sort jobs and job profiles displayed in the Job Profile panel. Use these features to quickly locate files for a job in progress or the appropriate job profile, recommendations, or cloud job features for a new field operation.

Job filtering also allows the operator to view only work assigned to a specific grower, farm, or field, type of job file, or to a specific operator.

**Note:** *Applied filter options will be displayed each time the Job Profile panel is selected. If a job profile or previous application is not displayed, clear the filter options or check that the set filtering options do not exclude the desired selection.*

**Note:** *The Only My Work filter option is only used with AgSync cloud jobs.*

### Job Profile Selection

When the equipment arrives at the field and a job is started, the operator selects the preconfigured job profile from the **Job Profile** drop-down menu and verifies the job settings, enters the target product rate or rates, selects any modifications to the guidance or scout information, and selects start to begin a new field application or start operations.

The job profile panel also displays any previous jobs started using a preconfigured profile. To resume a previous job operation, select the specific job file, verify the job settings, and select start. ROS also provides utilities to help sort and filter the items displayed in the job profile panel to help the operator quickly locate and select the correct profile or previous operation.

**Note:** Setting up a job profile is not a requirement and is designed as a Grower function. The default Start Job profile allows a user to quickly start a job and allows the user to assign GFF, saved guidance lines, and scout groups (if applicable).



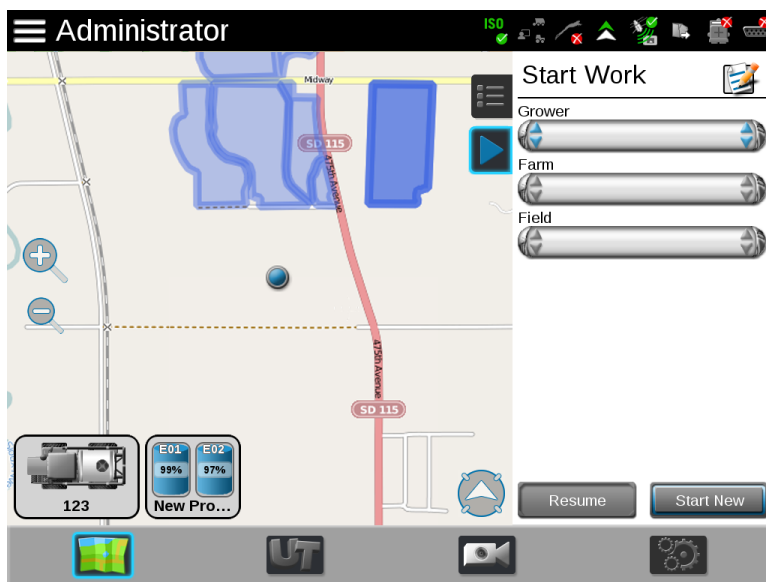
### Camera Panel

The camera panel allows the user to access cameras connected to the display. Toggle between up to four video sources with on designated as a reverse camera.

Refer to "Analog Video Camera Configuration" on page 184 for additional information.



### Street Maps

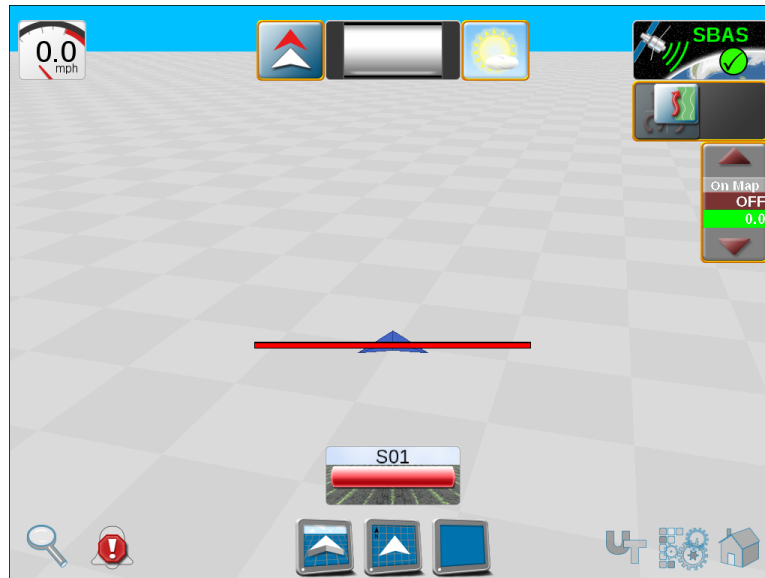


Street maps provides a view of scouting field boundaries in the area. If desired, the user can filter the scouting field boundaries by grower, farm, and field. The user can also select the scout field boundary directly from the map. Street maps need to be created on the Slingshot® web site.

Refer to "Street Maps" on page 294 for additional information on street maps.

## Run Screen Overview

## Guidance Screen Overview



ROS allows each equipment operator to select which widgets will be displayed during operation, move each of the widgets to a desired portion of the screen, and save multiple screen configurations for use during future operations and other operators.

ROS also allows an Administrator to create a custom wallpaper and copy it to multiple Viper® 4+ devices so all machines can have the same guidance screens the administrator deems appropriate for operation. The administrator created screens are locked and cannot be modified by the users.

## Change the Operation Screen View

All icons on this page are available in their respective field computer on the run/guidance screens. These icons allow the user to change or alter aspects of the run/guidance screen.

### Change Field View

Select one of the following icons to switch to the selected view:

 3D Guidance

Select this view to use a three dimensional view of the current machine position in the field area.

 Field Review

The field review mode allows the operator to move the display to any portion of the field area to review coverage or operation data for the current operation.

**Note:** *Select a completed field boundary in the field review mode to display the boundary area.*

 Widget View

The widget view provides the operator with a view for additional widgets, tools, and other feature controls necessary during various field operations and allows the operator to place as many widgets as necessary without covering guidance or field information.

**Note:** *Refer to "Configure Widget Layouts" on page 257 for more information on editing widget layouts.*

## Change Zoom Level

 Zoom

Select the zoom icon in the lower, left corner of the display and use the sliding bar to adjust the zoom level desired for monitoring the field operation on the ROS display.

**Note:** *While using the 3D Guidance mode, the zoom slider will also adjust the view angle for down-field or overhead view of the vehicle location.*

 View Coverage Extents

In the field review mode, select the coverage extents icon along the bottom of the display to automatically set the zoom to display the extents of the coverage area, scout map, or prescription map completed or loaded into the job.

**Note:** *Select a completed field boundary in the field review mode to display the area within the Scout Group.*

## Vehicle Centering and Locking



### Vehicle Lock

In the field review mode, select the vehicle lock icon along the bottom of the display to keep the field review display centered on the current vehicle position during field operations.

## Chapter 4:

# Administrator and User Profile Overview

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User profiles save preferences such as language, units, screen brightness, and on-screen coverage map colors without affecting equipment operation for other users. With a customized user profile, equipment operators can quickly start or resume operations over shift or operator changes with their personalized settings.

Refer to the following articles for more information on:

- "Manage User Profiles" on the next page
- "Demonstration Mode" on page 51
- "General User Settings" on page 42
- "Product Rate Control Configuration" on page 48

## PIN Security and Profile Reporting

If desired, a unique Personal Identification Number (PIN) can be created for each user profile to secure the ROS device from unauthorized operation. With PINs enabled, the operator or administrator must provide the assigned PIN to log in to the device and operate control features, start a job, or record field data.

ROS also stores active profile information with completed job reports for review by an equipment owner or manager. A system administrator is also able to review field area covered by each active profile if multiple profiles were active during a single field operation.

This information is potentially useful to identify operator training needs, improve operator performance, or make adjustments for future field operations.

## Administrator Profile

Using the administrator profile, an equipment owner or manager create new user profiles for each operator on the ROS device.



## Manage User Profiles

Only the administrator profile may be used to create, edit, and manage various user profiles. User profiles are only allowed to edit and modify settings for the active profile.

**Note:** Raven will not be able to recover or reset the administrator PIN if the default (1111) is changed. Be sure to write down the administrator PIN and store it in a safe place if this feature is desired to ensure the ability to create user accounts remains accessible.


## Create User Profiles

To create new User Profiles:


1. Select the **Administrator Panel**  icon in the top left corner of the display.

2. Select the **User Profile**  utility.

**Note:** Verify that "Administrator" is displayed in the upper, left corner of the prompt. New user profiles cannot be created while logged in with a user profile. Log out of ROS and back in using the administrator profile and restart this procedure.





3. Select the **Administrator Options**  tab on the General User Settings prompt.
4. In the Administration Options area at the top of the Administrator Options tab, verify that the enable user logins option is selected.

**Note:** Enable the Require PINs option to prompt the equipment operator for a PIN before accessing ROS control features.

5. In the **Users** area toward the bottom of the Administrator Options tab, select the **Add**  button to create a new user profile.
6. Refer to "General User Settings" on page 42 and "Product Rate Control Configuration" on page 48 for details on completing the profile information for the new user profile.

## Edit or Delete User Profiles

To edit or delete User Profiles:


1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **Administrator Options**  tab on the General User Settings prompt.
3. Select an existing user profile from the user area at the bottom of the **Administrator** tab.
4. Select the **Edit**  button to edit the profile or the **Delete**  button to delete the selected profile.
5. Refer to "General User Settings" on the next page and "Product Rate Control Configuration" on page 48 for details on completing the profile information for the new user profile.

## General User Settings

**Note:** An administrator profile is available by default with ROS. It is recommended that the administrator profile be used only by an equipment owner or manager.

### User Information Tab

The user information tab provides fields for entering the operator contact information. To enter or edit user information:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **User Profile**  utility.
3. Select the **User Information**  tab on the General User Settings prompt. The following fields will be available:

#### User Name

Enter the first and last name of the system administrator or equipment operator in these fields.

**Note:** The user name in the administrator profile cannot be modified.

#### First and Last Name

Enter the first and last name of the system administrator or equipment operator in these fields.

#### Contact Information




Enter the home and mobile phone numbers, fax number, and e-mail address as desired for contacting the equipment operator in the associated fields.

#### Operator License Information

Enter the operator license and expiration date in these fields.

### Location Information Tab

The location information tab provides fields for company contact information and desired display language. To access location information:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **User Profile**  utility.
3. Select the **Location Information**  tab on the General User Settings prompt. The following fields will be available:

### **Company Name**

Enter the name of the company with which the operator or administrator is employed.

**Note:** *The user name in the administrator profile cannot be modified.*

### **Company Address and Location**

Enter the company or branch address, city and state, and country of operation.

### **Time Zone**



Select the Coordinated Universal Time (UTC) for the time zone in which the ROS device will be operating.


### **Language**

Select one of the available languages desired for operation of the ROS device. Each equipment operator may select a different language for operation and ROS will automatically switch to the desired language on log in.

## **Unit Preferences Tab**

The Unit Preferences tab provides access to personalized language and display unit preferences. To configure unit preferences:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **User Profile**  utility.

3. Select the **Unit Preferences**  tab on the General User Settings prompt. The following fields will be available:

### Base Units

Select the desired unit system:

Unit System	Units
Metric	centimeters (cm), liters (L), hectares (ha), kilometers per hour (km/h)
U.S. (English)	inches (in), gallons (gal), acres (ac), miles per hour (mph)
Turf	inches (in), gallons per 1000 square feet (gal/1000 ft <sup>2</sup> ), miles per hour (mph)

### Pressure Units

Select the desired pressure units:

Abbreviation	Units
PSI	Pounds per square inch
kPa	Kilopascal
bar	Bar or atmospheric
inHg	Inches of mercury
mmHg	Millimeters of mercury
atm	Atmospheres
hPa	Hectopascal

### Date Format

Select the preferred date format.

### Time Format

Select the preferred time format.




### Automatic Daylight Savings

Enable automatic daylight savings time adjustments if the local time zone jurisdiction observes daylight savings time.

## System Preferences Tab

The System Preferences tab provides access to settings to customize the ROS device display and operation.

To adjust system preferences:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **User Profile**  utility.
3. Select the **System Preferences**  tab on the General User Settings prompt. The following fields will be available:

### Mode

Set the display mode for day or night operations.

### Screen Brightness

Adjust the LED brightness for personal preference and ambient lighting conditions. This setting will also adjust the brightness of a compatible light bar connected to the ROS device.

### LED Brightness

Adjust the LED brightness for personal preference and ambient lighting conditions. This setting will also adjust the brightness of a compatible light bar connected to the ROS device.

### Automatic Power Down




Enable the automatic power down option to automatically shut down the ROS device when the vehicle ignition is switched off. This feature may be enabled to help ensure job information is saved and the device is properly powered down.

**Note:** *The default setting for the power down feature is enabled. To monitor the vehicle ignition status, the field computer will require the appropriate wiring harness and a connection to the vehicle ignition. Without the appropriate harness, the power down feature will have no affect on operation of the ROS device.*

## Alarm Settings Tab

To edit Alarm Settings:

**Note:** Audible and pop-up alarms will be triggered based upon the product control user settings. Refer to "Product Rate Control Configuration" on page 48 for details on these user settings.

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **User Profile**  utility.
3. Select the **Alarm Settings**  tab in the General User Settings prompt. The following fields will be available:

### **Audible Alarms**

Enable this option to receive audible alerts for alarm conditions detected by the ROS device.

### **Popup Alarms**

Enable this option to receive a prompt for alarm conditions detected by the ROS device.

### **Audible Backup Warning Enabled**

Select this check box to enable an Audible Backup Warning alarm.

### **Alarm Volume**

Adjust the alarm volume on the Audio Volume slider.

## Administrator Options Tab

When logged in as a system administrator, the Administrator Options tab provides access to the utilities to manage and edit user profiles. To access the system Administrator Options:

**Note:** The Administrator Options tab will only be available when logged in with the administrator profile.

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **User Profile**  utility.

3. Select the **Administrator Options**  tab on the General User Settings prompt.

The following fields will be available:

### Enable User Logins

Select this option to enable the user login feature on the ROS device. When enabled, the system administrator may create and manage multiple users or equipment operator profiles.

Refer to "Create User Profiles" on page 40 for details on creating new user profiles or "Edit or Delete User Profiles" on page 40 for assistance with managing user profiles.

### Require PINs

Enable this option to require a personal identification number, or PIN, to access ROS and the control system features. This feature is recommended to help secure the control system from unauthorized access or operation.

### Set PIN

The administrator PIN field is displayed below the "Require PINs" option. Enter the desired administrator PIN or personal identification number used to log into the administrator profile.

**Note:** Raven will not be able to recover or reset the administrator PIN if the default (1111) is changed. Be sure to write down the administrator PIN and store it in a safe place to ensure the ability to create user accounts remains accessible.

## User Profile Security Options Tab

The Security Options tab allows the profile user to enter a new personal identification number, or PIN, for secure login. To access the Security Options tab:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **User Profile**  utility.
3. Select the **Administrator Options**  tab on the General User Settings prompt.



4. Select the **Security Options**  tab on the General User Settings prompt. The following fields will be available:

### **Set PIN**

Enter the desired personal identification number used to log into the profile.



## **Product Rate Control Configuration**

Raven field computers allow the user to customize product rate control and other product options.

### **Adjust Product Control User Settings**

During field operations, ROS creates and displays a live coverage reference map for the equipment operator. During rate control operations (e.g. seeding, product application, etc.), the ROS device will display field areas in which the actual monitored rate of product application is at, or within tolerance, of the target rate or where the actual rate is too high or too low.

To access the available product control User Settings:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **User Profile**  utility.
3. Swipe or use the page navigation at the bottom of the General User Settings prompt to access the product control user settings. The following fields will be available on the product control user settings display:

### **Rate Thresholds**

ROS allows each user to set the high and low limits tolerated for application before the system provides an alert or alarm condition during field operations.

#### **Max Rate Threshold**

Enter the top limit for product application before the ROS device provides alerts for a high rate condition.

## Min Rate Threshold

Enter the bottom limit tolerated for product application before the ROS device provides alerts for a low rate condition.

## Rate Colors

Select the High, OK, and Low rate colors to select custom rate colors for the user.

## Zero Rate Tolerance

Dry or granular application systems rely upon one or more encoders to monitor the application system and measure the rate of product being applied. In some instances, such as when driving through zero rate zones or with the application system toggled off, the encoders may register a false rate pulse due to excessive bouncing or jarring of the equipment. These false signals will be recorded by the ROS device as an area of product coverage and will be displayed in the job report and may display as over application in zero rate zones.

The zero rate tolerance value is intended to help filter these pulses and eliminate encoder "chatter" when the application system is not engaged or actively spreading product.

Enter the minimum application rate, in pounds per acre [kilograms per hectare], required for the control system to register as field coverage during application control operations. Any rate signals received below this threshold will be ignored and will not count toward the product volume or coverage area applied.

**Note:** *On some machines, the main bin will supply a relatively high volume of product and the tolerance may be set relatively high. Other bins that supply micro-nutrients may apply material at a much lower rate and will require a lower zero rate tolerance value.*




## Brightness Settings

Raven field computers can adjust the brightness of the display screen to the operator's preference. All Raven field computers also feature a Day/Night setting to allow the field computer to automatically adjust the brightness of the screen depending on the time of day.

## Adjust Brightness Settings

The System Preferences tab provides access to settings to customize the ROS device display and operation.



To adjust system preferences:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **User Profile**  utility.
3. Select the **System Preferences**  tab on the General User Settings prompt.
4. If desired, select one of the options in the **Display Mode** drop-down:
  - **Day** - This option sets the brightness level during daytime operation. The default setting is 100%.
  - **Night** - This option sets the brightness level during nighttime operation. The default setting is 1%.
  - **Auto** - This option will automatically switch the display mode according to the time of day.
5. Drag the respective slider bars to manually adjust the **Screen Brightness** or **LED Brightness**.

**Note:** *This setting will also adjust the brightness of a compatible light bar connected to the ROS device. Refer to "Configure Light Bar Display Settings" on page 178 for more information on light bars.*

## Demonstration Mode

Set the ROS unit to demonstration mode to allow the unit to be used for display purposes. To switch to the demonstration mode:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Select the **Demo Mode**  button in the lower, left corner of the display.
3. Select the option to **Restart with the Demo Mode Enabled**. The ROS device will restart with the demonstration mode features enabled.
4. Perform the above procedure again to toggle the demonstration mode off.

**Note:** There is a Viper® 4+ Setup Demo for Raven CAN components at <https://portal.ravenprecision.com>.





## Chapter 5:

# ROS System Manager Overview

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The system manager utilities allow the operator to review the software and firmware versions currently installed on various system devices, temporarily activate system features, and check status of a Slingshot® connected device or request remote support.

To view information on software currently installed or available for use with this device:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **System Manager**  utility.

3. The following tabs will be available:

**Note:** To transfer or copy files or settings using ROS, refer to "ROS File Manager Overview" on page 71 for more information on the file maintenance operations.

#### Software Update

The software update tab displays ROS software version information and allows the operator to update software or revert a previous version as needed. Refer to "Install a ROS Update" on page 61 for additional information about using the software update tab.

#### Hardware Update

Firmware version information is displayed on the hardware update tab. This information may be useful for troubleshooting CAN systems or components. This tab also allows the operator to update the CAN system components as necessary to take advantage of new features available from Raven Industries Division. Refer to "Install CANbus or ISObus Firmware Updates in ROS" on page 65 for details on performing firmware updates via the ROS device.

#### Feature Keys

The Features Keys tab displays permanent feature activations available. This tab also displays the time remaining for temporary authorization of ROS features. Temporary time codes entered on this prompt will only be available for a specific time period and will expire at a set time interval. Contact a local CNH dealer for assistance with permanent authorization of available ROS features. Refer to "Feature Unlocks Overview" on page 67 for details on unlocking features.

#### Slingshot®

Select the Slingshot® tab to view Field Hub wireless communication information or to enable a remote support session. For additional information on Slingshot® services, refer to the ROS Slingshot® connected device Calibration and Operation Manual or contact a local Slingshot® dealer.

#### Hardware Information

The hardware information tab contains information about the field computer's internal hardware states, usage statistics, diagnostics tools for CANBus, and network

connectivity information. Refer to "Hardware Information" on the next page for more details on specific device hardware.

License 

Contains the Raven Operating Software end user license agreement.



## Hardware Information

To access information about the ROS device hardware:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **System Manager**  utility.
3. Select the **Hardware Information**  tab.

4. Select the **General** or **Lifetime** views to display the following hardware information details for the ROS device:

## General

Provides information on the hardware such as:

### **Platform**

The ROS device type or name.

### **OEM ID**

Displays the OEM ID number.

### **Hardware Revision**

The ROS device hardware version.

### **Micro-controller Version**

The firmware version installed on-board the ROS device.

### **FPGA Version**

Firmware version of the FPGA controller.

## Lifetime

The lifetime statics provides runtime information for the ROS device. The following information will be available when the lifetime option is selected:

### **Hardware Lifetime**

Provides a tally of operational hours on the ROS device, the number on power cycles, and the number of shutdowns.

### **Hardware Status**

Includes information on the switch power, camera power, camera fault, and FPGA fault.

## Usage

Provides CANbus information such as warning counts, bus off counts, and on error status.

## Networking

Provides information on the IP address, gateway, and the interface name.

## Updates Overview

Raven regularly supplies software updates to field computer software. It is recommended to keep the device updated to the most recent software version to utilize all features and functions.

Refer to the following for more information on:

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<a href="#">Download a Field Computer Software Update</a> .....	58
<a href="#">Download an Update via Slingshot®</a> .....	60
<a href="#">Install Software Update with USB</a> .....	61
<a href="#">Update Hardware</a> .....	64

## Download a Field Computer Software Update

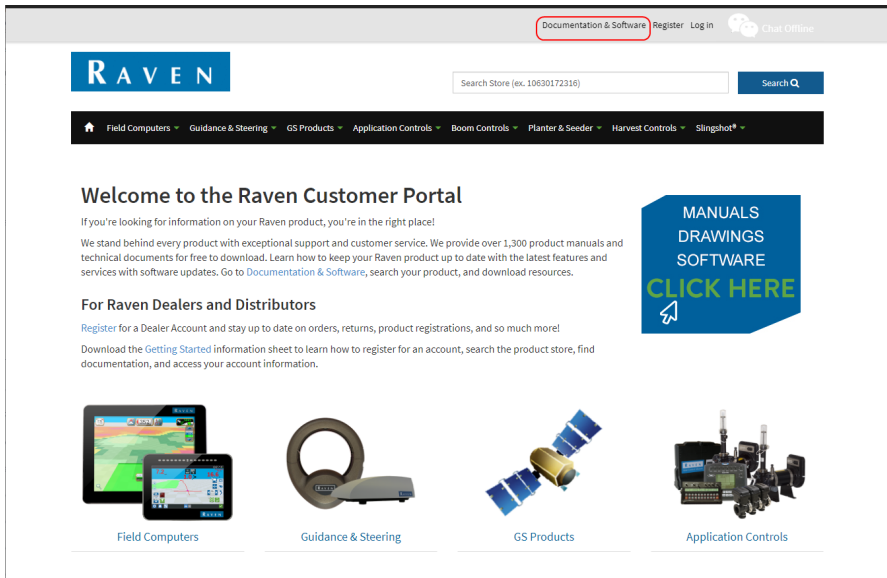
**Note:** *The following procedure is for example purposes only. Any images provided in this section may not accurately depict the web browser or prompts encountered on various home or office computer systems. Please refer to computer or web browser user help for additional assistance.*

Software updates for Raven field computers will be made available periodically from the Raven portal website: <https://portal.ravenprecision.com>

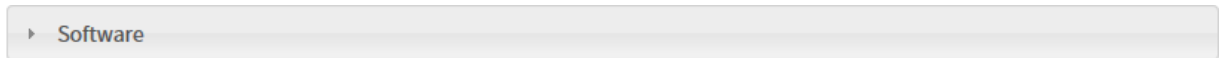
**Note:** *CAN node firmware is included with the ROS software download and will automatically download to the ROS device. However, node updates will not be installed until the user installs the update. The node updates in the ROS update will be the latest version of ROS release and may not be the latest version available.*

To download field computer updates:

1. On a home or office computer, visit <https://portal.ravenprecision.com>.
2. Select **Documentation & Software**.



3. Select **Field Computers** along the left side of the page.
4. Select desired device (**Viper® 4 & Viper® 4+** or **CR7™ & CR12™**).
5. Select the **Software** drop-down specific to your machine.



6. Select the desired software update.
7. Select **Save As** from the drop-down menu.
8. Select **Save** to save the software to the computer. Select a commonly used download directory or a destination which will be easy to locate after the download completes.

**Note:** *It may be necessary to accept security or warning prompts displayed by the browser or computer system to successfully save the software update to the computer.*

9. Insert a USB flash drive used with the Raven field computer into an available USB port on the computer.

**Note:** *Ensure the USB flash drive has a folder titled "Raven" with another folder inside the Raven folder titled "Updates" so the file path is as follows: USB-Drive-Name > Raven > Updates*

10. Copy the software update zip file (\*.zip) from the download location to Updates folder in the USB flash drive.
11. See and follow the installation instructions included with the download.

**Note:** Raven field computers allow the user to download updates directly to the device via Slingshot®. Refer to "Download an Update via Slingshot®" below for more information.

## Download an Update via Slingshot®





If a Raven field computer is connected to the internet via a Slingshot® connection, the field computer can download a software update directly to the field computer.

### Download a ROS Update via Slingshot®

Updates to the ROS version may be made available periodically for download via the Slingshot® wireless service. This feature allows a system administrator or operator to download and install ROS updates from the vehicle cabin without requiring a USB flash drive or a home or office computer to update the ROS version.




**Note:** The ROS device will automatically check for updates upon start up if the Slingshot® connected device is connected and communicating with a wireless service provider.

To manually check for a ROS update:


1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **System Manager**  utility.
3. Select the **Software Update**  tab.
4. Select the **Update**  button along the right side of the prompt to check the Slingshot server for available ROS updates.

To review and install ROS updates:

**Note:** Review the software release notes before downloading or installing any software updates.

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **System Manager**  utility.
3. Select the **Software Update**  tab.
4. If a ROS update is available, review the release notes at the bottom of the prompt and then select the **Download** button to begin the software download.

**Note:** Allow several minutes for the software download to complete. Contact a local CNH dealer for additional information regarding the ROS update.

The software update may be removed from the ROS device without applying the update by selecting the **Delete**  button. Contact a local CNH dealer for additional assistance if necessary.

5. Once the software download is completed, select the **Install** button to begin the software update process. The ROS device will automatically restart to complete the installation.



## Install Software Update with USB


Software updates can be downloaded on a computer and installed to the Raven field computer with a USB drive. If a software update has not been downloaded, refer to "Download a Field Computer Software Update" on page 58.

**Note:** Software updates can be downloaded directly to the field computer via Slingshot®. See "Download an Update via Slingshot®" on the previous page for more information.

## Install a ROS Update

To apply a software update to the ROS device:



1. Insert the USB flash drive with the ROS update in the required folder into the ROS device.
2. When an update is detected, press **Install**. The update will install. The **Update Available**  status will be displayed in the upper, right corner of the main panel display and the update file will be copied to the ROS device.
3. Select the **System Manager**  utility.

4. Select the **Software Update**  tab.
5. Select the **Install Update** button to update the ROS version. The device will install the available update version and automatically restart.

**Note:** After the ROS device restarts, it is necessary to redetect GPS. To redetect GPS, perform the steps at "Redetect a Serial Device" on page 178.

## View ROS Software Information

To view information regarding the ROS version currently installed or for a ROS updated available for the ROS device:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **System Manager**  utility.

3. Select the **Software Update**  tab.

The following ROS version information will be available:

**Current Version** 

ROS version used by the device during field or control system operations. This version information may be important if service or support is required.

**Install Latest Update**

If a newer ROS version is available, the updated version number will display. Select the install latest update button to install the version displayed onto the device. When the system is restarted, this will be the current version used for operation. If desired, select Delete and the update will not install.

**Note:** Updates can be performed if connected to a Slingshot® field hub. Refer to the Slingshot® Operation manual for additional information using slingshot to perform updates.

**Undo Last Update** 

In the event that an update to ROS provides undesirable operation, the device will store the last software version installed and allow the operator to revert to the version displayed in this field.

**Factory Reset**



The factory reset feature may be used to revert the device to a factory condition.

**Note:** Only perform this procedure if instructed by a dealer or service technician. All settings and user files will be erased during the factory reset process. Perform file maintenance and copy all critical data to a USB flash drive prior to performing a factory reset.

## Revert to Previous ROS Versions

To revert to a software version previously installed on the ROS device:



1. Select the **System Manager**  utility.
2. Select the **Revert to Previous Version**  button to reinstall the displayed ROS version. The device will reinstall the previous version and automatically restart.

## Update Hardware

Raven field computers can apply updates to other devices and hardware that are connected to the field computer.

### View Hardware Version Information in ROS

To view firmware information for the system components currently connected to the ROS device:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **System Manager**  utility.
3. Select the **Hardware Update**  tab.

The following firmware version information will be available for each node currently detected on the CANbus:

#### **Node**

The node name or identification information will be displayed in this column.

#### **Program Number**

The program number is used to identify the node on ROS.

**Note:** *The program number displayed on the hardware update tab does not reflect the program identified on the physical serial number tag affixed to the node from the factory.*

#### **Current Version**

The firmware currently installed on the node will be displayed in this column.

#### **Newest Version**

If node firmware updates have been transferred to the ROS device, the update version will be displayed in this area.

## Install CANbus or ISObus Firmware Updates in ROS

**Note:** The node firmware can be transferred from the USB flash drive onto the ROS device before the firmware updates can be applied to nodes connected to the system using the System Manager utility. Refer to "Import CAN Node Updates" on page 79 for assistance copying CAN Node Update files.

To apply a firmware update to a CANbus system component:


1. Insert the USB flash drive with the firmware update files into the ROS device.  
**Note:** Refer to "Download a Field Computer Software Update" on page 58 for more information on the folder structure required for performing the update.
2. Use the USB Manager utility within the File Manager to import the CAN node updates. Refer to "ROS File Manager Overview" on page 71 for additional assistance using the USB Manager.

3. Select the **System Manager**  utility.

4. Select the **Hardware Update**  tab.

5. Select a specific node to be updated.

**Note:** Note the program number (PGM #) for the node selected. In case of problems with the node update, this number will be required to select the appropriate program number for recovering the node. Refer to "Node Recover Mode in ROS" on the next page or contact a local CNH dealer for additional assistance.

6. Select the appropriate update from the **Versions Available** list for the selected node.
7. Select the **Apply Update**  button to update the firmware on the selected node. The ROS device will install the selected firmware update. Repeat the process to update any other nodes as necessary or required.

**Note:** If a problem is encountered during the firmware update process, refer to the Raven CANbus Installation Manual for information on troubleshooting the node and use the recovery mode to attempt to restore the CANbus node. Refer to "Node Recover Mode in ROS" on the next page for additional information on using the recovery mode with a Raven CANbus system.

## Node Recover Mode in ROS

**Note:** The node program number is required to properly recover the node. If the program number is unknown, contact a local CNH dealer or the Raven Technical Support Center for additional assistance with appropriate program numbers for recovering a CANbus node.

To attempt to recover a CANbus node on which a failed update has occurred:

1. Insert the USB flash drive with the firmware update files in the required folder into the ROS device.

**Note:** Review "Download a Field Computer Software Update" on page 58 for more information on the folder structure required for performing the update.

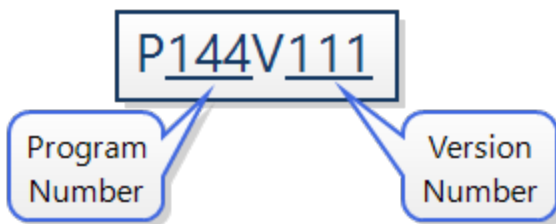
2. Use the USB Manager utility within the File Manager to import the CAN node updates. Refer to "ROS File Manager Overview" on page 71 for additional assistance using the USB Manager.


3. Select the **System Manager**  utility.

4. Select the **Hardware Update**  tab.

5. Disconnect the **rectangular connectors** OR the **Logic fuse** on the node for approximately five seconds to cycle power to the node. If the node has any LEDs, ensure they are off or stop flashing before reconnecting the node.

6. On the ROS device, select the version field and use the scrolling list to select the appropriate node program to reset the node. The node program and version numbers will be displayed in the following format:



7. Select the **Apply Update**  button to attempt to recover the node. If the node recovery fails, or for additional support, contact a local CNH dealer.

## Feature Unlocks Overview

Some features offered on Raven field computers are locked and must be activated, temporarily or permanently, to be used in the field computer.

Refer to the following articles for more information on:

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<a href="#">Temporary Feature Unlocks</a> .....	67
<a href="#">Permanent Feature Unlocks</a> .....	68

### Temporary Feature Unlocks

Some optional features of Raven field computers are locked when shipped. Any temporary unlock will remain active for the trial period after the unlock is activated. The temporary unlock timer will continue until the unlock expires. Once the temporary unlock expires, the feature will be available using the activation package. Contact a local CNH dealer for additional assistance with temporary unlocks or feature activation.



#### Temporarily Unlock a ROS Feature

ROS features the ability to temporarily unlock additional ROS features for a predetermined time. To temporarily authorize features for use with ROS:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **System Manager**  utility.
3. Select the **Unlocked Features**  tab.
4. Select **Activate** located next to Temporary Unlock. The **Begin Temporary Unlock** window will open.
5. Review the list of features and select **Yes** to begin the temporary unlock.

**Note:** *There are two, 20-hour unlocks available by default. The 20-hour timer will only decrease when in a job. When not in a job, the timer will not decrease.*

When no additional temporary unlocks are available, a temporary authorization code may be obtained to unlock ROS features for a predetermined time. To manually temporarily authorize features for use with ROS:

1. Select the **System Manager**  utility.
2. Select the **Unlocked Features**  tab.
3. Note the **Identification Number** and **Job Code Time** values displayed on the prompt.
4. Contact the Raven technical support center with the values observed from the previous step.
5. Select **Enter Code** and enter the temporary service code to add time to the temporary features time remaining.




**Note:** *Temporary key operation time remaining begins at the time the temporary code is requested. Even if the temporary code is not entered on the field computer, time will be deducted from the time remaining if the device is used to manage field operations.*

## Permanent Feature Unlocks

Some optional features of Raven field computers are locked when shipped. Permanent unlocks must be purchased through a CNH dealer. After purchasing the unlocks, the files are loaded to the field computer with a USB drive.

### Permanently Unlock a ROS Feature

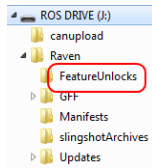
To permanently activate optional features for ROS:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **System Manager**  utility.
3. Select the **Unlocked Features**  tab.
4. Note the identification number displayed on the prompt.


**Note:** *The identification number may also be found on the bar code on the back of the ROS device.*

5. Contact a local CNH dealer to purchase a Registration Code for the feature.
6. Visit the [Raven website](#) and fill out the activation key request form.
7. Download the software feature package from the link provided after the activation key request form is submitted.

- Copy the feature package to the USB flash drive used with the ROS device. The feature package can be copied to the following directory on the flash drive: "USB Drive Name" > Raven > FeatureUnlocks



**Note:** In current updates, the feature package can be placed anywhere in the USB flash drive. Check the ROS device version to verify.

- Connect the USB flash drive to the ROS device. The feature package will automatically install.
- Restart the ROS device when prompted to make the new feature available for use.
- Pull out the USB when reboot starts.
- After the device restarts, access the **Unlocked Features**  tab and verify the activated features are displayed in the Unlocked Features area.



## Chapter 6:

# ROS File Manager Overview

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The following sections provide information on using the File Manager utilities to edit grower, farm, field information, export files, ISO files, and manage a connected USB flash drive and other file management options.

To view job and file information currently stored on the ROS device:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.



3. The following tabs will be available:

File Manager Tab 

The file manager tab allows the operator to rename files and manage grower, farm, field (GFF) folders and assignments right on the ROS device. Manual file transfer is also located under this tab. Refer to "Using the File Manager" on page 74 for more information on file structure.

USB Import Manager Tab 

The USB import manager tab allows the operator to find and transfer files from a connected USB flash drive to the ROS device. Refer to "USB Import Manager" on page 77 and "File Export" on page 92 for assistance using the USB manager.

File Transfer History Tab 

If a Slingshot® Field Hub is connected with the ROS device for wireless communication, the File Transfer History tab may be used to track and review transfer history via the Field Hub.

**Note:** Refer to the Slingshot® Field Hub Calibration and Operation Manual for additional information on using the Slingshot® Field Hub with the ROS device.

File Management Options 

The File Management Options tab is currently only used if a Slingshot® Field Hub is connected to the ROS device. If a Field Hub is not installed, it is **not** recommended to leave the **Send Jobs to Slingshot®** options enabled.

**Note:** Refer to the Slingshot® Field Hub Calibration and Operation Manual for additional information on using the Slingshot® Field Hub with the ROS device.

Refer to the following articles for more information on the ROS File Manager:

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<a href="#">Using the File Manager</a> .....	74
<a href="#">Using Filters and Renaming Files</a> .....	74
<a href="#">Selecting Files</a> .....	75
<a href="#">Delete Files</a> .....	75
<a href="#">USB Import Manager</a> .....	77
<a href="#">Create Grower, Farm, Field (GFF) Information</a> .....	89

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[Manage Grower, Farm, Field \(GFF\) Information](#) .....90

[Delete Grower, Farm, Field \(GFF\) Information](#) ..... 91

[File Export](#) .....92




## Using the File Manager

If desired, edit, rename, and remove files right on the ROS device in the vehicle cabin. Refer to the following sections for more assistance with using File Manager features.

**Note:** CAN node update files, or the “canupload” files will be displayed in the file manager. To ensure that the CAN firmware version information is available on the ROS device, it is recommended not to edit the file names for the node firmware update files. If desired, remove all firmware update files from the ROS device after performing any necessary node updates. Review “Install CANbus or ISObus Firmware Updates in ROS” on page 65 for more information on downloading and applying CAN node firmware updates.


## Using Filters and Renaming Files

To use the file filters or rename files:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Manager**  tab. The *File Manager* will open and display a list of files currently stored on a ROS device.

**Note:** Enable the Show System Files option to view and manage ROS system files while performing file maintenance operations.







User Files	System Files
Job	CAN node updates
ISO XML	Screen Shots
Prescription (Rx) Maps	Core Dumps
Scout Groups	Log Files
Saved Guidance Lines	Street Maps
AgX Rec	Wallpapers

4. Select the **Filter**  icon at the top of the “All Files” list to set filters for file type or grower, farm, or field assignments.

5. To rename a file, select the file name in the Files list and use the on-screen keyboard to rename the file.




## Selecting Files


If desired, select a file to modify grower, farm, or field (GFF) assignments. To select files:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Manager**  tab. The *File Manager* will open and display a list of files currently stored on a ROS device.
4. Use the File Manager to filter the "Files" list as desired. Review [Using Filters and Renaming Files](#) for assistance using the filters.
5. Select the **Select**  icon displayed to the right of the file name to move individual files to the Selected Files list. To move all files currently displayed in the Files list, select the **Select All**  button at the top of the "Files" list.  
***Note:** If files are filtered, the Select All button will only select files available with the existing filter settings.*
6. Select the **Clear**  button to the right of a file name to remove the file from the Selected Files list or select the **clear all** button at the top of the list to remove all files at once.

## Delete Files

To delete files from the ROS device:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Manager**  tab. The *File Manager* will open and display a list of files currently stored on a ROS device.
4. Review "Selecting Files" above to move files to the "Selected Files" list.

5. Select the **Delete**  button at the top of the "Selected Files" list and accept the displayed prompt to delete the selected files from the ROS device.

---

## USB Import Manager

The USB Import Manager utilities allow the machine operator to select and import the following file types from a USB flash drive connected to the ROS device:



Grower, Farm, Field Folder Structure


- CAN Node Updates
- Jobs
- Slingshot® Archives
- Prescription (Rx) Maps
- Scout Groups:
  - Field Boundary
  - Flags
  - Line
  - Zone
- Guidance Lines
- ISO Task Data
- Street Maps
- agX Rec Package
- Widget Profiles

**Note:** *The USB manager only displays file types recolonized and used with the ROS device. Other file formats or types may not be transferred to the ROS device using the USB Manager.*

### Import Grower, Farm, Field (GFF) Folder Structure

To import grower, farm, field (GFF) folder information from a USB flash drive:

1. Insert a USB flash drive used with the ROS device and containing the folder structure and files to be imported.
2. Select the **Administrator Panel**  icon in the top left corner of the display.
3. Select the **File Manager**  utility.

4. Select the **USB Manager**  tab.
5. Select the USB drop-down and select the connected USB flash drive from which to import files.
6. Select the File Type drop-down and select the **GFF Folder Structure** option.



**Note:** Only one file type may be imported at a time. Perform the import procedure multiple times in order to import multiple file types.

7. Select the next button on the USB manager tab. The USB flash drive and folder structure will display.
8. Use the displayed browser to locate the **Grower** folder within the GFF folder structure to be imported.



**Note:** When importing the GFF folder structure, only select to the "Grower" folder level of the GFF folder structure. The ROS device will automatically transfer the folder information contained within the grower folder to complete the GFF structure. If farm or field folders are selected, the GFF folder structure will be incorrect when imported to the ROS device.

9. With the grower file selected, select one of the following import actions:

- **Copy**  - Create a duplicate of the selected information on the destination to be selected.
- **Move**  - Export the selected information to the destination to be selected and remove the information from the ROS device.

The Import Files will display.




10. Verify imported files list is correct. If the list requires further configuration, select the **Cancel** button to return to the USB Manager tab.
11. Select the **Import** button to begin the file transfer process.

### Import CAN Node Updates

Review "Install CANbus or ISObus Firmware Updates in ROS" on page 65 for additional information on downloading and applying updates to Raven CANbus hardware.

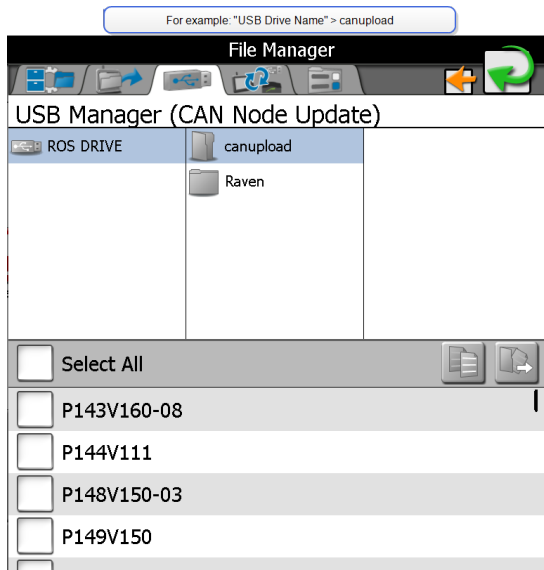
**Note:** Any node firmware updates copied or moved to the ROS device will be saved on the device until deleting using the file maintenance feature. Refer to "Delete Files" on page 75 for assistance with deleting node update files from the ROS device.

To import CAN node firmware updates from a USB flash drive:




1. Insert a USB flash drive used with the ROS device and containing the CAN node updates.
2. Select the **Administrator Panel**  icon in the top left corner of the display.
3. Select the **File Manager**  utility.
4. Select the **USB Manager**  tab.
5. Select the **USB drop-down** and select the connected USB flash drive from which to import files.
6. Select the File Type drop-down and select the **Node Update** option.
7. Select the **Next** button on the USB manager tab. The USB flash drive and folder structure will display.



8. Use the displayed browser to locate and select the **canupload** or **ISOUpload** folder downloaded from the Raven web site. Node update files currently stored on the USB flash drive will be displayed in the lower portion of the USB manager tab.



**Note:** Review "Install CANbus or ISObus Firmware Updates in ROS" on page 65 for additional information on downloading and applying updates to Raven CANbus hardware.

9. Select the **Select All**  button at the top of the file list to import all node updates from the USB flash drive. Node updates may be removed or deleted after the CANbus hardware update process has been completed. Alternatively, select the box displayed to the left of the node update file name to import only a specific node update if the file name is known.
10. With at least one CAN node update file selected, select one of the following import actions:
- **Copy**  - Create a duplicate of the selected information on the destination to be selected.
  - **Move**  - Export the selected information to the destination to be selected and remove the information from the ROS device.




The Import Files prompt will display.

11. Verify the list of files to be imported is correct. If the list requires further configuration, select the **Cancel** button to return to the USB Manager tab.
12. Select the **Import** button to begin the file transfer process.

### Import Jobs

Follow the procedure below to import job files saved or exported as a job data package (.jdp). To import a .jdp file from a USB flash drive:

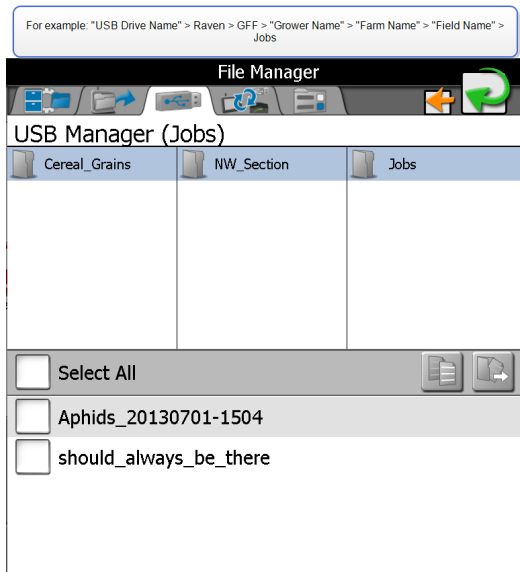
**Note:** Jobs may also be imported via a Slingshot® Archive (.ssa) file type. Refer to ["Import a Slingshot® Archive" on the next page](#) for assistance importing this file type.




1. Insert the USB flash drive with the job profile.
2. Select the **Administrator Panel**  icon in the top left corner of the display.
3. Select the **File Manager**  utility.
4. Select the **USB Manager**  tab.
5. Select the **USB drop-down** and select the connected USB flash drive from which to import files.
6. Select the **File Type** drop-down and select the **Jobs** option.

**Note:** Only one file type may be imported at a time. Perform the import procedure multiple times in order to import multiple file types.

7. Select the **Next** button. The USB flash drive and folder structure will display.

8. Use the browser to locate and select the **Jobs** folder which contains the desired .jdp files. Job files currently stored on the USB flash drive will be found within the GFF folder structure and are displayed in the lower portion of the USB manager tab.






9. Select the box displayed to the left of the listed file names to select specific files to import. Alternatively, select the **Select All**  option at the top of the file list to select all files currently displayed.
10. With at least one job file selected, select one of the following import actions:
- **Copy**  - Create a duplicate of the selected information on the destination to be selected.
  - **Move**  - Export the selected information to the destination to be selected and remove the information from the ROS device.

The Import Files prompt will display.

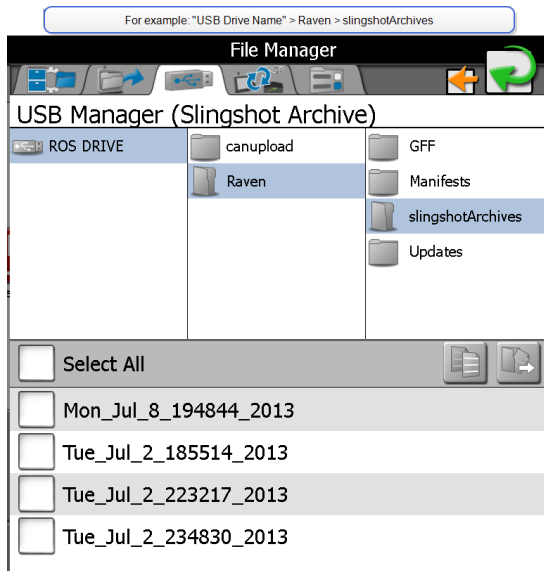
11. Verify the list of files is correct. If the list requires further configuration, select the **Cancel** button to return to the USB Manager tab.
12. Select the **Import** button to begin the file transfer process.

### Import a Slingshot® Archive

To import a Slingshot® Archive (.ssa) file from a USB flash drive:



1. Insert the USB flash drive containing the Slingshot® Archive file.
2. Select the **Administrator Panel**  icon in the top left corner of the display.
3. Select the **File Manager**  utility.
4. Select the **USB Manager**  tab.
5. Select the **USB drop-down** and select the connected USB flash drive from which to import files.
6. Select the File Type drop-down and select the **Slingshot® Archive** option.
 

***Note:** Only one file type may be imported at a time. Perform the input procedure multiple times in order to import multiple file types.*
7. Select the **Next** button. The USB flash drive and folder structure will display.
8. Use the browser to locate and select the **slingshotArchives** Slingshot® Archive files currently stored on the USB flash drive will be displayed in the lower portion of the USB manager tab.



9. Select the box displayed to the left of the listed file names to select specific files to import. Alternatively, select the Select All option at the top of the file list to select all files currently displayed.

10. With at least one file selected, select one of the following import actions:

- **Copy**  - Create a duplicate of the selected information on the destination to be selected.
- **Move**  - Export the selected information to the destination to be selected and remove the information from the ROS device.

The Import Files prompt will display.




11. Verify the list of files to be imported is correct. If the list requires further configuration, select the **Cancel** button to return to the USB Manager tab.
12. Select the **Import** button to begin the file transfer process.

### Import Prescription (Rx) Maps

**Note:** Prescription maps may also be imported via a Slingshot® Archive (.ssa) file type. Refer to Refer "[Import a Slingshot® Archive](#)" on page 82 for assistance importing this file type. If working in a cloud job, prescription maps loaded locally will automatically share with other field computers in the same cloud job.

To import a prescription or Rx map from a USB flash drive:

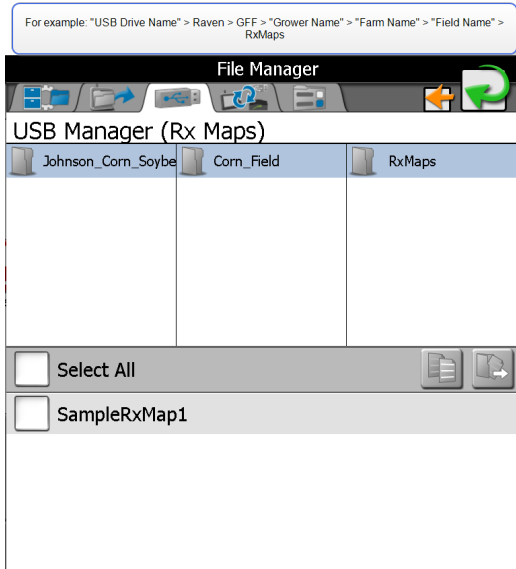
**Note:** Field computers must have VRA capability and the necessary unlock(s) to achieve prescription map sharing.



1. Insert a USB flash drive used with the ROS device and containing the scout group files to be imported.
2. Select the **Administrator Panel**  icon in the top left corner of the display.
3. Select the **File Manager**  utility.
4. Select the **USB Manager**  tab.
5. Select the **USB drop-down** and select the connected USB flash drive from which to import files.
6. Select the file type drop-down and select the **Rx Maps** option.

**Note:** Only one file type may be imported at a time. Perform the input procedure multiple times in order to import multiple file types.

7. Select **Next**. The USB flash drive and folder structure will display.

- Use the browser displayed to locate and select the **RxMaps** folder which contains the map to be imported. Prescription map files currently stored on the USB flash drive will be found within the GFF folder structure and are displayed in the lower portion of the USB manager tab.



- Select the box displayed to the left of the listed file names to select specific files to import. Alternatively, select the Select All option at the top of the file list to select all files currently displayed.
- With at least one file selected, select one of the following import actions:
  - Copy**  - Create a duplicate of the selected information on the destination to be selected.
  - Move**  - Export the selected information to the destination to be selected and remove the information from the ROS device.




The Import Files prompt will display.

- Verify the list of files to be imported is correct. If the list requires further configuration, select the **Cancel** button to return to the USB Manager tab.
- Select the **Import** button to begin the file transfer process.

### Import Scout Groups

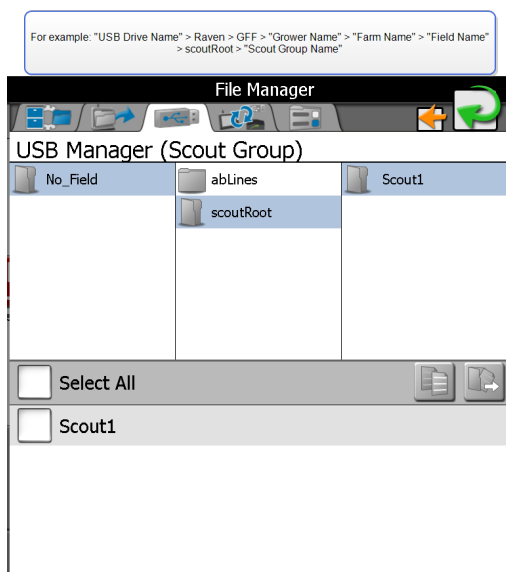
**Note:** Scouting information such as field boundaries and no-coverage zones may also be imported via a Slingshot® Archive (.ssa) file type. Refer "[Import a Slingshot® Archive](#)" on



*page 82 for assistance importing this file type.*

1. Insert a USB flash drive used with the ROS device and containing the scout group files to be imported.
2. Select the **Administrator Panel**  icon in the top left corner of the display.
3. Select the **File Manager**  utility.
4. Select the **USB Manager**  tab.
5. Select the **USB drop-down** and select the connected USB flash drive from which to import files.
6. Select the file type drop-down and select the **Scout Group** option.
7. Select the specific feature type in the scout groups category to import individual scout group features (e.g. field boundaries, flags, lines, and zones) independently.

**Note:** *Only one file type may be imported at a time. Perform the input procedure multiple times in order to import multiple file types.*

8. Select **Next**. The USB flash drive and folder structure will display.
9. Use the browser displayed to locate and select the **scoutRoot** folder which contains the scout group to be imported. Scout group files currently stored on the USB flash drive will be found within the GFF folder structure and are displayed in the lower portion of the USB manager tab.



10. Select the box displayed to the left of the listed file names to select specific files to import. Alternatively, select the Select All option at the top of the file list to select all files currently displayed.
11. With at least one file selected, select one of the following import actions:
  - **Copy**  - Create a duplicate of the selected information on the destination to be selected.
  - **Move**  - Export the selected information to the destination to be selected and remove the information from the ROS device.




The Import Files prompt will display.

12. Verify the list of files to be imported is correct. If the list requires further configuration, select the **Cancel** button to return to the USB Manager tab.
13. Select the **Import** button to begin the file transfer process.

**Note:** When importing a Field Boundary or Zone not created on a Viper® 4+ (ROS), the user must assign a Scout Group Name for all features.

### Import Guidance Lines

**Note:** Guidance lines may also be imported via a Slingshot® Archive (.ssa) file type. Refer "[Import a Slingshot® Archive](#)" on page 82 for assistance importing this file type.

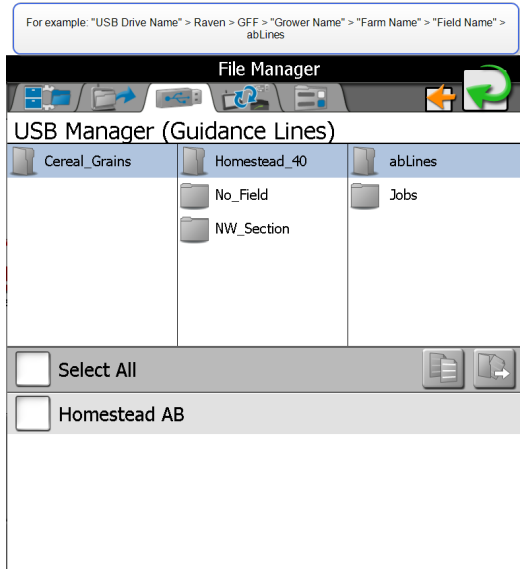
1. Insert a USB flash drive used with the ROS device and containing the scout group files to be imported.
2. Select the **Administrator Panel**  icon in the top left corner of the display.
3. Select the **File Manager**  utility.
4. Select the **USB Manager**  tab.
5. Select the **USB drop-down** and select the connected USB flash drive from which to import files.
6. Select the file type drop-down and select the **Guidance Lines** option.



**Note:** Only one file type may be imported at a time. Perform the input procedure multiple times in order to import multiple file types.

7. Select **Next**. The USB flash drive and folder structure will display.



8. Use the browser displayed to locate and select the **abLines** folder which contains the map to be imported. Prescription map files currently stored on the USB flash drive will be found within the GFF folder structure and are displayed in the lower portion of the USB manager tab.



9. Select the box displayed to the left of the listed file names to select specific files to import. Alternatively, select the Select All option at the top of the file list to select all files currently displayed.
10. With at least one file selected, select one of the following import actions:
- **Copy**  - Create a duplicate of the selected information on the destination to be selected.
  - **Move**  - Export the selected information to the destination to be selected and remove the information from the ROS device.

The Import Files prompt will display.

11. Verify the list of files to be imported is correct. If the list requires further configuration, select the **Cancel** button to return to the USB Manager tab.
12. Select the **Import** button to begin the file transfer process.

### Import ISO TASKDATA









The import ISO TASKDATA section provides options to import data from Slingshot® or a USB stick. This information can be GFF data or field boundaries.

Refer to the *ROSSlingshot® Field Hub Calibration and Operation Manual* for additional information on using the Slingshot® Field Hub with the ROS device.

## Create Grower, Farm, Field (GFF) Information

Raven field computers can create and store the grower, farm, and field information of any operator of the field computer. This can be helpful when working with multiple different growers, farms, or fields with the same Raven field computer.








To create new Grower, Farm, Field (GFF) associations for jobs:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Manager**  tab. The *File Manager* will open and display a list of files currently stored on a ROS device.
4. Select the **Edit**  button at the top of the Selected Files list.
5. Select the **Edit**  button displayed at the top of the GFF display.
6. Select the **Grower panel** at the top of the display to expand the Grower panel.
7. To add a new:
  - grower to the GFF structure, select the **Add**  button.
  - farm or field to an existing Grower, select the appropriate grower from the list.
8. Select the **Farm panel** below the list of available growers to expand the Farm panel.
9. To add a new:
  - farm to GFF structure, select the **Add**  button.
  - field to an existing grower and farm, select the appropriate farm from the list.
10. Select the **Field panel** at the bottom of the GFF display to expand the Field panel.
11. To add a new field, select the **Add**  button to add a field to the selected grower and farm.




## Manage Grower, Farm, Field (GFF) Information


Raven field computers can create and store the grower, farm, and field information of any operator of the field computer. This can be helpful when working with multiple different growers, farms, or fields with the same Raven field computer.

To edit current grower, farm, field associations for all files displayed in the Selected Files list:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Manager**  tab. The *File Manager* will open and display a list of files currently stored on a ROS device.
4. Select the **Edit**  button at the top of the Selected Files list.
5. Select the **Edit**  button displayed at the top of the GFF display.
6. Use the file browser to select the desired grower, farm, or field entry to edit.
7. With the appropriate entry selected, select the **Edit**  button. To delete a GFF entry, select the **Delete**  button.

To reset grower, farm, field information:





1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Manager**  tab. The *File Manager* will open and display a list of files currently stored on a ROS device.
4. Press the Arrow next to the desired grower, farm, or field in the all files column to move the desired GFF to the Files column.
5. Press the Notepad key above the files column. This will open the grower, farm, field manger screen.

6. Press the **Delete**  icon in the reset grower, farm, field cell. A prompt will open asking "This action will permanently remote all growers, farms, fields and their associations. Do you wish to continue?".
7. Select **Yes** to reset all growers, farms, fields and their associations. Press **No** to return to the previous screen.

## Delete Grower, Farm, Field (GFF) Information

Raven field computers can create and store the grower, farm, and field information of any operator of the field computer. This can be helpful when working with multiple different growers, farms, or fields with the same Raven field computer.

To delete GFF files from the ROS device:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Manager**  tab. The *File Manager* will open and display a list of files currently stored on a ROS device.
4. Review "Selecting Files" on page 75 to move files to the "Selected Files" list.
5. Select the **Delete**  button at the top of the "Selected Files" list and accept the displayed prompt to delete the selected files from the ROS device.

## File Export

The following sections provide information on using the file export feature to copy or move job information for direct job reporting, for use with other ROS devices, or for upload to a Slingshot® user account.

**Note:** Use the following procedures to export files to a USB flash drive if a Slingshot® Field Hub, or a wireless network connection, is not available for wireless file transfer. A Slingshot® connected device and wireless service contract will be required to send files to the Slingshot® web service from the vehicle cabin. Contact a local Slingshot® dealer or refer to the ROS Slingshot® Field Hub Calibration and Operation Manual for additional assistance with using the Slingshot® Field Hub for transferring job files.

### Export Job Reports and Coverage Information




ROS is capable of exporting job reports and coverage information in the following formats:





- Portable document format (.pdf)
- Job data package (.jdp)
- Slingshot® archive (.ssa)
- Shape file (.shx, .shp, and .dbf)

The following procedures assist with exporting job and field information to a connected USB flash drive for transferring information to a home or office computer system.

**Note:** A Slingshot® Field Hub and wireless service contract OR an RS1™ with cellular card and data plan will be required to send files to the Slingshot® web service from the vehicle cabin. Contact a local Slingshot® dealer or refer to the ROS Slingshot® Field Hub Calibration and Operation Manual for additional assistance with using the Slingshot® Field Hub for transferring job files.

To export job data from the ROS device in the above formats:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Manager**  tab. The *File Manager* will open and display a list of files currently stored on a ROS device.

4. If necessary, use the file list type and grower, farm, field (GFF) filters to assist with finding and selecting the desired files for export.
5. Move the files to **Export** from the left side of the File Manager to the right side.  
Alternatively, select the **Select All**  option at the top of the file list to select all files currently displayed and matching the set filter conditions.
6. Select the **File Export**  icon.
7. From the File Export screen, select either Slingshot® or the listed USB drive. If more than one USB drive is inserted, there will be multiple choices.
8. With at least one file selected, select one of the following export actions:
  - **Copy**  - Create a duplicate of the selected information on the destination to be selected.
  - **Move**  - Export the selected information to the destination to be selected and remove the information from the ROS device.

9. The **Export Files** prompt will display:

- **GFF Structure** - Select this option to create a job data package (.jdp) on the USB flash drive with the grower, farm, field (GFF) file structure. The .jdp file may be transferred to a Slingshot® viewer or user account to review job information or create job reports, or to another ROS device via the USB flash drive to continue the job.

***Note:** While the GFF file structure is transferred to the USB flash drive using this export option, the GFF assignments will not be inherently associated with the .jdp file if transferred to another ROS device. To reassociate the .jdp with the GFF information, the GFF structure will need to be imported via the USB manager and then reassign the .jdp to the GFF using the File Manager tab.*

- **Slingshot® Archive** - The Slingshot® Archive (.ssa) file type may be used with either a Slingshot® user account or to transfer multiple files to another ROS device. Select this file type to transfer multiple files as one package.

The .ssa file allows multiple files to be imported into the Slingshot® web portal as a single file.

***Note:** If imported onto another ROS device, files exported as an .ssa will retain GFF associations from the original device. All files exported to the "slingshotArchives" directory on the USB flash drive will be required to retain the GFF associations from the previous device.*

10. Enable the following **Report Generation** options to export additional report or coverage map files for viewing, creating, or archiving completed job information:

**Note:** Report generation options will not be available when exporting Slingshot® Archive (.ssa) file types.

- **Generate Report (.pdf)** - Select this option to export a portable document format (.pdf) document directly from the ROS device. A .pdf document is a common file format viewable on any computer system, often with a free software package available on-line from several sources.
- **Include Shape Files (.shx, .shp, and .dbf)** - The shapefile format consists of four separate files created for each product channel active during the field operation. Select the "Include Shape Files" option to export a shape format (.shp), a shape index (.shx), an attribute database (.dbf), and a project (.prj) file for each control channel active during the field operation.

The shapefile format requires specialized software to view on a home or office computer system and each of the above file types must have the same file name (different extension) for the shapefile format to function correctly.

11. Select the confirm button in the lower, right corner of the Export to USB prompt to start the export process. When complete, the ROS device will return to the **File Export** tab.

### Export Other Field Operation Files









ROS is capable of exporting the following files used during field operations:

- Prescription (Rx) Maps (shapefile format)
- Scout Groups (.sct)
- Guidance Lines (.ab)
- CAN Node Updates
- Screen Shots
- Core Dumps
- Log Files

If desired, files can be exported for archiving or be transferred for use on another ROS device. The following procedures are for exporting field operation files to a connected USB flash drive.



**Note:** A Slingshot® Field Hub and wireless service contract will be required to send files to the Slingshot® web service from the vehicle cabin. Contact a local Slingshot® dealer or refer to the ROS Slingshot® Field Hub Calibration and Operation Manual for additional assistance with using the Slingshot® Field Hub additional assistance with using the Slingshot® Field Hub.

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Manager**  tab. The *File Manager* will open and display a list of files currently stored on a ROS device.
4. Select the **File Export** tab.
5. Use the **Filter**  to assist with finding and selecting the files. Move the files to export from the left side of the file manager to the right side. Alternatively, select the **Select All**  option at the top of the file list to select all files currently displayed and matching the set filter conditions.
6. Select the **File Export**  icon.
7. From the File Export screen, select either Slingshot® or the listed USB drive. If more than one USB drive is inserted there will be multiple choices.
8. With at least one file selected, select one of the following export actions:
  - **Copy**  - Create a duplicate of the selected information on the destination to be selected.
  - **Move**  - Export the selected information to the destination to be selected and remove the information from the ROS device.

9. The Export Files prompt will display:

- **GFF Structure** - Select this option to export the field operation file types to the USB flash drive with the grower, farm, field (GFF) file structure. The field operation files may be transferred to a Slingshot® viewer or user account to review job information, or to another ROS device via the USB flash drive to continue the job.




**Note:** *While the GFF file structure is transferred to the USB flash drive using this export option, the GFF assignments will not be inherently associated with the field operation files if transferred to another ROS device. To reassociate the .jdp with the GFF information, import the GFF structure via the USB manager and then reassign the .jdp to the GFF using the File Manager tab.*

- **Slingshot® Archive** - The Slingshot® Archive (.ssa) file type may be used with either a Slingshot® user account or to transfer multiple files to another ROS device. Select this file type to transfer multiple files as one package.

**Note:** *If imported onto another ROS device, files exported as an .ssa will retain GFF associations from the original device. All files exported to the "slingshotArchives" directory on the USB flash drive will be required to retain the GFF associations from the previous device.*

10. Select the **Confirm** button on the Export to USB prompt to start the export process. When complete, the ROS device will return to the **File Export** tab.

### Export ISO Task Data

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Management Options**  tab.

4. Select **Export GFF data to USB as ISO TASKDATA**.



**Note:** *Send Jobs to Slingshot® is set as the default setting to send jobs via Slingshot® when closing the job.*

5. The *ISO GFF Export* window will open.






6. Select the desired USB from **Select export media**.

**Note:** *ISO TASKDATA can only be edited on the device the TASKDATA was created on.*

7. Select **Export** to export the GFF data to the selected USB device. The GFF data will be in an ISO XML format.

## Export a Widget Profile

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Management Options**  tab.
4. Select **Export Widget Profiles to USB**.



5. The *Wallpaper Export* window will open.



6. Select the desired USB drive from **Select export media**.

**Note:** *Widget Profiles can only be edited on the device the wallpaper was created on.*

## Chapter 7:

# Machine Configuration Overview

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Raven field computers can save machine configurations for various types of vehicles and equipment with which the field computer will be operated.

**Note:** *Entering all measurements as accurately as possible will ensure the best coverage and guidance results during in-field operations. Verify all measurements before entering them into the field computer and check values entered for each setting or option.*

Refer to the following articles for information on machine configuration:

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<a href="#">New Machine Configuration</a> .....	102
<a href="#">Create a New Machine Configuration</a> .....	103
<a href="#">Added Equipment or Implement Configuration</a> .....	109
<a href="#">Add a New Implement</a> .....	110
<a href="#">Delete a Machine Configuration</a> .....	112
<a href="#">Delete an Existing Machine Configuration</a> .....	112
<a href="#">Section Control Settings</a> .....	113
<a href="#">Modify Section Settings</a> .....	113
<a href="#">Calculate Section Offsets</a> .....	115
<a href="#">Configure/Adjust Section Offsets</a> .....	115
<a href="#">View Section Groups</a> .....	115
<a href="#">Section Settings</a> .....	117
<a href="#">Modify Section Settings</a> .....	117
<a href="#">Calculate Section Offsets</a> .....	119
<a href="#">Configure/Adjust Section Offsets</a> .....	119
<a href="#">Machine Configuration Tab</a> .....	120
<a href="#">Guidance Information</a> .....	120
<a href="#">Offset Information</a> .....	121
<a href="#">General Information Tab</a> .....	122

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<a href="#">General Information Details</a>	124
<a href="#">Tongue/Hitch Length</a>	124
<a href="#">Measurements Tab</a>	126
<a href="#">GPS Measurements</a>	126
<a href="#">Machine and Hitch Measurements</a>	127
<a href="#">Equipment Tab</a>	129
<a href="#">Section Group Display</a>	130
<a href="#">Section Group Options</a>	130
<a href="#">Equipment Setup - General Information Tab</a>	132
<a href="#">General Information</a>	133
<a href="#">Reporting Information</a>	133
<a href="#">Equipment Setup - Measurements Tab</a>	135
<a href="#">Equipment Offsets</a>	135
<a href="#">Equipment Setup - Sections Tab</a>	137
<a href="#">Section Information</a>	138
<a href="#">Section Offsets</a>	140

## New Machine Configuration

All Raven field computers allow for machines to be configured to the operator's preference. These machines can include tractors such as articulated, tracked, front wheel or rear wheel steered, and also self-propelled machines such as sprayers, spreaders, harvesters, or swathers.

For pull-type, drawn, or mounted equipment to pair with configured machines, refer to "Added Equipment or Implement Configuration" on page 109.




**Note:** *Entering all measurements as accurately as possible will ensure the best coverage and guidance results during in-field operations. Verify all measurements before entering them into the field computer and check values entered for each setting or option.*

## Create a New Machine Configuration

Machine configurations matching the detected machine devices will display in the Machine Panel and may be selected by the operator to quickly change the ROS device setup for different configurations used during various field operations.

**Note:** A new machine configuration may be created without being connected to the specific equipment to be used with the configuration. However, if the configuration is created while the ROS device is connected to a different CANbus system, the created machine configuration will need to be modified or adjusted when ROS first detects the CANbus system to be associated with the machine configuration.

To create a new Machine Configuration:

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select the **Add**  button to create a new machine configuration.
3. Use the on-screen keyboard to enter the desired machine configuration name and touch the done button. The machine garage will display.
4. Select an existing machine profile or select the **Add**  button toward the upper, right corner of the display to create a new profile for the machine configuration. The following options are available for configuring new machines:






### Create a New Tractor Profile

Profiles for tractors such as front wheel assist, articulated, tracked, and traditional tractors will be configured for addition of a pull-type or towed implement using a separate implement profile. Refer to "Create a New Self-Propelled Profile" on page 105 for more information on pull-type implement profiles.

**Note:** Tractor profiles may be assigned to a machine configuration with one or more pull-type implement profiles such as a tool bar, pull-type applicator, or air-seeder cart and drill, etc.

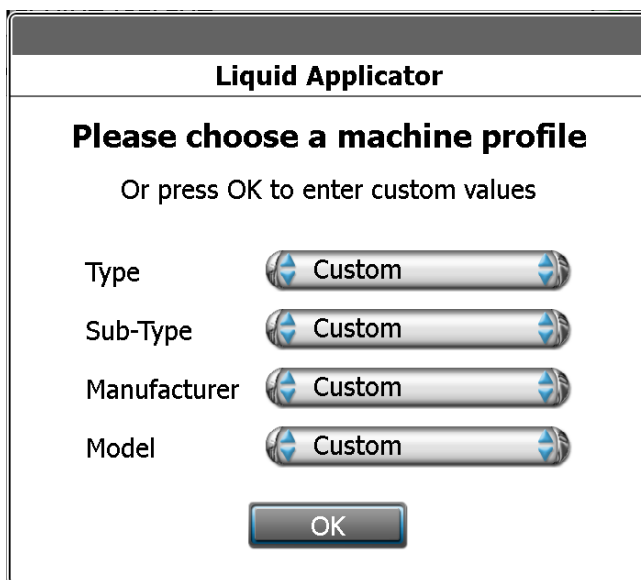
To access the machine garage and create a new tractor machine profile:







1. Select the **Machine Panel**  to display any available machine configurations.
2. Select the **Edit**  button.
3. Select the **Machine Garage**  button to view any machine profiles already configured.
4. Select the **Add**  button to create a new machine profile.
5. Select either:
  - the **Tractor** machine type to create a new profile from scratch.
  - an existing tractor to clone the machine profile settings for the new machine.
6. Use the on-screen keyboard to enter the name for the new machine profile and select the **Done**  button.
7. If creating a new profile from scratch, complete the steps in the following drop-down. If using an existing profile, proceed to the next step.

#### New Machine Profile

- a. The *Machine Profile selection* prompt will display if creating a new machine profile from scratch.



- b. Use the drop-down selections to set the machine profile type, sub-type, manufacturer, and model (if available) of the machine to be created.

8. The **General Information**  tab allows the operator to enter or modify machine information. Select the information fields and use the on-screen keyboard to enter general information about the machine for identification purposes. If a preset machine profile was selected, verify the information displayed and make adjustments if necessary.
9. Select **Next**.
10. Set or adjust the **GPS Offset** measurements and Antenna Height. Refer to "Measurements Tab" on page 126 for assistance with measuring these values.
11. Enter the **Wheel Base Measurement**. Refer to "Equipment Tab" on page 129 for assistance with measuring the machine wheel base.
12. Select **Next**.
13. Review the section information. If a preset machine profile was selected, the section information for the equipment available from the manufacturer will be set for section groups as appropriate. Select:
  - the **Delete**  button to remove section groups from the machine profile.
  - the **Edit**  button to modify sections labels, widths, or offset information.
  - the **Add**  button to create a new or customized section group.



**Note:** Refer to "Modify Section Settings" on page 113 for more information on setting up implement section groups.




### Create a New Self-Propelled Profile

Profiles for self-propelled agricultural machines such as sprayers, spreaders, harvesters, or swathers are configured with an implement fixed or attached on the vehicle.

**Note:** Self-propelled machine profiles cannot be assigned to a machine configuration with an additional pull-type implement such as a disk or plow, tool bar, pull-type applicator, etc.

To access the machine garage and create a new self-propelled machine profile:

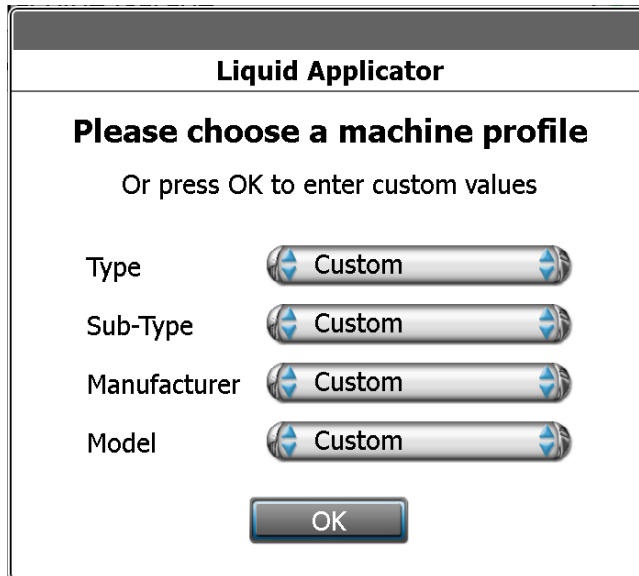
1. Select the **Machine Panel**  to display any available machine configurations.
2. Select the **Edit**  button.

3. Select the **Machine Garage**  button to view any machine profiles already configured.
4. Select the **Add**  button to create a new machine profile.
5. Select either:
  - the **Self-Propelled** machine type to create a new profile from scratch.
  - an existing self-propelled implement to clone the machine profile settings for the new machine.
6. Use the on-screen keyboard to enter the name for the new machine profile and select the **Done**  button.

7. If creating a new profile from scratch, complete the steps in the following drop-down. If using an existing profile, proceed to the next step.

#### New Machine Profile

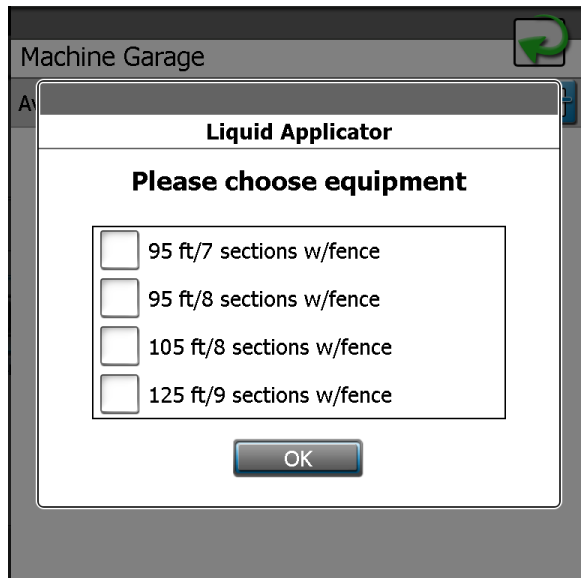
- a. The *Machine Profile selection* prompt will display if creating a new machine profile from scratch.







The image shows a dialog box titled "Liquid Applicator". Inside the dialog, the text "Please choose a machine profile" is displayed in bold, followed by "Or press OK to enter custom values". Below this text are four drop-down menus, each with "Custom" selected. The labels for the drop-downs are "Type", "Sub-Type", "Manufacturer", and "Model". At the bottom of the dialog is an "OK" button.

- b. Use the drop-down selections to set the machine profile type, sub-type, manufacturer, and model (if available) of the machine to be created.

- c. When the appropriate selections are set, select the **OK** button. The *equipment selection* prompt will display.



- d. Review the available OEM equipment options.
- e. Depending upon the equipment offered from the manufacturer or the optional features installed on the machine for which the profile is being created, select:
- no options to enter custom section profiles later in this procedure.
  - a specific option matching, or close to, the OEM equipment currently installed on the machine.
  - multiple, or all, equipment options if the machine offers multiple equipment configurations using the installed equipment.
- Note:** *If the configuration is using an ISO product controller, the ISO equipment will be assigned to the configuration later. Refer to "Equipment Tab" on page 129.*
- Note:** *Delete or adjust section groups as necessary later in this procedure for optional features or customized configurations.*
- f. Select the **OK** button to accept the selected equipment options and proceed with the machine profile configuration.

8. The **General Information**  tab allows the operator to enter or modify machine information. Select the information fields and use the on-screen keyboard to enter general information about the machine for identification purposes. If a preset machine profile was selected, verify the information displayed and make adjustments if necessary.
9. Select **Next**.
10. Set or adjust the **GPS Offset** measurements and Antenna Height. Refer to "Measurements Tab" on page 126 for assistance with measuring these values.
11. Enter the **Wheel Base Measurement**. Refer to "Equipment Tab" on page 129 for assistance with measuring the machine wheel base.
12. Select **Next**.
13. Review the section information. If a preset machine profile was selected, the section information for the equipment available from the manufacturer will be set for section groups as appropriate. Select:
  - the **Delete**  button to remove section groups from the machine profile.
  - the **Edit**  button to modify sections labels, widths, or offset information.
  - the **Add**  button to create a new or customized section group.

**Note:** Refer to "Modify Section Settings" on page 113 for more information on setting up implement section groups.

## Added Equipment or Implement Configuration

All Raven field computers allow for equipment and implements to be configured and added to existing machine configurations or profiles. These implements can include plows, disks, pull-type applicators, planters, carts, or other types of equipment.




For machines to pair with the equipment or implement, refer to "New Machine Configuration" on page 102.

**Note:** Entering all measurements as accurately as possible will ensure the best coverage and guidance results during in-field operations. Verify all measurements before entering them into the field computer and check values entered for each setting or option.

## Add a New Implement





**Note:** A new machine configuration may be created without being connected to the specific equipment to be used with the configuration. However, if the configuration is created while the ROS device is connected to a different CANbus system, the created machine configuration will need to be modified or adjusted when ROS first detects the CANbus system to be associated with the machine configuration.


To create a new Machine Configuration:

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select the **Add**  button to create a new machine configuration.
3. Use the on-screen keyboard to enter the desired machine configuration name and touch the done button. The machine garage will display.
4. Select an existing machine profile or select the **Add**  button toward the upper, right corner of the display to create a new profile for the machine configuration. The following options are available for configuring new machines:

### Create a New Implement Profile

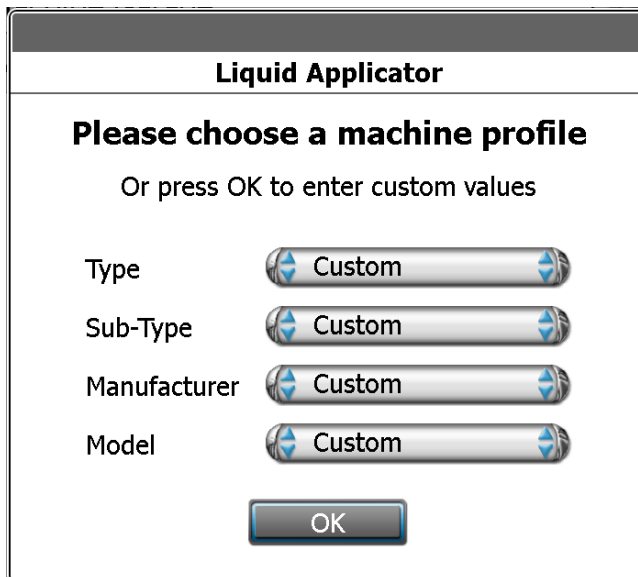
To access the Implement Garage and create a new implement profile:

1. Select the **Machine Panel**  to display any available machine configurations.
2. Select the **Edit**  button.
3. Select the **Implement Garage**  button to view any machine profiles already configured.
4. Select the **Add**  button to create a new machine profile.

5. Select either:
  - the **Two Wheel Cart** type to create a new single axle profile from scratch.
  - the **Four Wheel Cart** type to create a new double axle profile from scratch.
  - the **Pull-Type Toolbar** type to create a new pull-type toolbar from scratch.
  - the **Mounted Toolbar** type to create a new mounted toolbar from scratch.
  - an existing implement profile to clone the profile settings for the new machine.
6. Use the on-screen keyboard to enter the name for the new machine profile and select the **Done**  button.
7. If creating a new profile from scratch, complete the steps in the following drop-down. If using an existing profile, proceed to the next step.

#### New Implement Profile





- a. The *Machine Profile selection* prompt will display if creating a new machine profile from scratch.



The screenshot shows a dialog box titled "Liquid Applicator". Inside the dialog, the text "Please choose a machine profile" is displayed, followed by "Or press OK to enter custom values". Below this text are four drop-down menus, each labeled with a field name: "Type", "Sub-Type", "Manufacturer", and "Model". Each drop-down menu currently shows the word "Custom". At the bottom of the dialog is an "OK" button.

- b. Use the drop-down selections to set the implement profile type, sub-type, manufacturer, and model (if available) of the implement to be created.



8. The **General Information**  tab allows the operator to enter or modify implement information. Select the information fields and use the on-screen keyboard to enter general information about the implement for identification purposes. If a preset implement profile was selected, verify the information displayed and make adjustments if necessary.
9. Enter the front and rear (if applicable) tongue and hitch length measurements for the implement. Refer to "General Information Tab" on page 122 for assistance with measuring these values.
10. Select **Next**.
11. Review the section information. If a preset implement profile was selected, the section information for the equipment available from the manufacturer will be set for section groups as appropriate. Select:
  - the **Delete**  button to remove section groups from the implement profile.
  - the **Edit**  button to modify sections labels, widths, or offset information.
  - the **Add**  button to create a new or customized section group.

**Note:** Refer to "Modify Section Settings" on the facing page for more information on setting up implement section groups.


## Delete a Machine Configuration


In some cases, an outdated or unneeded machine configuration should be removed from the field computer to free up space for different configurations.

**Note:** Once deleted, machine configurations cannot be retrieved.

## Delete an Existing Machine Configuration

**Note:** Deleting a machine configuration does not delete individual machine or implement profiles used within the configuration.

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select the desired machine configuration.






3. Select the **Delete**  button toward the right side of the display.
4. Select the **Yes** button on the displayed prompt to permanently delete the machine configuration.


## Section Control Settings




Raven field computers can adjust section control settings, allowing the operator to customize when sections are turned on or off during field operations.

### Modify Section Settings

To set up or modify section settings on an implement:

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.
3. Select the larger machine icon near the top of the screen. The *General Information*  tab of the selected machine or implement will display.
4. Select the **Equipment**  tab.
5. Select the:
  - **Add**  button to create a new section group and use the on-screen keyboard to enter a group name or description for the new group.
  - **Edit**  button to modify group and section settings for an existing section group.

**Note:** *If no section groups are configured, the Add button will be displayed in the first group.*
6. Select the **General Information**  tab.
7. Select the **Name** field and enter the desired name or description of the section group.
8. Select the **Type** drop-down field and select the type of sections in the group.

9. Enter any applicable information to be shown with the completed job or field report in the lower portion of the **General Information**  tab.
10. Select the **Measurements**  tab.
11. Configure the overall offset of the implement (e.g. spray boom, spread pattern, knives or shanks, etc.) from the center of the machine or implement pivot point as necessary.
  - a. Select the left/right offset direction and select the offset distance field and use the on-screen keypad to enter the distance from the center of the implement pivot point to the center of the section group. Refer to "Equipment Setup - Measurements Tab" on page 135 for additional information on measuring the implement offsets.
  - b. Select the aft offset distance field and use the on-screen keypad to enter the distance from the center of the implement pivot point to the center of the section group. Refer to "Equipment Setup - Measurements Tab" on page 135 for additional information on measuring implement offsets.
12. Select the **Sections**  tab.
13. Select the **Number of Sections** field and use the on-screen keypad to enter the number of sections in the group. ROS will update the sections display with the appropriate number of sections.
14. Select a section indicator to display section settings.
15. Select the section label field and use the on-screen keyboard to enter the desired label (up to three characters) for the section.
16. Select the **Width** field and use the on-screen keypad to enter the section width in inches [centimeters].

**Note:** ROS is capable of calculating section offsets for standard implements automatically. For standard section configurations (e.g. sections aligned end-to-end and centered on the swath midpoint) set the section width for each section and touch the "Calculate Offsets" button.

Section offsets may still be adjusted to customize the section configuration as necessary.

17. Select the **Wired As** field and enter the appropriate “boom sense” connection or lead used to sense the section status. Refer to the ROS Device Installation Manual, the Raven CANbus Installation Manual, or contact a local CNH dealer for additional assistance with section connections and cabling.
18. Repeat step 13 through step 16 to set the section settings for each section in the section group. Once the section labels, width, and wired as settings are configured, ROS may be used to automatically calculate and set the section offsets for the group.

## Calculate Section Offsets

To automatically calculate section offsets:

1. Verify that the section width field for each section in the group has been entered correctly.
2. Select the **Calculate Offsets** button to automatically align sections end-to-end along the swath midpoint. ROS will calculate and set the offset values for a standard section configuration (e.g. similar to sections on a self-propelled sprayer).

## Configure/Adjust Section Offsets

To manually configure or adjust section offsets:




1. Select the left/right direction setting and select the appropriate offset direction.
2. Select the left/right field and enter the offset distance.
3. Select the fore/aft direction setting and select the appropriate offset direction.
4. Select the fore/aft field and enter the offset distance.

## View Section Groups

The section groups feature of ROS provides a flexible method for configuring sections for various implement types. Section groups may be configured for separate “boom systems” or to group various boom sections as necessary. For example, section groups may be used to configure a tiered boom system, setup control sections on a row crop planter, or to separate implement sections on a multi-bin air seeder system with liquid booms.




**Note:** ROS uses the section groups to determine the overall implement or working width when providing swath guidance during field operations. For assistance with modifying the width used for implement guidance, refer to "Machine Configuration Tab" on page 120.

To view configured section groups:

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.
3. Select the larger machine icon near the top of the screen. The *General Information*  tab of the selected machine or implement will display.
4. Select the **Equipment**  tab.

**Note:** When using an implement profile assigned to a machine configuration, use the page navigation at the bottom of the tab, or swipe across the screen, to access additional implement profiles without backing out to the machine configuration panel.

The Equipment tab displays the name or description, type, and overview of the configured sections and section labels for any configured section groups.






5. Select the:
  - **Edit**  button to access or edit additional section group or individual section settings. Refer to the "Modify Section Settings" on page 113 for more information on modifying section settings within section groups.
  - **Delete**  button to remove a section group from the machine or implement.
  - **Add**  button in the next available group to add a new section group. Use the on-screen keyboard to enter a group name or description for the new group and refer to the "Modify Section Settings" on page 113 for assistance with section settings within section groups.




**Note:** The Edit and Delete buttons will only display for configured section groups. If no section groups are configured, the Add button will be displayed in the first group.

## Section Settings



### Modify Section Settings

To set up or modify section settings on an implement:

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.
3. Select the larger machine icon near the top of the screen. The *General Information*  tab of the selected machine or implement will display.
4. Select the **Equipment**  tab.
5. Select the:
  - **Add**  button to create a new section group and use the on-screen keyboard to enter a group name or description for the new group.
  - **Edit**  button to modify group and section settings for an existing section group.

**Note:** *If no section groups are configured, the Add button will be displayed in the first group.*
6. Select the **General Information**  tab.
7. Select the **Name** field and enter the desired name or description of the section group.
8. Select the **Type** drop-down field and select the type of sections in the group.
9. Enter any applicable information to be shown with the completed job or field report in the lower portion of the **General Information**  tab.
10. Select the **Measurements**  tab.

11. Configure the overall offset of the implement (e.g. spray boom, spread pattern, knives or shanks, etc.) from the center of the machine or implement pivot point as necessary.
  - a. Select the left/right offset direction and select the offset distance field and use the on-screen keypad to enter the distance from the center of the implement pivot point to the center of the section group. Refer to "Equipment Setup - Measurements Tab" on page 135 for additional information on measuring the implement offsets.
  - b. Select the aft offset distance field and use the on-screen keypad to enter the distance from the center of the implement pivot point to the center of the section group. Refer to "Equipment Setup - Measurements Tab" on page 135 for additional information on measuring implement offsets.

12. Select the **Sections**   tab.
13. Select the **Number of Sections** field and use the on-screen keypad to enter the number of sections in the group. ROS will update the sections display with the appropriate number of sections.
14. Select a section indicator to display section settings.
15. Select the section label field and use the on-screen keyboard to enter the desired label (up to three characters) for the section.
16. Select the **Width** field and use the on-screen keypad to enter the section width in inches [centimeters].

**Note:** ROS is capable of calculating section offsets for standard implements automatically. For standard section configurations (e.g. sections aligned end-to-end and centered on the swath midpoint) set the section width for each section and touch the "Calculate Offsets" button.

*Section offsets may still be adjusted to customize the section configuration as necessary.*

17. Select the **Wired As** field and enter the appropriate "boom sense" connection or lead used to sense the section status. Refer to the ROS Device Installation Manual, the Raven CANbus Installation Manual, or contact a local CNH dealer for additional assistance with section connections and cabling.

18. Repeat step 13 through step 16 to set the section settings for each section in the section group. Once the section labels, width, and wired as settings are configured, ROS may be used to automatically calculate and set the section offsets for the group.

## Calculate Section Offsets

To automatically calculate section offsets:

1. Verify that the section width field for each section in the group has been entered correctly.
2. Select the **Calculate Offsets** button to automatically align sections end-to-end along the swath midpoint. ROS will calculate and set the offset values for a standard section configuration (e.g. similar to sections on a self-propelled sprayer).



## Configure/Adjust Section Offsets

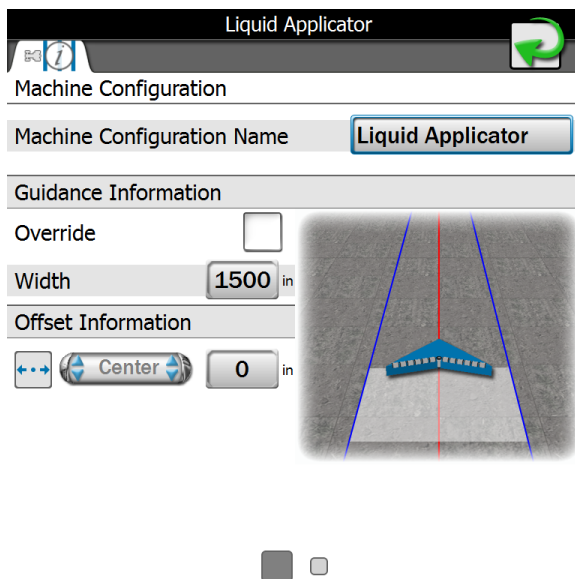
To manually configure or adjust section offsets:

1. Select the left/right direction setting and select the appropriate offset direction.
2. Select the left/right field and enter the offset distance.
3. Select the fore/aft direction setting and select the appropriate offset direction.
4. Select the fore/aft field and enter the offset distance.



## Machine Configuration Tab

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.
3. Select the larger machine icon near the top of the screen. The *General Information*  tab of the selected machine or implement will display.
4. Use the page navigation at the bottom of the prompt, or swipe across the screen, to display the first settings page and display the machine configuration tab.



### Machine Configuration Name

Displays the name or description for the current machine configuration.

### Guidance Information

#### Override Enable

Select the Override option to enable or disable the guidance override option. Use this option to override the configured implement section width for calculating and displaying guidance paths during field operations.

## Width

Enter the desired override width for calculating and displaying guidance paths during field operations.

**Note:** *The override width does not modify configured section information. Coverage of active sections will be displayed and mapped as configured for the machine profile.*

## Offset Information

### Left/Right Override Direction


Select the direction drop down and select the direction in which the guidance path should be overridden.

### Left/Right Override Distance

Select this field and enter the distance for the guidance path override direction.

## General Information Tab

To view the **General Information**  tab:

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.

3. Select the larger machine icon near the top of the screen. The *General Information* tab of the selected machine or implement will display.

**Note:** Use the page navigation at the bottom of the prompt, or swipe across the screen, to access other information for profiles assigned to the selected machine configuration.

### Self-Propelled and Tractor

Rear Boom Sprayer

Self-Propelled - General Information

Type	Applicator
Sub-Type	Sprayer
Manufacturer	
Model	
Nickname	Rear Boom Sprayer

### Pull-Type Implement

Spreader

Four-Wheeled Cart

Type	Spreader
Sub-Type	Spinner Box
Manufacturer	
Model	
Nickname	Spreader

Tongue/Hitch Length

Front Tongue	0	in
Rear Tongue	0	in
Hitch	0	in

**Note:** Information may be prepopulated in the following fields if a preset machine or implement profile has been selected during set up. Select any of the fields described below and use the on-screen keyboard to edit the displayed profile information.

## General Information Details

The following information about the machine or implement profile will display on the

**General Information**  tab:

### Type

A description of the type of machine or implement used with the selected profile.

### Sub-Type

The sub-type field offers an additional line of equipment description to help identify the appropriate equipment with which the profile should be used.

### Manufacturer

Name or description of the original equipment manufacturer.

### Model

A model number, model year, or other designation to help identify the equipment used with the profile.

### Nickname

If desired, a name or description used by operators or fleet administrators to identify the equipment may be entered. This description will be displayed in the machine panel area on the main display.

## Tongue/Hitch Length

**Note:** The tongue and hitch length settings are only applicable to pull-type implements and carts and will not be used with self-propelled or tractor profiles.

### Tongue or Front Tongue

Enter the distance in inches [centimeters] from the implement hitch to front axle on a pull-type implement. The tongue distance must be measured parallel with the direction of travel.

**Note:** Only one tongue length measurement will be required for implements with a single "axle."

*For pull-type implements with an offset working section, set the left or right offset in the section group settings. Refer to "Equipment Setup - Measurements Tab" on page 135 for assistance with section group offsets.*

### Rear Tongue

For implements with a second "axle," Enter the distance in inches [centimeters] between the front and rear axles. The rear tongue distance must be measured parallel with the direction of travel.



### Hitch

The hitch distance should be entered if the implement or cart will be towed between the machine and another implement during field operations. Enter the distance in inches [centimeters] from the implement rear axle to the hitch point on the implement or cart. The hitch distance must be measured parallel with the direction of travel.


## Measurements Tab

**Note:** Measurements for pull-type implements are entered on the General Information tab. Refer to "General Information Tab" on page 122 for details on measurements for these implements.

To view the **Measurements**  tab:

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.
3. Select the larger machine icon near the top of the screen. The *General Information*  tab of the selected machine or implement will display.

**Note:** Use the page navigation at the bottom of the prompt, or swipe across the screen, to access other information for profiles assigned to the selected machine configuration.

4. Select the **Measurements**  tab to view the Profile Measurements prompt.

## GPS Measurements

To provide accurate guidance during field operations, calibrate the ROS for the position of the GPS antenna on the machine relative to the center of the pivot point. Refer to the following sections for assistance with measuring and setting the GPS measurements on the ROS device.

**Note:** The pivot point for a conventional tractor or self-propelled sprayer is the center of the rear axle.

**Note:** The pivot point for a tracked tractor is the center of the track length between the tracks.

**Note:** The pivot point for an articulated tractor is the point of articulation.

Left/Right Offset Direction 

Select the left/right offset direction drop-down and select the position of the GPS antenna from the center-line of the machine.

### Left/Right Offset Distance

Select the GPS offset distance field and enter the distance from the center-line of the machine to the GPS antenna in inches [centimeters]. The left/right offset distance must be measured perpendicular to the direction of travel.

### Fore/Aft Offset Direction

Select the fore/aft offset direction drop down and select the position of the GPS antenna from the machine pivot point.

### Fore/Aft Offset Distance

Select the GPS offset distance field and enter the distance from the pivot point to the GPS antenna in inches [centimeters]. The fore/aft offset distance must be measured parallel with the direction of travel.

**Note:** *If offset distance is not correct, there may be line A/B guidance movement on the screen.*

### GPS Antenna Height

The GPS Height value is the measurement from the ground to the bottom of the GPS antenna. The height value will only be necessary if a tilt corrected DGPS signal is provided to the field computer.

## Machine and Hitch Measurements

The machine measurement settings provide information about the machine geometry used by ROS to map the vehicle position during field operations and create coverage or as-applied data for field operations.

### Hitch Left/Right Offset Direction

Select the left/right offset direction drop down and select the position of the machine hitch from the center-line of the machine.

### Hitch Left/Right Offset Distance

Select the offset distance field and enter the distance from the center-line of the machine to the hitch in inches [centimeters]. Measure the left/right offset distance perpendicular to the direction of travel.

### Hitch Fore/Aft Offset Direction

Select the fore/aft offset direction drop down and select the position of the hitch from the machine pivot point.



### Hitch Fore/Aft Offset Distance

Select the offset distance field and enter the distance from the pivot point to the hitch in inches [centimeters]. The fore/aft offset distance must be measured parallel with the direction of travel.

### Wheel Base

The wheel base value is used by ROS to map coverage of the implement during field operations. Enter the distance between the front and rear "axle" in inches [centimeters]. The wheel base must be measured parallel with the direction of travel.

### Pivot to Front Axle

For articulated vehicles, measure the distance from the pivot point to the front axle.



### Pivot to Rear Axle

For articulated vehicles, measure the distance from the pivot point to the rear axle.


## Equipment Tab

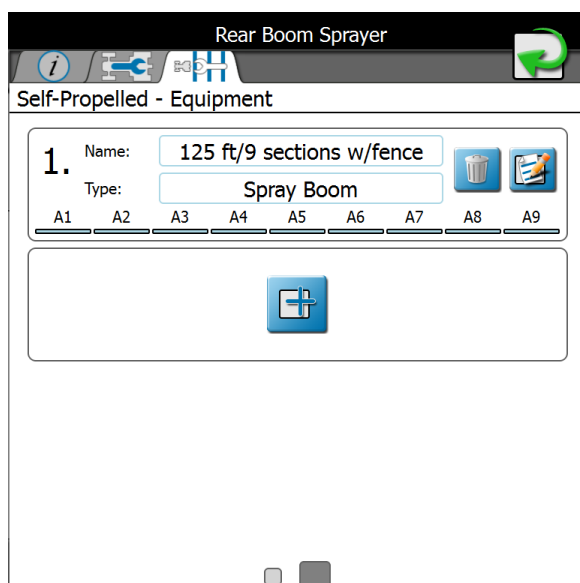
The Equipment tab provides an overview of configured section groups and allows the operator to create or manage section groups.

To view the **Equipment**  tab:


1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.
3. Select the larger machine icon near the top of the screen. The *General Information*  tab of the selected machine or implement will display.

**Note:** Use the page navigation at the bottom of the prompt, or swipe across the screen, to access other information for profiles assigned to the selected machine configuration.

4. Select the **Equipment**  tab to display configured section groups for the self-propelled or implement profile.



## Section Group Display

The following information about configured section groups will display on the **Equipment**  tab:

### Section Group Name

The name or description assigned to the section. Refer to "Equipment Setup - General Information Tab" on page 132 for more information on entering section group names or descriptions displayed in this area.

### Section Group Type


The selected or entered section type for the sections in the group. Refer to "Equipment Setup - General Information Tab" on page 132 for more information on entering section types displayed in this area.

### Section Labels and Abstract

The bottom of the section group area will display the number of sections and configured section labels for each section currently set for the section group. Refer to "Equipment Setup - Sections Tab" on page 137 for more information on setting up section labels.

## Section Group Options


### Edit Section Settings

Select the **Edit**  button to access or edit additional section group or individual section settings. Refer to the "Modify Section Settings" on page 113 for more information on modifying section settings within section groups.

### Delete Section Groups



Select the **Delete**  button to remove a section group from the machine or implement.

### Create a New Section Group



Select the **Add**  button in the next available group to add a new section group. Use the on-screen keyboard to enter a group name or description for the new group and refer to the "Modify Section Settings" on page 113 for assistance with section settings within section groups. The Add button can also be used to import a section group from an ISO product controller.


**Note:** *The Edit and Delete buttons will only be displayed for configured section groups. If no section groups are configured, the Add button will be displayed in the first group.*

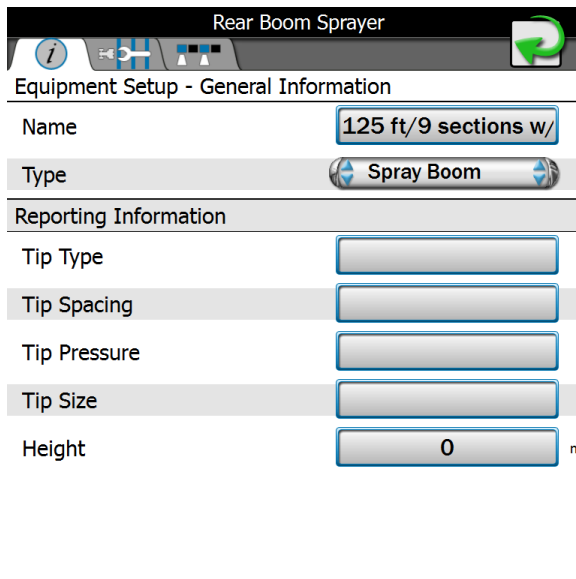
## Equipment Setup - General Information Tab

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.
3. Select the larger machine icon near the top of the screen. The *General Information*  tab of the selected machine or implement will display.

**Note:** Use the page navigation at the bottom of the prompt, or swipe across the screen, to access other information for profiles assigned to the selected machine configuration.

4. Select the **Equipment**  tab to view the currently configured section group information. Refer to "View Section Groups" on page 115 for information on the section group display or "Modify Section Settings" on page 113 for assistance with creating a new section group.
5. Select the **Edit**  button in the desired section group to edit section group information.

6. Select the **General Information**  tab to access the following settings for the selected section group:



The screenshot shows the configuration interface for a Rear Boom Sprayer. At the top, there is a title bar with the text "Rear Boom Sprayer" and a green refresh icon. Below the title bar, there is a navigation bar with several icons, including an information icon (i) which is highlighted. The main content area is titled "Equipment Setup - General Information" and contains the following fields:

- Name:** A text input field containing "125 ft/9 sections w/".
- Type:** A dropdown menu currently set to "Spray Boom".
- Reporting Information:** A section containing five input fields:
  - Tip Type: An empty text input field.
  - Tip Spacing: An empty text input field.
  - Tip Pressure: An empty text input field.
  - Tip Size: An empty text input field.
  - Height: A text input field containing "0" with a unit indicator "m" to its right.

**Note:** Information may be prepopulated in the following fields if a preset machine or implement profile has been selected during set up. Select any of the fields described below and use the on-screen keyboard to edit the displayed profile information.

**Note:** Depending on equipment type, reporting information may not be available.

## General Information

### Name

A name or description of the sections configured in the selected section group.

### Type

A description of the type of sections in the selected section group.

## Reporting Information

The lower portion of general information equipment setup or section groups allows the operator to enter the following information as applicable to the field operation:

**Note:** The following fields are for report notation or display information purposes only and will not set or adjust any values or control system characteristics for an application control system.

### Tip Type

Type of spray tips used on a liquid boom system during a field operation.

### Tip Spacing

Spacing between spray tips on a liquid boom system.

### Tip Pressure

This field may be used to note the average or target pressure for the currently installed spray tips.



### Tip Size

Enter the tip size information for display or information.




### Height

Use this field to note the average or target height in feet [meters] maintained for the current tips or boom configuration.

## Equipment Setup - Measurements Tab

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.
3. Select the larger machine icon near the top of the screen. The *General Information*  tab of the selected machine or implement will display.

**Note:** Use the page navigation at the bottom of the prompt, or swipe across the screen, to access other information for profiles assigned to the selected machine configuration.

4. Select the **Equipment**  tab to view the currently configured section group information. Refer to "View Section Groups" on page 115 for information on the section group display or "Modify Section Settings" on page 113 for assistance with creating a new section group.
5. Select the **Edit**  button in the desired section group to edit section group information.
6. Select the **Measurements**  tab to access the following settings for the selected section group:

### Equipment Offsets

Use the following settings to configure the location of the section group on the machine or implement:

**Left/Right Offset Direction** 

Select the left/right offset direction drop down and select the overall offset for the selected section group from the center-line of the machine or implement.

**Left/Right Offset Distance**

Select the offset distance field and enter the distance from the center-line of the machine or implement to the center of the section group in inches [centimeters]. The left/right offset distance must be measured perpendicular to the direction of travel.



### Fore/Aft Offset Direction



Select the fore/aft offset direction drop down and select the position of the section group from the machine or implement pivot point.

**Note:** *The fore equipment offset may not be available when configuring some implement types.*



### Fore/Aft Offset Distance


Select the offset distance field and enter the distance from the pivot point to the section group in inches [centimeters]. The fore/aft offset distance must be measured parallel with the direction of travel.

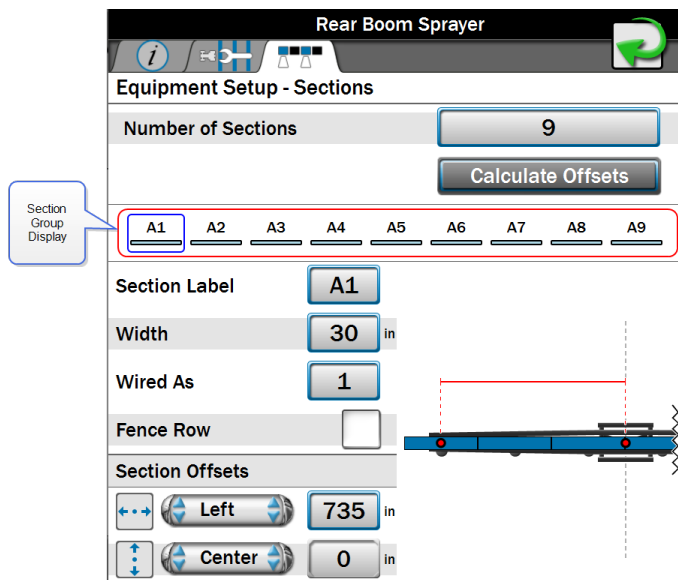
## Equipment Setup - Sections Tab

1. Select the **Machine Panel**  icon in the bottom left corner of the Street Maps view to display the available machine configurations.
2. Select any of the profile buttons for the machine or implements that are desired to be configured.
3. Select the larger machine icon near the top of the screen. The *General Information*  tab of the selected machine or implement will display.

**Note:** Use the page navigation at the bottom of the prompt, or swipe across the screen, to access other information for profiles assigned to the selected machine configuration.

4. Select the **Equipment**  tab to view the currently configured section group information. Refer to "View Section Groups" on page 115 for information on the section group display or "Modify Section Settings" on page 113 for assistance with creating a new section group.
5. Select the **Edit**  button in the desired section group to edit section group information.

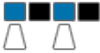
6. Select the **Sections**  tab to access the *Equipment Setup - Sections* screen. The following settings for the selected section group will be available:



**Note:** The section group display will not necessarily represent the physical section layout of the implement.

**Note:** If using ISO application such as Hawkeye<sup>®</sup>, Hawkeye<sup>®</sup> 2, AimFlex, or other OEM product, the boom setup control is done in the UT. To migrate UT boom over to "Machine Configuration" boom setup, press the add (+) icon.

## Section Information

The following information about configured section groups will display on the **Sections**  tab:

### Number of Sections

This field sets the number of sections available within the section group. Edit this number to add or remove sections from the section display area.

### Calculate Offsets Feature

ROS is capable of calculating section left/right offsets for standard section configurations (e.g. sections aligned end-to-end and centered on the swath midpoint).

This feature may be used to quickly set up sections for common configurations such as spray booms, tool bars, planters, and seeders.

To use the automated offset calculator:

1. Set and verify width values for all sections in the group. See "Equipment Setup - Sections Tab" on page 137 for details on setting the width value for each section.
2. Select the **Calculate Offsets** button. ROS will automatically set the left/right offsets for a standard section configuration.
3. If necessary, manually adjust the fore/aft or left/right offset direction and distance values to customize the section group configuration.

### Section Group Display

This area displays an abstract of the current section group configuration with the number of sections and assigned section labels. Select a section indicator shown in this area to view settings for each section in the group.

**Note:** *The section order displayed in this area will be duplicated for section status indicators during field operations. It is recommended to enter sections from left to right to ensure that the status indicators display a general representation of the section group status.*

### Section Label

Set the label to be displayed for each section during field operations. The section label may be up to three characters and will be displayed on section status display or on-screen switch box widgets selected for use during active jobs.

### Width

Set the width in inches [centimeters] to calibrate ROS for the area covered by each specific section during field operation.

### Wired As

Use the **wired as** field to set the physical "boom" sense or valve connection used for each configured section and to reorder sections in the group for accurate display during a field operation.

**Note:** *Raven boom sense cables are color coded as follows:*

Section Number	Lead Wire Color
1.	Black
2.	Brown
3.	Blue
4.	Black/White

Section Number	Lead Wire Color
5.	Brown/White
6.	Blue/White
7.	White/Black
8.	White/Brown
9.	White/Blue
10.	Pink
11.	Yellow/White
12.	Green/White
13.	Red/White
14.	White/Yellow
15.	White/Green
16.	White/Red

*The above section numbers assume that section 1 is located at the far left of the implement and section 16 is at the far right. Some OEM installations may connect these leads differently than indicated above. For additional assistance with switch lead or valve connections, refer to the Raven CANbus Installation Manual or contact a local equipment dealer.*

### Fence Row

Select the fence row option to designate the configured section as a fence row. The ROS device will not include sections assigned as fence rows in overall guidance width calculation. Guidance width and offset may still be overridden on the Machine Configuration tab. Refer to "Machine Configuration Tab" on page 120 for additional assistance.

## Section Offsets

Left/Right Offset Direction 

Select the left/right offset direction drop down and select the direction from the center of the boom or implement to the center of the section.

Left/Right Offset Distance

Select the offset distance field and enter the distance from the center of the boom or implement to the center of the section in inches [centimeters]. The left/right offset distance must be measured perpendicular to the direction of travel.

Fore/Aft Offset Direction 

Select the fore/aft offset direction drop down and select the direction from the center of the boom or implement to the center of the section.

Fore/Aft Offset Distance

Select the offset distance field and enter the distance from the center of the boom or implement to the center of the section in inches [centimeters]. The fore/aft offset distance must be measured parallel with the direction of travel.






## Chapter 8:

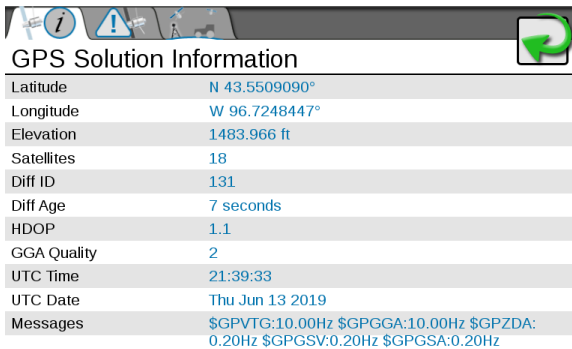
# View GNSS Information

Raven field computers can display all relevant GNSS information that is received by the field computer.

## View GPS Solution Information

To view solution information supplied by the GPS:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Diagnostics**  button to the right of the desired GPS receiver. The *GPS Solution Information* page will be displayed.



GPS Solution Information	
Latitude	N 43.5509090°
Longitude	W 96.7248447°
Elevation	1483.966 ft
Satellites	18
Diff ID	131
Diff Age	7 seconds
HDOP	1.1
GGA Quality	2
UTC Time	21:39:33
UTC Date	Thu Jun 13 2019
Messages	\$GPVTG:10.00Hz \$GPGGA:10.00Hz \$GPZDA: 0.20Hz \$GPGSV:0.20Hz \$GPGSA:0.20Hz

GPS Reverse Sensing

Reverse Sensing controlled by SmarTrax 3D.



4. The following information about the current GPS solution is displayed on this screen:

**Latitude/Longitude**

The current geographic coordinates of the ROS device.

**Elevation**

The current GPS elevation above sea level.

**Satellites**

Displays the number of satellites currently used in the position solution.

**Differential ID**

Depending upon the correction source used, this value will display the differential source identification such as the differential satellite PRN, a base station ID, etc. Some correction sources will not populate this field.

**Differential Age**

This value is the age of the last differential update. The differential age should not rise above a few seconds to ensure accurate position corrections during field operations depending on correction type.

**HDOP**

Horizontal Dilution of Precision (HDOP) is a value indicating the geometry of the satellites used in the position solution. Lower values indicate better positioning of the used satellites.

**GGA Quality**

Displays the current differential fix status. This value will display:

- '0' or '1' if no differential corrections are being received, single solution.
- '2' when the DGPS receiver has locked on to a differential source (SBAS or converging with GS/OmniSTAR corrections).
- '4' for RTK fixed mode for fine GPS course correction mode.
- '5' for fixed GS or OmniSTAR XP/HP correction modes or RTK float mode.

**UTC Time and Date**




Universal coordinated time and date information is displayed in these fields (Greenwich Mean Time).

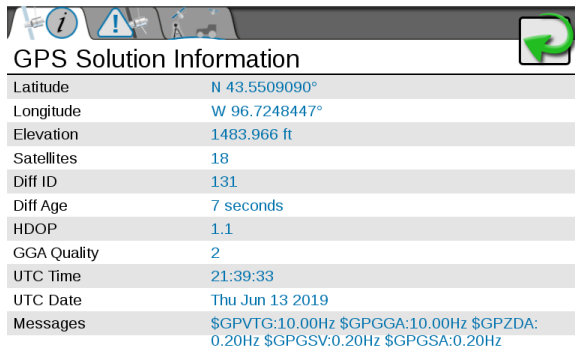
## Messages

Displays what NMEA messages are being received by ROS and the frequency at which they are being received.

## Enable GPS Reverse Sensing

The GPS reverse sensing feature may be enabled if the ROS device will be used to map application or field coverage where the vehicle may be traveling in reverse (i.e. backing into corners). To allow the ROS device to automatically detect when the vehicle is traveling in a reverse direction:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Diagnostics**  button to the right of the desired GPS receiver. The *GPS Solution Information* page will be displayed.



GPS Solution Information	
Latitude	N 43.5509090°
Longitude	W 96.7248447°
Elevation	1483.966 ft
Satellites	18
Diff ID	131
Diff Age	7 seconds
HDOP	1.1
GGA Quality	2
UTC Time	21:39:33
UTC Date	Thu Jun 13 2019
Messages	\$GPVTG:10.00Hz \$GPGGA:10.00Hz \$GPZDA: 0.20Hz \$GPGSV:0.20Hz \$GPGSA:0.20Hz

GPS Reverse Sensing

Reverse Sensing controlled by SmarTrax 3D.

4. Select the **GPS Reverse Sensing** option at the bottom of the *GPS Solution Information* page to toggle the reverse sensing feature.

**Note:** *The GPS based reverse sensing feature is not available if a Raven SmarTrax steering node with terrain compensation capabilities is detected on the CANbus and the Terrain Compensation feature on the node is activated.*

When reverse movement is detected during field operations, the device will maintain the vehicle indicator orientation when the system detects that the machine is moving in reverse.

**Note:** *If this feature is disabled, the guidance display will assume all vehicle motion is in the forward direction.*

*When the reverse sensing feature is enabled, ROS may require the operator to manually override the current direction of travel during field operations. Before beginning field operations, review "Widget Descriptions" on page 237 and "Configure Widget Layouts" on page 257 and ensure that the appropriate widgets for this feature are available on the guidance screen(s) as appropriate.*





*The Forward Override widget is required to manually override the direction of travel during a field operation.*

## View Current GPS Warnings

Information may be available for current GPS warning or alarm conditions as encountered by the ROS device:




**Note:** Warning information displayed by the ROS device only applies to corrections transmitted to the device. If using an external receiver, corrections may be received by the external equipment, but not transmitted to the ROS device. Check cable connections and verify communication settings before troubleshooting the correction source.

To display any current GPS warnings detected by the ROS device:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Diagnostics**  button to the right of the desired GPS receiver. The *GPS Solution Information* page will be displayed.
4. Select the **Current Warning**  tab.
5. Any active warnings or alarm conditions will be displayed on the current warnings prompt. This tab will also display possible solutions for the current warning or alarm conditions to assist with troubleshooting or correcting the current condition.

## Configure a Differential Type





To configure the type of differential corrections on a compatible receiver using the ROS device:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Use the radio options along the left of the tab to select the desired differential source.
5. Additional information, settings, and options may be displayed on the right of the Differential Settings tab based upon the selected differential type.

**Note:** Refer to "Differential Settings Tab" on page 162 for more information or additional assistance with these options.

## Reset Receiver Defaults





To reset default setting to a compatible Raven receiver using the ROS device:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select the **Restore Receiver Defaults**  button in the upper, right corner.  
*Note: The Restore Receiver Defaults button will not be available if a compatible receiver is not detected.*
5. Select **Yes** on the displayed *Caution* prompt to restore default settings to the GPS receiver or **No** to keep the current settings.

---

## Set the Elevation Mask

To set the elevation mask:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select the **General Settings**  tab. The *GPS Elevation Mask* setting will display.

**Note:** Use the elevation mask to adjust the minimum elevation above the horizon which the receiver may use in the position solution. This feature is adjusted in degrees above horizontal and may be used to force the system to ignore satellites which are too low on the horizon. The default elevation mask is 5°.





**Note:** Raising the elevation mask may cause the system to lose differential lock or could increase the occurrence of HDOP issues. Unless instructed to raise the elevation mask by a technician, leave this value at the default value of 5°.



## Set GPS Message Outputs

**Note:** Raven receivers use NMEA 0183 protocols. NMEA 0183 is a combined electrical and data specification for communication between marine electronics such as echo sounder, sonars, anemometer, gyrocompass, autopilot, GPS receivers and many other types of instruments. It has been defined by, and is controlled by, the National Marine Electronics Association.

To configure NMEA output messages and message rates using the ROS device:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select the **GPS Output**  tab.
5. Use the **Ports** drop-down field to select the desired port to configure.
6. Use the **Baud Rate** drop-down field to adjust the output baud rate.

**Note:** Use the **Enable Default Messages** option to reset the receiver default settings.

*If a SmarTrax steering system has been detected, an additional **Set for SmarTrax** check box will be displayed when the port connected to SmarTrax is selected. This check box allows the user to setup the port to support SmarTrax requirements.*

7. Use the **Message Type** sliding bars to adjust the output message rates as necessary for optional equipment.

## Unlock DGPS Receiver Features in ROS





**Note:** This process is for the integrated GPS receiver as well as supported Raven external receivers such as the 600S™, Phoenix 200, and Phoenix 300.

To purchase authorization codes and features, including GS correction:

Feature	Purchase Location
GS Corrections Unlock	Contact a CNH dealer
Satellite GS Subscription	<a href="https://portal.ravenprecision.com/">https://portal.ravenprecision.com/</a>
RTK Corecctions Unlock	Contact a CNH dealer

**Note:** Have the receiver model, serial number, and firmware version available when purchasing feature unlocks. Have the PAC code available when purchasing GS/Terrastar feature unlocks. Review "GPS Information Tab" on page 174 for assistance with finding information about a compatible GPS receiver.

After purchasing the desired authorization codes, return to the ROS device. To activate the purchased features on a compatible receiver:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select the **Authorization Code Entry**  tab.
5. Enter the authorization code acquired for the purchased features into the field.

**Note:** Enter the authorization code exactly as shown, including all capitalization and commas, and ensure there are no spaces before or after the code.

**Note:** The receiver model information will update on the *GPS Information* page when a new authorization code has been entered successfully.

## GPS Receiver Firmware Updates

Updates to the integrated device receiver may be made available periodically on the Raven Help web site:

<https://portal.ravenprecision.com/>

The following items will be required to update the integrated receiver:

- ROS device with an integrated receiver serial number starting with "BFN."
- Home or office PC or laptop with Microsoft Windows® operating system and the WinLoad utility.

**Note:** *WinLoad is not compatible with 64-bit operating systems.*

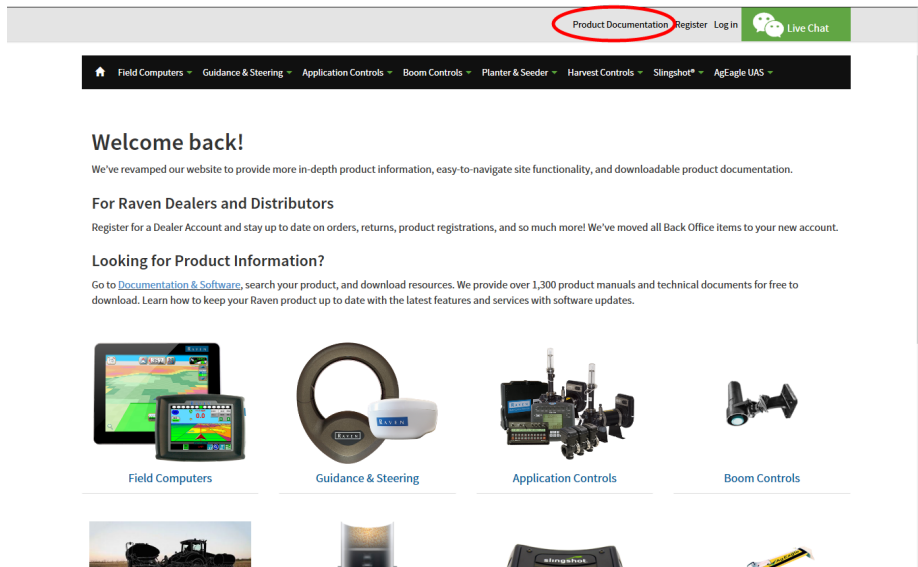
- Serial cable
- USB to serial adapter (optional)
- ROS device cable with "GPS Out" connector
- firmware update .hex file

### Firmware Download Example

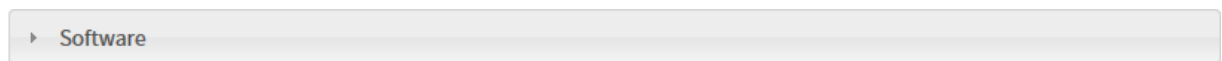
**Note:** *The following procedure is intended for example purposes only. Any images provided in this section may not accurately depict the web browser or prompts encountered on various home or office computer systems. Please refer to computer or web browser user help sections for additional assistance.*

To download Firmware updates:

1. On a home or office computer, visit <https://portal.ravenprecision.com/>.
2. Select **Documentation & Software**.



3. Select the desired device (Guidance & Steering, Boom Controls, etc.)
4. Select the **Software** drop-down specific to your machine.



5. Select the desired software update.
6. Select **Save As** from the drop down.
7. Select **Save** to save the software to the home or office computer. Select a commonly used download directory or a destination which will be easy to locate after the download completes.

**Note:** It may be necessary to accept security or warning prompts displayed by the browser or computer system to successfully save the software update to the computer.

## Updating the Receiver Firmware

### NOTICE



Integrated GPS receivers with serial number BFN1343 or lower are capable of OmniStar corrections. All Viper® 4+ receivers can be upgraded to GS. Depending on current capabilities, purchasing an upgrade may be necessary.

To apply the firmware update to the ROS device integrated receiver:

1. Shutdown the ROS device. Refer to "ROS Power On/Off" on page 12 for assistance with the proper shutdown procedure.
2. Disconnect the antenna cable from the back of the ROS device
3. Connect a serial cable from the PC to the connector labeled **GPS Output** on the ROS device cable.

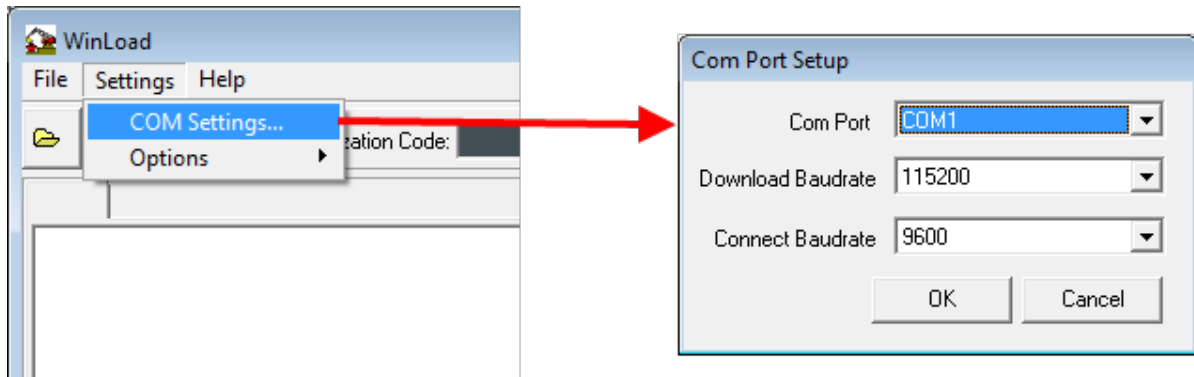
To determine the COM port being used by the PC:

- a. Click **Start**.
- b. Right Click on **My Computer**.
- c. Select **Properties**.
- d. Select **Device Manager**.
- e. Select the **Hardware** tab.
- f. Select **Device Manager**.
- g. Expand the **Ports** options. The port being used will be labeled **Communications Port**. If desired, temporarily unplug the cable to see what COM disappears.

**Note:** A USB-to-serial adapter may be required if the PC or laptop does not offer a serial port.

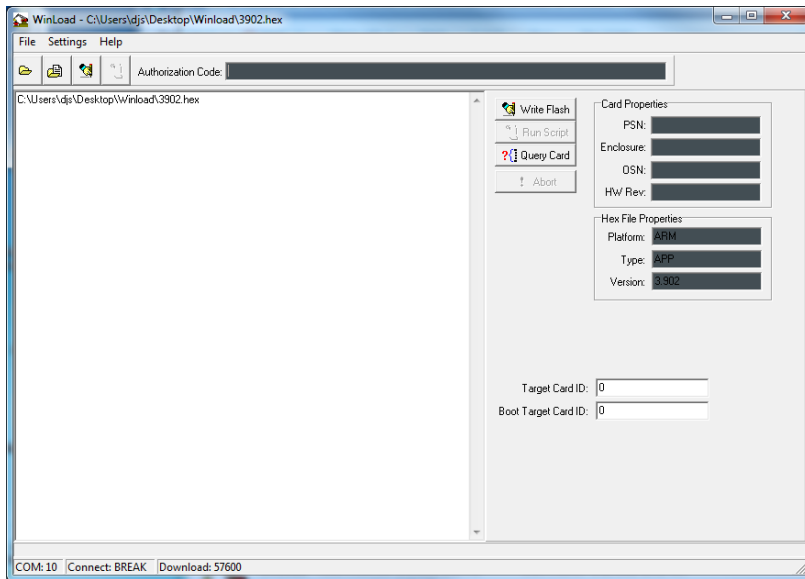
4. Extract, or unzip, the receiver update zip file.
5. On the PC or laptop, open the downloaded firmware update folder and locate the WinLoad application.

- Click on the settings option in the upper, left corner of the WinLoad window and select **COM Settings....**

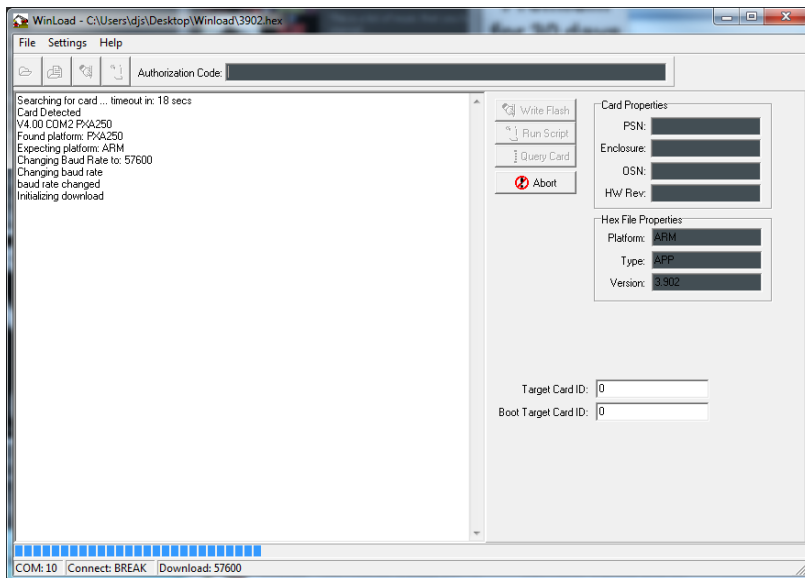


- In the *Com Port Setup* prompt, select the com port on the PC or laptop connected to the GPS out connector. Refer to the operating system help for assistance determining which com port is connected to the ROS device cable.
- Set the Download Baudrate to **115200**.
- Set the Connect Baudrate to **9600** and click OK.
- Click **File** in the upper, left corner of the WinLoad window and select **File Open....**
- Use the file browser to locate and select the receiver update .hex or .shex file. The file information should now be displayed in the main WinLoad panel.





- Click the **Write Flash** button to the right side of the main WinLoad panel. After the timer has counted down a few seconds, press the power button on the ROS device. The Viper® 4+ must show “Powered By Raven” before pressing Write Flash. The WinLoad program should display information in the main panel to indicate that the update is in progress.



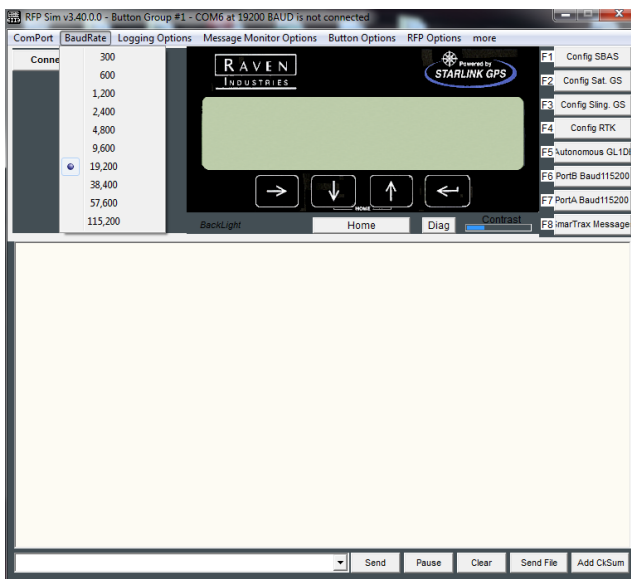
- Wait for the WinLoad update to complete. The blue loading bar will cycle through multiple times. When the Write Flash button is click-able, the download is complete.



- Once the update has finished, close the WinLoad application and restart the ROS device.

15. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
16. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
17. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
18. Select **Restore Receiver Defaults** .
19. Select **Yes**.
20. Restart the Viper® 4+.
21. On the PC or laptop, open the **RfpSim** program for the desired Com Port.
 

**Note:** RFPsim programs are located at under Guidance and Steering, GPS Receivers at <https://portal.ravenprecision.com/>
22. Select the matching BaudRate using the appropriate COM port.



23. Select **Connect**.
24. Confirm that data is streaming.
25. Type **FRESET** in the command line.
26. Press **Send**.

**Note:** Sometimes *FRESET* may need to be entered multiple times to work.



27. Power cycle the ROS device.
28. Allow the system to populate the GPS information.
29. Perform the steps in "Redetect a Serial Device" on page 178 to redetect GPS and serial devices.

**Note:** *It will take at least 20 minutes for the almanac to reload after the FRESET.*




"Microsoft Windows is a U.S. registered trademark of the Microsoft group of companies."

## Raven Receiver Settings Overview

The settings defined in the following articles will be available only for integrated or compatible Raven receivers. If a compatible receiver is not detected by the ROS device, the features detailed in the following articles will not be accessible. Check any cable connections and refer to "Redetect a Serial Device" on page 178 to reinitialize the serial communication ports.

- "Differential Settings Tab" on the next page
  - "GS-Satellite" on page 165
  - "OmniSTAR" on page 168
  - "RTK" on page 170
- "GPS Output Tab" on page 172
- "GPS Information Tab" on page 174
- "GPS Authorization Code Entry Tab" on page 176

## Differential Settings Tab

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select one of the following differential types available along the left side of the differential settings prompt:

**Note:** *The settings and options displayed on the right side of the Differential Settings prompt will vary based upon the selected differential type. Refer to the descriptions below for additional information and refer to the definitions section for each specific correction type for additional assistance with settings and options.*

### GL1DE Only

For areas with limited availability of differential correction sources (e.g. SBAS, OmniSTAR, etc.), the ROS device may offer Autonomous GL1DE as an autonomous GPS correction source. In GL1de only mode, ROS will use GPS satellites to locate the vehicle position within 20 in [50 cm].

**Note:** *No additional settings or features are available for the Autonomous GL1DE correction type. Refer to the specific ROS device manual or contact a local CNH dealer for more information on capabilities of a specific ROS device or display.*

### RTK

The Real-Time Kinematic (RTK) correction type uses a Slingshot® connected device, a Continuously Operating Reference Station (CORS) network, or a traditional base station system for a position solution. These systems use a ground reference station to provide highly accurate corrections.

**Note:** *The RTK option will be displayed only after an RTK authorization key is entered using the procedure listed at "Unlock DGPS Receiver Features in ROS" on page 153. Contact a local CNH dealer to obtain the authorization code or for more information on the Slingshot® RTK services.*

Refer to "RTK" on page 170 for additional information on available settings or options available for the RTK correction type.

### GS-Satellite

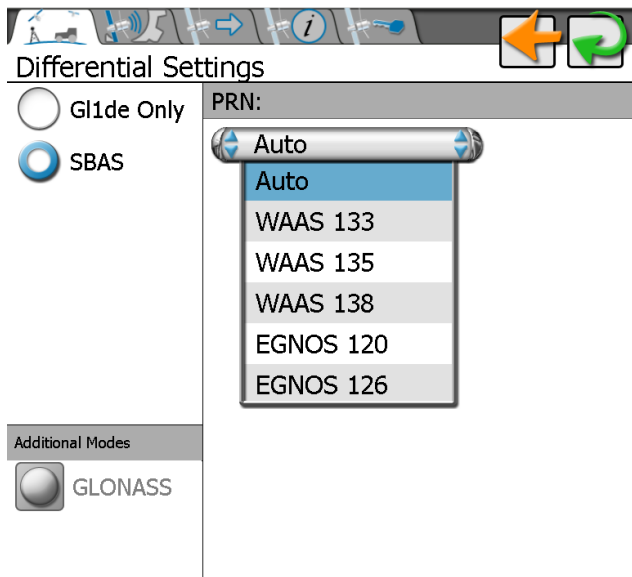
The GS correction service is a satellite based subscription service providing position solutions using GPS and GLONASS satellite constellations and using a Precise Point Positioning (PPP) technique to remove atmospheric errors to determine a position solution. Contact a local Raven dealer.

<https://portal.ravenprecision.com/gs-subscriptions>

**Note:** Refer to "GS-Satellite" on page 165 for additional information on available settings or options available for the GS-Satellite option.

### SBAS

The Satellite Based Augmentation System (SBAS) option utilizes the available Wide Area Augmentation System (WAAS) or European Geostationary Navigation Overlay Service (EGNOS) correction signals. These common correction services are available free for use in several regions and is the default correction source if available on the selected receiver.



Touch the drop-down list and select a **WAAS** or **EGNOS** satellite Pseudo-Random Number (**PRN**) to manually select the differential satellite which provides the best coverage for the operation area if desired. Selecting a PRN from the list locks the correction signal to the selected satellite. If the **Auto** is selected, the receiver will scan and automatically set the PRN throughout an operation.

## OmniStar

The OmniSTAR correction source offers a subscription based position service with various accuracy levels to match budget and operation needs. Refer to the OmniSTAR web site for additional subscription or purchasing information.

<https://www.omnistar.com/>

Refer to "OmniSTAR" on page 168 for additional information on available settings or options available when using a compatible receiver with the OmniSTAR correction type.

**Note:** ROS devices with internal GPS serial numbers higher than BFN1344xxxx are not compatible with OmniSTAR correction services. See "GPS Information Tab" on page 174 for assistance with verifying the serial number of the receiver. Contact a local CNH dealer for information on correction services available for ROS devices with newer receivers or for additional assistance. All integrated GPS receivers can be upgraded to GS corrections capability.


## GLONASS

If the ROS device supported receiver is capable of using the **GLONASS** satellite constellation, this mode will be displayed in the lower, left corner of the Differential Settings tab.




The optional **GLONASS** (Global Navigation Satellite System) satellite constellation may be unlocked to increase the number of satellites visible at any given time. This feature may help to improve satellite coverage or reduce HDOP issues during field operations.

Additional Modes	<b>Expires:</b> 0 weeks 0 days 0.0 hours
 GLONASS	<b>Type:</b> UNKNOWN(UNKNOWN)
	<b>ID:</b> 160187

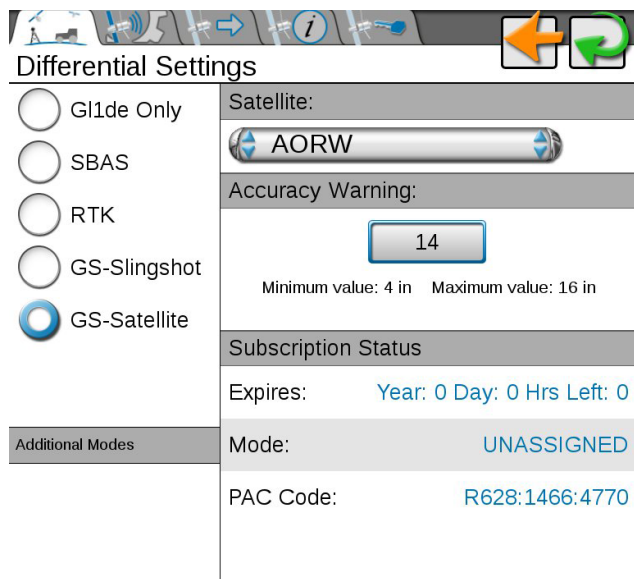
Once unlocked, the optional **GLONASS** mode will display the following status indicator when this feature is being used in the current position solution.

Additional Modes	<b>Distance Away:</b> 10.46 mi
 GLONASS	<b>Latitude:</b> 43.701931°
	<b>Longitude:</b> -96.709376°
	<b>Elevation:</b> 1360.83 ft

## GS-Satellite

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select **GS-Satellite** along the left side of the differential settings prompt.

Use the following settings and subscription information to manage GS correction services on the ROS device:



## Satellite

The satellite identities is used to select the satellite for the region in which the ROS device will be operating. Set this option to AUTO to allow the device to automatically select the satellite.

## Region Identities

ID	Description
98W	North America and Western South America
AORW	Eastern North America and South America
AORE	Eastern South America, Western Europe and Africa
25E	Europe, Africa, and Western Asia
IOR	Eastern Europe and Africa, Asia, and Western Australia
143.5E	Eastern Asia and Australia
POR	Eastern Asia and Australia and Western North America

**Note:** Visit the Raven web site for additional information and assistance with the satellite region identities.

<https://portal.ravenprecision.com/gs-subscriptions>

## Accuracy Warning

The accuracy warning value sets the allowable horizontal accuracy for field operation. When the receiver determines the position solution meets the set value, the solution will be considered converged and the appropriate status will be display.

**Note:** Higher values will allow the receiver to converge faster, but will allow more horizontal position error. Smaller values will provide more accurate position, but will take longer to converge and are more likely to lose a converged status during field operations.

The following information is displayed in the Subscription Status area of the Differential Settings tab when configured for GS-Satellite corrections:

## Expires

A display of the current time remaining before the GS subscription expires. Contact a local CNH dealer or access the Slingshot® store at the web address below to extend subscription services.

<https://portal.ravenprecision.com/gs-subscriptions>

**Note:** Be sure to log into the account to which the subscription service will be extended.

## Mode

The current activation status of the GS subscription. The mode field must display termed to allow Satellite GS corrections to be used during field operations. Contact a local CNH dealer

for assistance with extending GS correction services delivered via satellite.




### PAC Code

The PAC Code will be required for registration with the GS correction service.

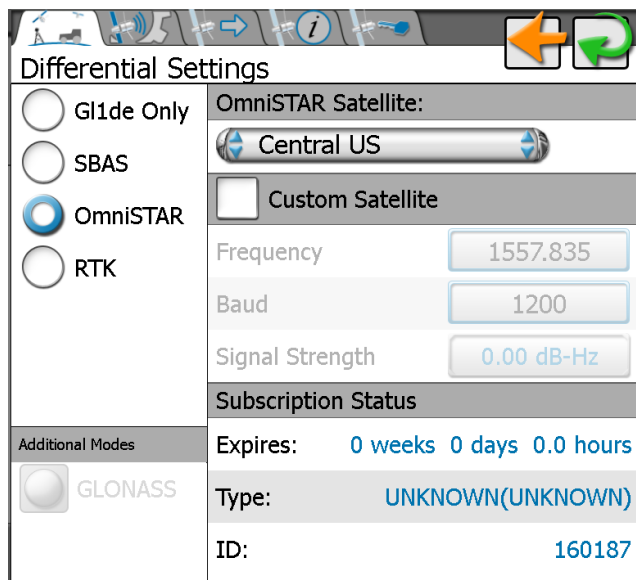


## Omnistar

**Note:** ROS devices with internal GPS serial numbers higher than BFN1344xxxx are not compatible with Omnistar correction services. See "GPS Information Tab" on page 174 for assistance with verifying the serial number of the receiver. Contact a local CNH dealer for information on correction services available for ROS devices with newer receivers or for additional assistance.

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select **Omnistar** along the left side of the differential settings prompt.

The following information and options will be available when configuring a compatible receiver and using the Omnistar correction service:



Differential Settings	
<input type="radio"/> Glide Only	Omnistar Satellite:
<input type="radio"/> SBAS	Central US
<input checked="" type="radio"/> Omnistar	<input type="checkbox"/> Custom Satellite
<input type="radio"/> RTK	Frequency: 1557.835
	Baud: 1200
	Signal Strength: 0.00 dB-Hz
	<b>Subscription Status</b>
	Expires: 0 weeks 0 days 0.0 hours
<b>Additional Modes</b>	Type: UNKNOWN(UNKNOWN)
<input type="checkbox"/> GLONASS	ID: 160187

### Omnistar Satellite

Select the specific satellite for use with Omnistar correction services for the area of operations.

### Custom Satellite Enable

This option allows the operator to enable a custom satellite for use with the OmniSTAR subscription. Only enable this feature when instructed by an OmniSTAR technician.

### Custom Satellite Frequency

If the custom satellite option is enabled, the custom frequency field displays the current satellite frequency used with OmniSTAR corrections.

### Custom Satellite Baud

If the custom satellite option is enabled, the custom rate field displays the current message rate for OmniSTAR corrections.




### Custom Satellite Signal Strength

If the custom satellite option is enabled, the custom rate field displays the signal strength of the selected satellite.

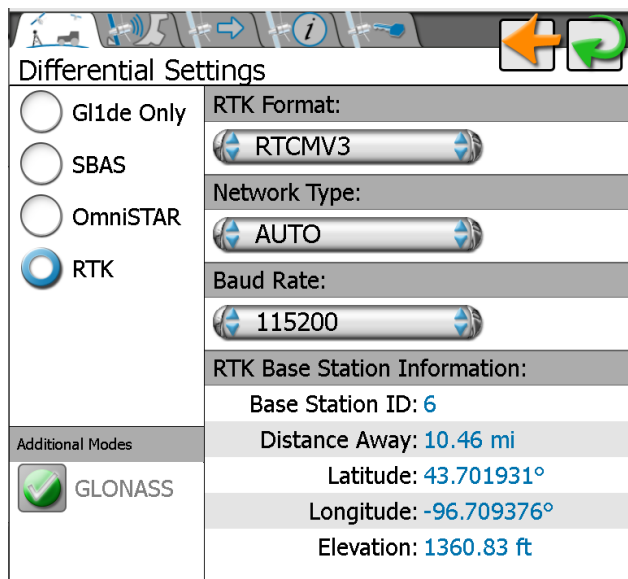
### Subscription Status

The subscription status area displays the OmniSTAR subscription expiration date, type of subscription (e.g. HP, XP, VBS, or G2), and the OmniSTAR ID required for registration with the OmniSTAR correction service.

## RTK

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select **RTK** along the left side of the differential settings prompt.

The following information and options will be available when configuring a compatible receiver and using the RTK correction type:



### RTK Format

Select the format of the correction messages sent from the RTK correction source.

### AUTO

AUTO will automatically search and detect compatible RTK correction formats.

### Network Type

Select the network from which the RTK corrections will be delivered.

### Baud Rate

Select the baud rate at which the correction messages are transmitted from the RTK correction source.

### Base Station ID

The base station identification number used for the current position solution. (Ex. Slingshot® connected device).





### Distance

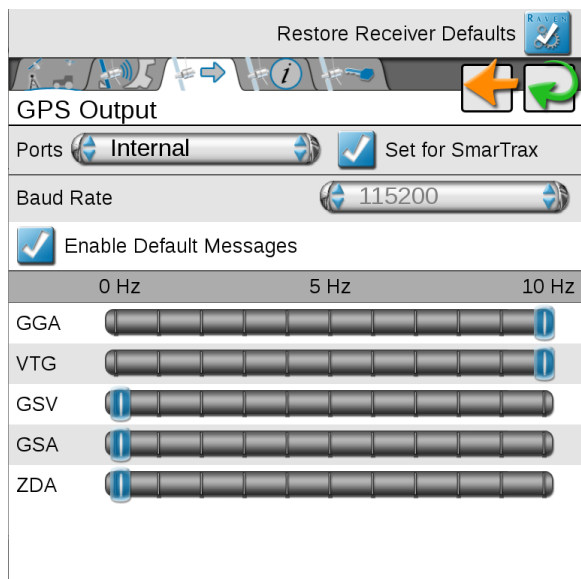
This value displays the baseline or distance from the vehicle position to the base station antenna.

### Latitude, Longitude, and Elevation

The bottom portion of the prompt when set for an RTK correction source will display the geographic coordinates and elevation of the current base station.

## GPS Output Tab

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select the **GPS Output**  tab.



### Use Defaults

Select **Use Defaults** to send default port and message settings to the selected receiver. This option may be used to reset defaults on either an integrated device receiver or a compatible Raven receiver connected to the ROS device.

**Note:** *With this option disabled, the following settings and options may be used to manually configure GPS output messages.*

### Ports Selection

Select the Ports drop down field and select the port to be configured. Port selection may affect the available message types and configured rates.

### Set for SmarTrax

Set for SmarTrax option is available for the ROS device output port. Select this option to automatically configure the device output for use with a Raven SmarTrax steering system.

### Message Types and Rates





The available port output message types and rates are displayed in the lower portion of the GPS Output tab. Select the slider buttons and drag the button to adjust the slider to set the desired message rates. Set the slider to 0 Hz to shut off the corresponding message. Shut off any messages not required for output to other system components to ensure the best possible performance during field operations.

### Port Baud Rate

Select the baud rate drop-down field and select the output communication rate for the ROS device. If connected to a Raven 600S, the baud rate will be locked at 115200 output on the connected port (typically Port A).

**Note:** *Some systems or components may require specific baud rate settings to receive messages sent from the ROS device. Please refer to the documentation provided with optional or external components for additional information on required communication settings when setting up ROS for use with optional devices.*

## GPS Information Tab

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select the **GPS Information Tab** .

GPS Information	
Model	D2LRPGTTNA
Serial Number	BFN12490231
Firmware Version	OEM060730RN0000
PAC code	QR633:7246:9910
Latitude	N43.550909°
Longitude	W96.724845°
Elevation	1483.85 ft
Satellites	18
Diff ID	138
Diff Age	5 seconds
HDOP	1.1
GGA Quality	2
UTC Time	21:41:55
UTC Date	Thu Jun 13 2019

### Model

Displays the GPS receiver model (e.g. Raven Phoenix 200, 600S, or Phoenix 300) or the current active model for the integrated receiver.

### Serial Number

The receiver serial number will be displayed in this area. This information may not be available for all receivers.

### Firmware Version

The current firmware version installed on the receiver. This information may not be available for all receivers.

### Latitude/Longitude

The current geographic coordinates of the ROS device.

### Elevation

The current GPS elevation above sea level.

### Satellites

Displays the number of satellites currently used in the position solution.

### Differential ID

Depending upon the correction source used, this value will display the differential source identification such as the differential satellite PRN, a base station ID, etc.

### Differential Age

This value is the age of the last differential update. The differential age should not rise above a few seconds to ensure accurate position corrections during field operations.

### HDOP

Horizontal Dilution of Precision (HDOP) is a value used to indicate the geometry of the satellite constellation used in the position solution. High HDOP values indicate that the visible satellite constellation is grouped close together which can negatively impact the accuracy of position and guidance systems.

### GGA Quality

Displays the current differential fix status. This value will display:





- '0' or '1' if no differential corrections are being received (single solution). It will display 0 if no GPS fix at all and one if there is a fix but no correction.
- '2' when the DGPS receiver has locked on to a differential source (SBAS, or convergence on GS/OmniSTAR).
- '4' for RTK fixed mode for fine GPS course correction mode.
- '5' for fixed GS or OmniSTAR XP/HP correction modes or RTK float mode.

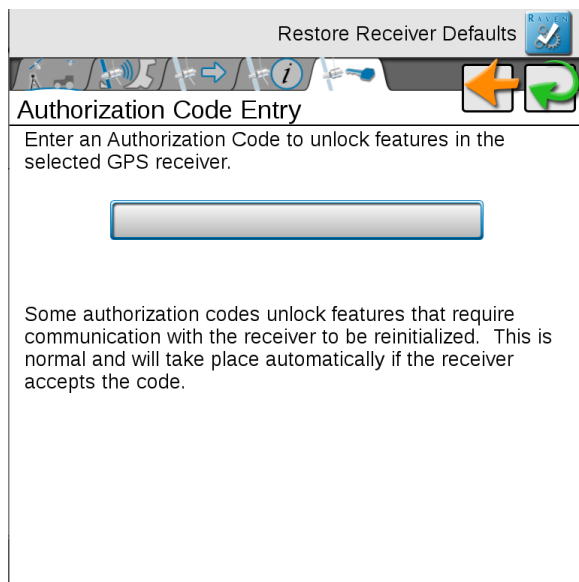
### UTC Time and Date

Universal coordinated time and date information is displayed in these fields.



## GPS Authorization Code Entry Tab

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **GPS**  module. The *GPS Global Settings* prompt will display.
3. Select the **GPS Configuration**  button to the right of desired receiver. The *Differential Settings* page will be displayed.
4. Select the **Authorization Code Entry**  tab.



### Authorization Code Field

Review the information displayed on the Authorization Code Entry tab before entering the code received from a local CNH dealer to activate or unlock optional features of the selected Raven receiver.

**Note:** Refer to "Unlock DGPS Receiver Features in ROS" on page 153 for assistance with obtaining the authorization code for optional features on the Raven receiver.

## Chapter 9:

# Serial Port and Device Information





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**Note:** The cabling in use determines which serial ports and devices are compatible with the field computer.

Raven field computers feature serial ports to connect to other devices. The field computer can display information about the serial port and devices connected to the port.

## View Serial Device Information

The ROS device provides a list of detected serial devices connected to the system. To review the serial devices currently detected by the ROS device:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **Serial Devices**  module. The *Serial Devices* tab will display. This tab will show the following information for each detected device:
  - serial device name
  - **automatic**  or **user configured**  communication settings
  - current active communication (COM) port
  - the input baud rate at which the ROS device is attempting to communicate with the device

**Note:** The COM port displayed on the *Serial Devices* tab does not reflect the cable connector label to which the device may be connected.

Redetect the serial devices if new devices are connected, or if an existing device connection is changed for any reason. Refer to "Redetect a Serial Device" on the next page for more information on detecting/redetecting serial devices.




## Serial Device Detection

Many different kinds of serial devices may be connected to the Raven field computer. Some devices may be automatically detected by the field computer software, but some devices

may need to be detected or redetected to function correctly.

## Redetect a Serial Device

To redetect serial devices connected to the system:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **Serial Devices**  module. The *Serial Devices* tab will display.
3. Select the **Redetect**  icon. A prompt will open.
4. Select whether to reset manually or user configured serial device communication settings before resetting and detecting connected serial devices and select **Yes** to restart the communication ports.
5. Allow the ROS device to scan the serial ports for connected devices. When complete, the *Serial Devices* tab will display.

## Lightbar Configuration

**Note:** *The cabling in use determines which serial ports and devices are compatible with the field computer.*

Raven field computers are compatible with external lightbars. Once connected the lightbar is properly connected, the field computer will detect the lightbar and allow the user to configure the lightbar settings.




**Note:** *For lightbar brightness settings, see "Brightness Settings" on page 49.*

## Configure Light Bar Display Settings

ROS may be used to control guidance information displayed on an external light bar. In this configuration, the light bar will only display information provided by the ROS device.

**Note:** *Refer to the installation instructions provided with the Raven light bar before connecting the light bar to the ROS device. Once installation is complete, connect the light bar to the 9-pin serial connection labeled "COM2", "COM3" or "Light Bar" on the appropriate cable. Contact a local CNH dealer for additional installation or connection assistance.*

To configure or adjust the light bar display settings:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **Light Bar**  module.
3. Select the **Light Bar**  tab to access the following light bar display settings:

### Path Deviation Sensitivity

The path sensitivity may be adjusted for the type of field operation being performed and allows the operator to adjust how the distance from the displayed guidance path will be displayed by the light bar. Select the fine, standard, and coarse presets as desired or touch the indicator values and enter custom values for each indicator.

### Bearing Deviation Sensitivity

The bearing sensitivity allows the operator to adjust how the light bar displays the course over ground (COG) deviation from the guidance path or line displayed by the ROS device. Select the fine or standard preset to adjust the light bar display.



### Reverse LED Option

When deselected, the light bar indicators will illuminate in the direction toward which the operator should steer to regain the guidance path. If the Reverse option is selected, the operator must steer away from the indicator lights to regain the correct guidance path.

## Configure the Light Bar Port

**Note:** Refer to the installation instructions provided with the Raven light bar before connecting the light bar to the ROS device. Once installation is complete, connect the light bar to the 9-pin serial connection labeled "COM2", "COM3" or "Light Bar" on the appropriate cable. Contact a local CNH dealer for additional installation or connection assistance.

To manually configure the light bar communication port settings:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **Light Bar**  module.

3. Select the **Port Configuration**  tab to access the following light bar display settings:

### Auto Detect

Enable the auto detect option and restart the serial communication ports to automatically detect a connected light bar device. Review "Redetect a Serial Device" on page 178 to restart serial communication ports.

**Note:** *The Port and Baud settings described below will not be available when the ROS device is configured for auto detecting a light bar.*

### Current Port Display

The current port on which the light bar is detected will be display in the upper, right corner of the Port Configuration tab for reference.

### Port

Touch the port drop down menu and select the communication port to which the light bar is connected to manually set the light bar communication port. Touch the Apply button to set the selected port setting.

**Note:** *The COM port selections do not necessarily reflect the connector label on the system cabling platform. Contact a local CNH dealer for additional assistance.*

### Baud

Touch the baud drop down menu and select the output baud rate from the light bar to manually configure the ROS device to detect the device. Touch the Apply button to set the selected baud setting.

**Note:** *When connecting a Raven RGL series light bar to the ROS device, it is recommended to set the light bar to a static baud rate. This will ensure that the serial device is detected when the ROS device scans for serial devices on power up.*

*If it is not possible to set the RGL lightbar to a static baud rate, lock ROS to a static baud rate for the port the RGL is connected to.*


## Configure Weather Station Devices in ROS


**Note:** *The cabling in use determines which serial ports and devices are compatible with the field computer.*

The ROS device is compatible with the WatchDog® Sprayer Station from Spectrum Technologies to record weather data during a field operation. When connected to ROS, the Sprayer Station may be used to display weather conditions throughout the day during field operations. The operator can also take a “snapshot” of weather conditions at any point during the operation and ROS will automatically add the information to the job or application report.

**Note:** *A weather station activation code will be required to unlock the weather station interface and features. Contact a local CNH dealer for additional information or assistance.*

To set up the weather station:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.

2. Select the **Weather Station**  module. The *Weather Station Settings* tab will display with the following settings:

#### Enable Logging to Job File

Select this option to allow ROS to automatically log weather data from the weather station for the job report.

#### Log Time Interval

Set the frequency for logging weather data into the application report. This information will only be available in the shapefile report. Refer to "File Export" on page 92 for additional information on exporting the shapefile job report with completed job files.

#### Enable Wind Speed Warning

Enable a warning alert if the weather station detects a wind speed over the set threshold during an in-field operation.


#### Wind Speed Threshold

Set the maximum wind speed allowed during field operations. The weather station will display an alarm if the weather station detects wind speeds above the set threshold.

#### Audible Alarm Interval

If enabled, the ROS device will sound an audible wind speed alert at the selected interval as long as the wind speed threshold is exceeded.

## Record Weather Snapshot

During an active job, touch and hold the **Weather Station**  widget to view detailed weather conditions currently monitored by the station. Touch the **Record Snapshot** button at the bottom of the Weather Station prompt to record the current conditions into the job report screen.

Refer to "End a Job" on page 235 for additional assistance with closing job files and editing weather information.

"WatchDog® Sprayer Station is a U.S. registered trademark of Spectrum Technologies"

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# Configure Third-Party Rate Provider Device Settings in ROS

**Note:** *The cabling in use determines which serial ports and devices are compatible with the field computer.*

*A third-party device activation code will be required to unlock the device interface and features. Contact a local CNH dealer for additional information or assistance.*

The ROS device is capable of interfacing with third-party rate management systems to adjust the application based upon the crop conditions detected by the third-party system. ROS will control the application system based upon the third-party device interface to adjust application rates as necessary during field operations.

To set up a third-party rate provider device:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **Third-Party Device**  module. The *Port Configuration* tab will be displayed with the following settings:

## Auto Detect

The auto detect option is recommended to allow the ROS device to automatically detect and connect to the third-party system upon system start up. Deselect this option only if the automatic detect feature is not properly connecting the third-party system or if instructed by a Raven technician.

Auto Detect must be disabled to access the following manual settings:

## Port

Manually select the port on which the third-party system may be detected.

## Baud

Select the baud rate for third-party communication during field operations.

## Apply Button



Select the **Apply** button when making changes to the communication settings to save the displayed settings.



## Hardwired Reverse Sense

This feature may be used to display a reverse camera view when reversing the machine or equipment. The hardwired reverse sense screen does not currently impact equipment position or mapping features on ROS devices.

Hardwired reverse sense allows the ROS device to display a reverse view camera if configured. To set up the Hardwired Reverse Sense feature:

1. Select the **Edit**  icon in the Machine Panel to view the machine devices.
2. Locate and select the **Hardwired Remote Sense**  module. The Hardwired Reverse Sense window will open.
3. Use the **Enable Hardwired Reverse Sense** option.

**Note:** Refer to "Analog Video Camera Configuration" below to configure camera views and enable the reverse camera pop-up.

4. Test the reverse detection feature. If the reverse view camera does not display correctly, enable the **Override Direction** check box to switch the polarity of the Hardwired Reverse Sense.

## Analog Video Camera Configuration


Raven field computers can connect to camera devices attached to the machine. Ensure all cable connections and devices are set up before configuring these settings in the field computer.


### Configure Camera

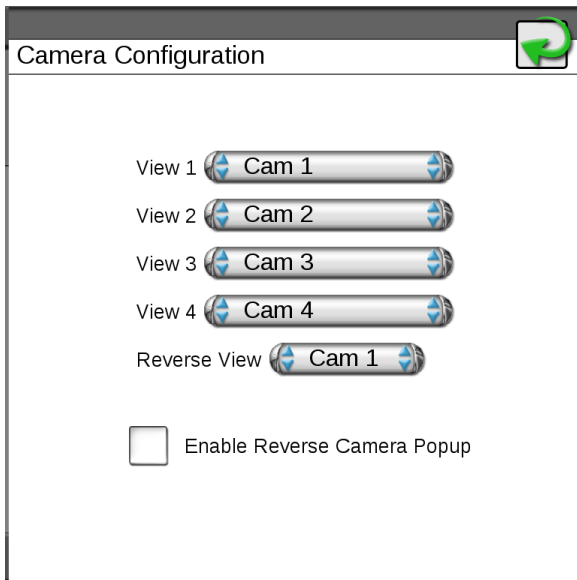
The ROS device can support up to four cameras.

**Note:** Refer to "Hardwired Reverse Sense" above for information on setting up the hardwired reverse sense feature.

To configure the camera views:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.

2. Locate and select the **Camera**  module. The *Camera Configuration* window will be displayed.
3. Use the **View** drop-down options to configure the camera for each view.
4. Use the **Reverse View** drop-down to set the camera providing a reverse camera view if applicable.
5. Select the **Enable Reverse Camera Popup** to provide a reverse camera view popup on the ROS device when GPS detects that the machine is moving in reverse.




**Note:** Refer to "Analog Video Camera Operation" below for information on operating analog video cameras.

## Analog Video Camera Operation

Raven field computers can view a live feed of camera devices . Ensure all devices and settings are configured before attempting to view the camera feeds.

### View Camera Feeds

To view the camera feeds while not in a job:

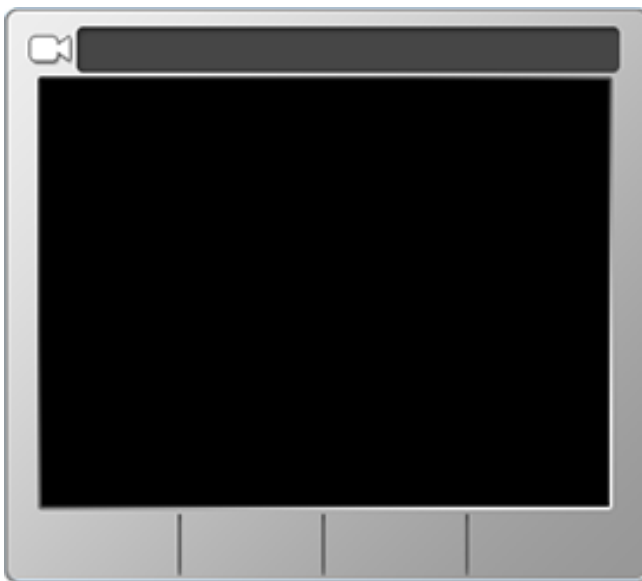
1. Select the **Camera**  module along the bottom of the display. The *Camera* view will be displayed.

2. Select the desired view (**View 1-4**) or the **Reverse View** to view the camera feed of the selected camera.



To view the camera feeds while in an active operation:

1. Select the **Camera Interface** widget.



2. Select the camera feeds along the bottom of the widget to select the desired feed to view during a field operation.

**Note:** Refer to "Analog Video Camera Configuration" on page 184 for information on configuring analog video cameras.

## Wi-Fi Connections Overview

Raven field computers can connect to Wi-Fi networks to give the device internet access. If compatible, Raven field computers can broadcast a Wi-Fi hotspot to other devices.

**Note:** For Wi-Fi functionality, ensure a Wi-Fi antenna is installed on the back of the Viper® 4+ in port 8.

Refer to the following articles for more information on:

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<a href="#">Connect to Wi-Fi</a> .....	187
<a href="#">Manually Add a Wi-Fi Network</a> .....	189
<a href="#">Wi-Fi Hotspot</a> .....	189

### Connect to Wi-Fi



Raven field computers can connect to Wi-Fi networks and set priority levels for specific networks.

#### Configure Networking Settings

**Note:** Networking settings are only available when logged in as an Administrator on the ROS device.

To connect the ROS device to a Wi-Fi network:

**Note:** The ROS device will automatically connect to known networks or hotspots with the strongest signal strength. The administrator may also create a connection priority list to set preferred connections which can be configured to help save plan data on mobile hotspots.

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **Networking**  module. The *Wireless Connectivity* tab will be displayed.

3. To select a Wi-Fi network, select **Client** from the drop-down menu. A list of available Wi-Fi networks or hotspots will be displayed.

**Note:** Select the **Refresh** button to redetect available networks. If a Wi-Fi network is not detected, ensure a Wi-Fi antenna is installed and that a Wi-Fi network is in within range.

4. Select the desired Wi-Fi network from the list and select the **Connect** button.

**Note:** Use the **Connect Automatically** check box to allow the ROS device to connect to the network or hotspot whenever it is available.

5. A *Password Required* prompt will be displayed if the network requires a password to connect. Enter the Wi-Fi password and select the **Accept** button.

6. The ROS device will attempt to connect to the Wi-Fi network. **Connected** will be displayed on the network or hotspot currently used for wireless communications.

**Note:** The hotspot is located in the drop-down menu below the Wi-Fi symbol.

7. Repeat step 4 through step 6 to connect to additional networks or hotspots if desired.

## Add a Priority Wi-Fi Connection


The administrator may set an order for preferred wireless networks and hotspots. This feature allows the ROS device to automatically connect to a home or shop Wi-Fi network when available to help save plan data on a mobile hotspot.




**Note:** The **Connect Automatically** option must be enabled to add a connection to the Wi-Fi priority connections.

*The ROS device will automatically connect to the Wi-Fi network or hotspot highest on the priority list when available. If no priority connections are available, the ROS device will connect to the available network with the strongest signal strength.*

*If Wi-Fi priority is set but a priority network is not in range, the Viper® 4+ will attempt to connect to any Wi-Fi connection in range that has Connect Automatically enabled.*

To set a Wi-Fi priority list:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.






2. Locate and select the **Networking**  module. The *Wireless Connectivity* tab will be displayed.
3. Select the **Settings**  button to navigate to the *Network Settings* tab.
4. Select the **Priority Settings** option. The *Automatic Connection Order* screen will be displayed.
5. Select the **Add**  button in the upper, right corner of screen and select one of the desired wireless connections. Do this for as many connections as desired.
6. If needed, use the up/down arrows to move the connections into the desired order.

## Manually Add a Wi-Fi Network

If a Wi-Fi network is not automatically detected, the user can manually enter the network specifications to connect to the network.

### Manually Setup Wi-Fi Network

To manually setup a network:




1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **Networking**  module. The *Wireless Connectivity* tab will be displayed.
3. Select the **Settings**  button to navigate to the *Network Settings* tab.
4. Select the *Connection Setup* option and then select the **Add**  button.
5. Use the *Create Profile* prompt to enter the **Network Name**, select the **Security** option, and enter the **Password**, if necessary.
6. Select the **Accept**  button to save the displayed settings and return to the *Wireless Connectivity* tab.

## Wi-Fi Hotspot

Some Raven field computers are capable of broadcasting a Wi-Fi hotspot to allow other devices to connect to and use the internet source of the field computer.

## Create a ROS Wi-Fi Hotspot

To use the ROS device as a Wi-Fi hotspot:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **Networking**  module. The *Wireless Connectivity* tab will be displayed.
3. Select the **Settings**  button to navigate to the *Network Settings* tab.
4. Select the **Hotspot Settings** option.

**Note:** *Enabling this option will disable Wi-Fi connections received by the ROS device. The ROS device cannot broadcast a hotspot while using a wireless connection to send and receive wireless data.*

5. If the ROS device is connected to a Wi-Fi network or hotspot, select the **Yes** button to disable Wi-Fi connectivity on the device.
6. Enter an SSID name for the hotspot.
7. Enter the password that must be entered on devices connecting to the hotspot.

8. To view devices connected to the hotspot broadcasted by the ROS device, navigate back to the *Wireless Connectivity* tab and select **Hotspot** in the drop-down menu.



**Note:** If **Auto** is selected, the field computer will negotiate with other nodes on the bus to determine who is hot-spot and who is client and connect appropriately.

**Auto** is typically recommended for pairing with an RS1™ device.





## Chapter 9:

# CANbus Overview

A Controller Area Network, or CAN, system is a high-integrity serial data communications bus that operates at a data rate of 250 kilobits per second for real-time control applications and uses special cables and terminators for operation. The CAN protocol has excellent error detection and confinement capabilities, making it very suitable and reliable for agricultural applications.

CAN systems allow products to be added to a control system at any time. Multiple control channels may be available for use with the field computer device for any combination of liquid, granular, chemical injection or spinner control applications.

### NOTICE



Refer to the *Raven CANbus Network Installation Manual* for installation information for individual CANbus control components. Be sure each component is properly mounted and cables are connected prior to powering the field computer.

## CANbus Detection and Version Information

The ROS device must be able to communicate with the CANBUS system when monitoring or controlling field operations. On power up, the ROS device should automatically establish communication with the boom/speed node, any AccuBoom™, AutoBoom®, or SmarTrax™ nodes (if installed) and multiple product control channels via the CANbus.

**Note:** *Product nodes may need to be readdressed before the ROS device will be able to detect each control channel on the CANbus. See "Readdressing Control Channels" on page 199 for detailed instructions on readdressing the product nodes. Contact a local CNH dealer for more information on required activation keys for controlling multiple products using the ROS device.*

The following articles offer further assistance with configuring or viewing CANbus information:


- "CANbus Node or ECU Version Information" on the facing page
- "Retry CANbus Communication" on page 197
- "Multi-Channel Node or ECU Configuration" on page 198
- "Readdressing Control Channels" on page 199
- "Reset CANbus Nodes" on page 201
- "Node Features and Activation Status" on page 202


## CANbus Node or ECU Version Information

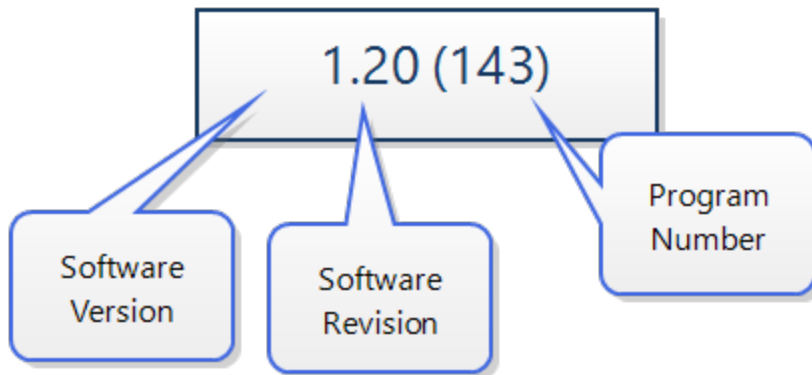
The ROS device must be able to communicate with the CANbus system when monitoring or controlling field operations. On power up, the ROS device should automatically establish communication with the boom/speed node, any AccuBoom™, AutoBoom®, or SmarTrax nodes (if installed) and multiple product control channels via the CANbus.

**Note:** *Product nodes may need to be readdressed before the ROS device will be able to detect each control channel on the CANbus. Refer to "Readdressing Control Channels" on page 199 for detailed instructions on readdressing the product nodes. Contact a local CNH dealer for more information on required activation keys for controlling multiple products using the ROS device.*

To view a list of nodes currently detected on the CANbus or ISOBUS network:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.

2. Locate and select the **CAN System**  module. The *CAN System* tab will be displayed. This tab will show a list of the CAN control nodes, available control channels, software version, software revision, and program number of each node detected on the CANbus.



**Note:** If a product node or control channel does not display as anticipated, retry the CANbus initialization. If the node or control channel is still not available, readdress the product control nodes or troubleshoot the node before starting field operations. Contact a local CNH dealer for additional assistance.




Review the "Install CANbus or ISOBus Firmware Updates in ROS" on page 65 for assistance with installing node updates to nodes connected to the CAN system. Only Raven CANbus nodes may be updated via the ROS device and CANbus communication system. ISOBUS ECUs cannot be updated via the ROS device.

## Retry CANbus Communication

If the ROS device loses communication with a node, restarting the CANbus may reestablish communication with the node.

**Note:** *If communication is not restored, or if the node continues to encounter communication issues, refer to the Raven CANbus Installation Manual or contact a local CNH dealer for assistance with troubleshooting the node.*

To restart CANbus network communications:




1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **CAN System**  module. The *CAN System* tab will be displayed.
3. Select the **Retry CAN**  button at the bottom of the *CAN System* tab to manually restart CANbus communication.
4. Confirm the restart of the CANbus system. ROS will restart the CANbus and return to the *CAN System* tab.
5. If all nodes are detected, continue field operations as normal. If product control nodes or control channels are not detected, the CANbus may need to be readdressed. Refer to "Readdressing Control Channels" on page 199 for assistance with readdressing the CANbus system.

## Multi-Channel Node or ECU Configuration

Some Raven CANbus nodes or ISOBUS ECUs may offer multiple channels for product rate control via the CANbus network. The number of channels available via these multi-channel or “multi-product” nodes may be increased or decreased for the equipment on which they will be used. It is recommended to configure nodes for only the number of channels offered by the vehicle or application equipment.

**Note:** *Some multi-channel nodes may require a feature unlock or activation code to allow access to additional control channels. Contact a local CNH dealer for more information or to purchase additional node capabilities.*

To configure a multi-channel node:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **CAN System**  module. The *CAN System* tab will be displayed.
3. Select the **Reset Product Control Node**  button at the bottom of the *CAN System* tab. A prompt with the currently set number of channels will be displayed.
4. Select the **Current Channel** value and use the on-screen keypad to enter the desired number of channels to be controlled via the multi-channel node.

**Note:** *ROS will only allow the operator to enter a value for the maximum number of channels currently available via the multi-channel node. Contact a local CNH dealer for more information or to purchase additional node capabilities.*




5. Select the **OK** button to accept the displayed value. The ROS device will reconfigure the multi-channel node and restart CANbus communications.

## Readdressing Control Channels

If the ROS device is unable to detect a CANbus node on start-up, troubleshoot the CANbus and the node and then readdress the CANbus:

**Note:** Only nodes offering product control channels will need to be addressed (single or multi-product nodes, motor control, planter or seeder control nodes, etc.). When readdressing multi-channel control nodes, configure the number of channels on the node prior to readdressing the CANbus. Review "Multi-Channel Node or ECU Configuration" on the previous page for details on configuring multi-channel control nodes.

### Raven CANbus Network



1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **CAN System**  module. The *CAN System* tab will be displayed.
3. Select the **Readdress CAN**  button at the bottom of the *CAN System* tab.
4. Confirm the readdressing operation for nodes offering product control channels.
5. Cycle logic power to the node to be assigned to control channel 1. To cycle power:
  - a. remove the logic power fuse on the cable connected directly to the node,
  - b. disconnect the node harness from the CANbus network (generation 2 systems),  
or
  - c. remove the node connector with the power and ground (red and white lead wires).
6. Continue to cycle logic power for any remaining nodes connected to the CANbus to assign remaining control channels as necessary.
7. When all product control nodes on the CANbus system have been assigned to control channels, select the **OK** button to finish the readdressing process.
8. ROS will restart CANbus communications and return to the CAN system tab. If all nodes are detected, continue field operations as normal. If CAN control nodes are still not detected, refer to the *Raven CANbus Installation Manual* or contact a local CNH dealer for additional assistance troubleshooting the node.



## ISOBUS Network

ECUs with product control capabilities may be re-ordered, or re-addressed, on the UT display using the ISO Product Control module. This feature may be useful to configure the ECU display or resort control channels for display during field operations.

If the ISOBUS needs to be reconfigured:




1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **ISO Product Control**  module. The *Product ID Mapping* page will be displayed.
3. Select the desired control channel to modify.
4. Select the up or down arrows along the right side of the display to move the selected channel up or down in the channel order.
5. Repeat this process for each control channel to readdress each product control channel available on the ISOBUS system.

---

## Reset CANbus Nodes

Resetting nodes to default settings will erase all settings stored on CANbus nodes used for product control and is not recommended unless directed by an authorized Raven service technician.




To reset the CANbus nodes to default settings:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **CAN System**  module. The *CAN System* tab will be displayed.
3. Select the **Reset Nodes**  button at the bottom of the *CAN System* tab to reset all CANbus product control nodes to default settings.
4. Confirm the CANbus reset. ROS will restore the CANbus settings and return to the *CAN System* tab.

## Node Features and Activation Status

Refer to "Feature Unlocks Overview" on page 67 for assistance with ROS features and activation status information.


To view any features activated with the Raven CANbus:


1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Locate and select the **CAN System**  module. The *CAN System* tab will be displayed.
3. Select the **Hardware Unlocks**  tab. Any features unlocked and available for use on the CANbus control system will be displayed on this prompt. Contact a local CNH dealer for additional assistance with available features and obtaining a feature activation code.

## Speed Sensor Set Up

A speed sensor is required for the ROS device to perform speed based control system operations such as product rate control, planter or seeder control, yield mapping, etc. Several options are available for speed sense and input. Contact a local CNH dealer for additional information.

To configure the ROS device for the speed sensor connected to the system:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.

2. Locate and select the **Speed Settings**  module. The *Speed Settings* tab will be displayed with the following settings, displays, and options:

### Sensor Type

Select the type of sensor currently used for speed signal with the control system.

### Speed Cal

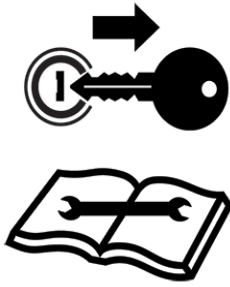
The speed calibration value is used to tune and adjust the control system to the connected speed sensor. A calibration value may be entered for each sensor type to allow the operator to quickly switch between speed sources if necessary without recalibrating the speed system during an active job.

The following calibration values are recommended for initial system set up:

Sensor Type Setting	Used with	Recommended Initial Speed Cal	
		Imperial	Metric
Wheel	Wheel Magnets	1000	254
	Speedometer Drive Speed Sensor	612	155
Radar	Raven Radar	598	152
GPS	External Raven DGPS Receiver	785	199
	Internal DGPS Receiver	812	206
	GPS Speed over CANbus <i>Note: A boom/speed node with firmware version 1.6 is required for GPS speed over CANbus.</i>	100	1000

These values are good starting points and generally yield adequate results, however, the speed cal should be refined for the specific system and equipment. Refer to "Calculate the Speed Calibration Values" on page 299 for instructions on refining the speed calibration.

**Note:** The GPS speed over CANbus feature is only available with specific Raven speed sense nodes. This feature utilizes NMEA speed over ground data transmitted over the CAN network which eliminates the need for a separate, external speed sensor.

**NOTICE**

When using the GPS speed over CANbus feature, no refining or adjustment is available for the speed cal value. Losing GPS signal for more than a second will also result in loss of the CAN speed signal which may affect product application in progress.

### Current Speed Display

The speed settings tab displays the current vehicle speed monitored by the selected speed sensor.

### Test Speed

The test speed feature may be used to simulate a speed signal when testing or troubleshooting the control and monitoring systems and allows the operator to check system function while the vehicle is stopped. To use the test speed feature, touch the self-test speed field and use the on-screen keypad to enter a value approximately equal to normal application speeds.

**Note:** A speed cal value must be set for the selected sensor type to allow the test speed feature to function. The test speed feature will be cleared automatically if the ROS device receives a signal from the actual speed sensor. To keep the test speed feature from disengaging, disconnect the speed sensor from the system during testing.

When utilizing a Test Speed, verify AccuBoom™ is disabled. AccuBoom™ requires a live GPS movement input so the Test Speed will not working correctly with it enabled.

### Distance Information and Reset

The ROS device monitors and tallies the distance traveled during equipment operation. This display may be used as an odometer or "trip meter" for the distance traveled by the equipment over a season or during a specific field operation.

**Note:** To reset the ROS device distance tally, touch the recal distance icon in the lower, right corner of the speed settings tab.



## Master Switch Configuration

Raven field computers can utilize a physical or on-screen master switch which can be configured within the field computer software.

### Configure the Master Switch Options

To configure ROS master switch options:

**Note:** *The master switch module will not be available if a boom speed node or other switch hardware (e.g. Raven Switch Box or SwitchPro) is detected on the CANbus.*

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Select the **Master Switch**  module.
3. Select the option necessary and best suited for implement control:
  - **On-Screen Master Switch** - Select this option to allow the operator to use an on-screen master switch widget to toggle the implement status. With this option selected, the operator will need to add the master switch widget to the guidance display in order to toggle coverage history on or off during field operations.

**Note:** *The on-screen master switch is only capable of toggling coverage for a single section or full implement. Review "Add Widgets to a Screen Layout" on page 258 for assistance with setting up and adding widgets to the guidance display for field operations.*
  - **Remote Master Switch** - Select this option if a remote master or proximity switch is connected to the "Remote Switch" connector on the chassis cable. Review the Raven CANbus System Installation Manual for additional information on installing the generation 1 interface or generation 2 chassis cable platforms.

## On-Screen Switch Box Configuration

The on-screen switch box option provides an options to control implement status right on the field computer display. This option may be preferable for equipment without existing switches or when a physical switch box is impractical or undesirable for operations.

**Note:** *The on-screen switch box must be configured prior to adding the widget to the run screen for use during in-field operations.*



**Note:** Refer to "Configure Widget Layouts" on page 257 for additional assistance with adding the widgets to the operation screen of the field computer.



## Configure On-Screen Switch Box


**Note:** Additional hardware may be required to control individual sections using the on-screen switch box. Contact a local CNH dealer for additional assistance or ordering information.

**Note:** The on-screen switch box option will not be available if a RavenSwitch Pro™ or CAN Switch Box is detected on the CANbus.

To configure the switch box:

1. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
2. Select the **On-Screen Switch Box**  module.
 

**Note:** If the on-screen switch box has been previously configured, a summary of the switch box assignments will be displayed.
3. Select the **Edit**  icon.
4. Select the **On-Screen Switch Box**  tab.
5. Select the number of switches value and use the on-screen keypad to enter the desired number of switches to control implement section functions.
6. If desired, select the section labels in the lower portion of the on-screen switch box tab to customize the switch box labels displayed during field operations.
7. To automatically assign sections to configured switches, select the **Auto-Map Sections** button in the lower, right corner of the display. This button will only be available if the number of configured implement sections matches the number of switches.
 

**Note:** Verify the section assignments before starting an actual field operation with the automatic section assignments.
8. To manually change assignments, select the **Switch Assignments**  tab.
9. Select a switch function in the upper portion of the Assignments tab.



10. Review all implement sections currently assigned to the on-screen switch function.
11. To change switch assignments, select the **Change Assignment** button. Only unassigned sections will be displayed on the section assignment screen for the selected switch. To reassign a section to a different switch function, the section must first be unassigned from the current switch.

# Chapter 10:

## Product Configuration

---

Raven field computers allow the user to configure and manage products for use in field operations.

Refer to the following articles for more information on:

---

<a href="#">Create a New Product</a> .....	209
<a href="#">Add a New Product Configuration</a> .....	209
<a href="#">Product Reporting Information in ROS</a> .....	210
<a href="#">Mix Ratios and Ingredients in ROS</a> .....	211
<a href="#">Edit a Product</a> .....	214
<a href="#">Edit a Product Configuration</a> .....	214
<a href="#">Delete a Product</a> .....	215
<a href="#">Configure a Bin Chain in ROS</a> .....	216
<a href="#">Configure Chain Profiles</a> .....	216
<a href="#">Operate the Bin Chain Job Widget</a> .....	217

## Create a New Product




Products can be added, customized, and saved in Raven field computers for use in field operations.

### Add a New Product Configuration

Product configurations save information on products assigned to each control channel and may be used to quickly set up the Raven OS for common or various input or application operations. The product configuration information may be used to enhanced job reporting information and allows improved product information to be saved, changed, and used quickly and easily.

To create a new product configuration:



---

1. Select the **Product Configuration**  panel to display any available product configurations.
2. Select the **Add**  button to create a new product configuration.
3. Use the on-screen keyboard to enter the desired name or description for the product configuration and touch the **Done**  button. The product setup screen will be displayed.
4. Refer to "Product Reporting Information in ROS" below and "Mix Ratios and Ingredients in ROS" on the facing page to configure the product or mix information for each control channel available in the product configuration.

## Product Reporting Information in ROS

The product channel information may be used to enhance the job reporting features and provide detailed input or application information for reference during the growing season or for archival record keeping.

To set up control channel information:

1. Select the **Product Configuration**  panel to display any available product configurations.  
***Note:** Refer to "Product Configuration" on the previous page for more information on how to create or edit a product configuration.*
2. Select the **Edit**  button in the Product Configuration panel to edit the selected product configuration.
3. Select a channel indicator shown along the left side of the prompt to select the control channel on which to add product information.

4. Select the **Mix Name** field to create or edit the tank mix or granular blend name. To select a previously configured mix, select the **Mix Name** drop-down and select a previous mix to assign the mix to the selected control channel.

**Note:** *Selecting a previous mix or blend will automatically enter any information entered previously for the remaining fields. Verify the mix or blend information before proceeding to the next control channel.*

*Editing the mix name will not create a new mix with the existing mix or blend information.*



5. If desired, select the unit to toggle between units (gal, pt, fl oz).

**Note:** *If needed, there is a mix calculator available to assist with determining the appropriate mix. Press the **Rate Calculator**  button and enter the desired values.*

6. Once the Mix Name is entered, the Raven OS will set the **Display As** label for the mix. If desired, select the **Display As** field and edit the label (up to 4 characters) to be displayed during field operations on user selected widgets.

7. Select the **Tank Manager**  button.

8. Select the **Current Volume** or **Current Weight** field and set the current tank volume or bin weight available for the mix or blend. This value is the total amount of product (carrier and all ingredients) in the tank or bin.

9. To refill a tank or bin to the full capacity of the product tank or bin, select the **Refill**  button. To refill all tanks or bins to full capacity, select the **Refill All**  button at the top of the prompt.

## Mix Ratios and Ingredients in ROS



When configuring a control channel for liquid control, the Product Configuration prompt will display a Carrier and Carrier Volume field. The Raven Operating System (ROS) uses the carrier volume or rate field to calculate the ratio of carrier and mixed ingredients during the field application.

### Enter Carrier Information

To enter carrier information for a tank mix:

1. Select the **Product Configuration**  panel to display any available product configurations.

**Note:** Refer to "Product Configuration" on page 209 for more information on how to create or edit a product configuration.

2. Select the **Edit**  button in the Product Configuration panel to edit the selected product configuration. If the control channel is configured for liquid product control, the Carrier and Carrier Volume fields will be displayed.
3. Select the **Carrier** drop-down selection and select the existing carrier product or select the **Add**  button to create a new carrier.
4. For liquid products, select the **Carrier Volume** field and enter the volume of carrier used in the mix. This field is used to set the ratio of product and does not have to reflect the actual volume of carrier in the tank.

**Note:** For example, if a chemical supplier used 1500 gallons of water mixed with 500 gallons of a liquid fertilizer for the nurse tank mixture, the Carrier Volume may be entered as 1500 and the ingredient volume may be entered as 500. The Raven OS will calculate the ratio for each tank load for the field application.


### Add Ingredients






The lower portion of the Product Configuration prompt allows mix or blend ingredients to be added to the Product Configuration. This information is used to calculate the ratios of product applied during field operations with the mix or blend assigned to the control channel.

To select ingredients and enter product information:

1. Select the **Product Configuration**  panel to display any available product configurations.





**Note:** Refer to "Product Configuration" on page 209 for more information on how to create or edit a product configuration.

2. Select the **Edit**  button in the Product Configuration panel to edit the selected product configuration.

3. Select the **Add**  button to add a product to the ingredient list. The *Favorite Products* list will be displayed. The Favorite Products prompt displays products that have been used for previous product configurations.
4. Select the desired product from the recently used list if available and select the **Done**  button to add the product to the ingredients list. To add an ingredient from the product database, select the **Add**  button at the bottom of the Favorite Products prompt. The *Reference Products* prompt will be displayed.
5. The *Reference Products* database contains thousands of preconfigured agricultural products and information that may be added to the ingredient list.
6. Use the filter options at the top of the *Reference Products* prompt to help locate and select the desired product for the ingredients list and select the **Done**  button to add the selected product to the ingredients list.  
**Note:** *The selected product will also be added to the Favorite Products list.*
7. To create a new product or ingredient not available in the product database, touch the **Add**  button at the bottom of the *Reference Products* prompt.

### Create a New Ingredient

To create a custom product or ingredient for a product configuration:

1. Select the **Edit**  button in the Product Configuration panel to edit the selected product configuration.  
**Note:** *Refer to "Product Configuration" on page 209 for more information on how to create or edit a product configuration.*
2. Select the **Add**  button at the bottom of the Product Configuration prompt to display the *Favorite Products* list.
3. Select the **Add**  button again to view the *Reference Products* database.
4. Select the **Add**  button once more to access the *Product Details* prompt.

5. Select the **Type** drop-down list and select the type of product to be added.

**Note:** Use the *Type filter option* available to the right of the *Type drop-down* to filter the product database information. This feature may be useful when adding a new product based off of a previous product line already in the database.

6. Select the **Manufacturer** field or select the drop-down option to enter or select a manufacturer.

**Note:** Use the *Manufacturer filter option* to the right of the *Manufacturer drop down list* to filter the product database information. This feature may be useful when adding a new product from a manufacturer already in the database.

7. Select the **Name** field or select the drop-down option to enter or select a product name or description already in the product database.

**Note:** Use the *product Name filter option* to the right of the *Name drop down list* to filter the product database information. This feature may be useful when adding a new product based upon a product or product line already in the database.

8. Select the **Liquid/Dry** drop-down and select the type of product to be configured.

9. Select the **Units** drop-down and select the preferred application rate units.

10. Select the **Registration** field and enter any registration information as available or necessary for reporting to governmental or environmental agencies.

11. Enter any additional product notes in the **Notes** area.



## Edit a Product

Existing products in Raven field computers can be edited or altered if changes are needed.

### Edit a Product Configuration

Product configurations save information on products assigned to each control channel and may be used to quickly set up the Raven OS for common or various input or application operations. The product configuration information may be used to enhanced job reporting information and allows improved product information to be saved, changed, and used quickly and easily.

To edit or modify an existing product configuration:

1. Select the **Product Configuration**  panel to display any available product configurations.
2. If necessary, select the product configuration to be modified.
3. Select the **Edit**  button to edit the selected product configuration. The *product configuration* prompt will be displayed.
4. Edit the existing information for each control channel as necessary to modify or adjust the configuration for the field operation needs. Refer to "Product Reporting Information in ROS" on page 210 and "Mix Ratios and Ingredients in ROS" on page 211 for additional information on entering product information for each control channel available in the product configuration.

## Delete a Product



In some cases, outdated or unneeded products should be removed from the field computer to free up space for different products.

**Note:** *Once deleted, products cannot be retrieved.*

**Note:** *Deleting a product configuration does not delete product information assigned to the configuration.*

Product configurations save information on products assigned to each control channel and may be used to quickly set up the Raven OS for common or various input or application operations. The product configuration information may be used to enhanced job reporting information and allows improved product information to be saved, changed, and used quickly and easily.




To delete an existing product configuration:

1. Select the **Product Configuration**  panel to display any available product configurations.
2. Select the product configuration to be removed.
3. Select **Delete** .
4. Select the **Yes** button on the displayed prompt to permanently delete the product configuration.



## Configure a Bin Chain in ROS

To manually configure Bin Chaining:



1. Open a job that is desired to use bin chains. Do not start the job.
2. In the Tank Assignment section, select the **Bin Chain**  icon. The *Bin Chain Management* prompt will display.  
**Note:** *If the Bin Chain icon is green, ROS has automatically chained the products with the same Product Mix name. If the icon is gray, there are no chained products or a manual chain may be configured.*
3. Select the **Manual Group** box.
4. Select and hold the **Add Bin Chains**  icon to add nodes. The primary product window will open.
5. Configure the **Primary Product, Bin Chain Name, and Rate Information.**
6. Select the **Add Node**  icon in the selected chain field to add other bins to the product.
7. Select the advanced method for bin switching. This can either be done when the Bin Level sensor alarm is triggered, when there is an empty tank, or a low tank alarm is triggered.
8. Repeat the process for each empty chain. A minimum of four products/nodes are required to have multiple chains.
9. After completing a bin chain, it is possible to reverse the bin chain order by pressing **Reverse**. This changes the order of the links (instead of 1 - 3 the order would become 3 -1).

**Note:** *After a bin chain has been configured, the user can create and select chain profiles. See "Configure Chain Profiles" below for more information on chain profiles.*

## Configure Chain Profiles

To configure a chain profile:

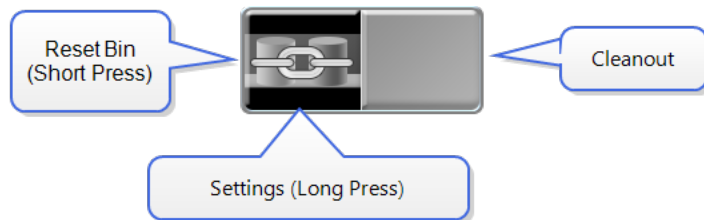
1. Manually create a chain. Refer to "Configure a Bin Chain in ROS" above for more information on manually creating a chain.

2. In the *Bin Chain Management* window, use the **Select Profile** button to open the *Select Bin Chain Profile* prompt.
3. Use the **magnifying glass**  icon to open the drop-down menu.
4. In the drop-down menu, select either the **Add**  button to create a new profile, or select the desired existing profile.
5. If creating a new chain profile, name the profile.

**Note:** To delete a chain profile, select the **X** next the unneeded profile in the drop-down menu.



## Operate the Bin Chain Job Widget

**Note:** If no bin chains have been configured, the following options will not be available. Refer to "Configure a Bin Chain in ROS" on the previous page and "Configure Chain Profiles" on the previous page for instructions on configuring bin chains and chain profiles.



To reset the chain to the first link, press the left half of the Bin Chain button.

To activate or deactivate cleanout, press the right half of the Bin Chain button. Cleanout is only available after the chain has completed with the advance method detected for all links in the chain.

To open the settings page, long press the bin chain button. There are two tabs. The first tab (**Bin Chain Settings** ) allows the user to adjust the settings as desired. The second tab (**Bin Link Order** ) allows the user to rearrange bin chain order.

### Bin Chain Settings Tab

To view and adjust settings on the *Bin Chain Settings* tab:

1. Select and hold the Bin Chain widget. The *Bin Chain Settings* will open.

Bin Chain Settings

Select Bin Chain: N01

Active Link: SingleProductNode 3

Advance Method

Auto Advance

Bin Level Sensor

Tank Empty

Low Tank

Action Upon Completion

Shutdown Chain

Start Cleanout

Delayed Chain Shutdown 0 sec

### Select Bin Chain

Change the product.

### Active Link

Select the desired node.

### Advance Method

Select Auto Advance and refine the settings based on preferences.

**Note:** Select only one of the auto advance options.

**Bin Level Sensor** - Advances to next node in the chain when the bin level sensor low level triggers.

**Tank Empty** - Advances to the next node in the chain when the tank is empty.

**Low Tank** - Advance to the next node in the chain when the low tank sensor triggers.

### Activation Upon Completion

**Shutdown Chain** - Will turn all nodes in the chain off when the last bin is complete. The chain will go into cleanout ready mode.


**Start Cleanout** - Will turn all of the nodes to auto with each having a fraction of the target rate for each bin. For example, a two bin chain will apply 50% out of each bin.

**Delayed Chain Shutdown** - Will leave the last node running for the set time (in seconds) and then turn all nodes off or advance to the next link.

**Note:** If the machine was reloaded after chain configuration is complete, reset the chain to the first bin in the chain.

## Bin Link Order Tab

To reorder products on the *Bin Link Order* tab:

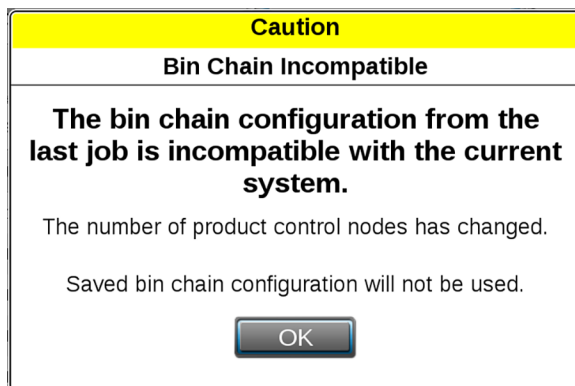
1. Use the up or down arrow next to the desired link to move it up or down the list.
2. Once complete, select the **Done**  button to save the settings. If desired, select **Reverse** to reset the order to the previously ran job.

## Bin Chain Errors

There are a few possible errors that only occur when using bin chain recall:

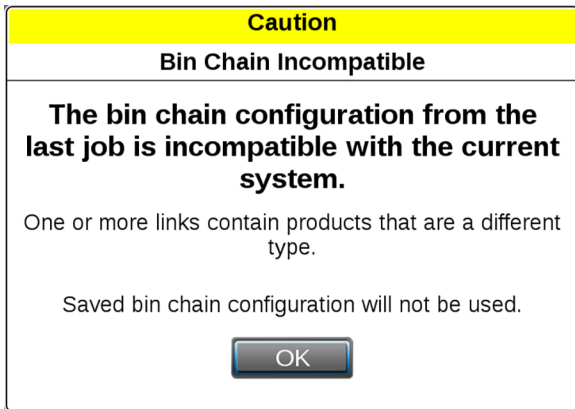
### The Number of Product Nodes has Changed

This error condition will appear if one of the previously used nodes on the selected chain was disconnected or removed. To correct this issue either ensure all the correct nodes are connected or configure a new chain without the missing node.



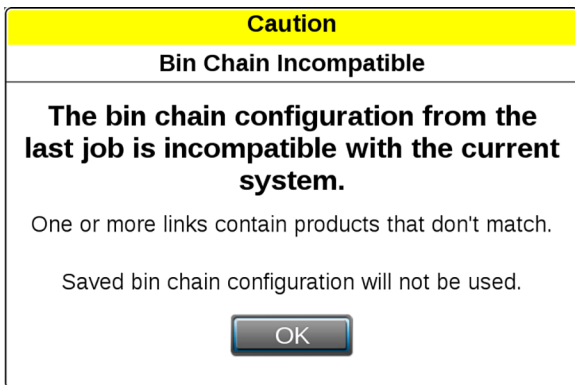
### One or More Links Contain Products that are a Different Type

This error occurs when different products types (liquid and granular) are contained in the same chain. To correct this issue either remove the different product type or create a new chain without the different product.



### One or More Links Contain Products that Don't Match

This error condition occurs if there is a product configuration and the nodes within the chain have different product assignments.



## Chapter 11:




# ROS Job Profile Configuration

---

**Note:** Job profiles are not required to start a job.

### Create a New Job Profile


To configure a job profile for future field operations:

1. Select the **Jobs**  icon toward the right side of the Street Maps view to display the Job Profile panel.
2. Select the **Edit**  icon.
3. Select the **Add**  button near the bottom of the display. The *Job Profile Settings* screen will display.
4. Proceed with the following sections to complete the job profile set up as desired for use when starting future field operations.

## Job Profile Name

1. Select the profile name field and use the on-screen keyboard to enter the name or description of the profile.
2. Enter a name or description that will help identify the specific field for which the profile is configured.

## Field Information




1. Select the **Edit**  icon in the field information area and use the selection fields to assign the job profile.

## General Settings

1. Select the guidance drop-down field and select the preferred guidance type or line to use during field operations with the selected profile. A guidance line must be available on the ROS device to select a guidance line for the profile. Refer to "Select a Guidance Pattern" on page 264 and "Save AB Guidance Paths" on page 269 for assistance with setting or saving a guidance path.
2. Select the scout drop down field and select an available scout group to use with the profile. A scout group must be available on the ROS device to select a scout group for the profile. Refer to "ROS Scout Groups Overview" on page 281 for additional information on creating scout groups and features for use during field operations.




### Edit an Existing Job Profile

To modify an existing job profile:

1. Select the **Jobs**  icon toward the right side of the Street Maps view to display the Job Profile panel.
2. Select the **Edit**  icon.
3. On the *Job Profile* screen, select the **Edit**  icon for the job profile to be modified.


### Delete a Job Profile

To remove a job profile from the Job Profile panel:

1. Select the **Jobs**  icon toward the right side of the Street Maps view to display the Job Profile panel.
2. Select the **Edit**  icon.
3. On the *Job Profile* screen, select the **Delete**  button for the desired file.
4. **Confirm** that the delete process to permanently remove the job profile.

## Start or Resume a Job in ROS


To start a new job or field operation:

1. Select the **Jobs**  icon toward the right side of the Street Maps view to display the Job Profile panel.



2. Select one of the following options for starting a job:

#### Start Job

Select the **Start Job**  option to begin a default field operation with or without assigning Grower, Farm, Field data or profiles to the job. This option may be desired to quickly start a job or if additional data collection or record keeping will not be necessary. GFF, scout guidance lines, and scout groups can be loaded if applicable.

#### Start agX Job

agX files are created on a computer before heading out the field. These files are called "recommendations". Recommendations contain information such as field boundaries, application rates, and prescription maps. The process to start an agX job varies from a typical application. Refer to "agX Jobs" on page 227 for more information on starting an agX job.

#### Start a Connected Workflow™ Job

Connected Workflow™ jobs (formerly known as pre-populated jobs) are created in Slingshot® and sent to the field computer via the Slingshot® link. Information such as Grower, Farm, Field, prescription maps, and mix ratios are preconfigured in the Connected Workflow™ job. Connected Workflow™ job icons appear similar to other jobs but have a small check box on the icon. Refer to "Connected Workflow™ Jobs" on page 231 for more information on starting a Connected Workflow™ job.

#### Start a Cloud Job


Cloud jobs are similar to Connected Workflow™ jobs but can have multiple machines operating within the same job. When in a cloud job, the Connected Workflow™ job information and coverage from other machines in the same Slingshot® account will be visible on the Viper® 4+. Cloud job icons look similar to other jobs but have a cloud on the job icon. Refer to "Cloud Jobs" on page 229 for more information on starting a Cloud job.

#### Job Profile

Select a configured Job Profile to begin a field operation using a previously configured job profile. Refer to "ROS Job Profile Configuration" on page 221 for assistance with creating or editing job profiles.

#### Resume Previous Job

Select a previous job to add to the previous coverage history.

3. Verify the GFF assignments displayed in the upper, left corner of the prompt. This information will be set with the job profile if already configured. If necessary, select the **Edit**  icon at the top of the *Job Setup* prompt to reassign the job to GFF structure or create new GFF entries as necessary. Editing GFF is not available for agX or Connected Workflow™ jobs or cloud jobs unless you are the originator.
4. If desired, select the **Job Name** field and use the on-screen keyboard to enter a new name or description for the field operation being started.
5. Enter a name or description that may be used to identify the job if it is necessary to resume the field operation at a later date or to help with archiving field data back at the home or office.
6. To change the job profile in the *Job Setup* prompt, use the Job Profile drop-down and select the desired profile. If a different profile is selected, restart this procedure to verify settings as required before starting the field operation.
7. Verify the guidance type or path for the field operation. If a guidance line is saved on the ROS device, select the Guidance drop-down field and select the saved line to load for the field operation.
8. Verify the scout group for the field operation. Scout groups may contain a field boundary, recorded zone map features, and other scouted field map features as saved. Select the Scout drop-down field and select the saved scout group to load for the field operation. Scout groups are not available for agX or Connected Workflow™ jobs or cloud jobs unless you are the originator and are starting a job for the first time.

9. Verify any application control or monitoring features for active control channels to be used during the field operation being initiated.

**Note:** *If the same product has been assigned to multiple nodes, the ROS device will automatically combine the same products into a chain.*

**Note:** *Check application control system calibration, verify product information.*

*The ROS Product Control Calibration and Operation Manual will provide additional information for these features and capabilities of a liquid or granular application system.*

*Other optional input, application control, or operation monitoring systems may offer additional control settings or specific features for use with the ROS system. Review the operation manuals provided with these systems for additional assistance with feature specific job options.*

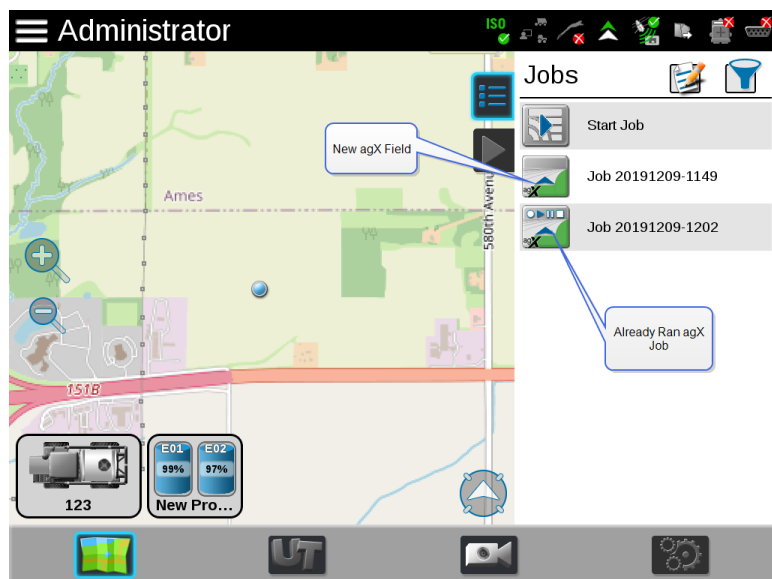
10. Select **Start**  to open the operation screen.

**Note:** *Refer to "End a Job" on page 235 for information on ending a job.*

## agX Jobs





**Note:** For more information on starting jobs and other kinds of jobs, refer to "Start or Resume a Job in ROS" on page 223.

agX recommendations are created on a computer and sent to the ROS device via Slingshot® or transferred via a thumb drive. The data, saved as a .RDP file, contains information such as field boundaries, prescription maps, and chemical information.



### Start an agX job

After transferring the .RDP file to the field computer:

1. Select the desired agX field boundary.
2. Select the **Add**  button.
3. Select the desired recommendation from the **Name** drop-down.
4. Select the **Node Assignment** for the recommendation.
5. Select the **Done**  button to go the previous screen.
6. Either select the **Start**  button to start the job, or select the **Add**  button to add additional recommendations.

## Resume agX Job




To resume an agX job that was started previously, select the desired agX job. The agX jobs that have already been started have play, pause, and stop buttons along the top of the button.



## Cloud Jobs

Before starting a cloud job, it is important that there is an active Slingshot® connection and that Cloud Jobs are enabled in File Manager.

To enable cloud jobs in File Manager:

1. Select the **Administrator Panel**  icon in the top left corner of the display.
2. Select the **File Manager**  utility.
3. Select the **File Management Options**  tab.
4. Select the **Enable Cloud Jobs** check box.

## Starting a Cloud Job

To start a cloud job:

1. Select the desired cloud job.

**Note:** For more information on starting jobs and other kinds of jobs, refer to "Start or Resume a Job in ROS" on page 223.

2. If joining a cloud job, confirm that the auto-assigned products from the cloud job are correctly assigned to the control channels on the machine.



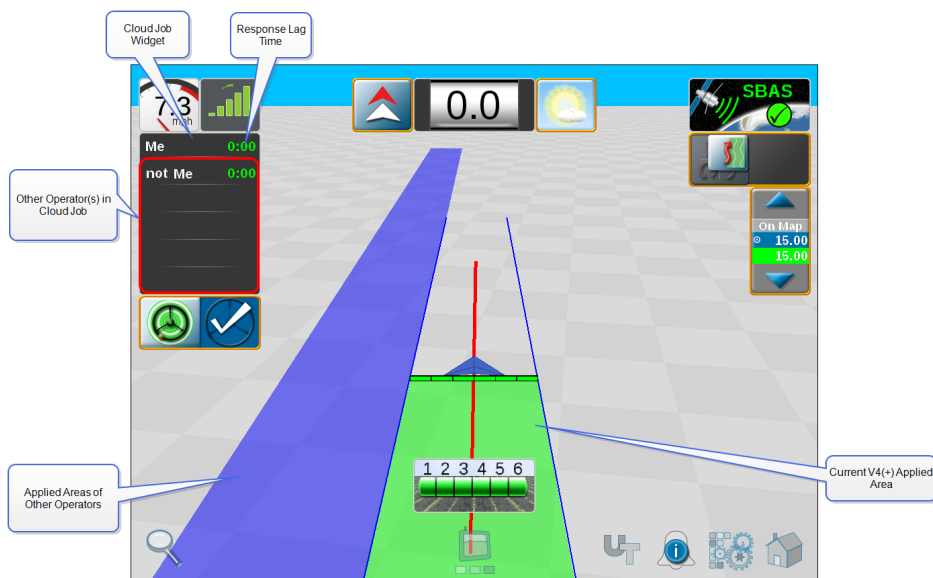
The screenshot displays the 'Tank Assignment' window in the ROS software. At the top, it shows 'Grower: Raven', 'Farm: Raven', and 'Field: Raven'. Below this is the 'Job Name' field set to 'WO1'. There are three buttons: 'Last Pass', 'Scout', and 'None'. The main table is titled 'Tank Assignment' and has columns for 'Current Mix Name', 'Mix', and 'Rate Mode'. The table contains 8 rows, each representing a tank (P02 to P08). Callouts point to various elements: 'GFF' points to the Grower/Farm/Field info; 'Product Information' points to the 'None' button; 'Editable Mix Name' points to the 'Current Mix Name' column; 'Product Reorder' points to the up/down arrows in the 'Current Mix Name' column; 'Editable Rate Field' points to the rate input field for P02. At the bottom, there are radio buttons for 'Product View' (selected) and 'Node View', and a green play button.

Current Mix Name	Mix	Rate Mode
2,4-	2,4-D	15.00 gal/ac
P02	P02	0.0 lb/ac
P03	P03	0.0 lb/ac
P04	P04	0.0 lb/ac
P05	P05	0.0 lb/ac
P06	P06	0.0 lb/ac
P07	P07	0.0 lb/ac
P08	P08	0.0 lb/ac

3. Select **Start** .

**Note:** If there is an issue with Slingshot® or Enable Cloud Jobs is not selected, a Cloud Job Warning error window will open. Exit the job, verify Enable Cloud Jobs is selected and Slingshot® is connected.

4. Start a job as normal. On this screen, the applied areas of all other operators within the cloud jobs will display in blue. A list of the other operators in the same job will be visible in the Cloud Job widget. The number to the right of the operator name indicates the time (in seconds) since that field computer last communicated. If there isn't a number behind the name, it indicates that the operator is no longer active in the job.



---

## Connected Workflow™ Jobs

Connected Workflow™ (formerly known as pre-populated Jobs) jobs are created in Slingshot® and imported to the field computer via Slingshot®. Connected Workflow™ jobs contain information such as Grower, Farm, Field, prescription maps, and mix ratios. Connected Workflow™ jobs have a small checklist icon on the job icon.



**Note:** For more information on starting jobs and other kinds of jobs, refer to "Start or Resume a Job in ROS" on page 223.

After selecting the Connected Workflow™ job, a Connected Workflow™ job confirmation screen will open:



1. If needed, use the product reorder arrows to move the mix(es) up or down to the desired node location.

Grower: Raven  
Farm: Raven  
Field: Raven

Job Name: WO1

Guidance: Last Pass Scout: None

Tank Assignment

Current Mix	Mix	Rate	Mode
2,4-D	2,4-D	15.00	gal/ac
P02	P02	0.0	lb/ac
P03	P03	0.0	lb/ac
P04	P04	0.0	lb/ac
P05	P05	0.0	lb/ac
P06	P06	0.0	lb/ac
P07	P07	0.0	lb/ac
P08	P08	0.0	lb/ac

Product View Node View Start


**Note:** Select the Node View button to view the node name and the current mix.

Connected Workflow™ job products will have the information button visible behind the Editable Mix Name. Products without the Information button are extra nodes on the bus and not associated with the Connected Workflow™ job.

2. If desired, select the **Editable Mix Name** field and rename the mix. The edited name will only be visible to the current operator and is not saved in the Connected Workflow™ job.

**Note:** If a product from the Connected Workflow™ job is incorrect and/or requires edits for correction, see "Product Reconfiguration" on the facing page.

3. Select the **Guidance** drop-down to select the desired Guidance type.
4. Select the **Scout** drop-down to select (if applicable) a Scout group.

5. After completing the Connected Workflow™ job configuration, select **Start**  to start the Connected Workflow™ job.




## Product Reconfiguration


In some instances, jobs sent via work orders will require product reconfiguration for accurate job completion.

**Note:** For more information on work order jobs, refer to "Connected Workflow™ Jobs" on page 231 and/or "Cloud Jobs" on page 229

To reconfigure products (mixes, application methods, etc.) from work orders:




1. Select the desired job.
2. Select the **Edit**  icon. The *Product Reconfiguration* page will open.

3. If any of the displayed values, totals, or products are inaccurate, select the field that needs to be corrected and edit until the desired changes are made.
4. If any of the displayed ingredients are not needed, select the **Delete**  button to remove them from the product.
5. If a new ingredient is needed, as example for a product mixture, select the **Add**  button and a new dialog window will open.
6. After all correct changes have been made, select the **Done**  button in the upper right-hand corner to save the new ingredients.

7. Once all changes have been made in the *Product Reconfiguration* page, select the **Done**  button in the upper right-hand corner to save the new products configurations to the job.

## End a Job

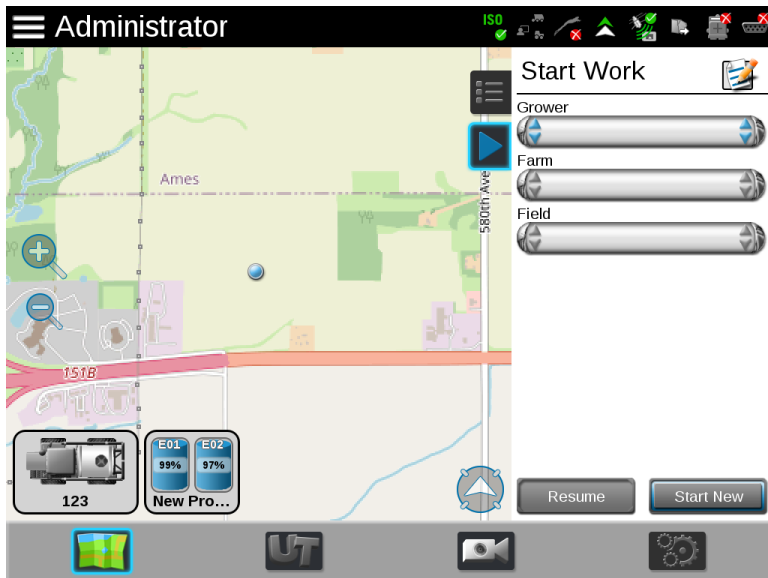
To close or end a job currently in progress:

1. Select the **Home**  button in the bottom right corner of the display. The *Application Report* tab will display.
2. Select any information fields and enter any desired or necessary job data or notes regarding the field operation.
3. Select the **Weather Report**  tab.
4. Select the **Include Weather Report** option at the top of the prompt to include weather information in the job report for the field operation.
5. Select any information fields and enter any desired or necessary weather information or notes regarding weather during the field operation.
6. Weather information may be collected automatically during the field operation if a weather station is connected to the ROS device. Refer to "Configure Weather Station Devices in ROS" on page 181 for additional information about using a weather station.
7. Select the **Job Complete** option if the field operation is finished.
8. The job will still be displayed in the Job Profile panel, but will display a check mark to indicate the job has been completed and does not need to be restarted to complete any operations.
9. If a Slingshot® connected device is connected with the ROS device, select the **Send to Slingshot®** option to transfer the job to the Slingshot® web service via the wireless network. Refer to the ROS Slingshot® Field Hub Calibration and Operation Manual for assistance with Slingshot® Field Hub set up and operation.
10. Select the **Stop**  button in the bottom right corner of the prompt to close the job and return to the main panel display.

## Start Work in ROS


The *Start Work* option in ROS allows a user to quickly start field operations without setting up a job. Start Work will save the GFF data from the last field operation to allow the user to quickly resume previous work. Previous work data is saved in the selected field until the data is cleared. Select the **Resume** option to continue the previous work in the field or the **Start**

**New** option to start over work in the field. Alternatively, a user can enter new GFF information and start a new field operation.




## Resume Previously Started Work

To resume work that was previously started:

1. Select the **Start Work**  icon toward the right side of the Street Maps view to display the Start Work panel.
2. Ensure the GFF information listed in the panel is correct.
3. Select **Resume**. The most previous field and any work done in the field will display on the guidance screen and field operation may begin.

## Start New Work

1. Select the **Start Work**  icon toward the right side of the Street Maps view to display the Start Work panel.
2. Select the desired grower, farm, and field information.
3. Select **Start New**. The guidance screen will display the field and field operation may begin.

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## Chapter 12:

### Widget Descriptions

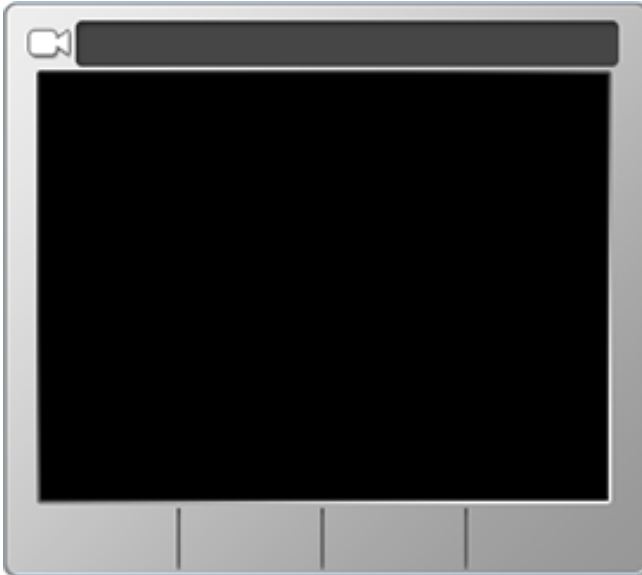
Raven field computers feature user-selectable widgets which allows the device to be configured to display the information necessary for various field operations or customized for operator preferences. Some widgets may be required to perform specific tasks with field computer while others may be used for status or information display if desired.

Several widgets will require installation of additional hardware or components to enable use of the widget during a field operation. The following sections are intended to assist with selecting and using various widgets available for use with standard system installations. Please refer to the documentation for each optional system or feature for additional information on using widgets with these systems.

## ROS In-Job Widgets

### Accessory Application and Operational Widgets

#### Camera Interface

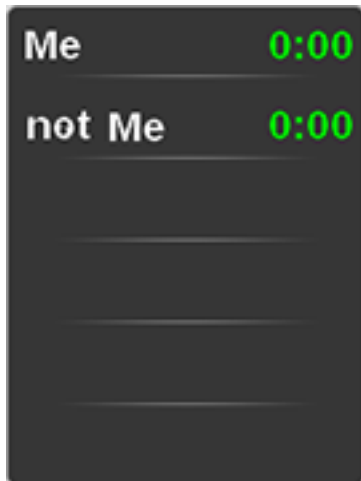


If a camera system is connected to the ROS device, select the Camera Interface widget to view camera feeds for the connected devices. Tap on the camera feeds along the bottom of the widget to select the desired feed to view during a field operation.

Touch and hold on the widget during a field operation to access camera feed settings. Select a Reverse Cam to set the camera feed to view when ROS detects reverse vehicle travel. There will be a camera interface widget available for the cameras configured on the machine (up to four) but only one camera widget can be placed on the screen at a time.

---

## Cloud Job



When running in a cloud job, the Cloud Job widget will be visible. This widget shows the names of the other profiles in the same job and the response time for those profiles. If there isn't a number after the profile name, the operator is no longer active in that job. See "Cloud Jobs" on page 229 for more detailed information about cloud jobs.

## Day/Night Mode



The day/night widget allows the operator to toggle between a day and night display mode during a field operation. Tap the widget to toggle the display mode. Touch and hold the widget to view screen and LED brightness settings for the current mode.

**Note:** Refer to "System Preferences Tab" on page 45 for additional information on the available brightness settings.



## Scouting



The scouting widget is used to record or manage scout groups during field operations. Use the Scouting widget to record features such as field boundaries, zone maps, or field markers for future reference. See "ROS Scout Groups Overview" on page 281 for more detailed information about using ROS to record scout group features.

## Weather Station



If a WatchDog Sprayer Station is connected to the ROS device, the system may be used to automatically log weather data during a field operation or to capture a "snapshot" of current conditions for the operation.

During a field operation, touch and hold the Weather Station widget to view current weather conditions. Use the Record Snapshot button to copy the current weather conditions to the job report.

**Note:** Refer to "End a Job" on page 235 for assistance with editing a job report.

## GPS Widgets

### Compass



The Compass widget displays the current GPS heading as detected by the receiver. Tap the Compass widget to toggle the compass display.

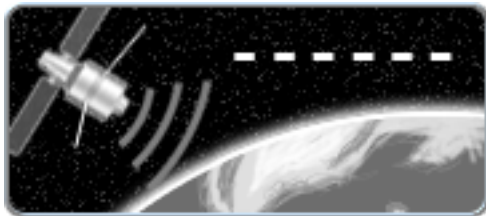
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## Forward Override



The Forward Override widget may be necessary if the reverse sensing feature is enabled. See "Enable GPS Reverse Sensing" on page 146 for more detailed information about the Reverse Sensing feature. If ROS detects reverse vehicle travel, tap the forward override widget to manually override ROS to a forward direction of travel.

## GPS Status



The GPS Status widget may be used as a status indicator for signal reception used for the current position solution. This widget will display the selected and current correction type and status for NMEA messages received by ROS during field operations.

Touch and hold the widget to access a GPS Health prompt with additional details on GPS reception.

**Note:** Refer to "Raven Receiver Settings Overview" on page 161 for articles on the information displayed on the GPS Health prompt.

## GPS Summary



The GPS Status widget provides an indicator for signal reception used for the current position solution and the current speed detected by the GPS receiver. This widget will display the selected and current correction type and status for NMEA messages received by ROS during field operations.

Touch and hold the widget to access a GPS Health prompt with additional details on GPS reception.

**Note:** Refer to "Raven Receiver Settings Overview" on page 161 for articles on the information displayed on the GPS Health prompt.

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## Heading and Speed Widget



The Heading and Speed widget displays the current GPS heading and vehicle speed as detected by the receiver. Touch and hold this widget to access the GPS Health prompt with additional details on GPS reception.

**Note:** Refer to "Raven Receiver Settings Overview" on page 161 for articles on the information displayed on the GPS Health prompt.

**Note:** The GPS filter mode allows the operator to filter the course over ground information provided for position information during field operations. Higher filter settings may be desirable in some regions to help smooth rapid course variations reported by the GPS receiver and provide smoother course information on job reports.

**Note:** The default filter setting is Low (this is the recommended setting). Raise the filter mode setting to increase the filtering capabilities if GPS corrections in your region normally create erratic or fluctuations in GPS course over ground information, or create other issues during field operations or on job reports.

## Vehicle Speed



The Vehicle Speed widget displays the current vehicle speed as reported by a speed sense node on the CANbus. The speed displayed using this widget is the speed to which a rate control system will be using for speed compensated rate control systems.

## Guidance Widgets

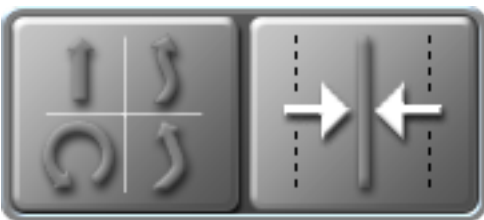
### 3D Map



Add the 3D Map or 3D Map Wide widgets to the widget only view to display a picture in picture display of the application area while viewing the widget only view.

**Note:** Only one of the 3D map widgets may be added to the widget only view at any time.

### AB Utilities



The AB Utilities widget will be necessary to select guidance modes, set AB paths, or to save or load an AB guidance path. Tapping the AB utilities widget will set A and B points for a guidance path (if a guidance path is not set) or access the AB guidance line tools and will provide access the Nudge and Swath prompt.

**Note:** Refer to "Guidance Lines and Patterns Description" on page 261 and "Create a Guidance Pattern" on page 265 for additional assistance with using the AB guidance mode features.

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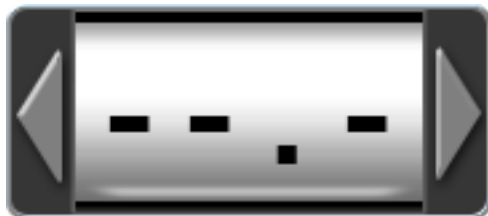
## AutoTurn



The AutoTurn widget displays the current vehicle speed and the distance to the next turn. Tapping the highlighted side of the widget will increase the number of skipped swaths by one, tapping the darkened side of the widget will change the direction of the next turn, and long pressing on the middle section will open the configuration options. See "Operate the AutoTurn Widget" on page 275 for more detailed information on operating the AutoTurn widget.

**Note:** Refer to "Configure AutoTurn" on page 273 for additional assistance with setting up the AutoTurn feature.

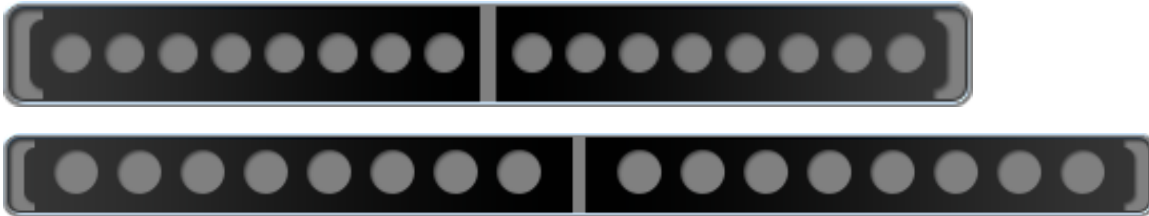
## Distance from Guidance Line



The Distance from Guidance Line widget will be used with a guidance line set using the AB utilities and will display the distance and direction from the current vehicle position to the displayed guidance path.

**Note:** Refer to "Create a Guidance Pattern" on page 265 for assistance with setting an AB line with the AB Utilities widget.

## Light Bar



On-screen Light Bar widgets provide the operator with a heads-up display of the machine position during swath guidance. Select the size of the light bar widget desired to provide a representation of the distance and direction to the displayed guidance path.

The Light Bar widgets may be used in conjunction with an external light bar mounted on the vehicle. See "Configure Light Bar Display Settings" on page 178 for more detailed information about light bar settings.

## Nudge Arrow



The Nudge Arrow widget offers the same display information as the Nudge Status widget, but provides access to nudge controls directly on the current display view or mode. Select this option to allow the operator to manually adjust the guidance line directly from the guidance display during field operations.

Tap the arrow buttons displayed on the Nudge Arrow widget to nudge the displayed guidance line by the active nudge value. Touch and hold the widget to access the Nudge and Swath prompt. See "Nudge Features and Tools" on page 271 for more detailed information about operating the Nudge feature.

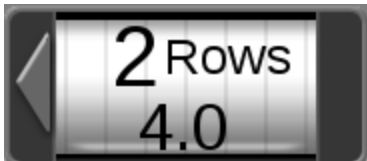
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## Nudge Status



The Nudge Status widget displays the current nudge applied to the displayed guidance line. Touch and hold the Nudge Status widget to access the Nudge and Swath prompt. See "Nudge Features and Tools" on page 271 for more detailed information about operating the Nudge feature.

## Row Width Distance From Guidance Line Widget



Row Width Distance from Guidance Line widget displays how many rows off from the desired row the machine is. After placing the widget on the guidance screen, press and hold the widget until the Row Width box appears, then enter the row width. The arrow on the widget indicates the direction the machine is off from the desired row. The row value is approximate and rounds up or down depending on how close the machine is to the row.

## SmarTrax™



Add the SmarTrax™ widget to easily access view SmarTrax™ status or access SmarTrax™ Settings.



## SmarTrax™ Waiver



The SmarTrax™ Waiver widget will display if the SmarTrax™ liability waiver has not been accepted.

## Swath Info



Select the Swath Info widget to display the guidance path number when using an AB guidance mode (e.g. Straight AB, Pivot, or Fixed Contour) for field guidance. This widget will display "LST" when using the Last Pass guidance mode.

**Note:** Refer to "Guidance Lines and Patterns Description" on page 261 and "Create a Guidance Pattern" on page 265 for additional assistance with using guidance modes and setting AB guidance paths.

## Implement Status and Control Widgets

### AccuBoom™



The AccuBoom™ widget shows AccuBoom™ status and also provides quick access to additional AccuBoom™ information.

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## Boom Capacity



Having the Boom Capacity widget on the run screen provides visibility to the percentage of the boom capacity currently used. This is for information purposes only.

## Flip



A flip area is primarily used for planting and tilling to create a boundary around the edge of the field or another obstacle that creates a zone that will not be planted. This allows the user to plant the entire field and, when done with everything in the field except for the flip area, go back and plant that area last. See "Create a Flip Area" on page 292 for more information on flip areas and the Flip widget.

## Master Switch



The boom/implement Master Switch widget provides an option for an on-screen master switch to toggle all configured sections on or off. Select this option if a machine switch panel or another switch option is available for toggling boom section status. See "Configure the Master Switch Options" on page 206 for additional assistance with enabling the on-screen master switch feature.

**Note:** A Raven CAN switch box or Switch Pro™ will override the on-screen master switch (only available if a boom speed node is not installed) widget. It is not recommended to select this widget if another master switch will be used to control section status on the implement.

## On-Screen Switch Box

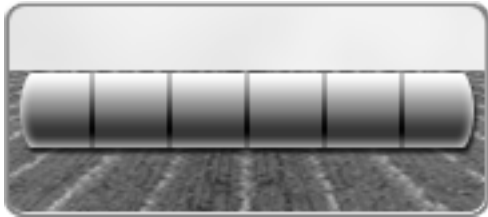


Select the On-Screen Switch box widget to control sections directly on the ROS device during field operations. The on-screen switch box widget will only be available if the on-screen switch box feature has been configured and if a Raven CAN switch box or Switch Pro™ is not detected on the CANbus.

Tap the on-screen section switch to select the switch state for the selected section. Toggle the master switch to control all sections at the same time.

---

## Section Status



The Section Status widget is available in various widths and allows the operator to select the best option for displaying configured sections.

Select the "Product-Based" widget to display status for sections assigned to specific products only. Touch and Hold the widget to select the desired product or to view all sections. Refer to the ROS Product Control Calibration and Operation Manual for assistance with assigning sections to available control channels.

### Product Control Widgets

## AutoBoom®



Select the AutoBoom® widget to access settings that automate boom height adjustment. Using the existing machine hydraulics, the AutoBoom® parallel hydraulic system keeps the machine's hydraulic system open, using only the hydraulic fluid needed to balance the hydraulic cylinders to allow the booms to raise or lower effortlessly.

## Bin Chain



The Bin Chain widget provides options to reset the chain to the first link, cleanout, or open the settings page. See "Operate the Bin Chain Job Widget" on page 217 for more information on features and settings offered by the Bin Chain widget.

**Note:** Refer to "Configure a Bin Chain in ROS" on page 216 for additional assistance with setting up and using bin chains.

## Fan Speed



This will display the fan speed in revolutions per minute. Information on this widget is used for information purposes only.

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## Field Area



Select the Field Area widget to display a tally of area covered during the current field operation. Touch and hold the field area widget to select the desired product map to display the area coverage tally.

Select the "Product On Applied Map" option to display the area for a product control channel selected in one of the product list widgets. Select the "Remaining" option to display the remaining area that has not yet been covered. Refer to the ROS Product Control Calibration and Operation Manual for assistance with product control settings and using product control widgets.

**Note:** *If the "Remaining" option is selected, coverage outside of the boundary is considered applied area. If the user applies coverage outside of the boundary, the remaining value will be inaccurate. To consistently obtain accurate remaining coverage, stay within the boundary during application.*

## Individual Product Control



Displays the target and actual application rate for the selected product. This widget allows the user to select the Data Type, Implement, Function or Feature, Data Element, and the product Name. This widget will show status on/off status, volume, and allow the user to increase or decrease flow rate.

## Liquid Pressure



The Liquid Pressure widget will display the approximate pressure of the liquid in the system. This is for informational purposes only.

## Liquid Pump RPM



Shows the RPM of the pump based the pump speed. This information if for references purposes only.

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## Product Levels



The Product Levels widget shows the calculated product level based on the starting level and application rate. These levels are for informational purposes only.

## Pump



The Pump widget shows the pump number and the operation status of each pump.

## RX Options



Having the RX options on the operating screen provides quick access to view the current prescription information and RX look ahead settings for prescription rate map zones.

## Slingshot®



The Slingshot® field hub provides wireless access to transfer GFF data or to import software updates for field computers.



## Tally Registers



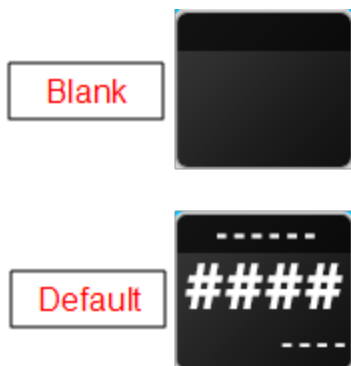
Select the Tally Registers widget to provide a display of total volume, field volume, total area, field area during field operations.

Tap the Tally Registers widget to toggle the available register information for display during the operation. Touch and hold the tally registers widget to access the Tally Registers prompt. See "Tally Register Prompt" on page 279, for more detailed information about the tally register.

**Note:** Some ISO ECU's may not report tally register values.

## ISO Widgets

### Assignable UT



The assignable item widget allows the user to create a configurable widget for any ECU that makes data points available to monitor a desired Data Type, Function or Feature, or Data Element on the desired Implement.

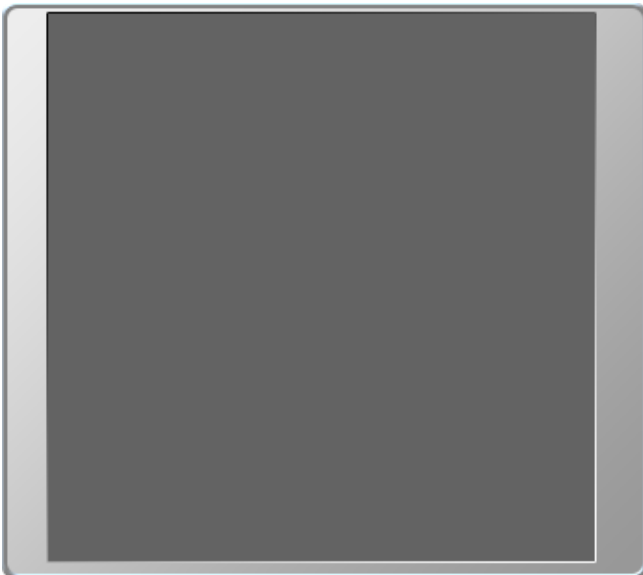
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## Interactive UT



To scroll through various ISO applications, place the ISO Working Set Selector widget on the run screen. This allows the user to have a scroll through all of the items running on the ISObus system. Scroll left or right through the selector to view the available systems on the ISObus system. Press the center of the button to show all available ISO working sets. From the list of available working sets, select a working set to make it active.

## ISO



The ISO widget shows the status of ISO devices on the machine.



## Configure Widget Layouts

Widgets can be added, moved, or deleted from the operation screen of a Raven field computer.

### Create a Screen Layout

ROS allows the user to customize the widgets displayed on the operation screen and save the customization in a Screen Layout.





To create a new screen layout, while in a job:

1. Select the **Screen Configuration**  icon.
2. Swipe or use the page navigation at the bottom of the *Manage Screen Layouts* prompt to select the desired view or mode of the new screen layout.
3. Select the **Add**  button in the bottom left corner of the screen.
4. Enter the desired name for new screen layout. The new screen layout will appear with the default screen layouts.

**Note:** Refer to "Add Widgets to a Screen Layout" below for more information on adding widgets to a screen layout.

## Add Widgets to a Screen Layout




To use the widget editing mode to add widgets to a screen layout, while in a job:

1. Select the **Screen Configuration**  icon.
2. Swipe or use the page navigation at the bottom of the *Manage Screen Layouts* prompt to select the view or mode with the screen layout to be modified.
3. Select the **Edit**  button to enter the *Widget Editing* mode.
4. Select the **Add Widgets**  icon along the bottom of the display. The *Widget Selection* prompt will display.
5. Swipe or use the page navigation at the bottom of the widgets prompt to browse the available widgets.
6. To add a widget to the screen, select and hold the desired widget for approximately two seconds. The *Widget Edit* will be displayed.
7. Select the **Exit Widget Mode**  button along the bottom of the display to return to the manage screen layout prompt.

**Note:** Refer to "Move Widgets to Modify a Screen Layout" below for assistance with modifying the widget layout.




## Move Widgets to Modify a Screen Layout

To move widgets or customize a screen layout, while in a job:

- 
1. Select the **Screen Configuration**  icon.
  2. Swipe or use the page navigation at the bottom of the *Manage Screen Layouts* prompt to select the view or mode with the screen layout to be modified.
  3. Select the **Edit**  button to enter the *Widget Editing* mode.
  4. In *Widget Editing* mode, select and hold on the widget that is desired to be moved. The widget will be highlighted.  
**Note:** Refer to "Add Widgets to a Screen Layout" on the previous page for more information on adding widgets to a screen layout.
  5. Drag the widget to the desired display location and release.
  6. Select the **Exit Widget Mode**  button along the bottom of the display to return to the manage screen layout prompt.

## Remove a Widget from a Screen Layout

To remove a widget from a screen layout:

1. Select the **Screen Configuration**  icon.
2. Swipe or use the page navigation at the bottom of the *Manage Screen Layouts* prompt to select the view or mode with the screen layout to be modified.
3. Select the **Edit**  button to enter the *Widget Editing* mode.
4. In *Widget Editing* mode, select the widget to be removed.
5. Select the **Delete** icon in the upper, left corner of the widget to remove the widget from the screen layout.
6. Select the **Exit Widget Mode**  button along the bottom of the display to return to the manage screen layout prompt.



## Chapter 13:

# Guidance Lines and Patterns Description

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## Straight (AB) Line



The Straight (A-B) Line pattern is well suited for operations within rectangular fields and straight swaths.

The straight line, or parallel, pattern is created by drawing a straight line through two user defined points (A and B). After A and B points are set, the field computer uses the programmed equipment width and the original path to calculate parallel guidance paths for the rest of the coverage area.

## Pivot



The Pivot pattern is designed to provide guidance within a field with a center pivot, or circle, irrigation system.

The pivot pattern is created using two user defined points on the circumference, or swath furthest from the irrigation hub, of the field area. The pivot pattern does not require the entire circumference of the field to be driven before beginning guidance; however, best results are generally achieved by driving further along the initial swath when creating a pivot guidance pattern.

## Fixed Contour



The Fixed Contour pattern is ideal for creating and saving swaths which follow irregular field boundaries, waterways, well heads, etc., or where the ability to skip swaths in an irregular pattern is necessary.

The fixed contour pattern is created by setting the first, or "A," point and driving the first full swath before setting the second, or "B," point. The field computer will then connect points recorded along the first swath and displays the fixed contour path.

As long as the fixed contour pattern is active and the original path is available, the field computer will use the initial swath and programmed equipment width to calculate contours for the rest of the coverage area nearest path regardless of previous application history or coverage mapping.

**Note:** *Curvature of the fixed contour guidance path should not be too aggressive. Overly aggressive curves may produce undesirable results. Always be aware of sharp turns when using the fixed contour pattern if an assisted steering system such as Raven SmarTrax system is engaged. Contact a local CNH dealer for more information about Raven assisted steering systems.*

## Last Pass



Last Pass is best used for applying around the headlands of a field, in U shaped areas, and circular patterns. Last Pass creates a guidance path based on previous coverage in a field. Every two seconds, last pass searches for a piece of coverage (previously applied area) in order to maintain the guidance path.

## Multiple Guidance Lines

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Multi-line coverage is a guidance pattern type in which multiple already created guidance lines are loaded in at the same time. When loaded, the guidance system will attempt to lock onto a nearby line and steer the machine to the detected line until the user attempts to steer to an alternative line.

If multi-line is selected, it is recommended to check the box next to the “Show extra lines” option. This shows the multiple lines of coverage. The guidance pattern should switch automatically, but the user can manually switch the guidance pattern by using the rightmost option in the selection group.

Each line in the multi-line file has an associated line number determined from the file. The swath count widget displays the associated line number of the currently tracked line.

**Note:** Multi-line files are shape files (.shp and .shx) which can be imported from a USB thumb drive using the same method as other guidance line types. For more information on importing files from a USB thumb drive, see "Import Guidance Lines" on page 87.

## Last Pass Swathing





**Note:** Last Pass Swathing (Last Pass 2) is not meant for headlands, U-shaped areas, or circular patterns. Use the Last Pass pattern for these situations.

Last Pass Swathing is used when making passes back and forth across a field. After turning roughly 30 to 45 degrees, it assumes the machine is turning around for the next swath in the field. A dynamic fixed contour line is created after a turn, which enables the guidance path and the machine to hold tighter to the previous coverage. The line is also extended out approximately 40 meters at the beginning and end to help with leading in and out of the headlands. These line extensions also help auto-steering by allowing the machine to acquire the line earlier. The line will not disappear as long as the center of the machine is within 1/2 of a swath width. After 1/2 of a swath width, it will search for another piece of good coverage. The refresh button can be used to clear the line and cause guidance to search for another good piece of coverage. For example, use the refresh button when switching from making north/south passes to making east/west passes. Driving 1/2 of a swath width away from the current line will also work in this situation.

**Note:** Using the refresh button or driving 1/2 of a swath width away from the line will not create the line extensions. The line extensions will not display until the following pass.

## Set a Guidance Line or Guidance Pattern

Raven field computers can generate lines or patterns that guide the machine during field operations.

**Note:** Refer to "Guidance Lines and Patterns Description" on page 261 for an overview of all available guidance lines and patterns.

### Select a Guidance Pattern



The AB Utilities widget will be required to set and manage AB guidance paths during field operations. Refer to "Add Widgets to a Screen Layout" on page 258 to add the AB utilities widget to a screen layout before performing the following procedures.

**Note:** The AB Utilities widget may also be used to access nudge features and tools. Refer to "Nudge Features and Tools" on page 271 for assistance with using AB guidance nudge during field operations.

**Note:** The Last Pass modes is enabled and set by default when starting a job without selecting a saved guidance path. Refer to "Start or Resume a Job in ROS" on page 223 for assistance with configuring job settings or "ROS Job Profile Configuration" on page 221 for assistance with setting up a job profile.

To select a guidance pattern:

1. Select the **Guidance Pattern** button.



2. Select the desired pattern.

**Note:** Refer to "Guidance Lines and Patterns Description" on page 261 for an overview of all available guidance lines and patterns.

## Create a Guidance Pattern

To create a new guidance path:

**Note:** This example will use the AB Straight guidance pattern, but all other guidance patterns are created by the same process.

1. Select the **Set A** button on the widget.



2. Begin driving the first swath. While ROS may allow the second point to be set before driving the full swath, best results are generally achieved by driving further along the initial swath before setting the B point.

**Note:** When creating a Fixed Contour path, ROS will require that the full swath length be driven to plot points along the swath.

3. Select the **Set B** button.



4. If needed, select the **Recalibrate** button to move the guidance line to the current position.



## Create an AB Straight Guidance Pattern Using a Heading

To set a new straight AB line guidance path using a compass heading:

1. Select the **Set A** button on the AB Utilities widget.



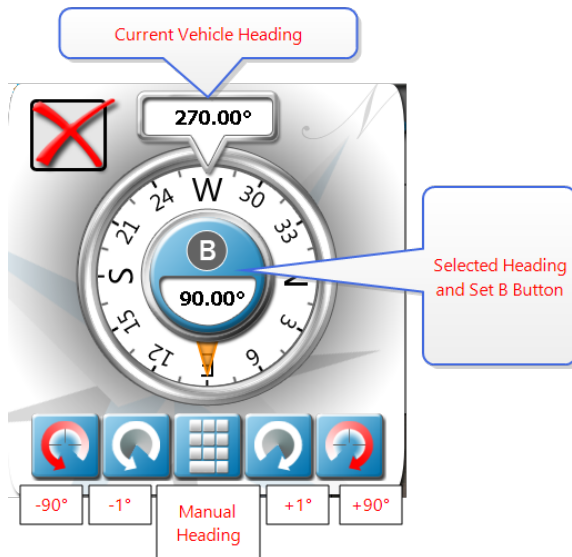
2. Select the **Pattern Type** button.



3. Select the **Straight A-B by Heading** button.

**Note:** *There is no minimum distance between A and B points when setting an AB line using a heading.*

4. Select the **Set B by Heading**  button to display the *Set B by Heading* prompt:



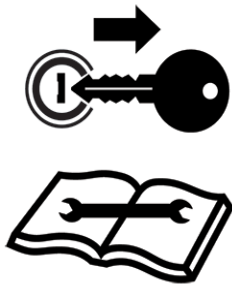
5. Use the course setting options along the bottom of the prompt to adjust the value displayed as the selected heading.
6. Select the **Set B** button in the middle of the compass display to set the guidance path using the selected heading.

## Recalibrate or Reset AB Guidance Line in ROS

### Recalibrate AB Guidance Path

The Recalibrate Guidance Path feature is intended to be used to reset an existing guidance path to the current vehicle position to correct for issues such as GPS drift. This feature may also be useful to adjust an AB guidance path for use with an implement with a different width than the implement used to record the path.

#### CAUTION




Please use caution when recalibrating a guidance path loaded from previous field operations. Contour paths may not provide anticipated results and cause the equipment to swing or cover areas unintended for coverage or into nearby obstacles.


To clear the current AB guidance path:

1. Select the **AB Utilities** widget to display the *Swath Tools* prompt.



2. Select the **More**  button to access the *Nudge and Swath* prompt.

**Note:** The nudge features are also available on the *Nudge and Swath* prompt. Refer to "Nudge Features and Tools" on page 271 for assistance with using AB guidance nudge during field operations.

3. Select the **Recalibrate**  button. The AB path will reset to the center of the configured vehicle swath.

### Reset AB Guidance Path

Multiple AB paths may be used during a field operation as desired for field guidance. Before a new AB guidance path may be created during a field operation, the existing AB path must be cleared.

To clear the current AB guidance path:

1. Select the AB Utilities widget.



2. Select the **Reset**  button.

## Saved Guidance Lines and Patterns

Guidance lines and patterns can be saved in the Raven field computer for later use in field operations.

### Save AB Guidance Paths


Saving an AB guidance path allows the line to be assigned to a job profile or selected when setting up for a field operation.

**Note:** Only the active AB guidance paths will be saved. Last pass paths will not be stored by ROS.

To save the displayed guidance path:

1. Select the **AB Utilities** widget to display the *Swath Tools* prompt.



2. Select the **More**  button to access the *Nudge and Swath* prompt.

**Note:** The nudge features are also available on the *Nudge and Swath* prompt. Refer to "Nudge Features and Tools" on page 271 for assistance with using AB guidance nudge during field operations.

3. Select the **Save**  button.

4. Select the **Name** field to the right side of the *Save Guidance Line* screen and use the on-screen keyboard to create a new guidance path or select an existing guidance path to replace.


**Note:** *If the guidance line is saved in a cloud job, the line will be available to be loaded by other field computers that join the cloud job.*

## Loading a Saved Guidance Path





To load a guidance path into the current field operation:

1. Select the **AB Utilities** widget to display the *Swath Tools* prompt.



2. Select the **More**  button to access the *Nudge and Swath* prompt.

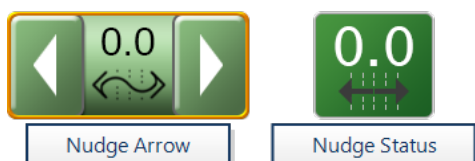
**Note:** *The nudge features are also available on the *Nudge and Swath* prompt. Refer to "Nudge Features and Tools" on the facing page for assistance with using AB guidance nudge during field operations.*

3. Select the **Load**  button.
4. Select either the **Path List**  tab or **Path Map**  tab to locate and select the desired guidance path to be loaded.
5. Select the path from the list or on the map and select the **Done**  button to load the selected path into the job for the current field operation.

## Nudge Features and Tools

The nudge feature allows an operator to make small or incremental adjustments to a guidance path during field operations. This feature is designed to allow the equipment operator adjust the guidance path to keep the implement running between rows or inside tramlines.

ROS offers two nudge feature widgets to match how frequently the nudge feature may be used, or what nudge information is needed, during various field operations.





Refer to "Add Widgets to a Screen Layout" on page 258 to add a widget to a screen layout before performing the following procedures.

**Note:** The nudge widgets also provide to access to some AB guidance tools. Refer to "Recalibrate or Reset AB Guidance Line in ROS" on page 268 or "Save AB Guidance Paths" on page 269 for assistance with using these AB guidance tools during field operations.


### Configuring Nudge Values

To configure nudge distance setting for use during field operations:

1. Select and hold the **Nudge**  widget to access the *Nudge and Swath* prompt.
2. Select the **Unit Toggle**  button to the right of the Nudge 1 or Nudge 2 to select the desired measurement for the nudge distance.
3. Select the **Nudge 1** or **Nudge 2** value and use the on-screen keypad to set the nudge distance.

### Activating and Using Nudge

To activate a nudge distance and adjust an AB guidance path during a field operation:

1. Select and hold the **Nudge**  widget to access the *Nudge and Swath* prompt.
2. Select the **Nudge 1** or **Nudge 2** button along the left side of the prompt to select the active nudge distance.





3. Select the **Nudge Left**  or **Right Button**  to adjust the displayed guidance path by the active nudge distance.

**Note:** If using the nudge arrow widget, tap the left or right arrows on the widget to adjust the displayed guidance line by the active nudge distance right from the guidance view or mode.

4. The Status area on the on-screen widget will display the nudge distance and direction applied the guidance path currently displayed.

### Reset Nudge

To remove any nudge distance applied to the current AB guidance path:

1. Select and hold the **Nudge**  widget to access the *Nudge and Swath* prompt.
2. Select the **Reset Nudge**  button to remove all nudge adjustments currently applied to the displayed guidance path.

## AutoTurn Configuration

**Note:** *AutoTurn is an unlocked feature. For information on unlocking features, refer to "Feature Unlocks Overview" on page 67.*

The AutoTurn feature enables automatic headland turning, allowing the machine to automatically turn itself to the next determined swath when approaching boundaries.

### AutoTurn Requirements

In order for AutoTurn to function correctly, ensure:

- The current job has a defined field boundary.

**Note:** *Refer to "Scouting Features" on page 281 for more information on field boundaries.*

- GPS is enabled and functioning.
- Guidance width is set up and accurate.

AutoTurn is currently compatible with:

- Straight AB
- Fixed Contour
- AB-Heading

**Note:** Refer to "Guidance Lines and Patterns Description" on page 261 for more information on these kinds of guidance patterns.

The **Turn Radius** feature must be checked and verified as accurate before operation to ensure no harm is inflicted on any machine or equipment.

## Configure AutoTurn

To configure the AutoTurn feature:

1. Select and hold on the middle portion of the **AutoTurn Widget** .

**Note:** Refer to "Operate the AutoTurn Widget" on page 275 for additional information on operating the widget.

2. The *AutoTurn Settings* page will open. The following options are available:

### Headland Swaths

- This value determines the number of swaths that will be used on the headlands.
- AutoTurn will assume that the operator wants to reduce crop run-over and target the most inner swath for the turn.
- Utilizing more than one swath reduces the chance of a boom tip exceeding the boundary or hitting a fence line.

### Skip Swath

- This value shows the number of swaths that will be skipped when driving down the headland.
- A value of "0" indicates that the operator will turn back into the field for the very next swath.
- A value of "1" indicates that the operator will drive past one swath, then turn back into the field, skipping the swath to be filled later (if applicable).
- Up to four skip swaths may be used.

### Field Buffer

- This value allows the user to add an additional buffer zone away from the boundary so that the boom tips do not approach the fence line.

### Turn Speed

- This value determines the target speed at which the tractor will turn.
- The faster the target speed, the larger the arc.
- The slower the target speed, the smaller the arc.

**Note:** For tractors with pulled implements, the turn should be fast enough yet narrow enough so the implement does not hit the tractor.

### Turn Radius

This value identifies the radius of the tightest turn possible. Turn radius is calculated from the turn speed and the Max G Force setting in the RS1™ advanced turning

options.

**Note:** Turn Radius must be checked and verified before operation to ensure there is no harm done to any machine or equipment.

**Note:** Refer to "AutoTurn Widget Operation" below for additional information on operating the AutoTurn feature with the AutoTurn widget.

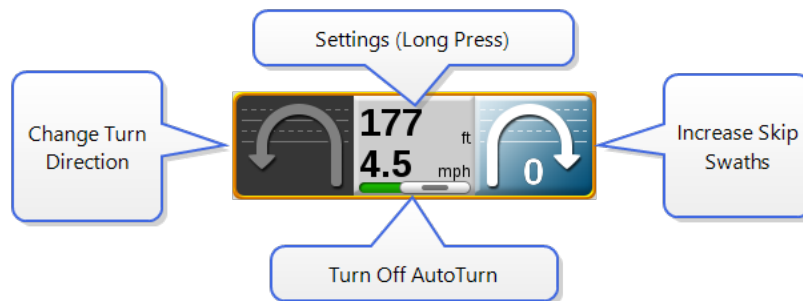
## AutoTurn Widget Operation

**Note:** AutoTurn is an unlocked feature. For information on unlocking features, refer to "Feature Unlocks Overview" on page 67.

The AutoTurn feature enables automatic headland turning, allowing the machine to automatically turn itself to the next determined swath when approaching boundaries.

### Operate the AutoTurn Widget

The AutoTurn widget is divided into three sections that act as separate buttons:




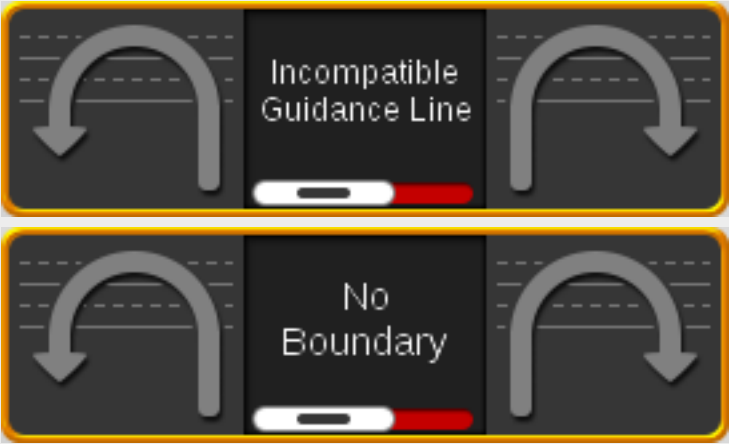


- Pressing the unselected/darkened arrow will change the turn direction.
- Pressing the middle button will enable/disable AutoTurn. Pressing and holding this button will open the configuration dialog window.
- Pressing the selected/highlighted arrow will increase the number of skip swaths by one.

### AutoTurn Widget Status

These widgets will indicate the status of the AutoTurn feature:

Description	Widget Status
Configuration Needed	
Turn Planned	
Turn in Progress	
Not Unlocked	
Too Fast for Current Turn	

Description	Widget Status
	
Distance to Turn and Current Speed	
Unable to Find Turn	
Manually Disabled	
Possible Error Statuses	

**Note:** Refer to "AutoTurn Configuration" on page 272 for additional information on configuring the AutoTurn feature.


# Tally Register Prompt




**Note:** Volume and area tallies are only available during an active job on ROS.

ROS provides a tally of the volume and area values to track totals over a period of time such as a field application or over the course of a season.


**Note:** Tally registers are a running total and do not automatically reset. The user must reset the tally registers.

To view the register:

1. Select and hold the **Tally Registers**  widget. The *Tally Registers* prompt will display.
2. Use the following table to reset tallies displayed on the register as necessary or desired over the course of an operation or season:

To Reset	Select and Hold
One register value	The desired value displayed in the register
A tally for all control channels	Tally Reset 
All tallies for a specific control channel	Channel Reset 
The full register	Register Reset 



3. To configure tank or bin levels or capacities during the field operation, select and hold the **Product Levels**  button. Refer to the ROS Product Control Calibration and Operation Manual for additional assistance with setting or configuring product values for field operations.
4. Select the widget to toggle through the tally registers. Select and hold to change the product widget tally.

## Chapter 13:

# ROS Scout Groups Overview

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ROS saves features such as field and zone boundaries, scouting lines, or flags as components of a scout group. Each job may utilize multiple scout groups or features may be copied from one scout group to another to complete various phases of a field operation.

**Note:** Refer to "Scout Group Manager" on page 285 for additional assistance with creating, loading, deleting, copying, or sharing scout groups.

The following sections are intended to assist with using ROS to perform scouting functions such as recording field boundaries, zone maps, or marking various field areas for future reference.

## Scouting Widget



The scouting widget is required to record scouting features during field operations. Refer to the "Add Widgets to a Screen Layout" on page 258 to add the scouting widget to a screen layout before performing the following procedures.

## Scouting Features

The following features may be recorded and stored with scout groups on a ROS device:

### Field Boundaries

Boundaries allow the operator to mark the field perimeter or outline the field area.

If an optional section control system is enabled for field operations, the field boundary will also create a basic zone map for the field. Refer to the calibration and operation documentation for the optional section control system or contact a local CNH dealer for additional assistance with setting up or using section control features with ROS.

**Note:** To review the field boundaries, go to the field review mode and touch anywhere in the field boundary to view the field boundary acres.

### Spray and Plant Zones

Zone map features may be used to assign areas of a field to zones designated for coverage or no-coverage.

If the optional automatic section control system is enabled, ROS will reference the zone map for section control features during the field operation. Refer to the calibration and operation documentation for the optional section control system or contact a local CNH dealer for additional assistance with setting up or using section control features with ROS.

### Scout Zone

Scout zones may be used to mark field areas for future reference or that may require attention. For example, use a scout zone to mark an area that has rocks, flooded areas, or a particularly heavy weed or insect infestation. When recalled in a future job, the operator will be able to find the area using the recorded scout zone. Scout zones will not provide any section control options, but may be useful for reference or to relocate specific areas within a field.

### Scout Line

A scout line may be recorded to mark a swath or dividing line within a field area. Similar to scout zones, a recorded scout line will not provide any section control or guidance options but may be used for reference or to relocate areas within a field.

### Flags

Flags may be used to mark a spot in a field and may be used for reference or to relocate a spot within a field.

### Automatic Boundary Creation

Previously existing coverage can be used to create a field boundary. If coverage already exists around the intended boundary, a field boundary can be created from the coverage, eliminating the need to drive around the field.

**Note:** Refer to "Create a Boundary" on page 284 for additional assistance in using the Automatic Boundary Creation feature.


### Auto-Application Zone

Uses coverage from previous jobs to create a spray/plant zone. The feature draws a no-spray zone box around the coverage from the previous job, and then the (spray/plant) auto-

application zone is carved out of the box using the coverage of previous jobs.

**Note:** Refer to "Auto-Application Zone (AAZ) Feature" on page 293 for additional assistance in creating and managing auto-application zones.

### Scout Object Sharing

By selecting the **Share**  icon in the scout widget dialog, users can share active field boundaries of scout groups with other cloud job participants. When shared, all field boundaries in the active scout group are uploaded to the cloud and associated with the cloud job. Other participants of the cloud job can view the shared field boundaries in an automatically-created scout group. The shared scout group is automatically named "JobName\_sct," the same name for the default scout group, and will replace the default scout group, allowing other cloud job participants to automatically view the shared field boundaries shortly after the originating participant has shared the scout group. Other scout groups may be selected at any time, but will not contain the field boundaries from the shared scout group.

### Scout Obstacles

Scout obstacles are very similar to scout zones, and may be used to mark field areas for future reference or that may require attention, however, Scout obstacles are sharable via the cloud to any cloud participants. The ROS device will treat scout obstacles the same as a generic scout zones, but are transferred to the GCS on request and marked as obstacles. Scout obstacles will affect path planning.

### Visual Boundary Conversion

If a work order includes a visual boundary, the user can promote the boundary to a field boundary in the scout widget dialog. If selected, a new field boundary will appear in the active scout group. Visual boundaries have no functionality aside from visual reference, while field boundaries can also be used to control shut-off sections of the boom and can be transferred to a GCS for path planning.

**Note:** Refer to "Create a Boundary" on the next page for additional assistance in using the Visual Boundary Conversion feature.



## Create a Boundary

The following procedures will detail how to use the Automatic Boundary Creation or Visual Boundary Conversion features to make a field boundary.


**Note:** Refer to "Scouting Features" on page 281 for additional information on these features.

### Automatic Boundary Creation

To create a field boundary from previously existing coverage:

1. Select the **Scout Group**  widget on the Guidance View or Mode.
2. Select **Field Boundary** in the *Scout Feature Type* drop-down menu.
3. Select **Coverage** in the *Create Boundary From* drop-down menu.
4. Select the **Add**  button.



**Note:** ROS may take several moments to create the boundary. A status bar will be seen next to the Add button.

5. The status bar will read **Success** to indicate a successful boundary creation.
6. Select the **Done**  button to return to the Guidance View or Mode.

**Note:** The generated boundary will follow the coverage exactly.

### Visual Boundary Conversion

To convert a visual boundary to a field boundary:

1. Select the **Scout Group**  widget on the Guidance View or Mode.
2. Select **Field Boundary** in the *Scout Feature Type* drop-down menu.
3. Select **Work Order** in the *Create Boundary From* drop-down menu.
4. Select the **Add**  button. The visual boundary from the work order will be converted to a field boundary.

# Scout Group Manager


Refer to the following procedures to manage scout groups and group features during field operations.

## Create a New Scout Group

To create a new group for scouting features:

1. Select the **Scout Group**  widget on the Guidance View or Mode.
2. Select the **Add Scout Group**  button.

**Note:** It may be beneficial to identify the scout group with the application or field id.



3. Select the **Done**  button to return to the Guidance View or Mode.

**Note:** Scout groups may be deleted using the File Maintenance features without an active job in progress on the ROS device. Refer to "Using the File Manager" on page 74 for assistance with using the file manager utilities.

## Load a Scout Group




To select and load a scout group, and all recorded features within the scout group, into an active job:

**Note:** Scout groups may be deleted using the File Maintenance features without an active job in progress on the ROS device. Refer to "Using the File Manager" on page 74 for assistance with using the file manager utilities.

1. Select the **Scout Group**  widget on the Guidance View or Mode.
2. Select the **Active Group** drop-down field and select the desired scout group to load.
3. Select the **Done**  button to return to the Guidance View or Mode.

## Delete a Scouting Feature

To delete specific scouting features:



1. Select the **Scout Group**  widget on the Guidance View or Mode.
2. Select the scout group that contains the specific desired scout feature from the active groups list.
3. Select the **Edit**  icon to open the *Scout Group Manager*.
4. Select the **Delete** icon.
5. Select **Done**  in the upper, right corner of the Scout Group manager prompt to return to the main Scout Group manager.

**Note:** *Scout groups may be deleted using the File Maintenance features without an active job in progress on the ROS device. Refer to "Using the File Manager" on page 74 for assistance with using the file manager utilities.*



### Copy a Scouting Feature

Features available on the ROS device may be copied into the current field operation by copying recorded feature(s) into the current scout group.

To copy a scouting feature(s) into the current scout group:


1. Select the **Scout Group**  widget on the Guidance View or Mode.
2. Select the **Edit**  icon.
3. Select the source to be copied from the **Select Source Group** drop-down.



**Note:** *The feature will remain in the source scout group.*

4. Use the check boxes to select the features to copy.
5. Select the **Copy from Group** button.
6. Select the **Done**  button to return to the Main Scout Group page.
7. Select the **Done**  button to return to the Guidance View or Mode.

### Share a Scout Group

To share a scout group to cloud participants:


1. Select the **Scout Group**  widget on the Guidance View or Mode.
2. Ensure the correct scout group and field boundaries are selected/active.

3. Select the **Share**  icon to send the field boundaries to the cloud job.
4. Select the **Done**  button to return to the Guidance View or Mode.



## Scout Feature Setup

To configure ROS to record a field feature boundary, line, or place flags to mark various positions in a field during an operation:


1. Select the **Scout Group**  widget on the Guidance View or Mode.
2. Select an existing scouting group or add a new group.  
*Note:* Refer to "Scout Group Manager" on page 285 for more information on scout groups.
3. Select the **Scout Feature Type** drop-down field and select the desired feature. Review "Scouting Features" on page 281 for more information on the features available for use with ROS.
4. Select the **Name** drop-down field to select a feature name previously recorded using the ROS device. Selecting a name used previously for a new feature will not affect the previous feature.  
*Note:* If needed, modify the name to assist with feature selection during future field operations.
5. Select the **Color Indicator** and select the desired color for the feature to be recorded or location to be marked.

6. Select the desired point recording mode. The following options are available:



### Auto Point Capture

Select this option to allow ROS to automatically record the vehicle path while recording the feature boundary.

To begin recording a field feature using the automatic point capture mode:

1. Select the **Start Recording**  button shown on the scouting widget to begin recording the field feature.

ROS will automatically capture points along the path driven by the equipment.





2. Select the **Pause Recording**  button at any time to momentarily stop recording the current equipment path for the feature being recorded. Select **Resume Recording**  to resume recording the field feature boundary.

3. Select the **Save and End Recording**  button to stop recording the field feature and save the current boundary to the scout group.

### Manual Point Capture

Select this option to manually select points for the feature or area.

To begin recording a field feature using the automatic point capture mode:

1. Select the **Start Recording**  button shown on the scouting widget to begin recording the field feature.
2. Select the **Add Point**  button on the scouting widget to plot the first point.
3. Continue driving the field feature boundary, selecting **Add Point**  button as necessary to record the outline of the field feature.
4. Select the **Save and End Recording**  button to stop recording the field feature and save the current boundary to the scout group.

**Note:** *If the feature provides any features for automatic section control systems enabled for the field operation, ROS will begin controlling sections after the feature is saved to the scout group. Refer to the calibration and operation documentation for the optional section control feature for additional information on setting up and using the section control system.*

7. Select the **left**, **center**, or **right** position for recording points on the feature boundary. ROS will record points at the left, center, or right of the configured equipment width.
8. Enable the **Override Shift Distance** option to enter a custom left or right offset distance if desired.
9. When creating a spray/plant zone for automatic section control features, select the following options to configure section control features:

#### Spray

Select this option to allow ROS to use an optional section control system to enable application sections to cover or apply product to the designated area.

#### No-Spray

Select this option to designate the area within the completed boundary as a non-application area. ROS will use any optional automated section control features to shut off application sections in these areas.

#### Plant

Select this option to allow ROS to use an optional section control system to enable seeding or row crop planting sections to input crops in the designated area.

#### No-Plant

Select this option to designate the area within the completed boundary as a non-input area. ROS will use any optional automated section control features to shut off input sections in these areas.

10. Select ready to start recording in the lower, right corner of the prompt to finish set up and to begin recording the boundary or plotting points for future reference. Refer to "Auto Point Capture" on the previous page or "Manual Point Capture" on the previous page for assistance with starting to record a zone boundary or plotting points for scout features.





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## Record a Field Feature

Refer to "Scout Feature Setup" on page 288 for assistance with setting up ROS to record a feature or plot points in a field during operation.





### Auto Point Capture

To begin recording a field feature using the automatic point capture mode:

1. Select the **Start Recording**  button shown on the scouting widget to begin recording the field feature.  
ROS will automatically capture points along the path driven by the equipment.
2. Select the **Pause Recording**  button at any time to momentarily stop recording the current equipment path for the feature being recorded. Select **Resume Recording**  to resume recording the field feature boundary.
3. Select the **Save and End Recording**  button to stop recording the field feature and save the current boundary to the scout group.

### Manual Point Capture

To begin recording a field feature using the automatic point capture mode:

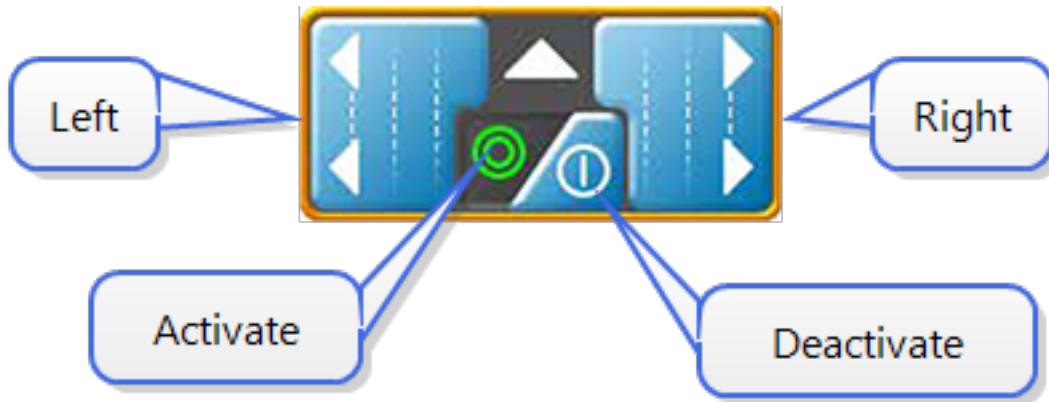
1. Select the **Start Recording**  button shown on the scouting widget to begin recording the field feature.
2. Select the **Add Point**  button on the scouting widget to plot the first point.
3. Continue driving the field feature boundary, selecting **Add Point**  button as necessary to record the outline of the field feature.
4. Select the **Save and End Recording**  button to stop recording the field feature and save the current boundary to the scout group.

**Note:** *If the feature provides any features for automatic section control systems enabled for the field operation, ROS will begin controlling sections after the feature is saved to the scout group. Refer to the calibration and operation documentation for the optional section control feature for additional information on setting up and using the section control system.*

## Create a Flip Area

A flip area is primarily used for planting and tilling to create a boundary around the edge of the field or another obstacle that creates a zone that will not be planted. This allows the user to plant the entire field and, when done with everything in the field except for the flip area, go back and plant that area last.

### Configuring Flip Settings



1. Select and hold the **Flip** widget on the run screen. The *Flip Options* window will open.
2. Select either the **Number of Swaths** or **Distance in: radial** button.
3. If **Distance in:** was selected, select the desired unit of measurement from the drop-down.
4. Enter the desired amount (this will either be number or swaths or the desired distance).

### Activating or Deactivating Flip

While running in a job:

1. Press the left or right arrow to begin recording a Flip zone offset to that side.
2. Press the arrow again to complete the Flip zone.
3. Set to **Activate** to prevent applying in Flip zones.
4. Set to **Deactivate** to allow applying in Flip Zones.


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## Auto-Application Zone (AAZ) Feature

Refer to the following sections to create and manage Auto-Application Zones.

### Create an Auto-Application Zone


To create an auto-application zone from the coverage of previous jobs:

1. Select the **Scout Group**  widget on the Guidance View or Mode.
2. In the **Scout Feature Type** drop-down list, select **Auto-Application Zone**.
3. In the **Select Job Coverage Data** drop-down list, select the desired previous job coverage from which to create the auto-application zone.
4. There is an option to filter previous jobs via GFF. Select Filter Jobs By GFF and select a grower, farm, and field to filter and narrow down the previous jobs.
5. Select **Load Data** to begin creating the auto-application zone. A loading status notification will display at the bottom of the screen.
6. Selecting the job does not load the auto-application zone. The Load Data button must be selected to create the AAZ.

### Manage Auto-Application Zones

An auto-application zone and a no-spray zone that encloses the AAZ will be added to the list of scout features as the chosen name for the AAZ and as No-Spray Zone. For more information on how to manage scout features, refer to "Scout Group Manager" on page 285.

## Street Maps

Street maps provides an aerial map view of an area along with available field boundaries in the area. To open street maps, select the **Street Maps**  icon. A window will open showing the street view as well as field boundaries (shown in blue) in the area.



### Downloading Maps

Before using street maps, a map must be downloaded from the Slingshot® portal.

<https://portal.ravenslingshot.com>

The downloaded map will only show the area selected by the user (in mile radius) and does not automatically update based on location. Since street maps is offline, it will only show areas imported to the field computer.

To download Street Maps:

1. Select the **Manage** drop-down from the top of the page then select **Street Maps**.
2. Select a location on the map. This will create a center point for map creation. At any time, if desired, select a different center point.
3. Use the **Size** slider bar to increase or decrease the map size. The map size (tile size) is measured in miles square.

For example, a map that is ten miles wide by ten miles long will be 100 square miles.

4. The latitude and longitude of the center point will display after choosing the center point.

**Note:** *If the coordinates of the center point location are known, the user can enter the coordinates into the latitude and longitude, and the Street Maps will create the center point.*

5. Enter a name for the map.

**Note:** *Having "Street Map" or "Map" as part of the name will make it easier to identify the file as a Street Map when in File Manager.*

6. Select **Create**. The map name will display on the left side of the screen. If desired, select the map name to view the download status. The display status "Processing" indicate the map is getting ready for download. "Ready to Download" indicates the map is ready to download.
7. Select **Ready to Download** to download the map.
8. Select **Save**.
9. Navigate to the desired save location on the computer or on the USB.

### Filtering

If desired, press the filter in the top left corner of the map to filter visible field boundaries by grower, farm, field, or job type. The field boundaries can also be filtered by most recent, name, etc.

### Zoom

Use the magnifying glass icons to zoom in or out on the map.

### Follow

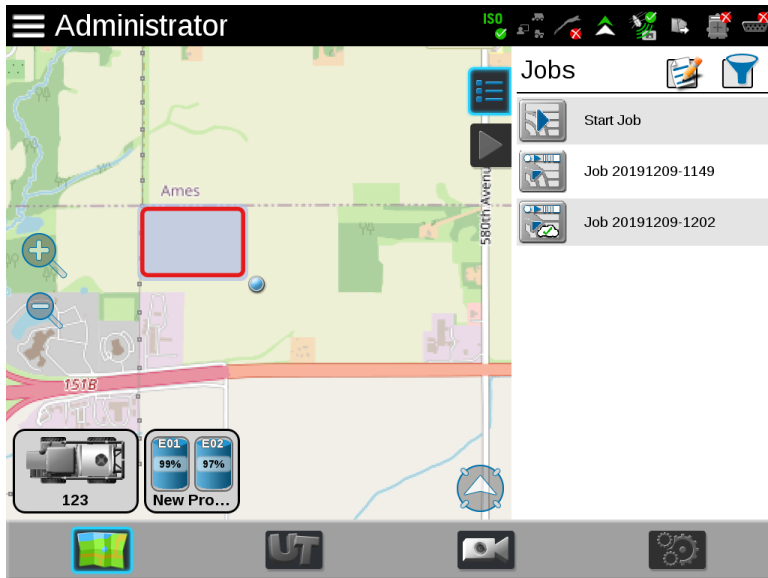
Press the arrow icon in the lower left corner of the screen to either have the map follow the machine or be able to pan and navigate around the map.

### Selecting a Job

On the map, field boundaries will be visible as blue shapes on the screen. Pressing the desired job will highlight the field boundary and open a window with a list of available jobs for that field boundary.


Select the desired job to start an existing job or press Start Job to start a new job.

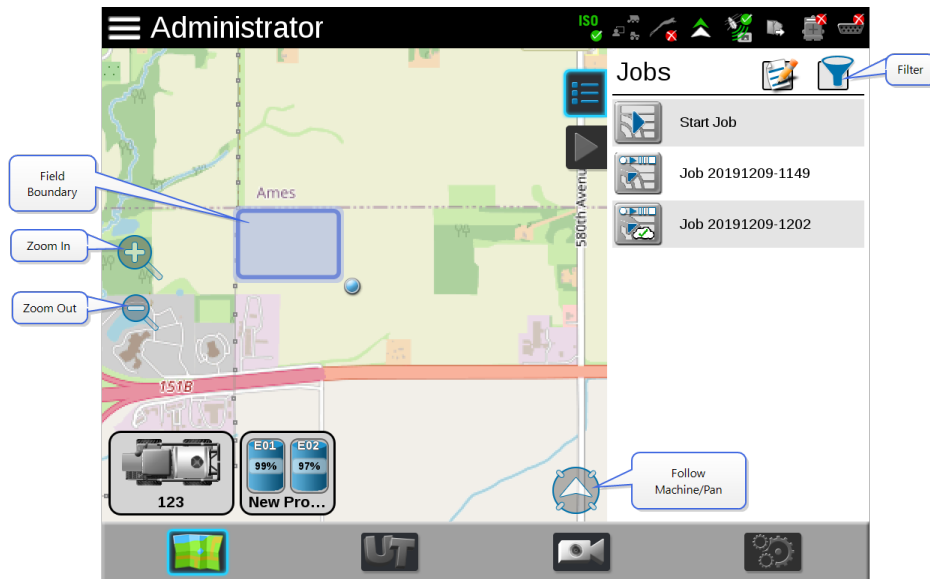




If there are multiple field boundaries in the area that have overlapping boundaries, select the desired area. A window will open that shows the available field boundaries in the selected area. Select the desired field boundary then select the desired job.

## Street Maps for agX

Street maps provides an aerial map view of an area along with available field boundaries in the area. To open street maps, select the **Street Maps**  icon. A window will open showing the street view as well as field boundaries (shown in blue) in the area.



### Downloading Maps

Before using street maps, a map must be downloaded from the Slingshot® portal.

<https://portal.ravenslingshot.com>

The downloaded map will only show the area selected by the user (in mile radius) and does not automatically update based on location. Since street maps is offline, it will only show areas imported to the field computer.

### Filtering

If desired, press the filter in the top left corner of the map to filter visible field boundaries by grower, farm, field, or job type. The field boundaries can also be filtered by most recent, name, etc.

### Zoom

Use the magnifying glass icons to zoom in or out on the map.

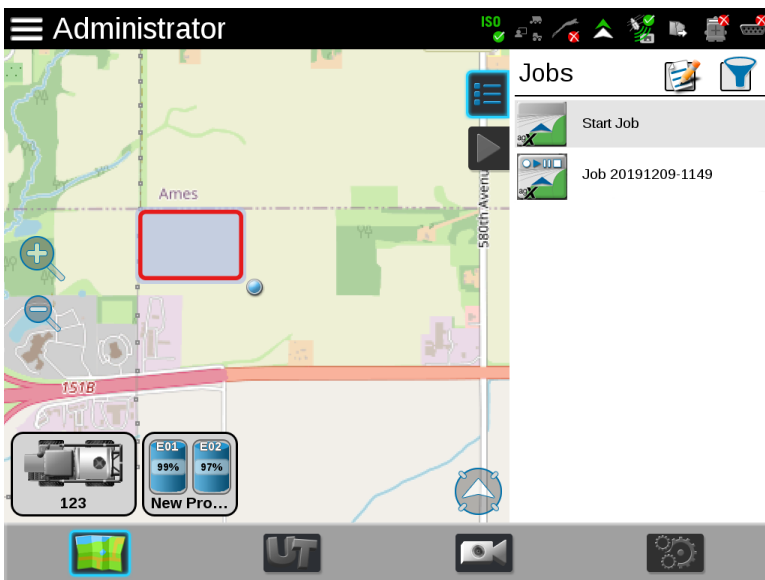
## Follow

Press the arrow icon in the lower left corner of the screen to either have the map follow the machine or be able to pan and navigate around the map.

## Selecting a Job

On the map, field boundaries will be visible as blue shapes on the screen. Pressing the desired job will highlight the field boundary and open a window with a list of available jobs for that field boundary.

Select the desired job to start an existing job, or select a new agX job image to start a new job.



If there are multiple field boundaries in the area that have overlapping boundaries, select the desired area. A window will open that shows the available field boundaries in the selected area. Select the desired field boundary then select the desired job.

## Chapter 13: Calculate the Speed Calibration Values

Raven industries recommends the following values for the initial speed cal:

Sensor Type Setting	Used with	Recommended Initial Speed Cal	
		English	Metric
Wheel	Wheel Magnets	1000	254
	Speedometer Drive Speed Sensor	612	155
Radar	Raven Radar	598	152
GPS	External Raven DGPS Receiver	785	199
	Internal DGPS Receiver	812	206
	GPS Speed over CANbus	1000	1000

These values are usually a good starting point and will generally yield adequate results; however, the speed cal should still be refined for each vehicle.

**Note:** *The GPS speed over CANbus feature is only available with specific Raven speed sense nodes. This feature utilizes NMEA speed over ground data transmitted over the CAN network which eliminates the need for a separate, external speed sensor.*

### NOTICE





When using the GPS speed over CANbus feature, no refining or adjustment is necessary or recommended to the speed cal value. Losing GPS signal for more than a second will also result in loss of the CAN speed signal which may affect product application in progress.

Refer to the following articles to adjust or tune the speed calibration value, or speed cal, for the specific speed sensor used with the ROS device:

- "Radar Speed Sensors" on the facing page
- "Wheel Drive Speed Sensor" on page 303

## Radar Speed Sensors

To tune or adjust the ROS device for the speed sensor connected to the system:

1. Make sure any section switches are turned OFF before powering the ROS device on.
2. Select the **Settings**  icon on the bottom right of the screen. The *Settings Menu* will open.
3. Locate and select the **Speed Settings**  module.
4. Select the **Recal Distance** button to reset the distance display to a "0" value.
5. Drive 1 mile [1 kilometer]. The field computer will measure the distance driven using the current speed cal value.

**Note:** *Accelerate and decelerate slowly. To achieve the most accurate calibration, do not use the vehicle odometer or ROS distance display to measure the actual distance driven. Use section lines or highway markers to determine the actual distance.*

6. At the end of the driven distance, view the distance display again and record the value. The ROS distance should read a value of approximately 5280 [1000]. If the display reads between 5260-5300 [990-1010], the default value of 598 [152] is accurate for the speed cal value.

7. If the distance displayed is not between 5260-5300 [990-1010], recalculate the speed cal with the formula:

$$ADJ = \frac{CSC \times 5280[1000]}{D}$$

where ADJ = Adjusted Speed Cal, CSC = Current Speed Cal (speed cal number used to drive the test distance), and D = the ROS Distance display at the end of the driven distance. Round to the nearest whole number.

**Note:** For Example, assume that the ROS Distance reads 5000 [980] after a known 1 mile distance has been driven using an initial speed cal value of 598 [152].

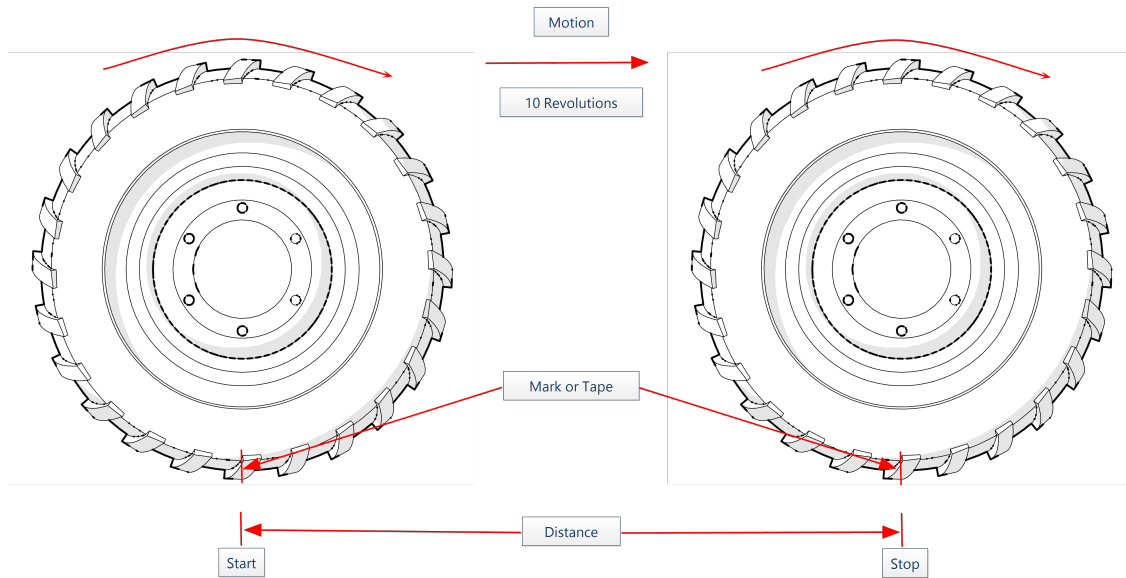
English	Metric
$ADJ = \frac{598 \times 5280}{5000} = 631.48$	$ADJ = \frac{[152] \times [1000]}{[980]} = [155]$

The Adjusted Speed Cal value is 631 [155]

8. Select the speed cal value for the radar speed sensor and use the on-screen keypad to enter the adjusted speed cal.
9. Verify the new speed cal derived from the equation by repeating steps 4 through 6.

## Wheel Drive Speed Sensor

1. Mark the tire on which the speed sensor is installed using chalk or a piece of tape as shown below.
2. Mark the corresponding spot on the ground.
3. Count 10 full revolutions of the wheel while traveling in a straight path. The mark must stop with the chalk or tape in the same orientation that it began at the starting point.



4. Calculating the Speed Cal with a Wheel Magnet Speed Sensor System
5. Mark the stopping point and measure the distance between the starting and stopping marks on the ground in inches [dm]. Round to the nearest whole number.

**Note:** This measurement is critical to the performance of the ROS device. Measure Carefully. Be sure tire is properly inflated before measuring. If possible, measurements should be made in the type of soil in which the vehicle will be operating. Tire circumference will vary when measured in soft or hard packed soil. For best results, measure several times and average the results.

6. Enter this measurement as the adjusted speed cal.

### Adjusting for Additional Magnets

Typically, four magnets are used with the wheel drive speed sensor. However, to ensure accurate speed readings for large tires and very low speed applications, additional wheel magnets may be necessary. Any even number of magnets may be used as long as they are of



alternating color and equally spaced. After calculating the speed cal, this number must be adjusted according to the number of magnets installed using the following formula:  
where ADJ = Adjusted Speed Cal, NM = Number of Magnets used and D = the Distance Measured.

**Note:** For Example, the distance measured between starting and stopping marks is 1200 and six magnets are installed.

$$\frac{4}{6} \times 1200 = 800$$

The Adjusted Speed Cal is 800.

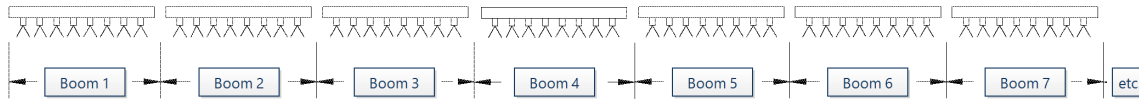
## Boom or Section Width Calibration

Use the following formulas to help calculate the boom or implement section widths for either broadcast or band applications.

### Liquid Control Systems

For liquid sprayers, the boom cal value is the width of the individual boom sections.

Calculate the width of each section by measuring the spacing between spray tips in inches [cm] and then multiplying by the number of tips in each boom section



**Note:** For Example, 20 tips in a section with spacing of 40 inches would yield:

$$20 \times 40 = 800 = SW$$

or a Section Width of 800 inches (approximately 67 feet). Enter 800 as the width for this section.

## Band Spraying Adjustment

To calculate the adjusted applied rate for band spraying applications, use the following formula:

$$\frac{BR \times BW}{S} = AR$$

Where BR = the Broadcast Rate, BW = the band width, S = the spacing between the tips, and AR = the Adjusted Rate for band spraying.

**Note:** For Example, if the Broadcast Rate is 20 GPA [200 L/ha], the band width is 14 inches [40 cm], and the tip spacing is 40 inches [100 cm]:

English	Metric
$\frac{20 \times 14}{40} = 7$	$\frac{[200] \times [40]}{[100]} = [80]$

Therefore, the adjusted rate is 7 gallons per acre or 80 liters per hectare.

## Granular Control Systems

To calibrate section widths in inches [cm] for the granular application types:

- For single section control systems, enter the total spread width as the boom 1 cal.
- For dual section control systems, enter the left side spread pattern as boom 1 cal and the right side spread pattern as boom 2 cal.
- For spinner control, enter the total spread width as boom 1, enter spinner spread width as boom 2 for spinner control. Boom 1 is associated with all products, boom 2 is the spinner control.

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# Limited and Extended Warranties

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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 (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 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.

## 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

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must be registered instead.

## Where can I register my product for the extended warranty?

To register, go online to <https://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 (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

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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.