# REBL™

BY OUTBACK GUIDANCE

# User Guide

## (Job Mode)

# Table of Contents

# Chapter 1: Getting Started

## Touchscreen Overview

### Understanding the Parts of the Touchscreen

The REBEL touchscreen comprises the following:

- Map - a moving graphical representation of the field operation. You can use zoom features and steering indicators, as well as view the applied area total for quick reference.
- Buttons and indicators - these appear along the edges of the display and provide quick access to settings, enable you to zoom in and out on the field, and show current navigation values.

| Screen Item | | Description |
|---|---|---|
| 1 | | Onscreen lightbar |
| | | Provides visual cues to stay on a guideline. Each bar (section) on the lightbar represents a relative distance between your guideline and your vehicle. |
| | | • Red bars left of center indicate the guideline is a certain distance left of your vehicle; thus, you need to steer to the left to get closer to your guideline. As you steer to the left, fewer bars are red (you are getting closer to your guideline). |
| | | • Green bars right of center indicates the guideline is a certain distance right of your vehicle; thus, you need to steer to the right to get closer to your guideline. As you steer to the right, fewer bars are green (you are getting closer to your guideline). |
| | | For a comparison of the onscreen lightbar and the optional external lightbar, see "Using the External Lightbar" on page 192. |
| 2 | Speed 9.1 mph  RTK 1  Worked 0.00 ac  Field 0.00 ac  Pass 0  Heading 85 | Real-time status tab (see page 10) |
| | | • Displays information in upper right of map. |
| | | • By default, only the top row appears. Press the tab to expand it (as shown at left); press it again to contract it (only top row visible). |
| 3 | | Vehicle indicator (representation of selected vehicle) |
| | | The triangle on the vehicle center points in the direction of travel. If the vehicle on the map is moving opposite to your actual direction of travel double-tap the vehicle to flip the vehicle direction on the map. If the vehicle is not moving, the triangle changes to a square. |
| | | See "Chapter 2: Working with Vehicles" for more information. |

| Screen Item | | Description |
|---|---|---|
| 4 | <br>No offset<br><br>2 m offset | Implement indicator<br><br>• Can be either a trailed ('regular' trailed or active trailed) or rigid (front or rear) implement.<br><br>• Width of actual implement is indicated by width of implement indicator (for example, a wider implement will appear wider on the map than a narrower implement).<br><br>• You can set front/back and left/right offsets (how far ahead/behind and left/right, respectively, the implement is located from the vehicle) and this is represented graphically on the map. The figures at left show a rear implement with no offset (top figure) and with an offset (bottom figure).<br><br>See "Chapter 3: Working with Implements" for more information. |
| 5 | | Guideline (red)<br><br>Imaginary line (path) upon which REBEL guides your vehicle.<br><br>See "Setting Paths Overview" for more information. |

| Screen Item | Description |
|---|---|
| 6 <br><br> Crosstrack indicator showing no crosstrack <br><br> Crosstrack indicator with snap indicator | **Crosstrack error** <br><br> Distance from your current driving position to your guideline with an arrow indicating the direction you need to drive to return to the line. For example, if you are driving an A=B line and you veer to the right and are off your line by 6 cm, your crosstrack error is 6 cm and the arrow is to the right of the value and pointing left (conversely, if you are 6 cm to the left of your line, your crosstrack error is 6 cm and the arrow is to the left of the value and pointing right). <br><br> If you have no crosstrack (see left top, just after engaging on an A=B path) the crosstrack shows zero. <br><br> When performing certain path adjustments, an additional indicator appears to the left or right of the crosstrack error indicator (see left bottom, just after snapping a guideline to your current position). <br><br> See "Chapter 7: Path Planning" for information on path planning (including setting and adjusting paths). |
| 7 <br><br> ISOUT | **ISOUT** <br><br> Displays the ISOUT window, where you work with ISOBUS-enabled implements. <br><br> See "ISOUT Overview" on page 50 for more information. |
| 8 | **Mapping Options button** <br><br> Displays the Mapping Options panel where you set the map view and perspective, set prescription map and applied map options, work with event markers (flags), and use 'return to point' guidance. <br><br> See "Mapping Options" on page 132 for more information. |
| 9 | **Path Planning button** <br><br> Displays the Path Planning panel, where you set or adjust paths, select a previous path, and configure/make eTurns. <br><br> See "Chapter 7: Path Planning" for more information. |

| Screen Item | Description |
|---|---|
| 10 <br><br> _(Sidebar icons: steering wheel, Apply: On, Straight, Contour, star, Menu)_ | Sidebar <br><br> Area along the right edge of the touchscreen. See the subsequent rows in this table for descriptions of each button. |

| Screen Item | Description |
|---|---|
| 11 <br><br> Not ready to engage (no errors) <br><br> Not ready to engage (errors) <br><br> Ready to engage <br><br> Pre-engage on <br> (not ready to engage) <br><br> Auto-Engage activated <br> and autosteering <br><br> Engaged | Engage (steering) button <br><br> Use the engage button to engage on a guideline (that is, lock onto a guideline use autosteering) when all autosteering requirements have been met. The button has the following states: <br><br> • Not ready to engage (errors if exclamation flashes on the button). Press the exclamation symbol to display the eDriveX Status screen that indicates the errors. See "eDriveX Status" on page 210 for more information. <br><br> • Ready to engage. All autosteering requirements have been met. Press the engage button to engage autosteering on the guideline. <br><br> • Pre-Engage: Enables you to activate autosteering before all engage requirements are met <br><br> • Auto-Engage (eDriveXD only): Enables auto re-engagement of interrupted autosteering. <br><br> • Manual: Enables manual engagement on a guideline (similar to buttons at left with no A or P). An actual setting exists only for eDriveXD. <br><br> • Engaged. REBEL is automatically steering you along your guideline. <br><br> *Note: If the engage Button missing from screen - eDriveX is no longer communicating with the terminal (such as eDriveX powered off).* <br><br> See "eDriveX Settings" on page 45 for information on eDriveXD settings (Manual, Pre-Engage, Auto-Engage). Pre-Engage is also available with eDriveXC. |
| 12 | Apply button <br><br> Turns implements on (green) or off (blue) to control rate controllers and log application/coverage data. |

| Screen Item | Description |
|---|---|
| 13 <br> Straight <br> Contour | Shortcuts <br><br> Provide one-press access to important functions. Straight and Contour (guidance buttons) appear by default, but you may change either or both. <br><br> See "Favorites and Shortcuts" on page 16 for more information. |
| 14 | Favorites button <br><br> Displays the Favorites panel of buttons you use often and want quick access to. The panel has five buttons by default, but you may add additional buttons (or replace any default buttons) for a total of 18 (two columns of nine favorites each). <br><br> See "Favorites and Shortcuts" on page 16 for more information. |
| 15 <br> Menu | Menu button <br><br> Displays the Menu Options panel—this is the main panel, the highest level of panels from which all options are accessible. <br><br> See "Using Panels to Work with the Touchscreen" on page 11 for more information. |
| 16 | Camera button <br><br> Displays the Camera window, where you can view: <br><br> • Reverse the view (flip the image horizontally displaying a mirror image) <br> • Switch between default and full-screen view <br><br> See "Using an External Camera" on page 191 for more information. |
| 17 <br><br> Contour Lock off <br><br> Contour Lock on <br><br> Contour Lock locked | Contour Lock button <br><br> Contour Lock button is displayed only when REBEL is in Contour mode—see "Setting and Following Contour Paths" on page 157 and "Contour Lock" on page 170 for more information. |

| Screen Item | | Description |
|---|---|---|
| 18 | <br><br>eTurns not ready<br><br><br><br>eTurns ready | eTurns button (appears at right of Wi-Fi and/or camera buttons only for eDriveXC systems)<br><br>Displays eTurns Control panel where you configure/make eTurns.<br><br>See "eTurns" on page 173 for more information. |
| 19 |  | Wi-Fi connection indicator (lower right of map)<br><br>Shows terminal Wi-Fi connection status—see "Networking Overview" on page 43 for more information. |
| 20 |  | Headland alert indicator (upper left of map; below rate/section tabs if they are visible)<br><br>Appears any time the implement crosses into a previously applied area.<br><br>See "Setting the Headland Alert" on page 25 for more information. |
| 21 |  | Zoom distance (lower left of map, above ISOUT button)<br><br>Distance between the grid lines on the map (value increases as you zoom out and decreases as you zoom in).<br><br>See "Zooming In and Out on the Map" on page 15 and "Straight Paths Options" on page 150 for more information. |
| 22 |  | Rate control and section control tabs<br><br>Appear only if you have AC110 or an ISOBUS implement installed and have configured rate control and/or section control for your system.<br><br><ul><li>Rate control tab (top tab)</li><li>Section control tab (middle tab)</li><li>Override button (if the optional switchbox is connected, this button is not visible)</li></ul>See "Rate Control and Section Control Tabs/Buttons" on page 184 for more information. |

| Screen Item | Description |
|---|---|
| 23  | ISOUT window <br><br> Virtual terminal window for an ISOBUS-enabled implement that is currently connected to (and recognized by) REBEL. The contents of the window are determined by the implement's manufacturer. Press the ISOUT button in the lower left of the screen to display ISOUT window. <br><br> See "ISOUT Overview" on page 50 for more information. |
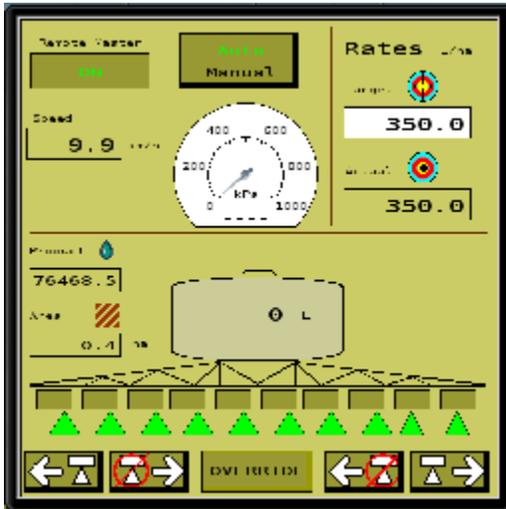
# Real-Time Status Tab

At the top right of the map, the real-time status tab displays one or three rows of commonly used read-only information. By default, only the first row appears (left graphic below). Press the tab to display all three rows (right graphic below); press the tab again to collapse it (hide the second and third rows).

*Single row*                    *Expanded (all three rows)*

The following table describes each row of the real-time status tab.

| Tab Row | Item | Description |
|---------|------|-------------|
| First row | Speed | Current speed of the vehicle |
| | Signal (correction) type with differential (diff) age | (Signal correction type) REBEL is receiving the following signals:<br><br>• N/A = not receiving a GPS signal<br>• 3d = three-dimensional signal<br>• 3D = three-dimensional differential signal (DGPS)<br>• RTK = real time kinematic corrections<br><br>(Differential age) Age of the corrections used in the DGPS correction:<br><br>• SBAS signals - typically 6 to 10 seconds<br>• RTK - optimal operating values are < 5 seconds |
| | Signal status | Satellite icon color indicates the following:<br><br>• Red = no fix on a DGPS signal<br>• Orange = tracking satellites<br>• Green = receiving a GPS signal |
| | Signal strength | Vertical bars indicate the quality of the GPS signal related to the standard deviation of the solution:<br><br>• SBAS - 3 to 4 bars are typical<br>• RTK - 4 bars are typical |
| Second row | Worked | Area of job worked so far |
| | Field | Field size for the job |
| Third row | Pass | Pass number (for straight, AB contour, and pivot paths)<br><br>Once the straight or pivot path is set, all passes are numbered. Pass 1 is to the right of the straight path and to the outside of a pivot path; Pass -1 is to the left of the straight path and to the inside of a pivot path. |
| | Heading | Vehicle's heading |

# Using Panels to Work with the Touchscreen

A panel is a pop out tab that appears to the left of the sidebar and contains buttons, fields, and other information you use to select system settings and options, view information, and perform work. You start by pressing Menu or by pressing a specific button on the map. Panel widths vary depending on how much information needs to be displayed.

- Narrow panel (example: press Menu > Settings > Map Settings to display the Map Settings panel)



- Wide panel (example: press Menu > Settings > System Preferences to display the System Preferences panel)



When pressed, some buttons on a panel may display another panel. Additionally, one of the following buttons appears at the bottom of each panel:

- Back - closes the current panel and displays the previous panel
- Close - closes the current panel (no panels are visible)
- Save - saves the currently selected options (where applicable)
- Done - completes a selection and returns you to the previous panel

Use the 'hide panel' button ▶ and the 'close panel' button ✕) along the left side of any panel, the 'show panel' button ◀ that appears after hiding a panel, and the Menu button to hide and close panels as follows:

- Hide a panel: Press ▶.

- Redisplay a hidden panel: Press ◀ or press Menu.

- Close a panel: Press ✕ or press Menu. The next time you press Menu you start over by displaying the Menu Options panel.



Hide panel (top) and                    Show panel button
close panel (bottom) buttons

The following example (based on the above figure) shows how to navigate the menus.

1. Press **Menu > Settings > System Preferences > Units**. The Units of Measure panel appears.

2. Press **U.S.** or **Metric** to set the units.

3. Press **Back/Close** repeatedly or press the close panel button to close the panel or press the hide panel button to hide the panel.

# Entering/Adjusting Settings

Fields/buttons appear in different colors and may or may not show the current setting. The following table provides descriptions/examples of several REBEL field/button types.

| Field/Button Type | Example | Function When Pressed |
|---|---|---|
| Blue button with no setting value displayed | System Preferences button  | Displays a panel where you select/enter values  |
| | Wind Direction button  | Displays a data entry window where you enter a value  |
| Blue button with value setting displayed | Sensitivity button  | Displays an adjustment window where you set values with a slider or arrows  |

| Field/Button Type | Example | Function When Pressed |
|---|---|---|
| | Units button <br> **Units: U.S.** | Displays buttons to select a value |
| Green with arrow | Map View button <br> **Map View: Vehicle** ▼ | Displays a drop-down list to select a value |
| White field | Server Address field (part of NTRIP login info) <br><br> Server Address [            ] | Displays a data entry window where you enter a value |
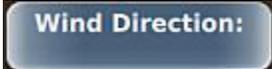
# Zooming In and Out on the Map

Use the common touchscreen 'pinch' method to zoom in or zoom out on the map.
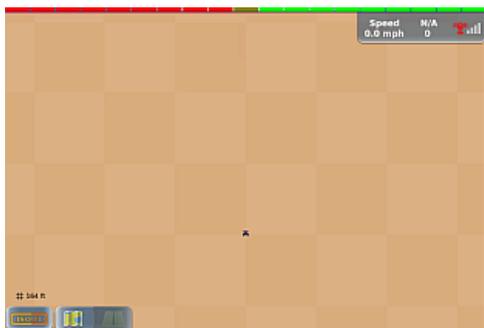
# Favorites and Shortcuts

REBEL gives you two options (favorites and shortcuts) to quickly access often-used buttons:

- Favorites are buttons you use often and want quick access to. The Favorites panel, be default, includes five favorites, but you can add favorites (for a maximum of eighteen) and delete favorites. As shown below, the Favorites panel is narrow when showing up to nine favorites but expands to show between ten and eighteen favorites. If a favorite is disabled (for example, Path Adjustment in the figures below), the related functionality is not available. Not all buttons can be added to the Favorites panel.



| Single-width | Double-width |
|:---:|:---:|
| (up to 9 favorites) | (10 to 18 favorites) |

When you add a favorite, the button appears on the Favorites panel exactly as it appears in its default location (and the button is still accessible from its default location). Deleting a favorite removes the button only from the Favorites panel; it does not remove it from its original location. For example, if you delete the Terminal Diagnostics button as a favorite that button is still available on the Diagnostics panel (after you press Menu > Diagnostics). You can also delete all favorites to start over and place all new favorites on the panel.

*Note: The Favorites button functions as a screen capture button when a USB drive (with Screenshots folder on the drive) is inserted into the REBEL terminal—see "Capturing Screen Images" on page 227.*

- Shortcuts refer to the two buttons above the Menu button on the sidebar. By default, the two shortcuts are Straight and Contour (guidance mode buttons). Any button that you can assign as a favorite you can assign as a shortcut.

To use a favorite or a shortcut:

- Press the Favorites button then press your preferred favorite or press your preferred shortcut.

To add a favorite or assign a shortcut:

1. Navigate to the button you want to add as a favorite or shortcut. For example, to add the Terminal Diagnostics button as a favorite press **Menu > Diagnostics** to display the Diagnostics panel.
2. Press and hold your preferred button for several seconds until the Manage Favorites window appears.

3. To add the button as a favorite, press Add to Favorites then press Ok in the confirmation window that appears.

    -or-

    To assign the button to one of the shortcuts, press your preferred shortcut button (1 or 2).

To remove a favorite:

1. Press the favorites button then press and hold the favorite you want to remove for several seconds until the Manage Favorites window appears.

2. Press **Remove from Favorites**. The favorite is removed from the Favorites panel.

# Settings

The Settings panel (Menu > Settings) provides access to multiple panels and screens that enable you to enter/edit various settings. Depending on your system features, the number of buttons on the panel varies and the panel will have a single column of buttons when displaying up to nine buttons or two columns (as at right) when displaying more than nine buttons. For example, the eTurns Setup button appears only if your system is authorized for eTurns.

Use the links below to access information on REBEL settings.

# System Preferences

Use the System Preferences panel (Menu > Settings > System Preferences) to enter all system preferences settings. See the following sections for more information.

To set display preferences:

- "Adjusting the Screen Brightness and Sound Level" on page 20
- "Setting the Language, Units, and GMT Offset (Local Time)" on page 21
- "Adjusting the Text Size" page 232

To set driving/map preferences:

- "Setting A=B Projection" on page 23
- "Setting Smoothing" on page 24
- "Setting the Headland Alert" on page 25
- "Setting Direction Detection" on page 26
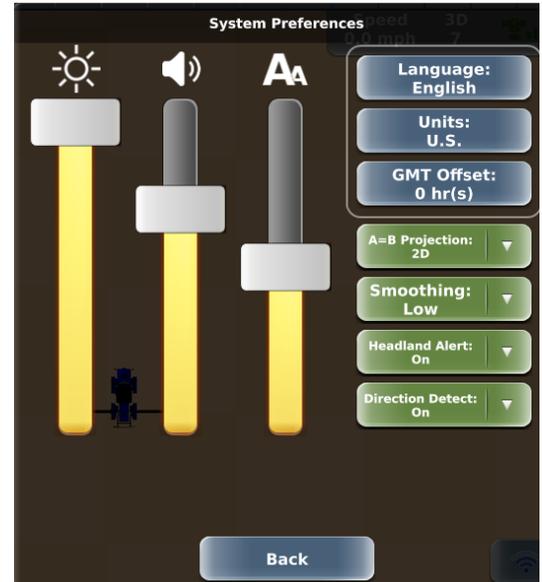
## *Adjusting the Screen Brightness and Sound Level*

Use the sliders on the System Preferences (Menu > Settings > System Preferences) panel to adjust the screen brightness (left slider) and the sound level (right slider). As you move the sliders the system provides feedback on the new settings:

- Brightness - As you move the slider up/down the screen brightens/dims, respectively.

- Sound - When you move the slider and release you finger from the screen the systems produces a beep at that volume level.

## *Setting the Language, Units, and GMT Offset (Local Time)*

Use the System Preferences panel (Menu > Settings > System Preferences) to set the following (three blue buttons on the panel):

- Language - The terminal should be set to the language you requested when you ordered your system. Use either procedure below if you need to change the language. REBEL supports the following languages: English, Spanish, Portuguese, German, and French.

- Units (of measure) - Set the unit of measurement (U.S. or Metric) in which REBEL displays/records measurements. When working with ISOBUS implements, verify the units in REBEL (described here) match those for your implement (as displayed in the ISOUT window). Depending on the ISOBUS implement, you may be able to change units within the ISOUT window for that implement. See "ISOUT Overview" on page 50 for more information on ISOUT.

- GMT Offset (local time) - The default system time is based on GMT. To set your local time enter an offset from GMT. For example, if your local time is seven hours before GMT, set the GMT offset to -7 hr(s). Local time is used for display in debug logs and appears on the GPS Status screen (Time field) - see "GPS Status" on page 197 for details on this screen.

To set the language at startup:

1. On the bootup Warning window, press **Language** to display the Select Language panel.

2. Use the up/down arrows to scroll through the list of languages (if necessary) then select a language. A message (similar to below) appears briefly and you are returned to the Warning window.

To set the language, units, or GMT offset after startup:

1. Press **Menu > Settings > System Preferences**. The System Preferences panel appears.

2. Change the settings as follows:

   - Press **Language** to display the Select Language panel. Use the up/down arrows to scroll through the list of languages (if necessary) then select a language. A message (similar to below) appears briefly, the panel closes, and Language button (System Preferences panel) shows the current setting.

   - Press **Units** to display the Units of Measure panel. The current selection is green. Press the blue units button to switch units. The panel closes and the Units button (System Preferences panel) shows the current setting.

   - Press **GMT Offset** to display the GMT Offset panel. Press the up/down arrows to change the offset (the offset changes in increments of 0.5 hours). Press **Back**. The panel closes and the GMT Offset button (System Preferences panel) shows the current setting.

3. Close or hide the panel.
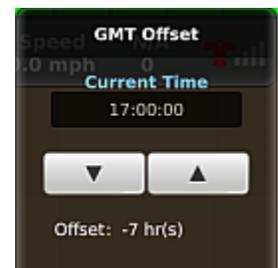
## *Setting A=B Projection*

A=B projection relates to the effect of the earth's curvature on guidance accuracy for A=B straight guidance. There are two A=B projection options: 2D (default) and 3D. Select 3D for wide field operations or interoperability with third party guidance systems that also use 3D guideline projection; otherwise, keep the default setting of 2D.

*Note: 3D A=B projection is unrelated to the 3D map view or the 3D GPS position type.*

To set A=B projection:

1. Press **Menu > Settings > System Preferences**. The System Preferences panel appears, and the Projection button displays the current setting (at right).

2. Press **A=B Projection** then select an option.

3. Close or hide the panel.

## *Setting Smoothing*

Smoothing determines the amount of smoothing of contours and applies to Contour paths and AB Contour paths. The smoothing applied to the current contour is based on the smoothing setting that was active during the preceding pass. Depending on preference and needs, smoothing can be adjusted to None (the default), Low, Medium, or High. For example, you may need to adjust the smoothing if a vehicle/implement combination does not allow turning within a tight radius or a very sharp curvature may not be desired during high-speed operation. Use the following table as a guide to setting the smoothing.

| Setting | Minimum Radius | Performance |
| --- | --- | --- |
| Off (default) | 5 m | System tries to follow every contour, even if the contour has a very tight curvature but may disengage when following a very tight turn. |
| Low | 10 m | System applies minimum smoothing. |
| Medium | 15 m | System applies medium smoothing. |
| High | 20 m | System generates optimized control paths for high-speed operation where the minimum curvature for each turn is large. It is not suitable for tight-turn operations as unwanted coverage gaps may occur. |

*Note: REBEL cannot generate the correct path if the curve diameter is less than twice the minimum radius.*

To set smoothing:

1. Press **Menu > Settings > System Preferences**. The System Preferences panel appears, and the Smoothing button displays the current setting (at right).

2. Press **Smoothing** then select an option.

3. Close or hide the panel.

## *Setting the Headland Alert*

A headland alert occurs when the implement enters a headland—a previously applied area. The alert is both an audible tone and an indicator that appears in the upper left of the screen (shown below and at right).
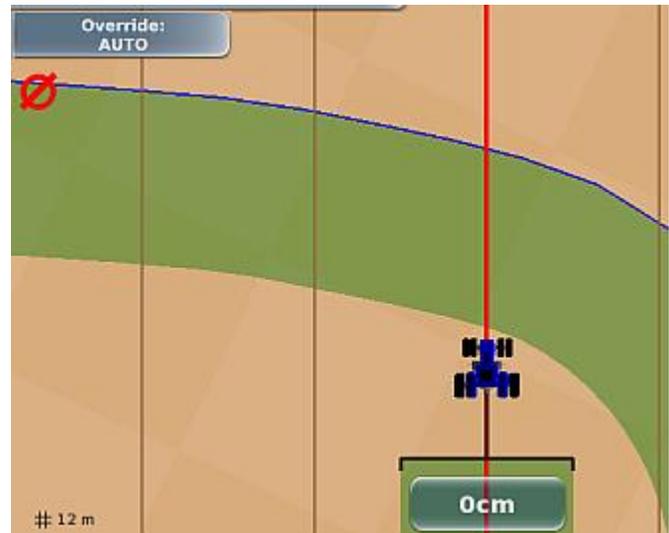
To set the headland alert:

1.  Press **Menu > Settings > System Preferences**. The System Preferences panel appears, and the Headland Alert button displays the current setting (at right).

2.  Press **Headland Alert** then select **On** (enable headland alert) or **Off** (disable headland alert).

3.  Close or hide the panel.

## *Setting Direction Detection*

Direction (heading) detection improves the ability of REBEL to determine the correct heading direction, especially when switching from forward to reverse (or reverse to forward) by double-tapping the vehicle icon on the map. Direction detection is performed by:

- The REBEL terminal when no autosteering component is connected
- The eDriveX ECU when eDriveX is connected (more precise direction detection)

*Note: Direction Detect is set to On by default. When eDriveX is connected to the terminal, changing the setting to Off has no effect because the eDriveX ECU provides more precise direction detection. When no autosteering component is connected to the terminal, you can set to On or Off (setting to Off will prevent the vehicle icon on the terminal screen from reversing in headlands when changing direction).*

To set direction detection:

1. Press **Menu > Settings > System Preferences** to display the System Preferences panel. The Direction Detect button displays the current setting.

2. Press **Direction Detect** then select **On** (enable direction detection) or **Off** (disable direction detection).

3. Close or hide the panel.

# GPS Settings Overview

The GPS Settings panel (Menu > Settings > GPS) enables you to set or view GPS-related information. The buttons in the orange box at right are always available; the remaining buttons (white box at right) appear based on the correction type you select using the Correction Type button. The default correction type is SBAS (at right). Use the links below for more information on the GPS Settings panel.

Always visible:

- "Correction Type" on page 29
- "NMEA Output" on page 30
- "Viewing and Entering Subscriptions" on page 32

"GPS Status" on page 197

- Receiver Status" on page 199

Visible with A325 antenna:

- "GNSS Output (Setting BeiDou On/Off)" on page 31

Visible depending on correction type:

- "SBAS Settings" on page 33
- "RTK Status" on page 201
- "NTRIP Settings" on page 34
- "Detecting a Radio" on page 35
- "Radio Link Settings" on page 36
- "e-Dif Status" on page 203

The figures below show the GPS Settings panel for other correction types (other than SBAS).

RTK correction type                                              e-Dif correction type

## *Correction Type*

See "GPS Settings Overview" on page 27 for an overview of the effect of selecting a specific correction type.

To set the correction type:

1. Press **Menu > Settings > GPS Settings > Correction Type** to display the Correction Type panel.

2. Press the correction type button (labeled 'SBAS' in figure at right) then select your preferred type.

3. Press **Save** then close or hide the panel.

See the following sections for information on viewing status information for RTK or e-Dif, as well as performing tasks related to the correction type. For example, you use the e-Dif Status screen to verify e-Dif initialization and to update an e-Dif point.

- "RTK Status" on page 201
- "e-Dif Status" on page 203

## *NMEA Output*

Use the NMEA panel to set the baud rate and output for available NMEA messages, and turn GLONASS and NMEA2000 on/off. Various cables and kits are available for specific applications such as yield monitors, rate controllers, and laptop PCs.

*Note: GLONASS functionality is for REBEL systems with the A325 GNSS antenna; if an A101 antenna is connected, the GLONASS button does not appear on the NMEA panel.*

For successful communication both REBEL and the external application must be configured to communicate similarly. Many applications can use the default settings, while some applications may require different settings. If you select a higher output rate (5 Hz or 10 Hz), you must also select a faster baud rate (19200 or 57600) for proper communication.

To set NMEA output:

1.  Press **Menu > Settings > GPS Settings > NMEA Output** to display the NMEA panel.

2.  Press **Baud Rate** then select a rate.

3.  To set a message output rate (see the table below for a brief description of each message), select a message, then select a rate (RTCM3 example below).

4.  *(A325 systems only)* Press **GLONASS** to turn the GLONASS logging on or off. This setting does not affect your reception of GLONASS signals; it affects only whether GLONASS satellites are included in log data.

5.  Press **NMEA2000 ISOBUS** to turn NMEA 2000 messages on or off for ISOBUS implements connected via the ISOBUS CAN port.

6.  Press **Save** then close or hide the panel.

The following table briefly describes each NMEA message.

| Message | Description |
|---|---|
| GGA | GPS position data (latitude, longitude, number of satellites used, age of differential corrections, etc.) |
| GLL | Latitude and longitude data |
| GSA | GPS DOP and active satellite information |
| GST | GNSS pseudorange error statistics and position accuracy |
| GSV | GNSS satellites in view |
| RMC | Contains recommended minimum specific GNSS data (latitude, longitude, ground speed, navigational status, etc.) |
| RTCM3 | Turn RTCM3 messages on or off |
| VTG | Course over ground and ground speed |
| ZDA | UTC time and date information |

## *GNSS Output (Setting BeiDou On/Off)*

*Note: Rebel can use GNSS only if the A325 (dual-band) antenna is connected; otherwise, the GNSS Output button on the GPS Settings panel is not visible (that is, you cannot display the GNSS panel below).*

BeiDou is the Chinese satellite navigation system, similar to the U.S. GPS system and the Russian GLONASS system. Use the GNSS panel to turn BeiDou on/off—turning BeiDou on enables REBEL to use BeiDou satellites to acquire a position. The default setting is On.

To set BeiDou on/off:

1. Press **Menu > Settings > GPS Settings > GNSS Output** to display the GNSS panel.

2. Press **BEIDOU**, select **On** or **Off**, then press **Save**.

3. Close or hide the panel.

### *Viewing and Entering Subscriptions*

The Subscriptions screen (Menu > Settings > Subscriptions) enables you to view the terminal serial number and current subscriptions/licenses, and enter a code for new subscriptions/licenses. When you enter a code, you are unlocking the features of that subscription (such as GLONASS) or specific application license (such as eTurns). Before you can enter a code, you must first contact Outback Customer Service to obtain the code. The terminal serial number also appears on the Receiver Status screen.



To enter a subscription/license code:

1. Press **Menu > Settings > Subscriptions** to display the Subscriptions screen.

   *Note: There are two alternative methods to display the Subscriptions screen:*

   *Menu > Settings > GPS Settings > Subscriptions*
   *Menu > Diagnostics > GPS > Subscriptions*

2. Press **Enter Code**, enter the code, then press **Done**.

3. Press **Ok** to close the success message, then press **Back** to close the Subscriptions screen.

4. Close or hide the panel.

## *SBAS Settings*

With Correction Type set to SBAS, use the SBAS Settings panel to change the SBAS satellites (or satellite PRN) used in REBEL's position calculation. The number of SBAS buttons that appear on the panel depend on the connected GPS antenna:

- A101 connected: SBAS 1, SBAS 2 (example shown at right)
- A325 connected: SBAS 1, SBAS 2, SBAS 3

The default value for each SBAS setting is Auto (REBEL automatically selects from the available satellites). When you select a different satellite from the default, the SBAS buttons on the panel show Manual instead of Auto. If you change any of these settings and then change them back to Auto, all are automatically set back to Auto (you cannot have a mix of manual and auto settings). See "Correction Type" on page 29 for more information.

To configure SBAS settings:

1. Press **Menu > Settings > GPS Settings > SBAS Settings** to display the SBAS Settings panel.

2. For each SBAS button:

   a. Press the button to display a panel showing the available satellites to select.

   b. Use the up/down arrows to scroll through the list of satellites (if necessary) then select the satellite you want to assign (SBAS 1 above). The panel closes, the selected satellite PRN is displayed on the button, and 'Manual' appears on all SBAS buttons, even for PRNs you did not change.

3. Close or hide the panel.

## *NTRIP Settings*

With Correction Type set to RTK, use the NTRIP panel to set up NTRIP on REBEL. NTRIP (Networked Transport of RTCM via Internet Protocol) is the protocol for transmitting GNSS data over the internet. REBEL has an internal NTRIP client that is used when receiving RTK corrections through a network RTK solution.

After you connect to NTRIP, REBEL will try to reconnect to NTRIP the next time you power on the terminal. To disable the reconnect feature, press Disconnect on the NTRIP Settings panel to disconnect NTRIP prior to powering off REBEL. See "Correction Type" on page 29 for more information.

To set up NTRIP:

1. Press **Menu > Settings > GPS Settings > NTRIP Setting**s. The NTRIP Settings panel appears.

2. Set your login information.

   a. Press **Edit Login Info**. The NTRIP Login Info panel appears (top of panel shown below).

   b. Enter values in the five white background fields (your network RTK provider should provide these values) then press **Save**. The panel closes and you are returned to the NTRIP Settings panel.

3. *(Optional)* Press **Auto Connect** then select **On** (REBEL automatically attempts to connect at startup) or **Off** (manually connect).

4. Press **Connect**.

5. After a successful connection, close or hide the panel.

To edit NTRIP login information repeat the steps above and edit the appropriate fields on the NTRIP Login Info panel.

## *Detecting a Radio*

Before configuring your radio in your RTK setup, REBEL must first detect it. Before you can detect it, make sure you set your correction type to RTK—see "Correction Type" on page 29.

To detect a radio:

1. With the Correction Type set to RTK, press **Menu > Settings > GPS Settings** to display the GPS Settings panel. The Detect Radio button is enabled but the Radio Link button is disabled (successful radio detection enables the Radio Link button).

2. Press **Detect Radio**. A message appears saying GPS will be lost during radio detection.

3. Press **Yes** to proceed. During detection the GPS Settings panel is disabled, and an in-progress indicator appears on the panel. When detection is complete, the settings panel for the radio appears (top of 400 MHz radio panel shown below).

4. See "Radio Link Settings" on page 36 to configure your radio (edit Radio Link settings).

## *Radio Link Settings*

Before using your RTK setup, make sure your connected radio is properly configured. Refer to the documentation for your RTK kit for more information on radio channel/frequency and mode. Before you can configure your radio, make sure REBEL has detected it—see "Detecting a Radio" on page 355.

*Note: Connecting NTRIP disables the Radio Link button and disconnecting NTRIP re-enables the Radio Link button—make sure you disconnect NTRIP (if connected) if you want to enter radio settings. Also, for the Radio Link button to be enabled you have to connect a radio to REBEL, and REBEL must recognize the radio.*

To set up a radio link:

1.  If you just detected your radio and are immediately configuring it, you will see one of the panels at right. Otherwise, to manually display a panel at right, press **Menu > Settings > GPS Settings > Radio Link**.

    - 400 MHz radio: near right panel
    - 900 MHz ratio: far right panel

2.  Set the frequency/channel.

    - 400 MHz radio: Press **Frequency**, enter the same frequency you entered on your base station radio, then press **Done**.

    - 900 MHz radio: Press **Channel**, enter the same channel you entered on your base station radio, then press **Done**.

3.  Select the mode. For both 400 MHz and 900 MHz radios, press **Mode** then select an option (400 MHz options are PC1, PC3, HGPS; 900 MHz options are SLOW, SLOW2, FAST).

    *Tip! For the 900 MHz radio, Outback recommends you set the Mode to SLOW when communicating with an Outback BaseLineX or Outback A221 and set the Mode to FAST when communicating with an Outback A321.*

4.  Press **Save**. A message appears stating that GPS will be lost during configuration. Press **Yes**. During the save, the radio panel is disabled then closes, then you are returned to the GPS Settings panel with the Radio Link button enabled.

5.  Close or hide the panel.

## *Lightbar Settings*

REBEL includes an onscreen lightbar and supports an (optional) external lightbar. See the following sections for more information on the onscreen and external lightbars.

- "Understanding the Parts of the Touchscreen" on page 1
- "Using the External Lightbar" on page 192

You can edit the following lightbar settings:

- Lightbar on/off (external lightbar only)
- Sensitivity (onscreen lightbar and external lightbar)
- Brightness (external lightbar only)

To edit lightbar settings:

1. Press **Menu > Settings > Lightbar Settings** to display the Lightbar Settings panel.

2. For Lightbar and Sensitivity, press the button then select an option. For Sensitivity, you may want to test each setting to determine your preference.

3. Press **Lightbar Brightness** to display the Lightbar Brightness slider (shown below), drag the slider or press the left/right arrows to set the brightness level, then press **Close**.

4. Press **Save**, then close or hide the panel.

# Switchbox Settings

This setting controls the brightness of the LEDs on the optional external switchbox. See "Using the Switchbox" on page 193 for more information on the switchbox.

To edit the switchbox brightness:

1. Press **Menu > Settings > Switchbox Settings**. The Switchbox Settings panel appears (shown at right).

2. Press **Switchbox Brightness** to display the Switchbox Brightness slider (shown below), drag the slider or press the left/right arrows to set the brightness level, then press **Close**.

3. Press **Save**, then close or hide the panel.
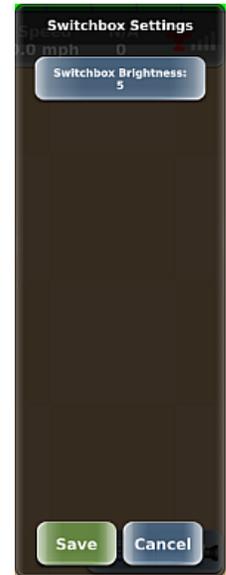
# ISOBUS Settings

Use the ISO Settings panel (Menu > Settings > ISOBUS Settings) to:

- Adjust UT (ISOUT) settings (page 39)
- Map physical inputs to functions on ISOBUS ECUs (page 41)
- Clear unneeded object pools (ISOBUS implement ECU data) to speed up ECU-to-UT performance (page 42)
- View UT diagnostic information to troubleshoot an issue (page 225)

## *UT (Universal Virtual Terminal) Settings*

Use the UT Settings panel (Menu > Settings > ISOBUS Settings > UT Settings) in conjunction with the table below to adjust ISOUT settings or restart the ISOUT window. To adjust a setting (green button), press a button then select an item from the drop-down.

| Button | Description |
| --- | --- |
| VT Version | Version of ISOUT standard supported by REBEL. |
| Function Instance | VT instance (1 is the primary VT) |
| Date Format Time Format Decimal Format | If your ISOBUS supports this feature, use these buttons to select a preferred format for ISOUT window data. |
| Preview | Set to On to have the ISOUT window display as a smaller window (does not appear full screen). Set to Off to have the ISOUT window display full screen. |
| Fullscreen Alarms | When set to On, alarm messages display full screen. |
| Restart | *Use this feature only when directed by Outback Guidance Customer Service.* Closes then reopens the ISOUT window. |

## *Mapping Auxiliary Inputs*

REBEL enables you to map physical inputs to functions on ISOBUS ECUs (for example, mapping a button on a joystick to raising part of an implement).

To map physical inputs to functions on ISOBUS ECUs:

1. Press **Menu > Settings > ISOBUS Settings > Aux Input Settings** to display the screen below.
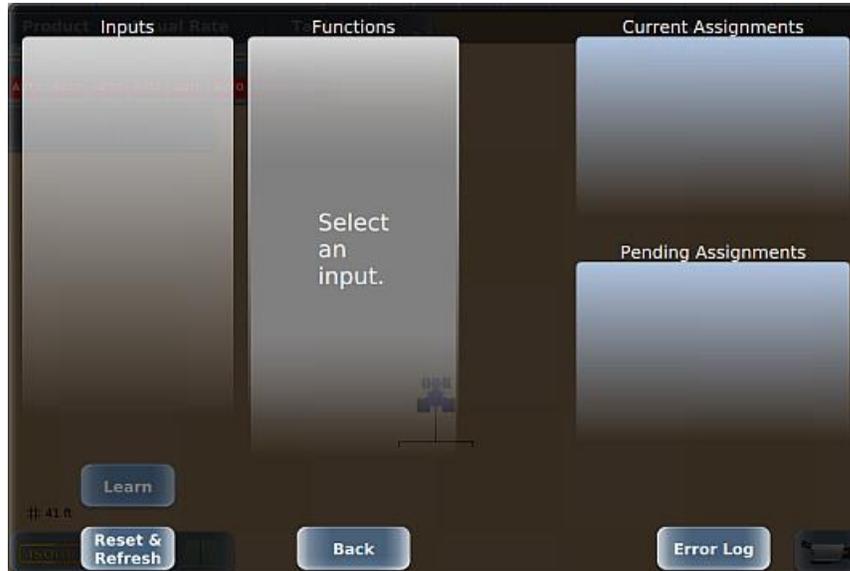


2. Follow the onscreen instructions to map your inputs, using the following buttons if necessary:

   - **Learn** - activates an onscreen wizard to walk you through the input mapping process
   - **Reset & Refresh** - resets auxiliary inputs

3. Close or hide the panel.

## *Clearing Object Pools*

An object pool is the screen data transmitted from the ISOBUS implement (ECU) to the REBEL terminal. When an ECU uploads an object pool to the terminal, REBEL saves the object pool, so the implement ECU does not have to transmit this same data each time you turn on the system.

If you experience data or system issues between the implement ECU and the terminal, you may clear all object pools and reboot the system to force the implement ECU to perform a fresh upload of data to the terminal.

To clear object pools:

1. Press **Menu > Settings > ISOBUS Settings > Clear Object Pools**. The Clear Object Pools panel appears (shown at right).

2. Use the up/down arrows to scroll through the list of object pools (if necessary) then select the object pools you want to delete; to delete all object pools press **Select All**.

3. Press **Delete**. A message appears asking if you are sure you want to clear the selected object pools—press **Yes** to confirm the deletion.

4. Close or hide the panel.

# Networking Overview

Press the Wi-Fi button [icon] or [icon] on the map or press Menu > Settings > Networking to display the Networking panel (at right), where you can:

- Connect to a wireless (Wi-Fi) network (before connecting to a network, verify you have any needed login information such as SSID and password)

- Disconnect from a Wi-Fi network

- Forget a Wi-Fi network (this deletes information for that connection, but you can always re-enter the information later)

- Turn Wi-Fi functionality on/off

*Note: Upon connecting to a network (a known network), upon subsequent boot ups REBEL automatically connects to the known network with the strongest signal. Once connected to a network, REBEL stays connected to that network as long as the signal is OK, even if other known networks have a stronger signal.*

## *Connecting to a Wi-Fi Network*

1. Press the Wi-Fi button on the map or press **Menu > Settings > Networking** to display the Networking panel. If not connected to a network, Connection Status shows 'Disconnected'.

2. Use the up/down arrows to scroll through the list of available Wi-Fi networks (if necessary) then select the network you want to connect to.

3. Press **Connect**.

   - If the network requires no login information (unlocked lock to far right of list button), a spinning progress circle appears to the right of the button you pressed and 'Connecting' appears in the Connection Status field. When connected, the lock changes to a green check and the Connection Status field shows the network name. See example below.

   - If the network requires login information, REBEL displays the appropriate login window for you to enter your information.

4. When you close or hide the panel, the Wi-Fi button [icon] is visible and shows as connected.

## *Disconnecting from a Network*

You can disconnect from a network by:

- Connecting to a different network (this disconnects the currently connected network)—see 'Connecting to a Wi-Fi Network' above.
- Forgetting a network, including the currently connected network (deletes login information that you will need to re-enter should you want to connect again).
- Turning Wi-Fi off (disconnects from the currently connect network, but turns all Wi-Fi functionality off as well). If you turn Wi-Fi off while connected to a network then turn Wi-Fi back on, REBEL automatically reconnects to the previously connected network if it is within range.

To forget a Wi-Fi Network:

1. Press the Wi-Fi button on the map or press **Menu > Settings > Networking** to display the Networking panel.
2. Select the network you want to forget, then press **Forget**.

To turn off Wi-Fi functionality:

1. Press the Wi-Fi button on the map or press **Menu > Settings > Networking** to display the Networking panel.
2. Press **Wifi Enabled** to set it to Off.

# eDriveX Settings

Use the eDriveX Settings panel (Menu > Settings > eDriveX Settings) to enable/disable eDriveX settings that pertain to how you engage on a guideline. The panel has only one button, with the available settings dependent on the connected autosteering system (eDriveXD or eDriveXC).

- **Manual** (eDriveXD only): You press the engage button to engage on a guideline. For eDriveXC, setting Pre-Engage to Off is essentially selecting a Manual mode.

- **Pre-Engage** (both eDriveXD and eDriveXC): After initially pressing the engage button to engage on a guideline, this feature allows you to press the engage button ahead of time (while not engaged on a guideline and not ready to engage because all engage criteria have not been met) so that when the criteria are met, REBEL automatically engages on the guideline. See page 46.

- **Auto-Engage** (eDriveXD only): After initially pressing the engage button to engage on a guideline, this feature allows you to automatically re-engage on a guideline after you drive off the off guideline or stop (not all engage criteria met) so that when the criteria are met (such as driving back toward the guideline), REBEL automatically engages on the guideline. *Note: There are specific requirements to using Auto-Engage; see page 48.*

*eDriveXD connected*          *eDriveXC connected*

## *Pre-Engage*

Pre-Engage enables you to activate autosteering before all engage requirements are met, then once they are met, REBEL automatically engages on a guideline. Pre-Engage works with all guidance modes. Although you enable Pre-Engage only once, you must manually press the engage button each time you want to activate it.

Pre-Engage involves the following steps:

1. Enable it (select it for eDriveXD or set it to On for eDriveXC).

2. Manually engage on the first guideline.

3. Upon at least one of the engage criteria (heading, crosstrack, speed, driving off the guideline) not being met to where autosteering is disengaged, activate Pre-Engage by pressing the engage button. You need to perform this last step (pressing the engage button) after each time you disengage, such as each time you turn around to drive toward the next guideline or when driving off your guideline for whatever reason and then wanting to engage again on the same guideline.

4. When the engage criteria are met, the steering automatically re-engages.

*Note: The procedure below shows how to use Pre-Engage (illustrating how the engage button changes at different steps) under the following scenario: a job is loaded, and you will create an A=B path.*

To use Pre-Engage:

1. Press **Menu > Settings > eDriveX Settings** to display the eDriveX Settings panel (only one button is available).

   - eDriveXD: Press **Engage Method** then select **Pre-Engage**.
   - eDriveXC: Press **Pre-Engage** then select **On**.

   A 'P' appears in the upper right of the engage button. If a job is active, the engage button is enabled.



2. Create a path (A=B below) then manually engage on the guideline by pressing the engage button (engage button turns green).
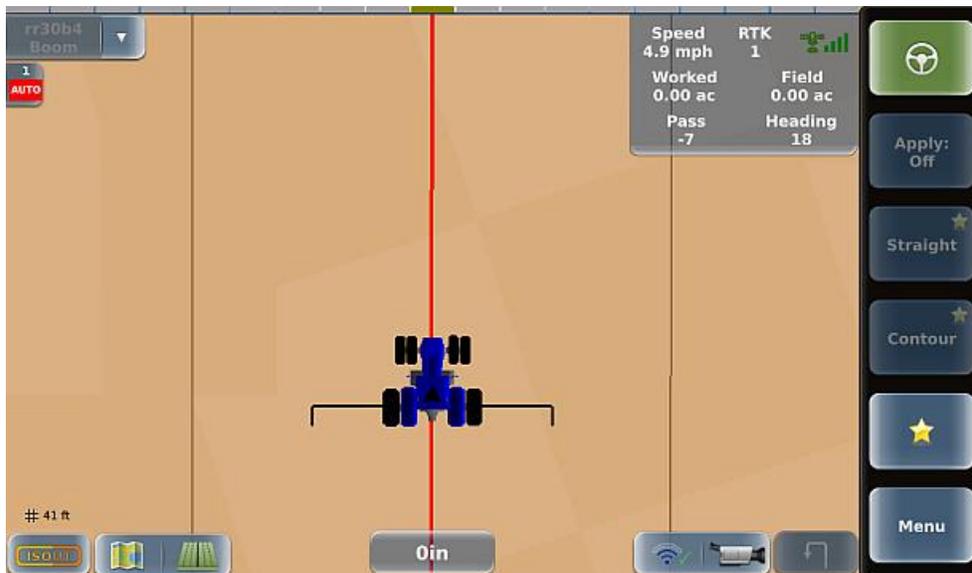
3.  Upon disengaging from the guideline (such as by steering off the guideline to make a turn and drive the next guideline), the engage button appears as follows (Pre-Engage on but autosteering criteria not met):

4.  Press the engage button to activate Pre-Engage so that when all autosteering criteria are met, REBEL will automatically engage on the guideline. **Note: You have 20 seconds to meet all criteria—during this time the engage button flashes between the following states. If 20 seconds passes, you will have to manually engage on the line.**

    Once engaged on the guideline, the engage button remains green (as above left).

5.  Repeat steps 2 and 3 as needed (such as for each swath).

### *Auto-Engage*

Auto-Engage is an eDriveXD feature that works with all guidance modes with the following requirements/conditions:

- For hydraulic valve type vehicles only.
- Can be used only when the vehicle is inside an Include boundary.
- Selecting (enabling) Auto-Engage deactivates Shuttle Shift.
- To use Auto-Engage, you must first manually engage on a guideline.
- Disengage by either steering off the guideline or by stopping (do not press the engage button when it is green to disengage).
- After disengaging, Auto-Engage is activated and the engage button flashes between blue and green. You have 45 seconds to meet all autosteering criteria. If all engage parameters are met, REBEL automatically engages on the guideline; otherwise, if all engage parameters are not met within 45 seconds, Auto-Engage is deactivated.

eDriveXC includes a similar but more automated feature called eTurns that enables REBEL to perform automated turns onto the next guideline—see "eTurns" on page 173 for more information.

*Note: The procedure below shows how to use Auto-Engage (illustrating how the engage button changes at different steps) under the following scenario: a job is loaded, you are inside the boundary, and you will create an A=B path.*

To use Auto-Engage:

1. Press **Menu > Settings > eDriveX Settings** to display the eDriveX Settings panel (only one button is available).

2. Press **Engage Method** then select **Auto-Engage**. An 'A' (with arrows) appears above the wheel icon on the engage button. If a job is active, the engage button is enabled.



3. Create a path (A=B below). With engage criteria met, the engage button is in a state of 'ready to engage' (red X no longer appears on the button).



   Press the engage button to manually engage on the guideline (engage button with the 'A' turns green). The example below shows several swaths already driven.
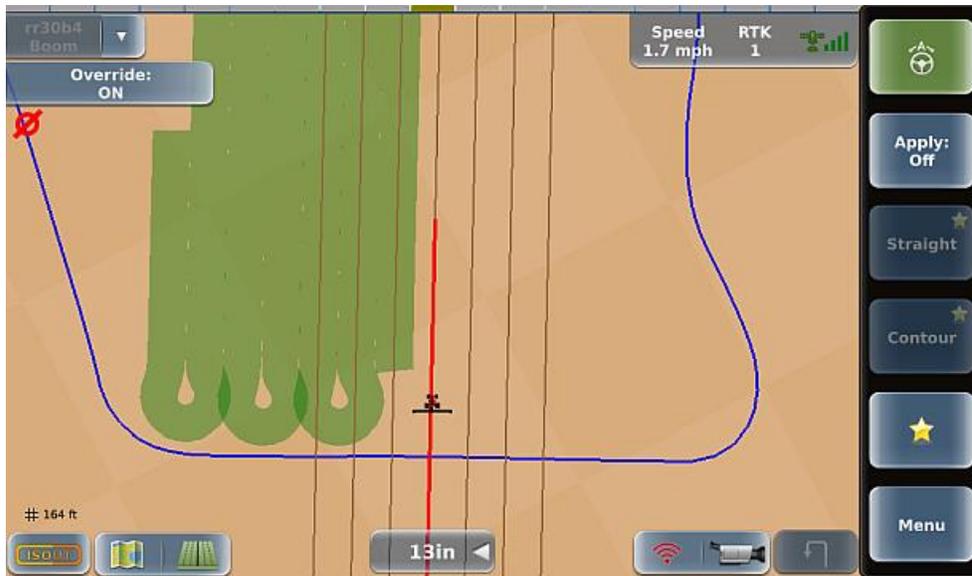
4.  Upon disengaging from the guideline (such as by steering off the guideline to make a turn and drive the next guideline), the engage button flashes between blue and green (not all criteria are met). **You have 45 seconds to meet all criteria—during this time the engage button flashes between the following states. If 45 seconds passes, you will have to manually engage on the line.**



Once engaged on the guideline, the engage button remains green (as above left).

*Note: If you drive outside the Include boundary, Auto-Engage is deactivated (the 'A' disappears from the engage button) even if you are still engaged on the guideline (engage button still green). Once you are back inside the Include boundary, Auto-Engage is re-activated.*

5.  Repeat step 4 as needed (such as for each swath).

# ISOUT Overview

This section provides the following general information on ISOBUS and ISOUT:

- ISOBUS and ISOUT overview
- Connecting an ISOBUS implement to REBEL
- Using the ISOUT window
- Troubleshooting

### ISOBUS and ISOUT overview

ISOBUS is a standard communication interface and graphic display for tractors, implements (such as a boom height controller), and farming systems that enables equipment from different manufacturers to communicate with each other. A universal virtual terminal (UT) enables an operator to interact with ECUs on the network through user inputs. Similar to a Web browser, the UT is for visualization only and does no processing. If your tractor supports ISOBUS it will have an ISOBUS port—typically located on the right side of the cab of the vehicle (two examples shown below).



*Note: ISOUT is a subscription-only feature—you must have a valid ISOUT subscription to use ISOUT. Contact your local dealer or Outback Guidance Customer Service to obtain an ISOUT subscription. To enter your ISOUT code see "Viewing and Entering Subscriptions" on page 32. If you have not entered a valid ISOUT subscription, pressing the ISOUT button (lower left of screen) displays a message stating you must enter a valid authorization code.*

### Connecting an ISOBUS Implement

To connect an ISOBUS-enabled implement, plug the implement cable ISOBUS connector into the ISOBUS port on the tractor.

*Note: For information on retrofitting a non-ISOBUS implement to enable ISOBUS functionality to work with REBEL, contact Outback Guidance Customer Service or review the Outback REBEL Quick Start Guide.*

Some farming systems use a separate ISOBUS terminal to communicate with ISOBUS-enabled implements. With REBEL, the ISOBUS terminal is displayed on the REBEL terminal in the form of a separate window (virtual terminal) as shown below. In REBEL the ISOBUS virtual terminal is known as ISOUT (the ISOUT button is in the lower left of the REBEL touchscreen).

When you connect an ISOBUS-enabled implement to REBEL the implement's information appears in the ISOUT window (see figure above).

## Using the ISOUT Window

The ISOUT window works similar to panels and screens in REBEL such that you press buttons and other screen items to navigate, resize, and move the window.

| How to... | | |
|---|---|---|
| Open the window | The ISOUT window opens when you power on your connected ISOBUS implement. If you need to re-open the window (after closing it), press the ISOUT button in the bottom left of the screen.<br><br>*Note: Opening the ISOUT window loads the object pools for that implement ECU.* |  |
| Navigate the window | Use the buttons on the right of the ISOUT window to display different screens within the window. Some screens contain sections you can press for further functionality. |  |

| How to... | |
|---|---|
| Resize the window | The window is maximized by default. Press the resize (middle right) button make the window smaller.<br><br><br><br>You can then move the window around the screen by pressing (holding) and dragging the window. Press anywhere in the resized window to return it to its default maximized size.<br><br> |
| Close the window | Press the close button (X, at right) or press the ISOUT button in the bottom left of the map.<br><br> |
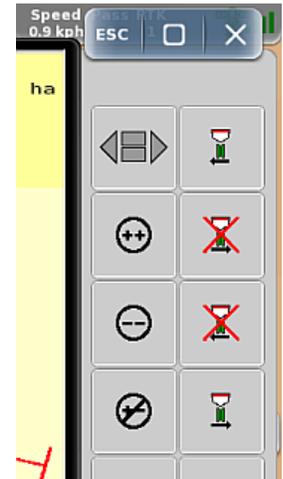
**How to...**

Display softkeys with window smaller (resized)

The Preview setting on the VT Settings panel determines if you can resize the ISOUT window and if softkeys appear when the window is resized. The examples that follow show the effects of the different settings.

Preview - On with softkeys
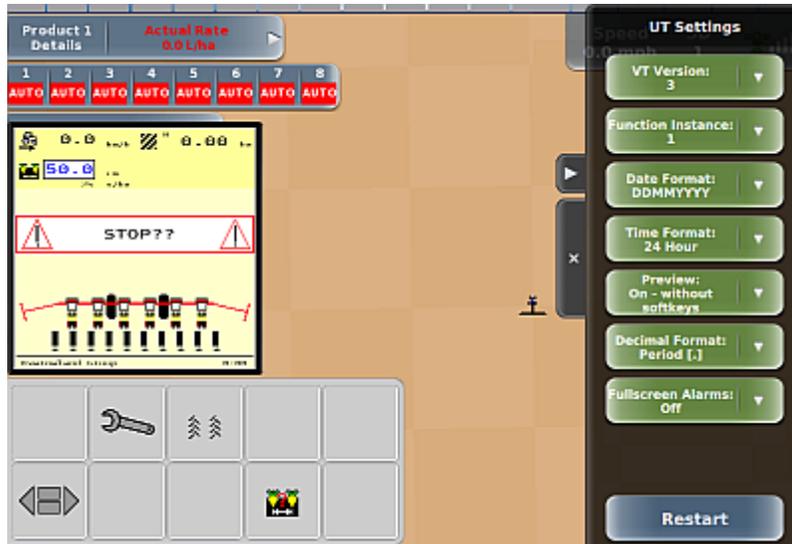


Preview - on without softkeys
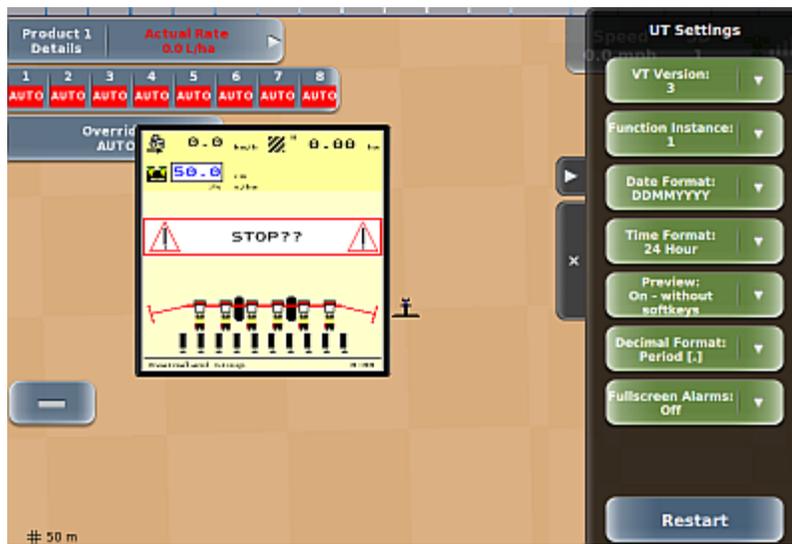
# Backing Up and Restoring Data

In any computer or machine environment it is good practice to back up your data. Security and the ability to restore previous terminal data are the two main reasons. REBEL enables you to back up data to a USB drive and restore terminal data from the USB drive. When you perform a backup, REBEL saves the data as a single file with a .tar file extension. For example, if you backed up your terminal data on January 12, 2018 the tar file is:
*ADO_Backups_01122018.tar*



To back up data to a USB drive:

1.  Insert a USB drive into the terminal then press **Menu > Diagnostics > Terminal Diagnostics**. The Terminal Diagnostics screen appears.

2.  Press **Backup Data**. REBEL briefly displays backup messages in the Last Backup field, creates a folder named 'ADO_Backups' on the USB drive and backs up the data to this folder. When the backup is complete:

    *   A Backup Complete message appears. Press **Ok** to close the message.
    *   The Last Backup field shows the date of the backup.

To restore data from a USB drive to the REBEL terminal:

1. Insert the USB drive containing your backed-up data into the terminal then press **Menu > Diagnostics > Terminal Diagnostics**. The Terminal Diagnostics screen appears.

2. Press **Restore Data**. The Terminal Diagnostics screen closes and the Restore Data panel appears (shown at right).

3. Use the up/down arrows to scroll through the list of data files (if necessary) then select the data file you want to restore.

   - The Restore Data panel closes, and the Terminal Diagnostics screen appears.

   - A progress indicator (circle) briefly appears followed by a reboot message. Press **Ok** to close the message.
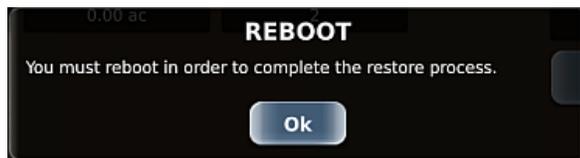
   - The Last Backup field shows the date of the restored file.

4. Reboot your terminal.

# Help Messages

While using REBEL a Help message may appear—typically when an action cannot be performed such as when pressing a disabled (dimmed) button. If a Help message appears, review the message then press **Ok** to close it. Below are two examples of Help messages that may appear while operating REBEL.



This message appears when attempt to create a new job (New Job button on the Jobs panel is disabled) with no GPS. Close the message, examine your system and take the necessary steps to obtain a GPS signal (such as verifying no cables are loose), then try again to create a new job.
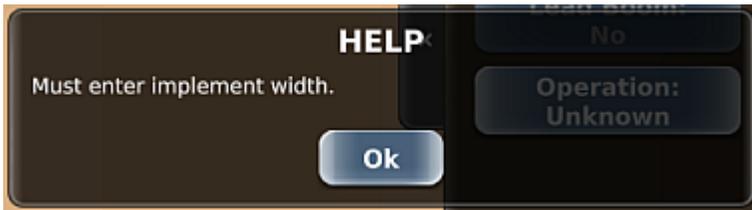


This message appears when you attempt to configure an implement (Implement Config button on the Implement Settings panel is disabled) before entering the implement width. Close the message, enter the implement width, then try again to configure your implement.

# Chapter 2: Working with Vehicles

A vehicle refers to a machine you drive in the field, such as a sprayer or tractor. You can add as many vehicles to REBEL as you want and select the one you need for your task. Subsequently, each time you power up, REBEL loads the vehicle that was loaded prior to the terminal being powered down. The map displays the vehicle (Standard Tractor shown below) in the color you selected when adding the vehicle (you can always change the color later).

Use the Vehicles panel (Menu > Vehicles) and the sections below to work with vehicles.

To work with new vehicles:

- "Before Adding a Vehicle" on page 58
- "Adding a Vehicle" on page 66
- "Determining the Antenna Offset in the Field" on page 74

To work with existing vehicles:

- "Loading a Vehicle" on page 79
- "Editing a Vehicle" on page 80
- "Exporting a Vehicle" on page 81
- "Importing a Vehicle" on page 82
- "Deleting a Vehicle" on page 83

# Before Adding a Vehicle

Review the sections below before adding a vehicle, as they provide valuable information on measuring your vehicle's dimensions and preparing for vehicle calibration.

- "Measuring Vehicle Dimensions" on page 59

- "Before Calibrating a Vehicle" on page 61

- "Converging Filters" on page 63

- "Steering Sensitivity and Attack Overview" on page 65

# Measuring Vehicle Dimensions

Measure your vehicle's dimensions before adding the vehicle in REBEL. When adding a vehicle, REBEL displays the vehicle dimensions for the vehicle type you select (standard tract, sprayer, etc.).



### Antenna Height

Antenna height is the vertical distance of the antenna's what measured from the ground up. Typically, you place the antenna on the cab roof. The figure at right shows the vehicle dimensions for a standard tractor—note that the illustration shows from where to measure antenna height. For the other vehicle types the antenna position screen shows similar information.
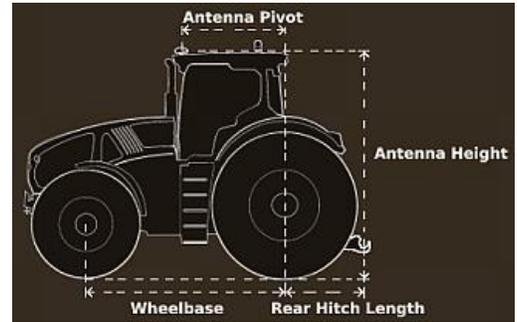
### Antenna Pivot

Antenna pivot is the perpendicular distance of the antenna's center in front of or behind the vehicle's pivot point. The vehicle's pivot point depends on the vehicle type, such as a standard tractor or sprayer. The figure above right (Vehicle Dimensions screen) shows from where to measure antenna pivot for a standard tractor (shown similarly for each vehicle type).

*Note: Measure the antenna pivot as accurately as practical, as this measurement has some impact on the accuracy of vehicle guidance and is also the reference point from which the implement offset is calculated. Unlike the antenna left/right offset, there is really no field method to verify or improve the antenna pivot measurement.*

### Antenna Offset

Antenna offset is the lateral (perpendicular) distance between the center of the GPS antenna and the centerline of the vehicle.

To achieve optimum steering accuracy, you must determine the antenna offset in the field. However, you need to have completed the calibration procedure before you can conduct the field tests, and to complete vehicle calibration, you need to enter the antenna offset values on the Vehicle Dimensions screen. Because you do not have an accurate antenna offset when working through calibration, you have two options:



- Leave the antenna offset as 0.00 and enter the measured offset later
- Enter an estimated 'provisional' offset value (suggested if you have a noticeable antenna offset that you can measure or estimate)

When you have completed the vehicle calibration and determined the actual antenna offset, you can revisit vehicle calibration and add the actual value; however, see *Completing vehicle calibration steps in sequence* and *Changing a completed calibration step* in "Before Calibrating a Vehicle" on page 61 for important information on changing calibration values.
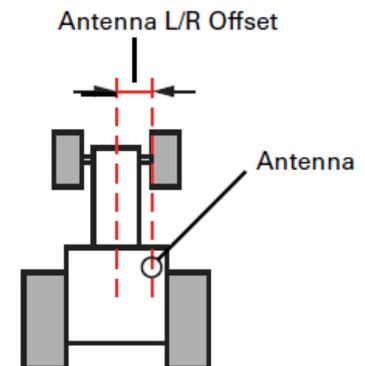
To enter a provisional antenna offset:

1.  Measure the perpendicular distance of the center of the antenna from the centerline of the vehicle.
2.  Enter the value as the antenna offset on the Vehicle Dimensions screen.

When 'calibrating an antenna offset' you are actually compensating for a physical antenna offset. To compensate for physical antenna offset you:

- Measure the effect of the uncompensated antenna offset
- Calculate the offset adjustment required
- Enter the calculated adjustment to compensate for the physical antenna offset

An offset—for which you will compensate—comprises a measured distance (the amount of the offset) and a direction (left or right of vehicle centerline). In the figure above, the offset distance is shown between the dotted lines and the direction is right.

Because it is difficult to measure the antenna offset on the vehicle, you must determine the antenna offset in the field to ensure maximum steering accuracy. However, you need to have completed the calibration wizard before you can conduct the field tests, and to complete vehicle calibration, you need to enter the antenna offset. This initial—or provisional—setting enables you to complete vehicle calibration so you can conduct the field test for an exact antenna offset.

*Note: If the center of your antenna is exactly on the centerline of the vehicle, you have no antenna offset and no compensation is required. When you carry out the procedures for determining the offset, the result will be a measured offset of zero and no further action will be required.*

*WARNING! Calibration is required if the system shows an offset while driving up and down on a guideline without an implement after completing the roll bias calibration.*

# Before Calibrating a Vehicle

Review the information in the table below before calibrating a vehicle.

| Consideration | Description |
|---|---|
| GPS/eDriveX checklist | Before calibrating a vehicle ensure that:<br><br>• GPS antenna/sensor is located in its final position and initialized<br><br>• You use the GPS source the vehicle will use in operations (for example, if you plan to use RTK in the field you must use RTK during calibration)<br><br>• All the items at the top of the eDriveX Status screen are green (see the Run Time Status Alerts table in "eDriveX Status" on page 210)<br><br>• eDriveX power switch is in the 'AUTO' position |
| Calibration steps and vehicle/valve types | The calibration steps you complete are based on the vehicle type (such as Standard Tractor or Sprayer) and valve type (such as AJX HIGH FLOW or Versatile) you select when adding a new vehicle. After selecting a vehicle/valve type combination (and then entering the dimensions of your vehicle) you calibrate your vehicle. The buttons (required steps) on the Vehicle Calibration panel depend on the vehicle/valve type combination you selected, as shown below.<br><br><br><br>Vehicle: Standard Tractor Valve: AJX STD FLOW    Vehicle: Standard Tractor Valve: Versatile    Vehicle: Tracked Valve: ESi |
| Completing vehicle calibration steps in sequence | Because you must complete the calibration steps in sequence, the step buttons are disabled (dimmed) until you can perform that step. For example, you must complete the *ECU Orientation* step (enabled button in above panels) before completing any of the other steps (disabled buttons). |

| Consideration | Description |
|---|---|
| Repeating a completed calibration step—b**efore completing the calibration process** | If you need to repeat a step you have already completed, you must redo all the subsequent steps that were also completed. For example, you have completed all the calibration steps for a wheeled hydraulic steering vehicle. You then need to change the eDriveX ECU orientation (first step). After you make this change only the next step (Coarse WAS) is enabled for you to change (all other steps are disabled). This behavior is only until you have completed all the calibration steps applicable to your vehicle. Once you complete the roll and pitch bias calibration, you can make changes at other steps without having to revisit the subsequent steps. |
| Repeating a completed calibration step—**after completing the calibration process** | Once you have successfully completed the calibration process, provided no calibration-related changes are made (vehicle, valve, required dimensions), you can go back to the Vehicle Calibration panel and rerun any of the moving steps. However, because of dependencies, rerunning a moving step will require subsequent steps to be rerun. |
|  | The popup note that a valid calibration will be lost if you restart the calibration process is displayed because a change to the ECU orientation constitutes a restart; if you change the ECU orientation all the previous calibration data will be lost and the whole calibration process will have to be rerun. If you do not change the ECU orientation, you can rerun any moving calibration, then rerun only the calibrations that come after the one you reran. |
| Engine speed during calibration | Some calibration steps should be carried out at full hydraulic pressure. Because some hydraulic systems need higher engine speeds than others to achieve full hydraulic pressure, it is recommended that you execute those calibration steps with a minimum engine speed of 1500 rpm. This is indicated as a requirement where it applies. |

## Converging Filters

Filters are an important part of the data processing that enables precision guidance and autosteering. To be effective, filters need to be converged. Filters may be either converged (for immediate use) or converged with convergence data stored (for immediate and subsequent reuse). Certain driving routines will result in convergence, but you need to meet more conditions for convergence data to be stored. A check mark next to Filters Converged in the Run Time section of the eDriveX Status screen indicates filters have been converged.
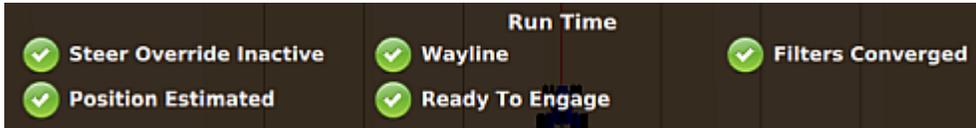


This check mark does not, however, indicate that the convergence data is stored (although it may be—see *Filter self-convergence* in the table below):

*Note on Vehicle/Valve Combination: Convergence data, if stored, is stored for each vehicle/valve type combination. If you change the vehicle/valve type combination to a combination for which there is no stored convergence data, you will need to repeat the appropriate convergence and convergence data storage requirements.*

Review the information in the table below to help you understand filters and convergence.

| Consideration | Description |
|---|---|
| Initial convergence or re-convergence | Initial filter convergence (and re-convergence if required) is achieved through a driving pattern. The driving sequences executed manually or automatically during the calibration process are normally enough for filters to converge. If the calibration driving sequences are enough, the convergence status will show as checked. You will then have to meet the requirements for convergence data storage. See *Manual driving sequence* (next row in this table) for additional information. |
| | If the driving sequences within the calibration process do not result in filter convergence, or a full calibration is not required, execute the 'manual' sequence described in the Manual Driving Sequence section below (and then the additional storage driving requirements detailed in the same section). See *Re-converging filters* later in this table for additional information. |
| | *Note on Antenna Position: Filter convergence includes a calculation of the antenna position. If there is a difference of more than 1 m between the calculated antenna position and the entered antenna fore/aft ('pivot') dimension, the filters will converge but the filter data will not be stored. To avoid this situation, ensure you have accurately entered the antenna pivot dimension when adding a new vehicle. See "Adding a Vehicle" on page 66 for additional information.* |
| Manual driving sequence | The steps below describe how to manually converge filters—perform these steps if the Filters Converged status indicator is a red exclamation point (see below). Pressing the underlined Filters Converged text provides instructions on how to resolve the issue. |
| |  |

| Consideration | Description |
|---|---|
| | Using the figure at right as a guide and driving the vehicle at a slow speed (typically 5-7 kph), complete the following steps to manually converge filters:<br><br>1. Drive straight for 10 m. If filters do not converge, go to step 2.<br><br>2. Drive a tight full circle to the left.<br><br>3. Drive a tight full circle to the right. If filters do not converge, go to step 4.<br><br>4. Drive straight for 10 m.<br><br>To store the newly acquired convergence data you must drive at least three minutes (recommended minimum) under autosteering and bring the vehicle to a stop (the point at which the data is stored). This can be cumulative—you do not have to immediately drive under autosteer for three minutes and stop. Provided you have three minutes of autosteering (for which filters must be converged) and come to a halt before you power off eDriveX, the convergence data will be stored—but see *Note* under *Initial convergence or re-convergence* (earlier in this table). |
| Filter self-convergence | On system startup, the filters converged status always indicates filters are not converged: this is normal. After you drive forward for at least ten seconds, the status should become checked indicating the use of stored convergence data. If the status does not change, it indicates convergence data is not stored. See *Re-converging filters* (next row in this table) for additional information. |
| Re-converging filters | Filters will need to be re-converged—and the new convergence data stored—if:<br><br>• Filter convergence data was never stored<br><br>• Antenna calibrated (entered) dimension is changed by more than 0.1 m<br><br>• Vehicle/valve type combination is changed to one that has not been used before (meaning there is no convergence data for the combination) see the *Note* above this table.<br><br>• If re-convergence is required, establish the reason and, accordingly, reset the antenna data, complete the calibration process, and/or complete the driving requirements for convergence and convergence data storage. |
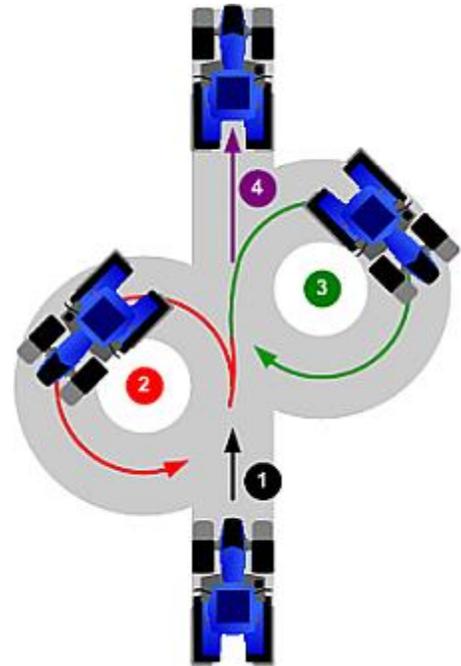
# Steering Sensitivity and Attack Overview

This section provides an overview of steering sensitivity and steering attack. Each setting has a default value and you typically review/adjust the settings when adding a vehicle (see "Adding a Vehicle" on page 66).

**Steering Sensitivity**

Steering sensitivity determines how aggressively a vehicle steers on a guideline while engaged on the line. You typically adjust sensitivity after calibrating a vehicle (during the process of adding a vehicle). An optimal value enables the vehicle to maintain the GPS guideline accurately without rapidly overshooting or responding too slowly. However, you may want to adjust sensitivity on the fly (while engaged on the guideline) if you notice:

- Vehicle jerks erratically back and forth across guideline (steering corrections too rapid)—sensitivity set too high (below left)
- Vehicle weaves excessively along guideline (crosstrack too high) —sensitivity set too low (below right)
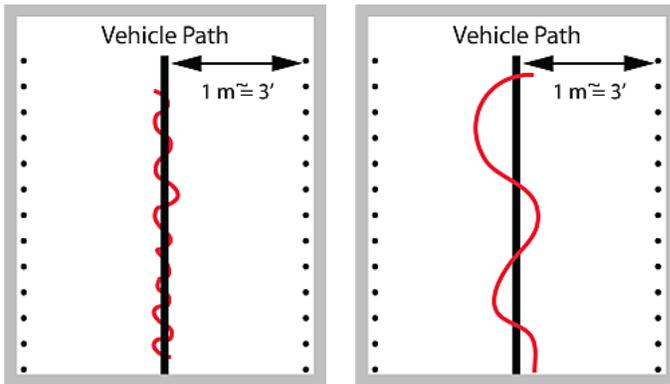


Depending on preference and needs, you can adjust sensitivity to between 0 and 20. The default setting of 7 is a good value to start with on most vehicles. Use the following table as a guide to set the sensitivity.

| Setting | Performance |
| --- | --- |
| Low value | Smooth steering adjustments, large crosstrack values (horizontal distance of the vehicle from the guideline). |
| Medium value | Good compromise between smooth steering and crosstrack. |
| High value | Aggressive steering adjustments with wheels very active, 'twitchy' (small crosstrack values). |

*Note: The best sensitivity setting for optimized machine control will depend on different parameters, such as vehicle type, implement, working speed, and field conditions.*

**Steering Attack**

Steering attack determines how aggressively the vehicle steers onto the guideline (not yet engaged on the line) when approaching it from a distance. Depending on preference and needs, you can set attack to between 1 and 10. The default setting 10 (maximum) is a good value to start with on most vehicles. Use the following table as a guide to set attack.

| Setting | Performance |
| --- | --- |
| Low value | Very slow line acquisition. The system is not overshooting the guideline during approach. |
| Medium value | Good compromise between a fast line acquisition and a reasonable amount of overshoot. |
| High value | Fast line acquisition with the potential to overshoot the guideline until the system catches up. |

# Adding a Vehicle

*Note: Adding a vehicle involves many steps—a large portion of the time spent is calibrating the vehicle. If there are time constraints when adding a vehicle, you may want to save your vehicle after completing all the non-calibration steps—but complete the calibration for optimal performance before running any jobs.*

When you add a vehicle it remains in memory, even if you move the terminal to another vehicle. For example, if you add a vehicle, move the terminal to another vehicle for use, and reinstall the terminal in the original vehicle, your original vehicle in REBEL will still be there. You must add a vehicle (and an implement) before you can start a job. Use the New Vehicle Profile panel (Menu > Vehicle Profiles > New Vehicle) to add a vehicle. If you have not already done so, see "Before Adding a Vehicle" on page 58.

Use the links below to help you add a vehicle. Although you do not have to complete each step, in order (such as entering the vehicle name, setting the color, etc.), you must select a vehicle type before selecting a valve type. When finished, press **Save** to save your vehicle.

**Tip!** *See the diagram below the following links for an overview of the panels/screens used to add a vehicle.*

- "Adding a Vehicle: Entering the Vehicle Name and Selecting the Vehicle Color" on page 68

- "Adding a Vehicle: Selecting the Vehicle Type and Valve Type" on page 69

- "Adding a Vehicle: Entering Vehicle Dimensions" on page 70

- "Adding a Vehicle: Calibrating a Vehicle" on page 71

- "Adding a Vehicle: Setting Steering Sensitivity and Attack" on page 73

Keypad to
enter name
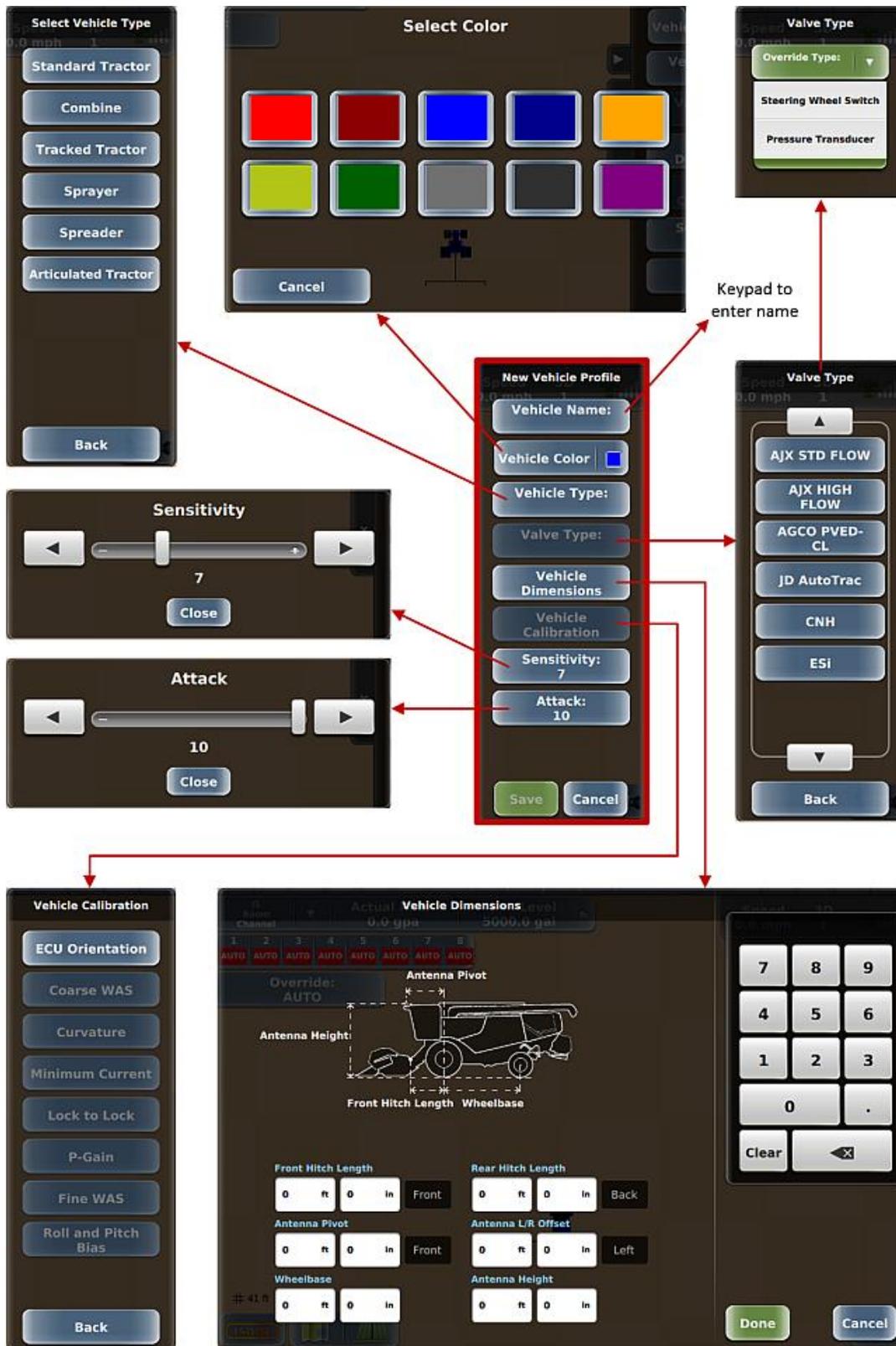
# Adding a Vehicle: Entering the Vehicle Name and Selecting the Vehicle Color

To add a vehicle:

1. Press **Menu > Vehicle Profiles > New Vehicle**. The New Vehicle Profile panel appears. You typically work your way from top down. Valve Type and Vehicle Calibration are disabled because they require completion of other steps on this panel first.

2. *Enter the vehicle name:* Press **Vehicle Name**, enter a name in the Enter Vehicle Name window, then press **Done**. The new vehicle name appears on the Vehicle Name button. *Tip! Use names you will recognize if entering many vehicles.*

3. *Select the vehicle color:* Press **Vehicle Color** then press a color in the Select Color window. The new color appears on the Vehicle Color button and on the vehicle on the map.
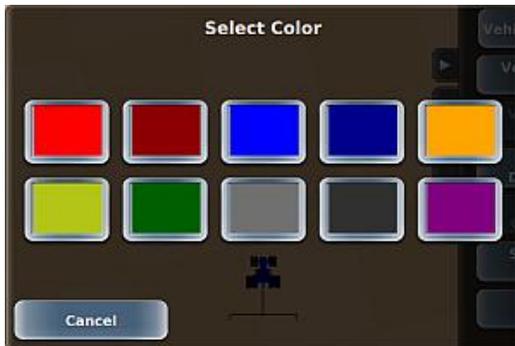
Go to the next step (selecting the vehicle type and valve type).

## Adding a Vehicle: Selecting the Vehicle Type and Valve Type

On the New Vehicle Profile panel, with the vehicle name and color set, select the vehicle type and valve type that match your vehicle.

To select the vehicle and valve types:

1. Press **Vehicle Type**, then on the Select Vehicle Type panel (see figure near right) select the appropriate vehicle type. The panel closes and the selected type appears on the Vehicle Type button (see below).

   

2. Press **Valve Type**, then on the Valve Type panel (see figure far right) select the appropriate valve type. Depending on the valve type you select, one of the following occurs:

   • The Valve Type panel closes.

   • A second Valve Type panel appears with one field: Override Type. Select **Steering Wheel Switch** or **Pressure Transducer** then press **Back** (to manually close the Valve Type panel).

   

   Following either scenario above, the Valve Type button shows the valve type. If you selected Pressure Transducer as the override type, 'P.T' appears on the button as shown below.
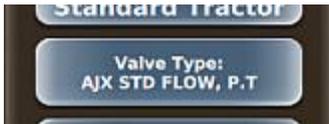
   

*Note: You can change vehicle type and/or valve type, and upon changing either, REBEL prompts you to restart the ECU for the changes to take effect. Press **OK** to acknowledge the message and continue. Only valve types valid for the currently selected vehicle type are available for selection. If you change the vehicle type and the currently selected valve type is not valid for that vehicle, a valve type no longer appears on the Valve Type button and you need to reselect a valve.*

Go to the next step (entering vehicle dimensions).

## Adding a Vehicle: Entering Vehicle Dimensions

Vehicle dimensions in REBEL comprise the following measurements: hitch length, wheelbase, and antenna measurements (height, pivot, and offset). If needed, review "Measuring Vehicle Dimensions" on page 69.

To enter vehicle dimensions:

1. One the New Vehicle Profile panel, press **Vehicle Dimensions** to display the Vehicle Dimensions screen (see below). If your system is set up for U.S. units you will see two fields for each dimension (ft and in); for metric units, you will only see one field (m).



2. Using the keypad to enter values, complete the following, then press **Done**.

| | |
|---|---|
| Hitch Length | Press either **Hitch Length** field (Front or Rear) and enter a value. |
| Antenna Pivot | Press the **Antenna Pivot** field, enter a value, then press **Front** (antenna in front of vehicle pivot point) or **Back** (antenna behind vehicle pivot point). |
| Antenna L/R Offset | Press the Antenna L/R Offset field, enter a value, then press Left (antenna left of vehicle centerline) or Right (antenna right of vehicle centerline). You can leave this as 0.00 when first working through this step of vehicle setup. |
| Wheelbase | Press the Wheelbase field then enter a value. Wheelbase of a vehicle is the distance between the centers of its two axles. |
| Antenna Height | Press the Antenna Height field then enter a value. |

Go to the next step (calibrating a vehicle).

# Adding a Vehicle: Calibrating a Vehicle

Make sure you have reviewed "Before Calibrating a Vehicle" on page 61 before performing a calibration.

To calibrate a vehicle:

1. On the New Vehicle Profile panel, press **Vehicle Calibration** to display the Vehicle Calibration panel (see at right). Your vehicle and valve types determine what buttons appear on this panel—see the 'Before Calibrating a Vehicle' link above for more information.

   Only the ECU Orientation field is active initially. You must complete the calibration steps in order, starting with ECU Orientation. After you complete one of the steps shown at right the button below that step is enabled (or multiple buttons are enabled). For example, after completing the ECU Orientation step, the next button (Coarse WAS) is enabled.

   *Note: For some tractor models, messages may appear during the calibration process that instruct you to perform tasks specific to these models. Follow the instructions onscreen to continue/complete your calibration.*

2. Press **ECU Orientation** to display the ECU Orientation panel (see below). When the panel first appears, the Apply Changes button and the Results section are not visible—they appear only after you select values for Logo and Connectors.

   Using the **Logo** and **Connectors** buttons, set the orientation of the top of the ECU (the face with the product logo) and of the two connectors. The connector orientation options are dependent on the Logo orientation so set Logo first. Press **Apply Changes**, then press **Done**.

*Note: The panels that appear for certain calibration steps have a status bar that indicates if you have met the conditions for that step. For example, if the step instructs you to drive less than a certain speed, the speed bar is red (below right) if you are driving too fast or green (below left) if you are driving within the correct range. Pay attention to the speed bar to help guide you through the calibration process. When instructed to center the steering aim at a specific landmark to ensure you are driving the vehicle in a straight line.*
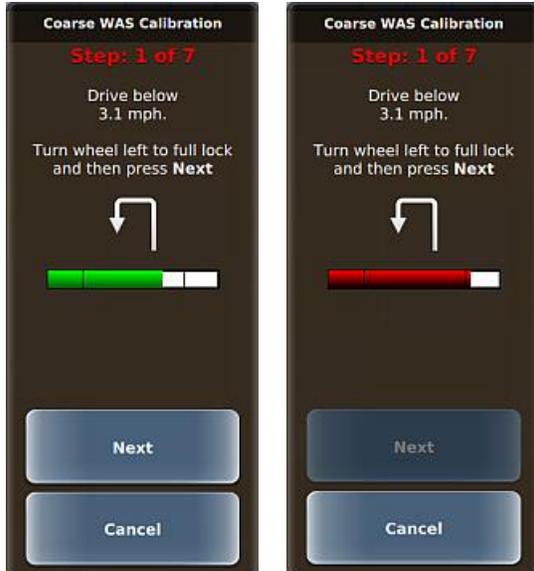
3. Press the next enabled button (below the one for the step you just completed), such as Curvature if you selected ESi as the valve type, then follow the onscreen prompts. Repeat this process for the subsequent buttons on the Vehicle Calibration panel.

After successfully calibrating your vehicle, go to the last step (steering sensitivity and attack).

## Adding a Vehicle: Setting Steering Sensitivity and Attack

Steering sensitivity determines how aggressively the vehicle tries to stay engaged on a guideline; steering attack determines how aggressively the vehicle steers onto the guideline when approaching it from a distance. See "Steering Sensitivity and Attack Overview" on page 65 for more information on these settings.

To set steering sensitivity and attack:

1. On the New Vehicle Profile panel, press **Sensitivity**. A slider appears, with a range of values from 1 (least aggressive) to 20 (most aggressive) and a default of 7. Drag the slider or press the left/right arrows to set the level, then press **Close**.



2. Press **Attack**. This slider has a rage of 1 (least aggressive) to 10 (most aggressive) and a default of 10. Drag the slider or press the left/right arrows to set the level, then press **Close**.



3. Press **Save** to save your vehicle settings and return to the Vehicles panel. The new vehicle name appears on the Current Vehicle button.

4. Close or hide the panel.

# Field-Testing the Antenna Offset

## Determining the Antenna Offset in the Field

There are two ways to determine the antenna offset:

- Track method (preferred): This method measures the track difference, in at least three places, during two passes (one in each direction) on the same A=B line. The method requires a surface where the vehicle clearly leaves tracks.

  *Note: 'Track' in this context means wheel or track marks on the ground. The track method for determining antenna offset is suitable for wheel and track vehicles.*

- Marker method: This method measures the offset using at least three flags (or other markers) to mark the center of the vehicle (hitch pinpoint) during two runs (one in each direction) on the same A=B line. If using the marker method, use at least three measurement points on the A=B line.

Whichever method you use, the antenna offset (the physical offset on the vehicle and the compensating offset value you enter in the system) is half the measured difference in the track of the vehicle over the two runs.

# Determining Antenna Offset - Track Method
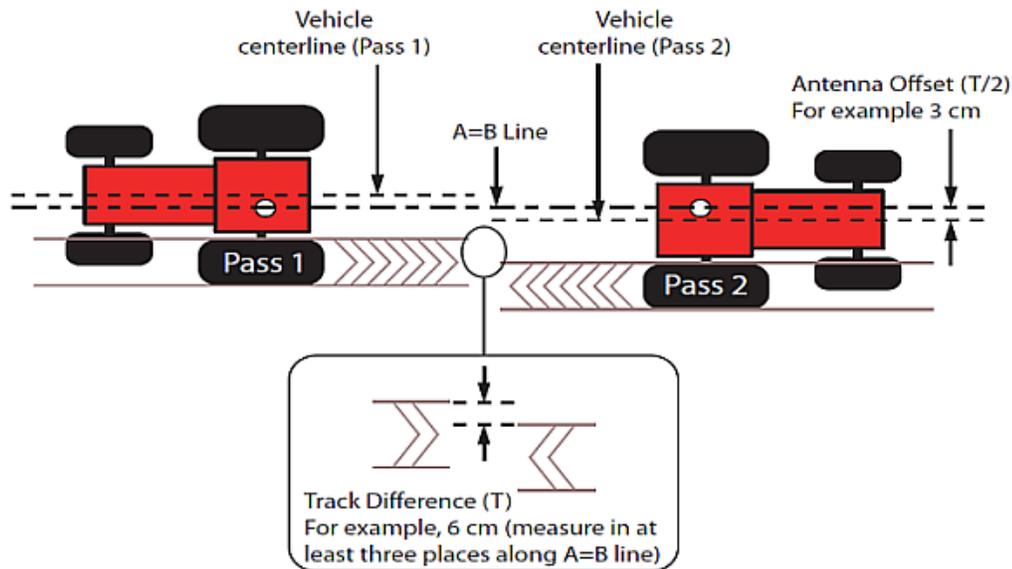


To determine antenna offset using the track method:

1. Set an A=B path (see "Setting an A=B Path" on page 152 if needed).

2. Maintaining a speed of 5 kph (3 mph) engage steering and let the system steer you along the guideline for at least 100 m. See Pass 1 in the above figure.

3. Perform a keyhole turn, re-engage the steering, and let the system steer you down the same guideline. See Pass 2 in the above figure.

4. In three different places along the A=B line, measure the distance between the corresponding track marks (inside edges, outside edges or centers, whichever are easiest to see and measure, see figure above). If there is variation, calculate the average difference. In the figure above the track difference is 6 cm, measured at the outside edges of the track marks at one point on the A=B line.

   *Note: Take your measurements where the vehicle was travelling with a crosstrack of between 0-1, that is, not just after re-acquiring the A=B line after your turn (this is sometimes referred to as 'allowing settling time').*

   Halve the measurement (3 cm). This is the amount of the physical antenna offset—the offset you need to compensate for and need to enter as the antenna offset (in meters, 0.03 m) at step 7.

5. Determine the direction of the offset—this is the left or right direction of the antenna's centerline relative to the vehicle centerline when viewed in the direction of travel.

6. Press **Menu > Vehicle Profiles > Current Vehicle > Vehicle Dimensions**. The Vehicle Dimensions screen appears.

7. Enter the antenna offset:

   a. Press the **Antenna L/R Offset** field (white box). "Enter Antenna L/R Offset" appears above the keypad and Left and Right buttons appear below the keypad (shown at right).

   b. Enter an offset value using the keypad, press **Left** or **Right**, then press **Done** to confirm the value and close the screen.

8. Close or hide the panel.

9. Test the completed calibration by letting the system control up and down on a new A=B path. The tracks should match. If they do not match, repeat the procedure for determining the antenna offset.
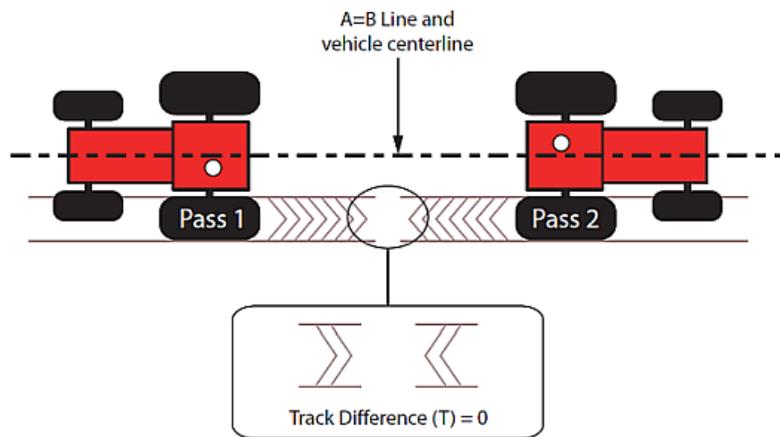
## Determining Antenna Offset - Marker Method
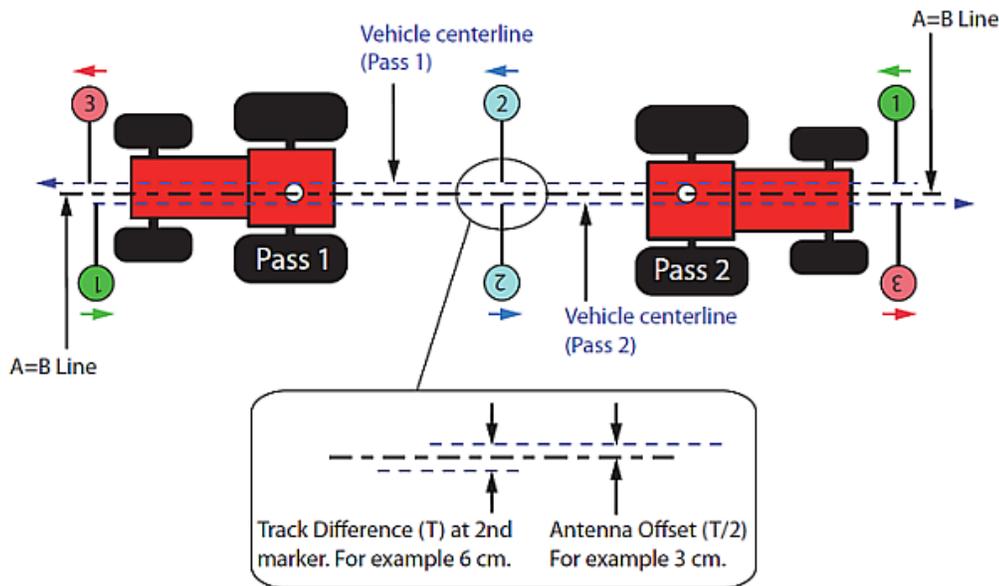


To determine antenna offset (marker method):

1.  Set an A=B path (see "Setting an A=B Path" on page 152 if needed).

2.  Maintaining a speed of 5 kph (3 mph) engage steering and let the system steer you along the guideline for at least 100 m. When the crosstrack has stabilized (0-1), place markers along the A=B line—at least three—on the centerline of the vehicle (the hitch pinpoint). See Pass 1 in the above figure.

3.  Perform a keyhole turn, re-engage the steering, and let the system steer you down the same guideline. When the crosstrack is stabilized (0-1), place more markers close to those placed on the first pass.

    *Note: Place your markers while the vehicle is travelling with a crosstrack of between 0-1, that is, not just after re-acquiring the A=B line after your turn (this is sometimes referred to as 'allowing settling time').*

4.  Measure the distance between corresponding markers. In the figure above the centerline difference is 6 cm.

    Halve the measurement (3 cm). This is the amount of the physical offset of the antenna—the offset you need to compensate for and need to enter as the antenna offset (in meters, 0.03 m).

5.  Determine the direction of the offset—this is the left or right direction of the antenna's centerline relative to the vehicle centerline when viewed in the direction of travel.

6.  Complete steps 6 through 8 in "Determining Antenna Offset - Track Method" on page 75.

7.  Test the completed calibration by letting the system control up and down on a new A=B path and placing markers as before. The centerlines should match. If they do not match, repeat the procedure for determining the antenna offset.

Track Difference (T) at 2nd marker = 0 cm.
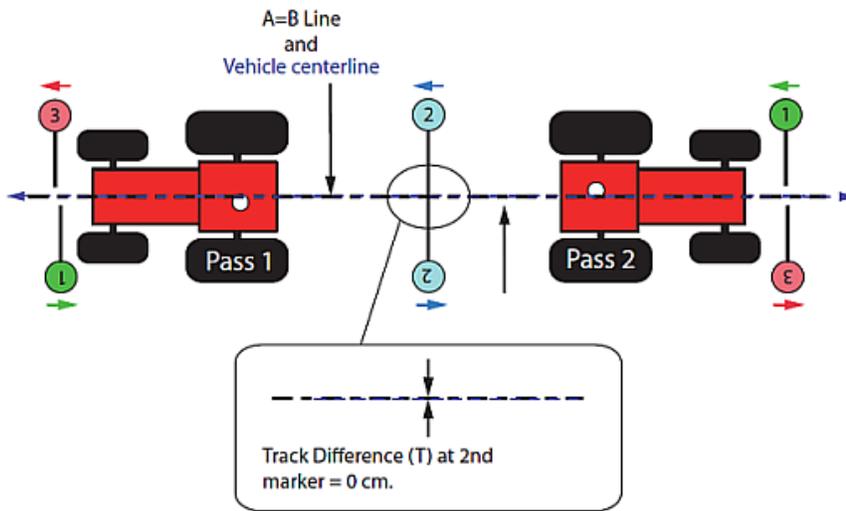
# Loading a Vehicle

Each vehicle you create in REBEL is saved to memory creating a list of vehicles. You can then load a vehicle from this list. When you load a vehicle, that vehicle's settings (such as color and calibration parameters) are loaded as well.

To load an existing vehicle:

1. Press **Menu > Vehicle Profiles > Vehicles List**. The Vehicles List panel appears (see figure at right).

2. Use the up/down arrows to scroll through the list of vehicles (if necessary) then select the vehicle you want to load. The Vehicles List panel closes, and the selected vehicle appears on the Current Vehicle button.

3. Close or hide the panel.

# Editing a Vehicle

You can edit only the currently loaded vehicle.

To edit a vehicle:

1. Press **Menu > Vehicle Profiles > Current Vehicle**. The Edit Vehicle Profile panel appears (see at right).

2. Edit your preferred settings, similar to entering the settings when adding a vehicle. See "Adding a Vehicle" on page 66 for more information.

*Note: 1) After a change of either vehicle type or valve type, a system message prompts you to restart the ECU for the changes to take effect. Press OK to acknowledge the message and continue—you will need to restart the ECU. 2) Only valve types valid for the currently selected vehicle type are available for selection. If you change the vehicle type and the currently selected valve type is not valid for that vehicle, a valve type no longer appears on the Valve Type button and you need to reselect a valve.*

# Exporting a Vehicle

You must have a USB drive plugged into the terminal to export a vehicle; otherwise, the functionality is disabled (the Export Vehicles button on the Vehicles panel is disabled). When you export a vehicle to a USB drive REBEL creates a 'vehicles' folder on USB drive and copies the VEHICLE file to that folder. For example, if you have a vehicle named 'TestVehicle1' and export that vehicle to a USB drive it will appear as follows: TestVehicle1.vehicle

To export a vehicle:

1.  Press **Menu > Vehicle Profiles > Export Vehicles**. The Export Vehicles panel appears (see figure at right).

2.  Use the up/down arrows to scroll through the list of vehicles (if necessary) then select the vehicles you want to export; to export all vehicles press **Select All**.

    *Note: If a vehicle of the same name you are exporting already exists on the USB drive, REBEL prompts you to confirm/cancel exporting that vehicle. Confirming the export overwrites the vehicle on the USB drive.*

3.  Press **Export**. An export progress message appears briefly followed by an export complete message. Press **Ok** to close the message.

4.  Close or hide the panel.

# Importing a Vehicle

You must have a USB drive plugged into the terminal to import a vehicle; otherwise, the functionality is disabled (Import Vehicles button on the Vehicles panel is disabled). The USB drive must contain a 'vehicles' folder at the root level of the drive and all vehicle files must be in this folder. For example, if your USB drive is drive M on your PC then your vehicle files should be in M:\vehicles. After importing a vehicle, you can load, export, or delete it.

To import a vehicle:

1. Press **Menu > Vehicle Profiles > Import Vehicles**. The Import Vehicles panel appears (see figure at right).

2. Use the up/down arrows to scroll through the list of vehicles (if necessary) then select the vehicles you want to import; to import all vehicles press **Select All**.

   *Note: If a vehicle of the same name you are importing already exists on your terminal, REBEL prompts you to confirm/cancel importing that vehicle. Confirming the import overwrites the vehicle on your terminal.*

3. Press Im**port**. An import progress message appears briefly followed by an import complete message. Press **Ok** to close the message.

4. Close or hide the panel.

# Deleting a Vehicle

*Caution: Deleting a vehicle permanently removes the vehicle and its calibrations—you cannot retrieve a deleted vehicle.*

You cannot delete the current vehicle; when deleting vehicles, REBEL displays a list of all but the current vehicle.

To delete a vehicle:

1. Press **Menu > Vehicle Profiles > Delete Vehicles**. The Delete Vehicles panel appears (see figure at right).

2. Use the up/down arrows to scroll through the list of vehicles (if necessary) then select the vehicles you want to delete; to delete all vehicles press **Select All**.

3. Press **Delete**. A message appears asking if you are sure you want to delete the selected vehicles.



4. Press **Yes**. The vehicles are deleted and removed from the list.

5. Close or hide the panel.

# Chapter 3: Working with Implements

An implement in REBEL refers to machinery attached to your vehicle, such as a sprayer, planter, or tiller. You can add as many implements to REBEL as you want and then select the ones you need for your job. REBEL stores information—such as implement geometry and eTurns setup—with each implement. The selected implement appears on the map with the vehicle (see figure below). The distance between the implement and the vehicle is determined by the front/back implement offset—see the "Understanding and Setting Implement Offsets" link below for more information.
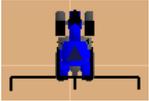
REBEL supports two implement types:

- ISOBUS: Implements that have built-in (industry-standard) ISOBUS functionality, where REBEL automatically detects the implement when you connect it to REBEL. You then use the ISOUT window to view/edit implement parameters.

- Non-ISOBUS: Implements that do not have built-in ISOBUS functionality, where you set up the implement using the New Implement button (see panel at right). This includes implements you use with AC110 for rate control and section control.

Use the Implements panel (Menu > Implement Profiles) and the links below to work with implements.

To work with new implements:

- "Implement Offsets" on page 86

- "Adding an AC110 Implement" on page 93

- "Connecting and Configuring an ISOBUS Implement Overview" on page 113

To work with existing implements:

- "Loading an Implement" on page 114

- "Editing an Implement" on page 115

- "Exporting an Implement" on page 116

- "Importing an Implement" on page 117

- "Deleting an Implement" on page 118

*Note: If you have a valid eTurns subscription, the Calibration button (New Implement Profile panel and Edit Implement Profile panel) is enabled after you complete the previous implement setup steps on these panels. For each implement you want to use with eTurns, you must perform eTurns calibration. See "eTurns" on page 173 regarding eTurns functionality.*

# Implement Offsets

In REBEL you can set two offsets for your implement: left/right offset and front/back offset. See the following sections for an overview of and how to set each type of implement offset.

Left or right (L/R) offset:

- "Left/Right Implement Offset Overview" on page 87
- "Setting the Left/Right Implement Offset - Preferred Method" on page 88
- "Setting the Left/Right Implement Offset - Alternative Method" on page 90

Front or back (F/B) offset:

- "Setting the Front/Back Implement Offset" on page 91

# Left/Right Implement Offset Overview

The left/right implement offset is the lateral (perpendicular) distance between the center of the implement and the centerline of the vehicle. When calibrating a left/right implement offset, you are actually compensating for a physical implement offset. And to compensate for physical implement offset you:

- Measure the effect of the uncompensated implement offset
- Calculate the offset adjustment required
- Enter the calculated adjustment to compensate for the physical implement offset

Calibration is required if the vehicle successfully repeats its passes while driving up and down on a straight A=B line without an implement, but still shows an offset (skip or overlap) during field work with an implement attached. In this case it is likely the implement is not centered in relation to the vehicle centerline. To compensate for this, you need to complete a left/right implement offset calibration for each implement used with REBEL.

The left/right implement offset—for which you will compensate—comprises a measured distance (the amount of the offset) and a direction (left or right of vehicle centerline). In the figure at right the offset distance (or amount) is X and the direction is right. Because it is difficult to measure the left/right implement offset on the vehicle/implement combination, you must determine the offset in the field to ensure maximum field work accuracy.

*Note: Calibration compensates for a static left/right implement offset caused by the physical dimensions of the implement. It does not prevent offsets caused by dynamic movements of the implement (such as drift on a slope).*

See "Setting the Left/Right Implement Offset - Preferred Method" on page 88 and "Setting the Left/Right Implement Offset - Alternative Method" on page 90 that describe the two ways to determine the left/right implement offset.
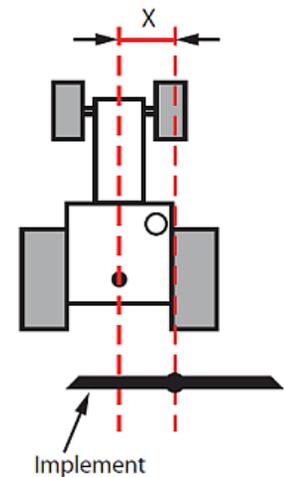
# Setting the Left/Right Implement Offset - Preferred Method

This method for setting the implement offset is the preferred method because it eliminates the possibility of errors caused by an incorrect vehicle width.
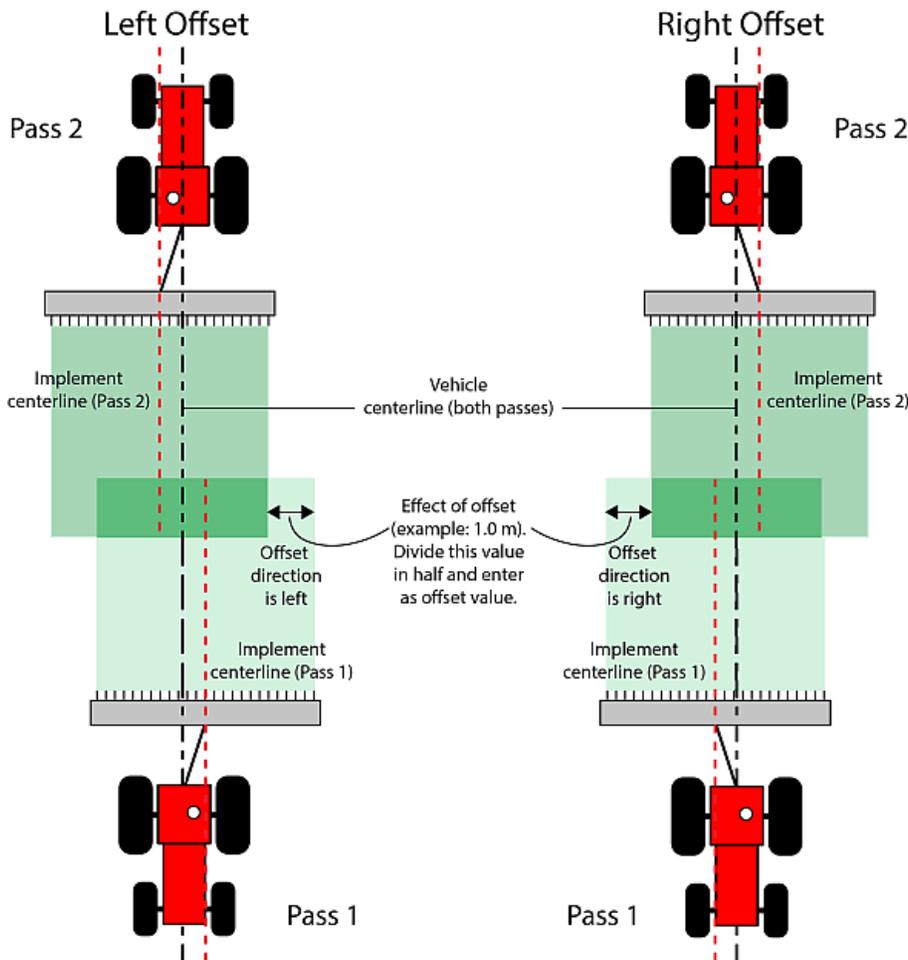


To determine implement offset:

1. Set an A=B path. See "Setting an A=B Path" on page 152 for more information.

2. Maintaining a speed of 5 kph (3 mph) engage steering and, with good crosstrack and with the implement straight, let the system steer you along the guideline for at least 100 m. Ensure the implement is in sufficient contact with the ground to leave a visible swath. See Pass 1 in the above figure.

3. Perform a keyhole turn, re-engage the steering, and let the system steer you down the same guideline, again with good crosstrack and with the implement straight. See Pass 2 in the above figure.

4. Measure the effect of the uncompensated implement offset shown in the figure above (1.00 m in example)—it is the width of the first swath not covered by the second swath.

5. Divide the measurement by two. This is the amount of the physical offset of the implement—the offset you need to compensate for and need to enter as the implement offset in the Implement Configuration screen (see step 7 below)—so 0.5 m in the figure above (and see step 8 below).

6. Determine the direction of the offset—this is the left or right direction of the implement's centerline relative to the vehicle centerline when viewed in the direction of travel. See the figure above for examples of both a left and right offset.

7. Navigate to the Implement Settings panel (see "Adding an AC110 Implement" on page 93 for help) then press **Implement Config** to display the screen below.
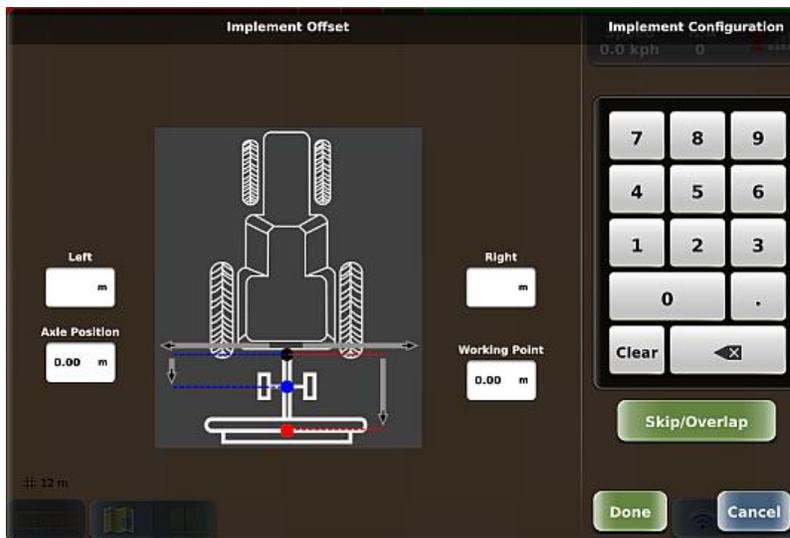
8.  *Enter the left or right implement offset.* Press the appropriate offset field (white box) then enter an offset value using the keypad on the right of the screen. After you enter the value the implement on this screen moves to the position indicated by the offset; for example, if you enter a Right offset the implement moves to the right. Press **Done**. The value is entered and the screen closes.

9.  On the Edit Implement Profile panel press **Save**. The Edit Implement Profile panel closes, and the new implement position is indicated on the map.
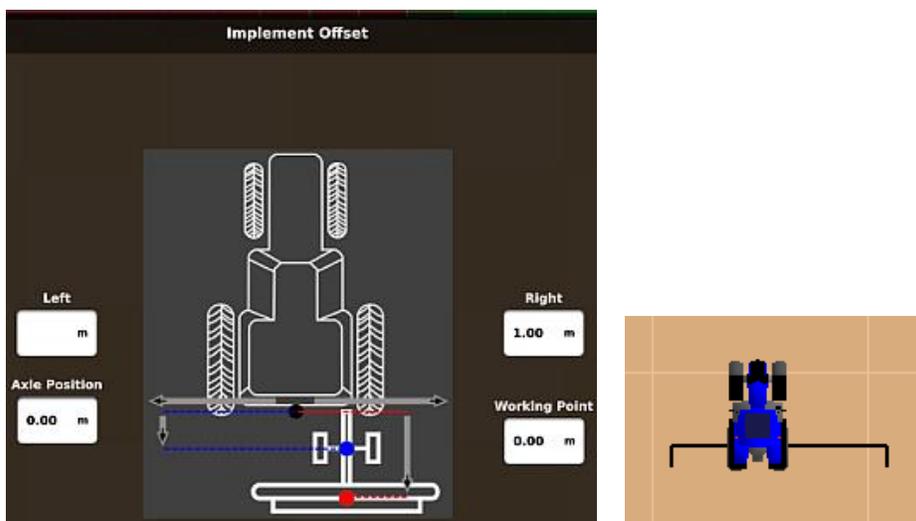


10.  Close or hide the panel.

11.  Test the completed calibration by letting the system control up and down on a new A=B line. The second swath should overlay the first exactly. If it does not, repeat the calibration.
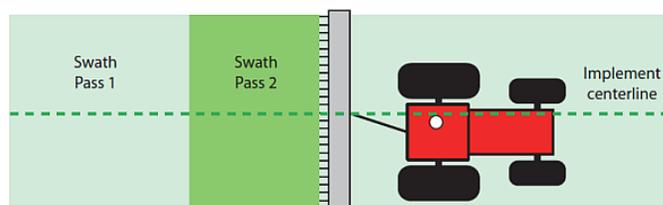


*Note: If test results still show skips or overlaps after calibrating both the antenna and implement offsets, make sure the implement width (Width button on Implement Settings panel) is correct.*

## Setting the Left/Right Implement Offset - Alternative Method

With this method, instead of driving two passes on the same guideline—one in each direction—you drive three passes on adjacent guidelines. Depending on the direction of your implement offset (left or right), you will get a skip or an overlap on the second pass and the opposite on the third pass.
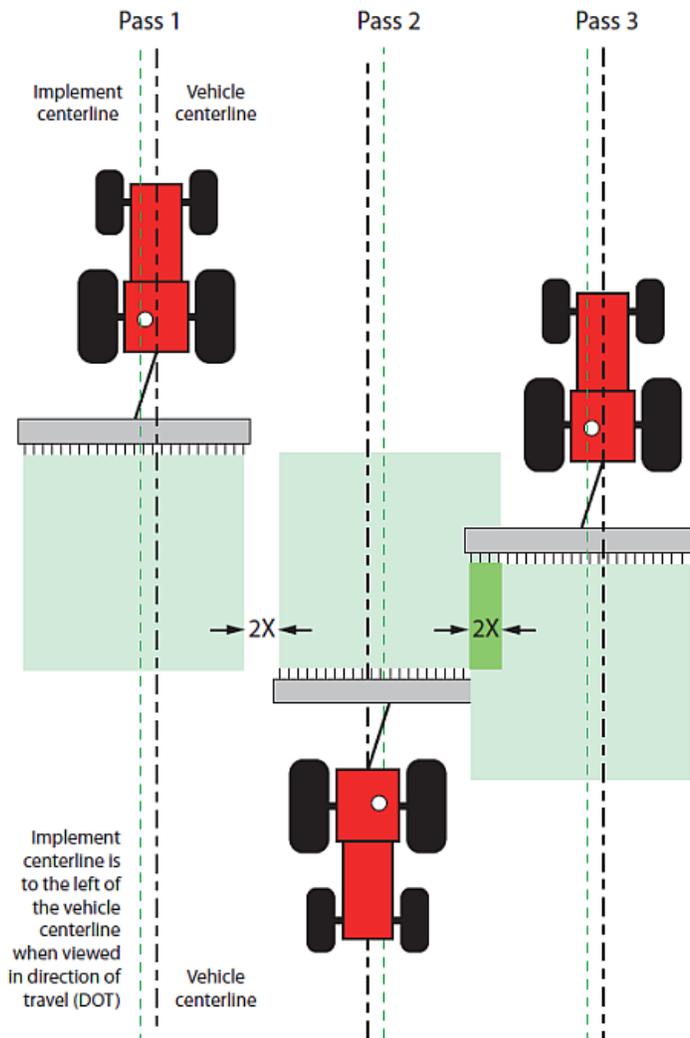


No implement offset entered. Skips and overlaps occur (2X). Direction of offset is Left when viewed in direction of travel.

The amount of skip and overlap will be the same. Whichever you measure (2X) divide it in half and enter the result as the implement offset (X) along with the direction of the offset, which is left in the example - start at step 7 of "Setting the Left/Right Implement Offset - Preferred Method" on page 88.

*Note: If the offset was to the right, Pass 2 would produce overlap, Pass 3 would produce skip.*

# Setting the Front/Back Implement Offset

REBEL enables you to set different front/back offsets and these depend on the mount type you selected for your implement.

- Front offset (Rigid Front mount only) or Rear offset (Rigid Rear mount only)—the Front or Back implement offset is the perpendicular distance between the vehicle's pivot point and the application line (spray impact point, seed drop point, etc.) of the implement. On the map, a Front offset places the implement in front of the vehicle and a Rear offset places it behind.

- Axle Position and Working Point (Trailed / Active Trailed mounts only)—axle position is the distance from hitch point to implement axle and working point is the distance from axle position to application line. The combined distances are similar to a back offset. If you set these offsets, the implement is behind the vehicle on the map.

You set a front/back offset using the Implement Configuration screen, which changes based on the implement's mount type (as shown below). These offsets affect the section control 'on/off' points and the variable rate control 'change' points as the implement passes over boundaries, previously worked areas, or prescription map areas.
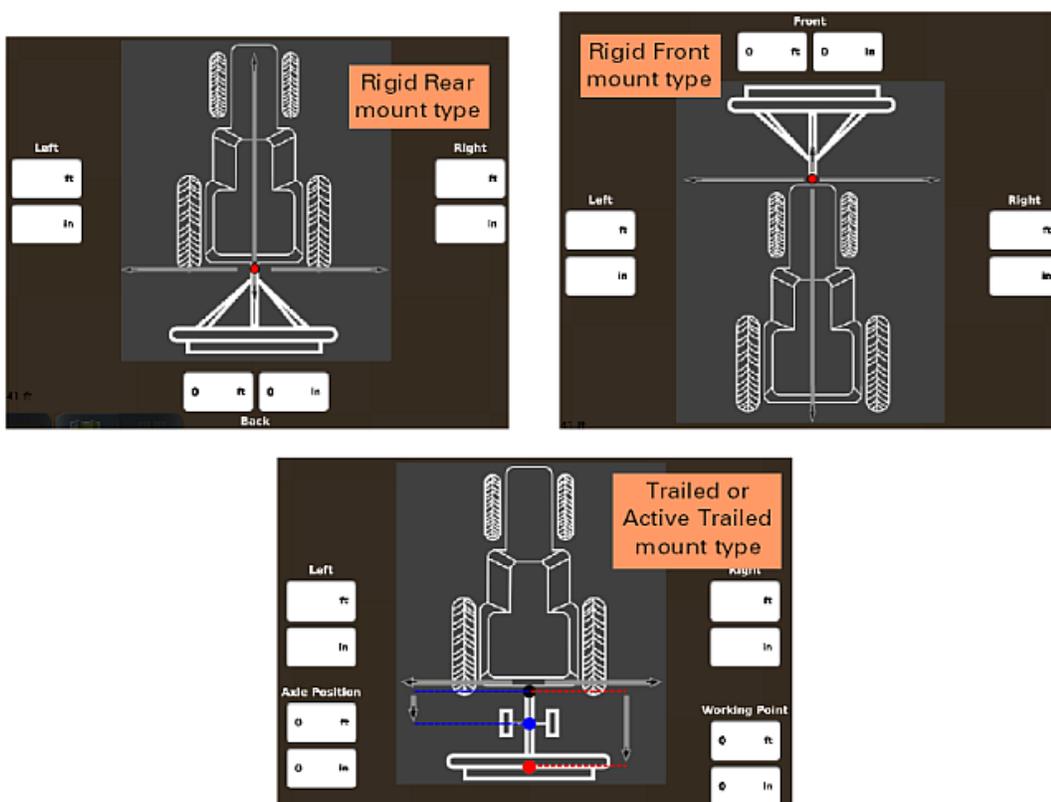


To set the front or back implement offset:

1. Navigate to the Implement Settings panel (see "Adding an AC110 Implement" on page 93 for help) then press **Implement Config** to display the screen below.
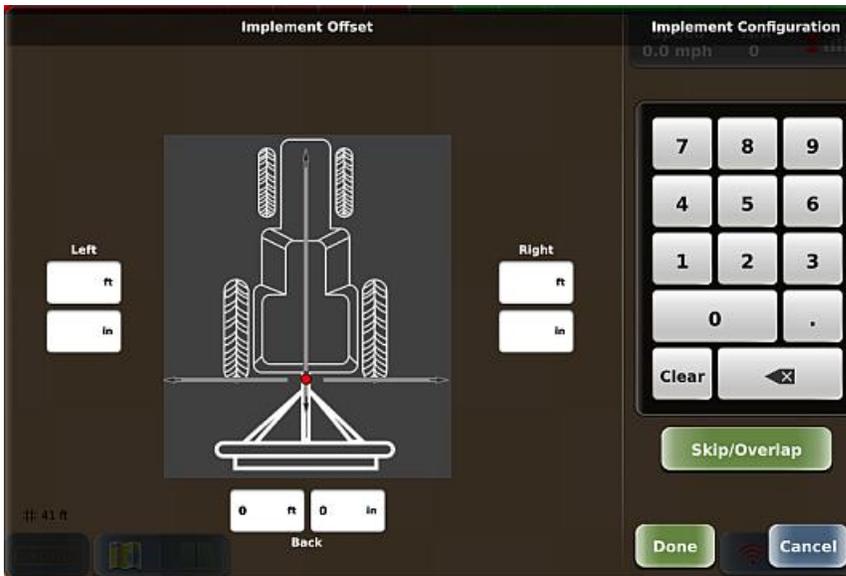
2. *Enter the front or back implement offset:* Press the **Front** or **Back** field (white box). Enter an offset value using the keypad on the right of the screen. After you enter the value the implement on this screen moves to the position indicated by the offset; for example, if you enter a Front offset the implement moves to the front. Press **Done**.

*Note: Based on the location of the application line of the implement, you may need to set a combination of left/right and front/back offsets on the implement.*

# Adding an AC110 Implement

*Note: Adding an implement involves many steps—many of these involve rate control setup and calibration. If there are time constraints when adding an implement, you can save your implement after entering the implement's width—but complete all the necessary setup and calibration for optimal performance before running any tasks.*

When you add an implement, it remains in memory. You must add (a vehicle and) an implement before you can start/run a task. Use the sections below to add an AC110 implement.

- "Adding an AC110 Implement - Name and Mount Type" on page 94

- "Adding an AC110 Implement - Implement Settings" on page 95

- "Adding an AC110 Implement - Rate Control Settings Overview" on page 101

- "Calibrating eTurns" on page 174

The navigation path to specific implement panels depends on how many implements are current and whether the implements have one boom or multiple booms. The following table describes how to navigate the different button presses.

| Implements/Booms | Navigation Path |
|---|---|
| One implement (single boom) | Menu > Implement Profiles > Current Implement |
| | Press Implement Settings to display the Implement Settings panel. |
| One ISOBUS implement (multiple booms) | Menu > Implement Profiles > Current Implement |
| | Press Boom List, then press the preferred boom to display the Implement settings panel. |
| One ISOBUS implement and one AC110 implement | AC110<br>Menu > Implement Profiles > Current Implements > (AC110 implement)<br>Press Implement Settings to display Implement Settings panel.<br><br>ISOBUS single boom<br>Menu > Implement Profiles > Current Implements > (ISOBUS implement)<br>Press Implement Settings to display Implement Settings panel<br><br>ISOBUS multiple booms<br>Menu > Implement Profiles > Current Implements > (ISOBUS implement)<br>Press Boom List, then press the preferred boom to display the Implement settings panel. |

# Adding an AC110 Implement - Name and Mount Type

When entering the implement name, use a name you will recognize if entering many implements. For example, step 2 below uses 'Trail_12m' for a 12-meter-wide trailed implement.

REBEL enables you to select from four distinct mount types:

- (2) rigid types: Rigid Rear (rigid mounting at rear of vehicle) and Rigid Front (rigid mounting at front of vehicle)

- (2) trailed types: Trailed (implement follows the vehicle but cuts corners, similar to towing a trailer with a car) or Active Trailed (implement follows the exact path of the vehicle)

To enter the implement name and select the mount type:

1. Press **Menu > Implement Profiles > New Implement**. The New Implement Profile panel appears (top of panel shown at right).

2. *Enter the implement name:* Press **Name**, enter a name in the Enter Name window (shown below), then press **Done**. The new implement name appears on the Name button.

3. *Select the implement mount type.* When adding an implement, the Mount Type is preset to the default type (Trailed) and this appears on the Mount Type button (see New Implement Profile panel, above right).

   Press **Mount Type** (the Mount Type panel appears with the implement name above the buttons, see at right), then press a mount type. The panel closes and the selected type appears on the Mount Type button.

Go to the next section (implement settings) to continue setting up your implement.

# Adding an AC110 Implement - Implement Settings

After entering the AC110 implement name and mount type, you can enter implement settings. On the New Implement Profile panel, press **Implement Settings** to display the Implement Settings panel. Initially, only a few fields appear on the panel; however, the remaining fields appear after you select AC110 as the Controller Type.



Use the table below to enter implement settings. The table presents Width, then Controller Type, then the rest of the left column settings, then the rest of the right column settings because Width is required before you can save your implement and Controller Type determines if additional settings appear on the Implement Settings panel.

| Button | Description |
|---|---|
| Width | Implement width |
| Controller Type | Displays the Select Controller Type panel. None is the default selection (no rate control). Select AC110 to display the rate control indicators and buttons on the map and enables all rate control functionality. |
|  | If an existing AC110 implement is current (active), the AC110 button is disabled (you cannot set up an AC110 implement while an existing AC110 implement is a current implement). See "Loading an Implement" on page 114 on making implements current (or not). |

Implement
Config

Press to display the Implement Configuration screen.

- Left side of screen shows Implement Offset (default, left below) section or Skip/Overlap section (right below)

- Right side of screen shows a keypad (used to enter values) and a green button you press to toggle between displaying the sections (buttons text indicates the section not shown)



To enter values in any of the fields, press the field, type values with the keypad, then press Done.

*For Implement Offset:*

- Left or Right offset—see "Left/Right Implement Offset Overview" on page 87

- Axle Position—distance from hitch point to implement axle

- Working Point—distance from axle position to the application line (spray impact point, seed drop point, etc.)

*For Skip/Overlap:*

Enter a value to drive a pattern where rows intentionally skip or overlap. When you enter a skip or overlap the map shows this as an area between swaths in the green coverage lines, where a skip is the non-sprayed area between swaths and an overlap is the dark green overlap between swaths.

If section control is enabled, the following conditions must be met, or section control will turn off the outside sections and not allow overlap):

- Overlap width must be less than the width of the outside sections.

- Section control Coverage must be set at 100%.
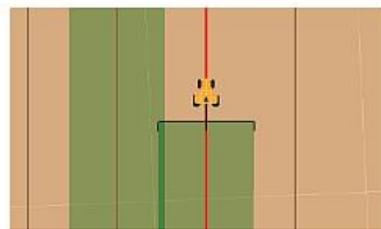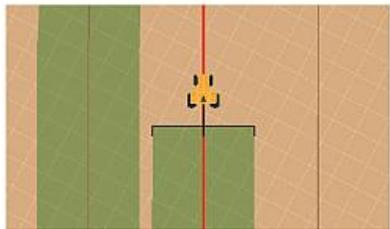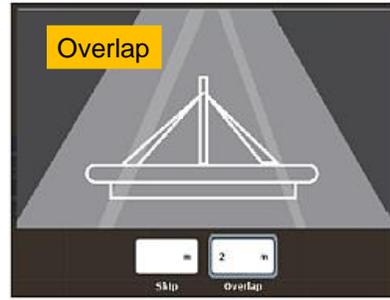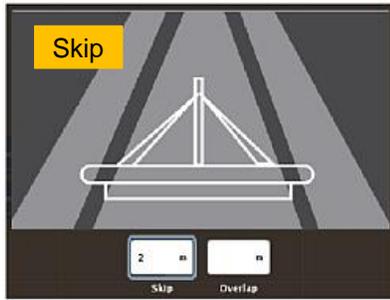
| Button | Description |
|---|---|



| | |
|---|---|
| Operation | Field operation for the implement/boom |
| | Press Operation to display the Boom Operation panel. Then press the preferred operation (the panel closes, and the selected operation appears on the Operation button). The operation you select determines what button appears below the Implement Settings button on the New Implement Profile (and the Edit Implement Profile) panel. |
| | • Planting/Spraying/Seeding—Rate Control Settings button |
| | • Spreading—Conveyor Control / Spinner Control buttons |
| | See "Adding an AC110 Implement - Rate Control Settings Overview" on page 101 for more information on these buttons (and their settings). |
| External Switches | Selecting this option (check mark appears in the box) enables you to perform the following section control functions using the joystick or boom switches built into your vehicle instead of using the map indicators/buttons on the terminal: |
| | • Turn Apply button ON and OFF |
| | • Toggle individual sections between ON and AUTO |
| | If your REBEL installation includes the optional switchbox and it is connected to the terminal, the External Switches check box is disabled because the switchbox performs similar functions. |
| | *Note: Implementation is dependent on your vehicle installation kit.* |

| Button | Description |
|---|---|
| Section Valve | Displays the Valve Type panel. Identify the wiring going to boom valves. Valve types are: <br><br> • Motorized 2 Direct - electric motorized valve that is: <br> 1) driven open with a positive voltage signal, and <br> 2) driven closed by a negative voltage signal across two signal wires. <br><br> • Motorized 2 Inverse - electric motorized valve that is: <br> 1) driven open with a positive voltage signal, and <br> 2) driven closed by a negative voltage signal across two signal wires. <br><br> • Motor/SOL 1 Direct - electric motor or solenoid valve that is: <br> 1) driven open with a single positive voltage signal, and <br> 2) returned to a closed position by a spring or other automatic means. <br><br> • Motor/SOL 1 Inverse - electric motor or solenoid valve that is: <br> 1) driven closed with a single positive voltage signal, and <br> 2) returned to an opened position by a spring or other automatic means. |
| Number of Sections | *Note: If you are performing a dry rate control operation, there is only one section—the Number of Sections button is disabled.* <br><br> Displays a keypad where you set the number of sections. AC110 supports a maximum of 16 sections, but note the following: <br><br> • Planting operation: If valve type is Motorized 2 Direct or Inverse, supports up to 8 sections. If valve type is Motor/SOL 1 Direct or Inverse, supports up to 16 sections. <br><br> • Spraying operation: Supports up to 10 sections |
| Section Location/ Width | *Note: Section/Location Width is disabled when Number of Sections is set to 1.* <br><br> Press Section Location/Width to display the Section Widths panel (shown at right). Upon setting the implement width and number of sections, REBEL divides the width by the number of sections to determine the width of each section; these widths are displayed on the Section Widths panel. <br><br> The bottom of the panel indicates the total widths (sum of section widths) and the boom (implement) width. These values must be equal. <br><br> You can change the width of any section by pressing a Width button, entering a new value, then pressing Done. Upon changing the first value, Total Widths and Boom Width will no longer be equal and the indicators appear red. When the values are unequal, the Done button is disabled. <br><br> To quickly reset all the widths to equal values where the sum equals the Boom Width value, press Auto-Locate. This re-enables the Done button. <br><br>  |

| Button | Description |
|--------|-------------|
| Group Sections | Press Group Sections to display the Group Sections screen (below), which enables you to put sections into manageable blocks for manual on/off toggling from the map and uses color coding and slider bars to enable you to easily set up the section groups. |
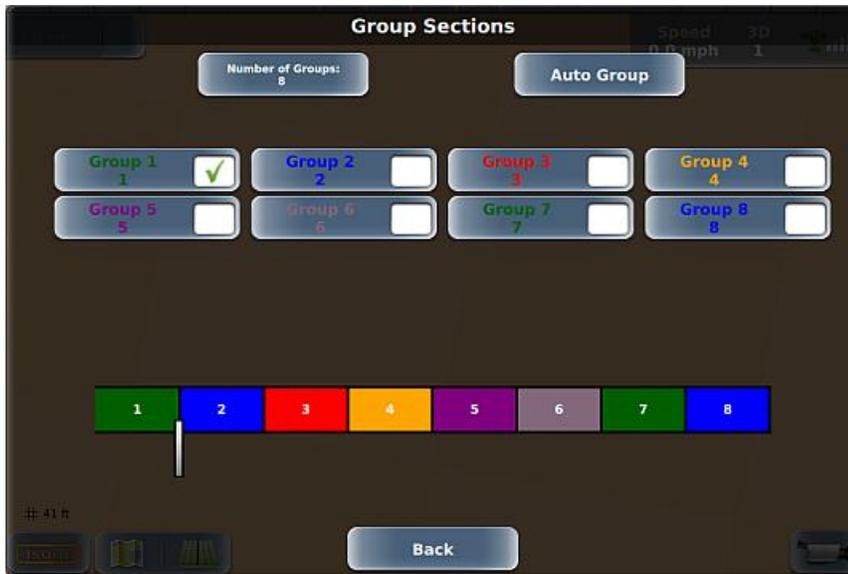
By default, the number of groups equals the number of sections and is reflected in the number of sections on the section control tab (upper left of map). Any time you change the number of groups, the change is reflected in the number of groups on the section control tab. For example, if your implement has ten sections and you do not change the number of groups (also ten), the section control tab shows ten sections (one per group). If you change the number of groups to two, the section control tab shows only two sections (five sections per group for ten sections).

To set the number of groups, press Number of Groups, enter a value using the keypad, then press Done. The Group Sections screen changes to reflect the number of groups—for example, when changing the number of groups from eight (shown above) to two (shown below).
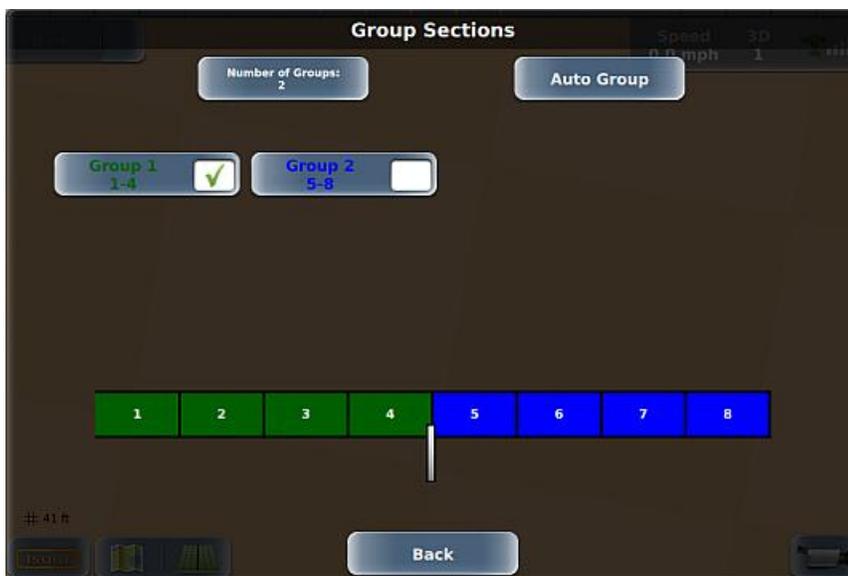
Each group's check mark box enables you to set the sections in that group.

| Button | Description |
|---|---|
| Section Location/ Width | Press to display the Overlap Settings panel, where you can fine tune overlap settings. |

**Coverage and Coverage at Boundaries** use sliders to set a value in a defined range.

- Coverage - Select the % boom section that must enter or exit a previously applied area before AC110 will turn it off or on.
- Coverage at Boundaries - Set the % coverage at a boundary line.

**Overlap Tolerance, On Time, and Off Time** use keypads to enter values.

Overlap Tolerance - Enter the amount of overlap side-to-side before section control takes effect. For example, you may use this if you have small sections, so section control does not turn on/off repeatedly on the end sections.
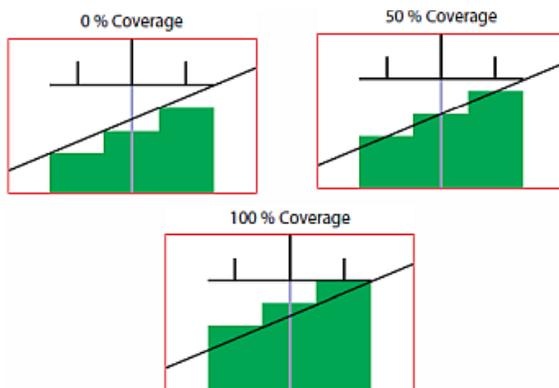
On Time - Enter the number of seconds needed to open the boom valves and build pressure ahead of an unapplied area. Increase the number to turn on sooner.

Off Time - Enter the number of seconds needed to close the boom valves ahead of a previously applied area. Increase the number to turn off sooner.

| Test Sections | *Note: Test Sections is disabled when Section Valve is set to None. You must save the implement before REBEL enables you to perform this test (otherwise, REBEL prompts you to save the implement if you press Test Sections before saving).* |

Enables you to test each section before operation (starting a job).

To test the implement sections, press **Test Sections**, then press **Yes**. The message closes and a new message appears—as REBEL tests each section (in order, from 1 to x, where x is the number of sections) the message and the rate control bar indicate the section tested.

# Adding an AC110 Implement - Rate Control Settings Overview

## *Adding an AC110 Implement - Rate Control Settings Overview*

Rate control configuration (settings) depends on the operation. You must configure each implement that you will use for rate control. Implement configuration includes calibration; perform the following (with the vehicle parked or moving) before calibrating the flow:

- Make sure the tank is clean then fill with several hundred gallons of water.
- Unfold the booms and move the vehicle to a safe location.
- Make sure the vehicle is running at the operating RPM used for spraying.

Use the links below and figures on the next page to help you configure your implement for rate control.

AC110 All Operations except Spreading:

- "Adding an AC110 Implement - Rate Control Settings for Non-Spreading Operations" on page 102

AC110 Spreading Operation

- "Adding an AC110 Implement - Rate Control Settings for Dry Rate Control (Conveyor)" on page 107
- "Adding an AC110 Implement - Rate Control Settings for Dry Rate Control (Spinner)" on page 111
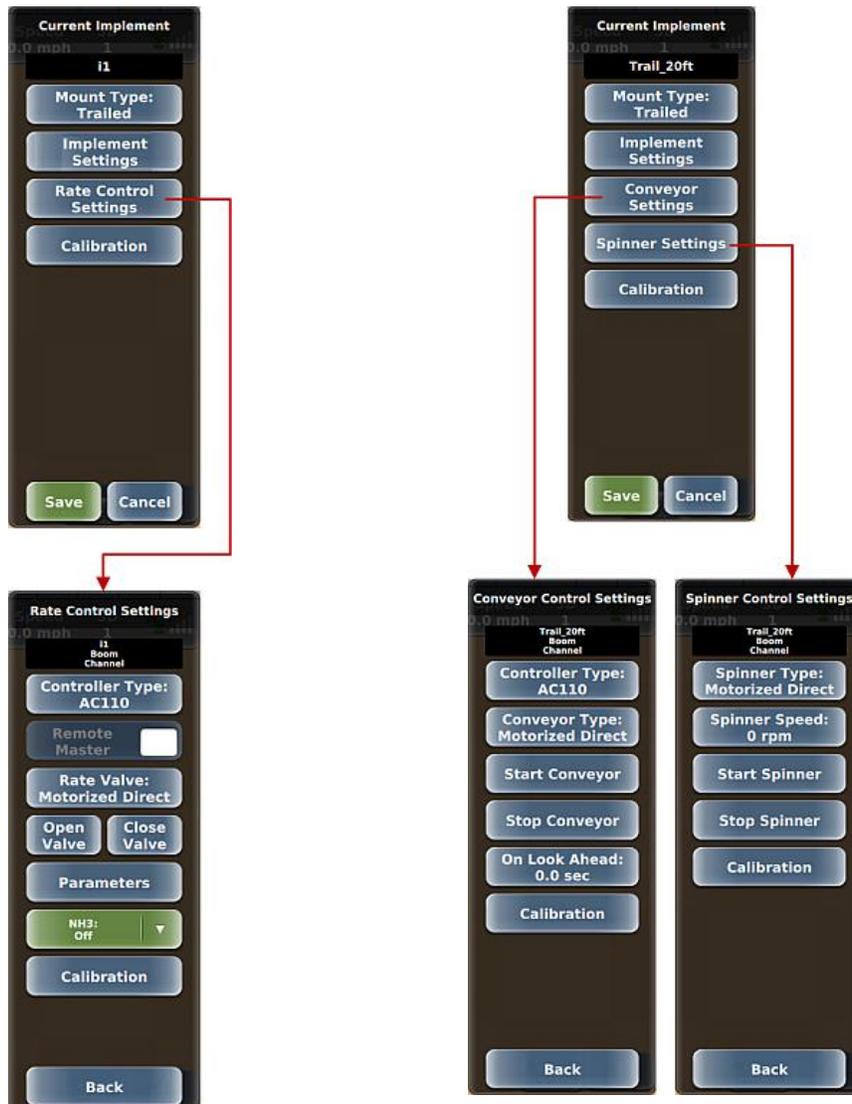
### Adding an AC110 Implement - Rate Control Settings for Non-Spreading Operations

Before you can use your implement for non-spreading operations, you must configure and calibrate it for rate control via the Rate Control Settings panel (Menu > Implement Profiles > New Implement Profile > Rate Control Settings, or Menu > Implement Profiles > Current Implement > Rate Control Settings). The table below describes the buttons on this panel and subsequent related panels.



| Button | Description |
|---|---|
| Controller Type | Press to display the Select Controller Type panel, then press either button to set the type:<br><br>• AC110 - displays the full set of buttons on the Rate Control Settings panel and rate control indicators/buttons on the map.<br><br>• None (default) - disables all rate controller panels and buttons in REBEL (select this option if you are not using rate control). |
| Remote Master | If your REBEL installation includes the optional switchbox and it is connected to the terminal, the Remote Master check box is enabled; otherwise, it is disabled. With the optional switchbox connected and the Apply switch (leftmost switch) on the switchbox set to ON, selecting the Remote Master check box enables you to use the vehicle joystick's master switch to turn Apply on or off.<br><br>*Note: Implementation is dependent on your vehicle installation kit.*<br><br>See "Using the Switchbox" on page 193 for more information on the switchbox and see "Understanding the Parts of the Touchscreen" on page 1 for more information on the Apply button. |

| Button | Description |
|---|---|
| Rate Valve | Displays the Valve Type panel. Options are:<br><br>• **Motorized Direct**<br>Two-wire electric motor opens/closes the flow control valve to increase/decrease the application flow rate.<br><br>• **Motorized Inverse**<br>Two-wire electric motor opens/closes the flow control valve to inversely decrease/increase the application flow rate.<br><br>• **PWM**<br>Electrohydraulic solenoid valve proportionally increases application flow rate with increased duty cycle (voltage).<br><br>• **PWM Ground**<br>Electrohydraulic solenoid valve proportionally decreases application flow rate with increased duty cycle (voltage).<br><br>• **PWM 2**<br>Similar to PWM but with a slower algorithm; use when rate control is too unstable when using PWM.<br><br>• **PWM 2 Ground**<br>Similar to PWM Ground but with a slower algorithm; use when rate control is too unstable when using PWM Ground.<br><br>• **Positive Close (On or Off)**<br>Select Yes for installations where the rate control valve is also used to stop and start product application, for example when no boom On/Off or section valves are present. |
| Open Valve and Close Valve | Useful in manually opening and closing the regulating valve to identify if you selected an incorrect Rate Valve option or if a cable is not connected. |
| Parameters | Press to display the Rate Control Parameters panel, from which you set the following (descriptions start in the next row of this table):<br><br>• On Look Ahead<br>• LowFlow Setting<br>• Valve Advance |
|  | On Look Ahead<br><br>Press to display a keypad where you enter the number of seconds before REBEL begins to adjust the regulating valve ahead of a rate change (increase the number to turn on sooner). For example, if the setting is 1 second, REBEL begins to adjust 1 second before it hits the new rate in an upcoming polygon. This setting applies only to variable rate applications (prescription maps). |

| Button | Description |
|--------|-------------|
| | LowFlow Setting |

Displays the LowFlow Setting data entry window.

Without a LowFlow setting the tips on your sprayer may shut off when flow drops below a certain rate (such as due to a drop in vehicle speed when traveling through a rough spot in the field). The LowFlow value you enter is the flow rate above which REBEL will continue to spray (apply product) and not close the regulating value completely and will maintain a minimum flow independent of speed and number of sections closed.

To determine the LowFlow Setting value for your implement:

1.  Identify the flow rate at which the spray tips begin to shut off.

    a.  *Put the system in Manual mode*
        Press the **Product Details** button on the map to display the Product Rate panel, then press the **Rate Bump** arrows (up arrow increases rate, down arrow decreases rate) to drop the rate until the tips shut off. See "Using Rate Control" on page 186 for more information.

    b.  *Identify what the flow value is on the Rate and Section Diagnostics screen*
        Press **Menu > Diagnostics > Rate Section Diagnostics** and observe the value in the Flow field. See "AC110 Diagnostics" on page 223 for more information.

2.  Enter a LowFlow Setting value that is slightly higher than the value from the previous step.
    Press **Menu > Implement Profiles > Current Implement > Rate Control Settings > Parameters > LowFlow Setting**, enter a value in the LowFlow Setting window (shown at right), then press **Done**.

If a low flow condition occurs during runtime, a red exclamation point appears on the Actual Rate section of the rate control tab.
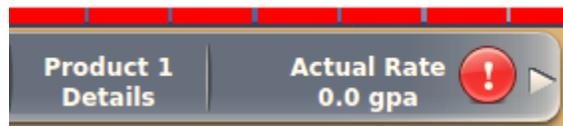


1.  Press **Actual Rate** to display the Rate Section Diagnostics screen with the following message:



2.  Press **Ok** to close the message.

3.  Take corrective action (such as increasing vehicle speed if that is the cause) to increase flow rate.

| Button | Description |
|---|---|
| | Valve Advance *(applies to PWM and motorized valves only)* |
| | For PWM and motorized valves you can enter a value to increase the valve position when coming out of headlands. For example, if spray comes on and briefly turns off when coming out of a headland (due to the boom having to recharge) you can enter a Valve Advance value to compensate for this. |
| | The range of Valve Advance values is 0 – 20 for PWM and Servo/motorized valves, where: |
| | • For PWM, 0 – 20 equals 0 – 30% increase from valve's current position<br>• For motorized, 0 – 20 equals 0 – 2000 ms |
| | When you are no longer applying product (Apply button displays Off): |
| | • For PWM, the system increases the valve's position by the % you entered<br>• For motorized, the system opens the valve the specified number of ms before it normally opens |
| Calibration | Displays the Calibrate Rate Control panel, from which you set calibration values (Meter Calibration, Pressure 1 Calibration, Pressure 2 Calibration), perform a system calibration, and view/edit calibration values (descriptions start in the next row of this table). |
| | Meter Calibration |
| | Press to display a keypad where you enter a meter calibration value. Locate the meter calibration tag or stamp on the flow meter and the corresponding calibration value. |
| | • For Raven systems, divide the calibration number by 10 and enter this number. For example, if 169 is the calibration value, enter 16.9.<br>• For TeeJet meters, enter the number as is.<br>• Many TeeJet meters list the calibration value in pulses/liter. It may be easier to change the units in REBEL to metric, enter the meter calibration, then change units back to U.S. |
| | After you enter a Meter Calibration value, the System Calibration button on the Calibrate Rate Control panel is enabled. |
| | Pressure1 Calibration and Pressure2 Calibration |
| | There are two pressure calibration settings (Pressure 1 and Pressure 2). Use the following procedure for each setting. |
| | 1. Enter a calibration value of 100 as a starting point.<br>2. Compare the pressure reading (on the Rate Section Control Diagnostics screen) to that of a manual gauge and adjust the Pressure Calibration value up and down to make it match. |
| | If no manual gauge is available, use the flow rate (on the Rate Section Control Diagnostics screen) to calculate a pressure based on your spray tip orifice size. See "AC110 Diagnostics" on page 223 for more information on the AC110 Diagnostics screen. |

| Button | Description |
|--------|-------------|
| | System Calibration |
| | This button is enabled only after you enter a Meter Calibration value. |
| | 1. Press **System Calibration** to start the system calibration process—a Calibrate message appears stating the calibration can take longer than 10 minutes. |
| | 2. Press **Yes**. The calibration process starts. A progress message (with elapsed calibration time) appears during calibration. To cancel the calibration press **Cancel** in the message. |
| | 3. Once calibration is complete a conformation message appears; press **Ok** to close the message. |
| | Calibration Values |
| | *Caution: The values on this panel are set during the calibration process. Outback recommends that you contact Outback Customer Service or your local dealer before changing any of these values.* |
| | Press to the display the Calibration Values panel. To edit any of the following values, press a button to display a keypad, enter a new value, then press **Done**. |
| | • K - gain, or how fast the system attempts to hit the target rate. |
| | • Trigger (l/min) - how soon before the target rate the system switches to fine control. |
| | • Flow Range (l/min) - distance (range) between high flow and low flow. |
| | • Min PWM - minimum voltage (percentage) to receive a control valve response. |
| | • Max PWM - maximum voltage (percentage) to receive a control valve response. |
| | • Time Response - measure of how quickly the rate control system will react before adjusting the actual rate when it deviates from the target rate |
| NH3 | Displays a drop-down list of two options: On and Off. |
| | • Set to On for NH3 (anhydrous ammonia) control. Rate will be in lbs. nitrogen/acre (US) or kgs nitrogen/hectare (metric). Volume remaining in tank will be lbs. or kgs of NH3. |
| | • Set to Off to set any other liquid as the application liquid. |

# Adding an AC110 Implement - Rate Control Settings for Dry Rate Control (Conveyor)

Before you can use your implement for spreading operations, you must configure and calibrate it for rate control via the Rate Control Settings panel. For spreading operations, you must configure both a conveyor and a spinner.

- For conveyor configuration and calibration, see the figure and table below.
- For spinner configuration and calibration, see "Adding an AC110 Implement - Rate Control Settings for Dry <span>Rate Control (Spinner)" on page 111.</span>



| Button | Description |
|---|---|
| Controller Type | Displays the Rate Controller Type panel. <br><br>• Setting the Controller Type to something other than 'None' displays the rate control indicators and buttons on the map and enables all conveyor control functionality. <br><br>• Setting the Controller Type to 'None' disables all rate controller panels and buttons in REBEL. Select this option if you are not using conveyor control. |
| Conveyor Type | Displays the Conveyor Type panel. Options are: <br><br>• Motorized Direct <br>Two-wire electric motor opens and closes the flow control valve to subsequently increase or decrease the application flow rate respectively. <br><br>• Motorized Inverse <br>Two-wire electric motor opens and closes the flow control valve to inversely decrease or increase the application flow rate respectively. <br><br>• PWM <br>Electrohydraulic solenoid valve proportionally increases application flow rate with increased duty cycle (voltage). <br><br>• PWM Ground <br>Electrohydraulic solenoid valve proportionally decreases application flow rate with increased duty cycle (voltage). <br><br>• Positive Close (On or Off) <br>Select Yes for installations where the rate control valve is also used to stop and start product application, for example when no boom On/Off or section valves are present. |

| Button | Description |
|--------|-------------|
| Start Conveyor and Stop Conveyor | Useful in manually stopping and starting the regulating valve to identify if you selected an incorrect Conveyor Type option or if a cable is not connected. |
| On Look Ahead | Displays the On Look Ahead data entry window. |
| | The On Look Ahead value is the number of seconds before REBEL begins to adjust the belt speed ahead of a rate change (increase the number to turn on sooner). For example, if the setting is one second REBEL begins to adjust one second before it hits the new rate in an upcoming polygon. |
| | This setting applies only to variable rate applications (prescription maps). |
| Calibration | Press to display the Calibrate Conveyor panel, from which you set calibration values (Density, Gate Height, Volume Calibration), perform system calibration and conveyor calibration, and view/edit calibration values (descriptions start in the next row of this table). |
| | Density Calibration |
| | Displays the Density Calibration data entry window, where you enter the density of the product (user-provided value). |
| | Gate Height |
| | Displays the Gate Height data entry window, where you enter the gate height (user-provided value). |
| | Conveyor Calibration |
| | To perform conveyor calibration: |

   1.  Press **Conveyor Calibration**. A Calibrate message appears.



   2.  Follow the directions to disengage the spinner and place a container under the conveyor to catch material, then press **Yes**. The calibration process starts and a progress message (with elapsed calibration time) appears.



   *To stop the calibration press **Stop**.*

   3.  Weigh the material and enter the weight value in the Volume Calibration window (see below).

| Button | Description |
|--------|-------------|
|        | Volume Calibration |
|        | Displays the Volume Calibration data entry window, where you enter the value obtained from the conveyor calibration (see above). |

| | |
|--|--|
| | System Calibration |
| | To calibrate the conveyor system: |

1. Press **System Calibration** to start the system calibration process—a Calibrate message appears.



2. Press **Yes**. The calibration process starts and may take up to ten minutes. A progress message (with elapsed calibration time) appears during calibration.



*To cancel the calibration press **Cancel**.*

3. Once calibration is complete the following message appears—press **Ok** to close the message.

| Button | Description |
|--------|-------------|
|        | Calibration Values |

Displays the Calibration Values panel (top of panel shown at right).

*Caution: The values on this panel are set during the calibration process. Outback recommends that you contact Outback Customer Service or your local dealer before changing any of these values.*

To edit the values, press the appropriate button and use the data entry window that appears to enter a value.

- Meter Calibration - resulting value of completed conveyor calibration (this is an advanced diagnostic parameter—if you need to adjust this value, contact Outback Guidance Customer Service for assistance). This field is enabled only after you enter a Volume Calibration value (see previously in this table).
- K - gain, or how fast the system attempts to hit the target rate.
- Trigger (l/min) - how soon before the target rate the system switches to fine control.
- Flow Range (l/min) - distance (range) between high flow and low flow.
- Min PWM - minimum voltage (percentage) to receive a control valve response.
- Max PWM - maximum voltage (percentage) to receive a control valve response.
- Time Response - (set by the calibration) measure, in seconds, of how quickly the rate control system will react before adjusting the actual rate when it deviates from the target rate.

# Adding an AC110 Implement - Rate Control Settings for Dry Rate Control (Spinner)

Before you can use your implement for spreading operations, you must configure and calibrate it for rate control via the Rate Control Settings panel. For spreading operations, you must configure both a conveyor and a spinner.

- For spinner configuration and calibration, see the figure and table below.
- For conveyor configuration and calibration, see "Adding an AC110 Implement - Rate Control Settings for Dry Rate Control (Conveyor)" on page 107.



| Button | Description |
|---|---|
| Spinner Type | Displays the Valve Type panel (top of panel shown at right). Options are: <br><br>• Motorized Direct <br> Two-wire electric motor opens and closes the flow control valve to subsequently increase or decrease the application flow rate respectively. <br><br>• Motorized Inverse <br> Two-wire electric motor opens and closes the flow control valve to inversely decrease or increase the application flow rate respectively. <br><br>• PWM <br> Electrohydraulic solenoid valve proportionally increases application flow rate with increased duty cycle (voltage). <br><br>• PWM Ground <br> Electrohydraulic solenoid valve proportionally decreases application flow rate with increased duty cycle (voltage). |
| Spinner Speed | Press to display a keypad, where you set the spinner speed (dry 'spray' width). |
| Start Spinner and Stop Spinner | Useful in manually opening and closing the regulating valve to identify if you selected an incorrect Spinner Type option or if a cable is not connected. |
| Calibration | Press to display the Calibrate Spinner panel, from which you set the Sensor Count, perform a system calibration, and view/edit calibration values (descriptions start in the next row of this table). |

| Button | Description |
|--------|-------------|
|        | Sensor Count |
|        | Press to display a keypad, where you enter the sensor count (for example, the number of bolts or bars on the spinner that pass the sensor during one revolution). This value is usually 1, 2, or 4. |
|        | System Calibration |
|        | To calibrate the spinner: |
|        | 1. Press **System Calibration** to start the spinner system calibration process—a Calibrate message appears stating the spinner will start/stop several times taking several minutes. |
|        | 2. Press **Yes**. The calibration process starts and a progress message (with elapsed calibration time) appears during calibration. *To stop the calibration press **Stop**.* |
|        | 3. Once calibration is complete the following message appears—press **Ok** to close the message. |
|        | 4. Power cycle the AC110. |
|        | Calibration Values |
|        | *Caution: The values on this panel are set during the calibration process. Outback recommends that you contact Outback Customer Service or your local dealer before changing any of these values.* |
|        | Press to the display the Calibration Values panel. To edit any of the following values, press a button to display a keypad, enter a new value, then press **Done**. |
|        | • K - gain, or how fast the system attempts to hit the target rate. |
|        | • Trigger (l/min) - how soon before the target rate the system switches to fine control. |
|        | • Flow Range (l/min) - distance (range) between high flow and low flow. |
|        | • Min PWM - minimum voltage (percentage) to receive a control valve response. |
|        | • Time Response - (set by the calibration) measure of how quickly the rate control system will react before adjusting the actual rate when it deviates from the target rate. |

# Connecting and Configuring an ISOBUS Implement Overview

When you connect an ISOBUS implement, REBEL automatically detects the implement and that implement remains in memory. You typically use the ISOUT window to view/edit ISOBUS implement parameters (see "ISOUT Overview" on page 50 and "ISOBUS Settings" on page 39).

Some implement settings you enter in the ISOUT window populate similar fields on the REBEL side—via the Current Implement panel for that implement—and typically include such fields as Width (implement width) and Number of Sections (section control). These fields will be disabled on the REBEL side since they are determined by the settings in the ISOUT window. See "Editing an Implement" on page 115 for more information.

To edit ISOBUS implement settings on the REBEL side, see "Adding an AC110 Implement" on page 93.

*Note: If your implement has only one boom, the Boom List button is replaced by the Implement Settings button, enabling you to immediately display the Implement Settings panel (without displaying the intermediate Boom List panel that is shown below).*

# Loading an Implement

Each implement you create in REBEL is saved to memory creating a list of implements. When you load an implement, it will use the dimensions and any section and rate control setup for that implement. The Implement List panel (Menu > Implement Profiles > Implement List) shows all the AC110 implements (new or imported) on your REBEL terminal, where:

- The numbers on the lower right of each implement button indicate the number of booms for that implement that are currently loaded followed by the total number of booms for the implement. For AC110 implements, this will always be 1/1 for the active implement and 0/1 for all other implements.

- The text below the list indicates the number of controls (implements) that are active and the number of sections for the active implement (one implement with eight sections shown at right).

- The active implement has a check mark ('12m_4s_rr' shown at right).

Because only one AC110 implement can be active, you must deactivate the currently active implement (by pressing that implement to remove the check mark) before selecting another implement (to make it active); otherwise, the following message appears.

To load an existing implement:

1. Press **Menu > Implement Profiles > Implement List** to display the Implement List panel. The current implement (if one is current) has a green check mark; press this implement to deactivate it (clear the check mark).

2. *(Optional)* If the implement list is long, you can filter the list by pressing the Search box at the top of the panel, tying text that is part of the implement name, then pressing **Done**. For example, you may want to filter the list and show only those implements that contain the word 'trail'.

3. Use the up/down arrows to scroll through the list of implements (if necessary), select the implement you want to load, then press **Save**. The panel closes and the selected implement appears on the Current Implement button.

4. Close or hide the panel.

# Editing an Implement

You can edit only the current implement. Editing implement settings is similar to entering them when adding an implement—see "Adding an AC110 Implement" on page 93 for more information.

To edit an implement:

1. Press **Menu > Implement Profiles > Current Implement** to display the Current Implement panel. If eTurns is authorized on your system, a Calibration button appears below the Rate Control Settings button.

2. Edit your preferred settings, similar to adding an implement, then press **Save**.

3. Close or hide the panel.

# Exporting an Implement

You must have a USB drive inserted in one of the USB ports on the terminal to export an implement; otherwise, the functionality is disabled (the Export Implements button on the Implements panel is disabled). When you export an implement to a USB drive, REBEL creates an 'implements' folder on the drive (if one does not already exist) and copies the implement .xml file to that folder.

To export an implement:

1.  Press **Menu > Implement Profiles > Export Implements** to display the Export Implements panel. The number at the lower right of each implement indicates the number of booms for that implement.

2.  Use the up/down arrows to scroll through the list of implements (if necessary) then select the implements you want to export; to export all implements press **Select All**.

    *Note: If an implement of the same name you are exporting already exists on the USB drive, REBEL prompts you to confirm/cancel exporting that implement. Confirming the export will overwrite the implement on the USB drive.*

3.  Press **Export**. An export progress message appears briefly followed by an export complete message. Press **Ok** to close the message.

4.  Close or hide the panel.

# Importing an Implement

You must have a USB drive inserted in one of the USB ports on the terminal to import an implement; otherwise, the functionality is disabled (the Import Implements button on the Implements panel is disabled). The USB drive must contain an 'implements' folder at the root level of the drive and all implement files must be in this folder. For example, if your USB drive is drive M on your PC, your implement files should be in the following folder: M:\implements

To import an implement:

1.  Press **Menu > Implement Profiles > Import Implements** to display the Import Implements panel.

2.  Use the up/down arrows to scroll through the list of implements (if necessary) then select the implements you want to import; to import all implements press **Select All**.

    *Note: If an implement of the same name you are importing already exists on the terminal, REBEL prompts you to confirm/cancel importing that implement. Confirming the import will overwrite the implement on the terminal.*

3.  Press **Import**. An import progress message appears briefly followed by an import complete message. Press **Ok** to close the message.

4.  Close or hide the panel.

# Deleting an Implement

*Caution:* *Once you delete an implement it is permanently removed from memory; you cannot retrieve a deleted implement.*

You cannot delete the current implement—thus, all implements except the current implement appear in the Delete Implements list. For example, the Implement List panel below left shows four implements (current implement, i1, has a check mark). The Delete Implements panel below right shows three implements—all but the current implement.

*All implements*          *Implements you can delete*

To delete an implement:

1.  Press **Menu > Implement Profiles > Delete Implements** to display the Delete Implements panel (see above right). The number at the lower right of each implement indicates the number of booms for that implement.

2.  Select the implements you want to export using any of the following methods:

    *   Use the up/down arrows to scroll through the list of implements (if necessary) then select the implements you want to delete.

    *   Press the search box (above the list), type text that is part of implement name, then press **Done**. REBEL filters the list of implements and displays only those implements containing the search text. Then select the implements you want to delete.

    *   Press **Select All** if you want to delete all implements.

3.  Press **Delete** then press **Yes** in the confirmation message (see below). The implements are deleted, and you are returned to the Implements panel.

4.  Close or hide the panel.

# Chapter 4: Working with Jobs

You can work with jobs in two ways:

- Using the Start Up Menu after powering on REBEL (refer to your Outback REBEL Quick Start Guide)—the Start Up Menu enables you to start a new job, continue a job (the job that was active when the terminal was last powered off), or skip loading a job (perform non-job functions).
- Using the Jobs panel (Menu > Jobs)—use the links below in conjunction with the Jobs panel to work with jobs.

To create a job:

- "Job Basics and Before Creating a Job" on page 120
- "Creating a Job" on page 121

To work with job templates:

- "Creating a Job Template" on page 129
- "Creating a Job from a Job Template" on page 130

To work with existing jobs:

- "Loading a Job" on page 122
- "Closing a Job" on page 123
- "Exporting a Job" on page 123
- "Importing a Job" on page 124
- "Renaming a Job" on page 125
- "Deleting Jobs and Associated Items" on page 126
- "Creating a Job Summary Report" on page 127

# Job Basics and Before Creating a Job

## What is a Job?

A job is a field operation you perform, such as spraying, tilling, or harvesting and is required for guidance and autosteering. You can work with jobs in two ways: using the Start Up Menu after powering on REBEL or using the Jobs button on the Menu Options panel. You can create job templates from existing jobs and use these templates to create similar new jobs.

## Job Numbering

When you start a new job REBEL automatically assigns it a job number. The job number is based on the current date and the order of the job number. For example, REBEL names the first job you start on April 2, 2013 as 13040201, where:

- 13 = year (2013)
- 04 = month (April, fourth month)
- 02 = day
- 01 = first new job on this date

If you start more than one new job on this date, REBEL uses the same year, month, and day and orders the last two digits. For example, if you start three new jobs on April 2, 2013, REBEL auto numbers them as follows:

- 13040201
- 13040202
- 13040203

*Note: When you export jobs to a USB drive (see "Exporting a Job" on page 123 for more information) and then view the job files on your PC, the job files have a .Log file extension—this extension is hidden when you work with job files in REBEL.*

## Before You Start a Job

See the following sections before starting a job:

- "Real-Time Status Tab" on page 10 to verify you have a GPS signal satellite

- "Adding a Vehicle" on page 66 to add a vehicle because you must have at least one vehicle in REBEL

- "Adding an AC110 Implement" on page 93 to add an implement because you must have at least one implement in REBEL

# Creating a Job

When you create a job REBEL automatically closes the active job. See "Job Basics and Before Creating a Job" on page 120 for information on what you need to do before starting a job and how REBEL automatically creates a job number when you start a job.

To start a job:

1.  Press **Menu > Jobs > New Job** to display the New Job panel. Client, Farm, Field, and Crop display 'Default' unless you enter/select new values. Values you enter for Temperature, Humidity, Wind Speed, and Wind Direction are for reference only; these values are not used anywhere else in REBEL.

2.  F*or Client, Farm, Field, and Crop:* Press a button to display a Select panel, then do either of the following:

    *   Select an existing option. The Select panel closes and the new value appears on the button on the New Job panel.

    *   Create a new one by pressing **New** (green button at the bottom of the Select panel), entering a value in the alphanumeric keypad, then pressing **Done**. The Select panel closes and the new value appears on the button on the New Job panel.

3.  *For Temperature, Humidity, or Wind Speed:* Press the button to display a numeric keypad, enter a value, then press **Done**.

4.  *For Wind Direction:* Press **Wind Direction**, press the appropriate direction buttons (see below) to enter the correct direction, then press **Done**.

5.  Press **Begin** then close or hide the panel.

# Loading a Job

Loading a job closes the previously open job and information associated with the job (such as swath lines, marks, and sprayed areas) appears on the map. There are two ways to load a job:

- Select from a list of previous jobs (Option #1 below)
- Continue (load) the most recently closed job to quickly continue that job without searching the list of previous jobs (Option #2 below)

When a job is loaded the top button on the Jobs panel is Current Job (below left). When no jobs are loaded and you have previously created a job, the top button on the Jobs panel is Continue Job (below right).



**Option #1 - Loading a Previous Job**

1. Press **Menu > Jobs > Previous Jobs**. The Previous Jobs panel appears (at right) displaying all previous jobs.

2. *(Optional)* To filter the list by Client, Farm, and/or Field to narrow the list of jobs displayed, press Client, Farm, or Field to display a panel, use the up/down arrows to scroll through the list (if necessary), then select an option (returns you to the Previous Jobs panel).

3. Use the up/down arrows to scroll through the list of jobs (if necessary), then select the job you want to load.

**Option #2 - Continuing the Most Recently Closed Job**

- Press **Menu > Jobs > Continue Job**.

# Closing a Job

In addition to closing a job manually (described here), the active job is closed automatically when you create a new job or when you load a job.

To close a job manually:

1. Press **Menu > Jobs > Close Job**. The job closes.

2. Close or hide the panel.

# Exporting a Job

You can export closed jobs and job templates; you cannot export an open job. You must have a USB drive plugged into the terminal to export a job; otherwise, the functionality is disabled (the Export Jobs button on the Import / Export panel is disabled). When you export a job, REBEL creates an 'S3Jobs' folder on the USB drive and copies the text file (.Log for job logs) and/or template (.tem for job templates). For example, if you export job number 12041101 to a USB drive, it appears as *12041101.Log*

To export a job:

1. Insert a USB drive into the REBEL terminal then press **Menu > Jobs > Import / Export > Export Jobs** to display the Export Jobs panel. This list displays only closed jobs.

2. Use the up/down arrows to scroll through the list of jobs (if necessary) then select the jobs you want to export; to export all jobs press **Select All**.

   *Note: If the USB drive contains a job of the same name you are exporting, REBEL prompts you to confirm/cancel exporting that job. Confirming the export overwrites the job on the USB drive.*

3. Press **Export**. The panel closes, an export progress message appears briefly, then an export complete message appears. Press **Ok**.

4. Close or hide the panel.
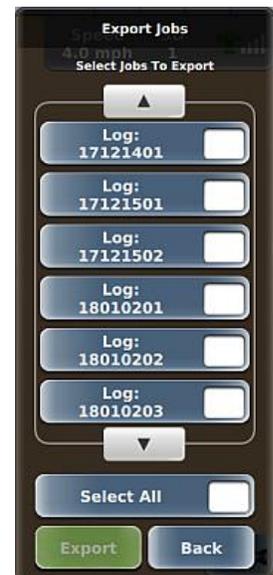
# Importing a Job

You must have a USB drive plugged into the terminal to import a job; otherwise, the functionality is disabled (the Import Jobs button on the Import / Export panel is disabled). The USB drive must contain an 'S3Jobs' folder at the root level of the drive and all job files must be in this folder. For example, if your USB drive is drive M on your PC then your job files should be in *M:\S3Jobs*

To import a job:

1.  Press **Menu > Jobs > Import / Export > Import Jobs** to display the Import Jobs panel.

2.  Use the up/down arrows to scroll through the list of jobs (if necessary) then select the jobs you want to import; to import all jobs press **Select All.**

    *Note: If the USB drive contains a job of the same name you are importing, REBEL prompts you to confirm/cancel importing that job. Confirming the import overwrites the job on the terminal hard drive.*

3.  Press **Import**, then press **Ok** to close the import complete message.

4.  Close or hide the panel.

# Renaming a Job

You can rename any job that is not the active job. To rename the active job you must first close it.

To rename a job:

1. Press **Menu > Jobs > Rename Jobs** to display the Rename Jobs panel (top of panel at right).

   - If a job is open, the Last Job button is disabled (as shown at right) because you cannot rename the active job.
   - If no jobs are open, the Last Job button is enabled.

2. *Rename the last job:* Press **Last Job**, enter a value in the keypad, then press **Done**. The keypad closes and new job name appears on the Last Job button.

   or

   *Rename a previous job:* Press **Select Other Job** to display the Rename Previous Job panel (shown at right), use the up/down arrows to scroll through the list of jobs (if necessary), then select the (Log button) job you want to rename. Enter the new job name then press **Done**. The new job name appears on the Log button.

3. Close or hide the panel.

# Deleting Jobs and Associated Items

*Caution:* *Deleting a job or associated item permanently removes the job or item—you cannot retrieve a deleted job or item.*

You can delete any closed jobs; thus, you cannot delete the active job. You can delete items associated with jobs—clients, farms, fields, and crops—but you must first delete all jobs associated with these items.

To delete a job or an item associated with a job:

1. Press **Menu > Jobs > Delete Items** to display the Delete Items panel (near right).

2. Press the button for the item you want to delete. The Delete panel for that item type appears. For example, press Delete Jobs to display the Delete Jobs panel (far right).

3. Use the up/down arrows to scroll through the list then select the items you want to delete; to delete all items press **Select All**.

4. Press **Delete**, then press **Yes** to confirm the deletion.

5. Close or hide the panel.
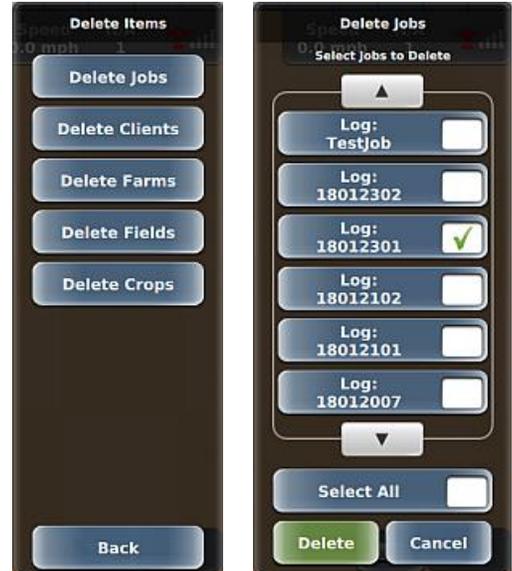
# Creating a Job Summary Report

A job summary report is a PDF file that displays job-related data (top of report) and a map of the sprayed area with any points or marks (bottom of report). You can create a job summary report only for the active job. Job summary reports are saved only to a USB drive, so you must insert a USB drive in the terminal to enable this functionality.

To create a job summary report:

1. Verify you have the correct job loaded and a USB drive inserted into the terminal.

2. Press **Menu > Jobs > Import/Export > Create Current Job Summary PDF**. The map portion of the report appears briefly in full screen then a message briefly appears stating the report was exported.

The figure below shows a sample job summary report. The table below the figure indicates the source of the data at the top of the report—whether the data is directly from fields on the screen or recorded/calculated values (*indicates recorded or calculated values).

| Field | Data Source (and description if recorded/calculated value) |
|---|---|
| Farm ID | Setup (Job) screen: Farm ID field |
| Vehicle ID | Main (Vehicle) screen: Vehicle Name field |
| Implement ID | Main (Implement) screen: Implement Name field |
| Operation | Notes (Job) screen: Operation field |
| Crop | Notes (Job) screen: Crop field |
| Field ID | Notes (Job) screen: Field ID field |
| *Start Time | Date you started the job |
| *Completion Date | Date you last performed any of the following:<br>• Set an A or B point<br>• Set a mark<br>• Applied product (green swath on map) |
| *Field Bound Area | Area within all defined perimeters/boundaries |
| *Applied Area | Field area on which you have applied product (this value is displayed on the Map screen button)—indicated by green swath area on the map |
| *Total Applied | Total volume of product deposited on field |
| *Average Rate | Average application rate (calculated by dividing the Total Applied by the Applied Area) |
| Operator ID | Notes (Job) screen: Operator ID field |
| Wind Speed | Notes (Job) screen: Wind speed field |
| Wind Direction | Notes (Job) screen: Wind direction field |
| Temperature | Notes (Job) screen: Temperature field |
| Humidity | Notes (Job) screen: Humidity field |

# Creating a Job Template

You can create a job template from any closed job; thus, you cannot create a job template from the active job. Additionally, creating a job template does not close the active job nor does it create a job if you have no job active.

To create a job template:

1. Press **Menu > Jobs > Templates > Create Template** to display the Create Template panel.

2. *(Optional)* Filter the list by Client, Farm, and/or Field: Press a button (Client, Farm, Field) to display a Select panel, use the up/down arrows to scroll through the list (if necessary), then select an option. Repeat as needed for the other buttons.

3. On the Create Template panel, use the up/down arrows to scroll the jobs list (if necessary), then select the job you want to use as a template. The panels close and the template is created from the selected job.

# Creating a Job from a Job Template

Using a template starts a new job based on the job template you select. REBEL supports two types of job templates:

- Templates you create from an existing job—see below for instructions on creating a job from this type of template.
- Preplanned templates—these are templates created specifically for your field (usually by a third-party) that you then import into REBEL. A preplanned template uses the data from your field and when loaded, displays all the guidelines for you (see "Preplanned Guidance" on page 171).

To create a job from a job template (not Preplanned):

1. Press **Menu > Jobs > Templates > Use Template** to display the Use Template panel.
2. *(Optional)* Filter the list by Client, Farm, and/or Field: Press a button (Client, Farm, Field) to display a Select panel, use the up/down arrows to scroll through the list (if necessary), then select an option. Repeat as needed for the other buttons.
3. On the Use Template panel, use the up/down arrows to scroll through the list of templates (if necessary), then select the template you want to use for the job. The panels close and a new job is started based on the selected template.

# Chapter 5: Map Options and Settings

## Map Options and Settings Overview

REBEL includes options and settings that enable you to set up and customize your map.

You set mapping options using the Mapping Options panel below (see "Mapping Options" on page 132).

You configure map settings using the Map Settings panel below (see "Map Settings" on page 142).

# Mapping Options

Mapping options refer to how you display your vehicle and field, markers (flags) you can set on your field, applied maps, and return-to-point guidance.

Use the Mapping Options panel (press [    ] ) and the links below to work with mapping options.

- "Map Views, Perspectives, and Positions" on page 133

- "Map Layers - Rx Maps and Applied Color Maps" on page 136

- "Using Event Markers" on page 138

- "Returning to a Point" on page 141

# Map Views, Perspectives, and Positions

Map views, map perspectives, and vehicle positions work together to provide you with different ways to view your vehicle and field. There are two map views (Vehicle and Field), two map perspectives (Top Down and 3D), and three vehicle positions (Low, Middle, and High). The map view determines whether the vehicle appears stationary and the map moves or vice versa. The map perspective refers to the angle at which you view the map. The vehicle position refers to vertical position of the vehicle on the touchscreen. The table below provides more information on map views, perspectives, and vehicle positions.

| Field | | Description |
|---|---|---|
| Map View | Vehicle | Use Vehicle view to "follow" the vehicle while work is in progress. In this view the map moves while the vehicle appears stationary on the screen. The vehicle is always pointing 'up' toward the top of the screen and the field adjusts. |
| | Field | In this view, the vehicle appears to move while the map appears stationary on the screen. You can pan to a specific area on the map by touching the screen and dragging the area into view. The field is oriented with North at the top of the screen and the vehicle points in its actual direction. For example, if the vehicle is driving southwest then it will point toward the bottom left of the screen. |
| Perspective | Top Down | Provides a bird's eye view of the job |
| | 3D | Provides a three-dimensional view down the field in the direction of travel |
| Vehicle Position | Low | Vehicle appears near bottom of screen |
| | Middle | Vehicle appears in middle of screen |
| | High | Vehicle appears near top of screen |

When first using REBEL select different view/perspective combinations to become more familiar with how they appear on the screen. You should also review the following combinations:

- Correct: Vehicle: Top Down
- Correct: Vehicle:3D
- Correct: Field: Top Down
- Incorrect: Field:3D (If you are in Field: Top Down and you select 3D the Map View automatically changes to Vehicle. Also, if you are in Vehicle:3D and you select Field the Perspective automatically changes to Top Down).

Both Map Views display the vehicle's position on the field and direction of travel. The Zoom + and Zoom - buttons are available in both views as well.

*See "Zooming In and Out on the Map" on page 15 for more information on zooming in and out on the screen.*

The following examples illustrate different map/perspective combinations:



Map View: Vehicle
Perspective: Top Down



Map View: Vehicle
Perspective: 3D



Map View: Field
Perspective: Top Down

The screens below show the different vehicle positions (low, middle, and high):

Low                              Middle                              High
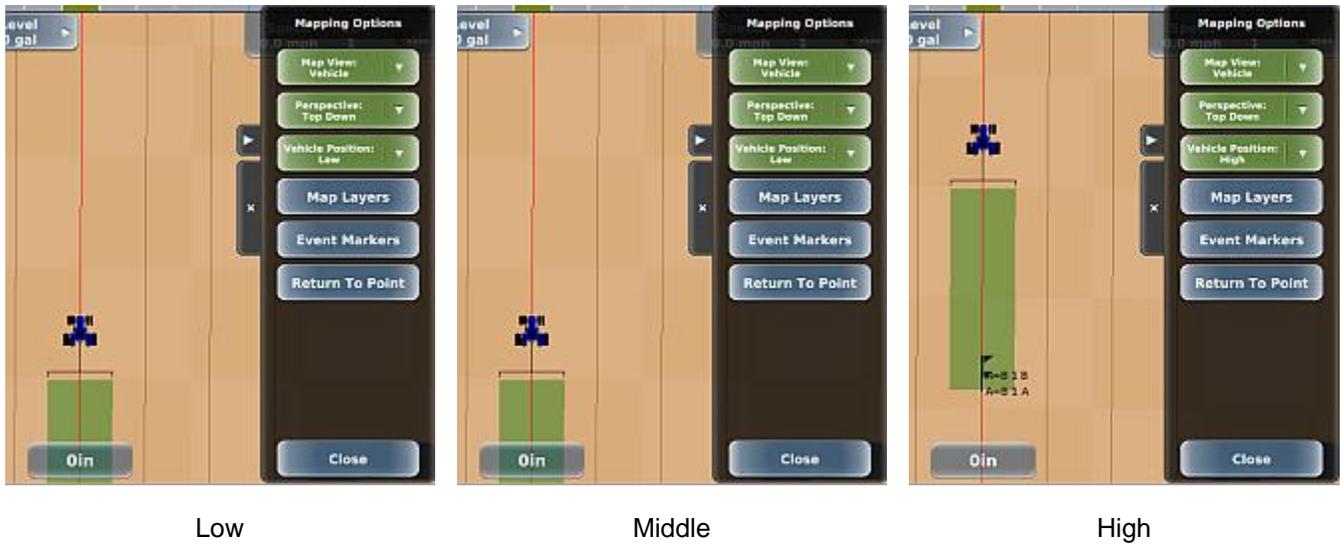
To set the map view, map perspective, and vehicle position:



1. Press [icon] to display the Mapping Options panel (at right).
2. For each option press the appropriate green button then select an option.
3. Close or hide the panel.

# Map Layers - Rx Maps and Applied Color Maps

*Note: The Map Layers button on the Mapping Options panel is visible only if you have optional rate and section control installed and connected to REBEL and configured for the current implement.*

A map layer refers to a specific feature you can display on the map—prescription maps and applied areas.

- A prescription map (Rx map) is a map of a particular land area divided into sections of different application rates. You use prescription maps in conjunction with rate control functionality to automatically spray different areas of your field at different flow rates. See "Loading or Deleting Prescription (Rx) Maps" on page 189 for more information.

- An as-applied area is the area to which you apply product (such as when spraying or seeding).

Use the Map Layers panel (![icon] > Map Layers) to:

- Show/hide the loaded prescription map.

- Show/hide as-applied areas.

- Adjust the opacity (transparency) of the loaded prescription map. In the examples below, setting opacity to its highest level (10) causes the prescription map to completely obscure the default REBEL map, while setting opacity to its lowest level (0) hides the Rx map.
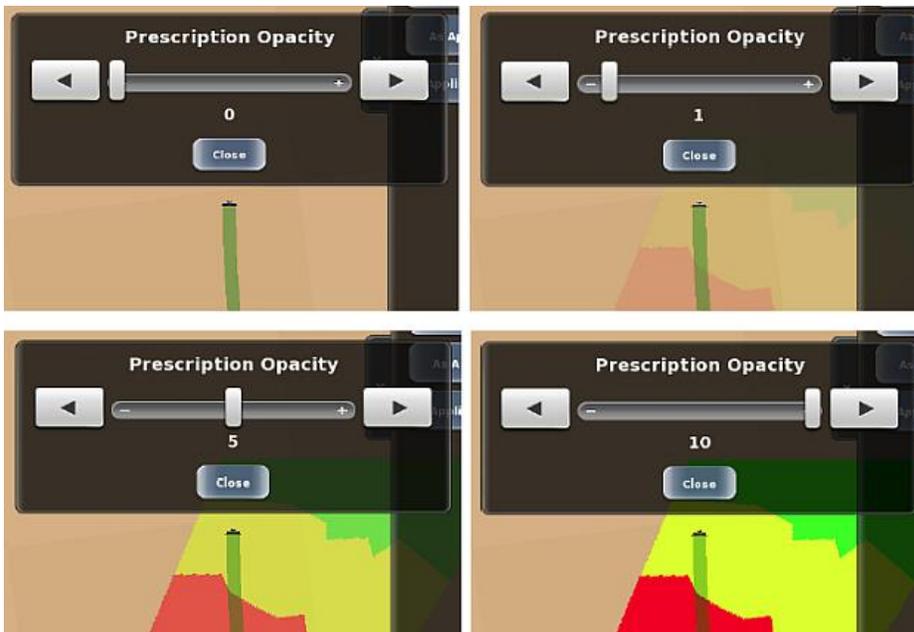


- Set the color range of as-applied areas to set the colors of varying coverage rates (different rates appear as different colors on the map)—see examples above (yellow, green, and red color-coded rates).

The table below describes how to use the buttons on the Map Layers panel.

| Button | Description |
| --- | --- |
| Prescription | *Note: This button is enabled only if a prescription map is loaded.*<br><br>Toggles between show (check mark) or hide (no check mark) the currently loaded prescription map. |
| Prescription Opacity | *Note: This button is enabled only if a prescription map is loaded.*<br><br>Transparency of the prescription map on the screen (higher value is less transparent, lower value is more transparent)<br><br>Press the button to display a slider (below). Drag the slider or press the left or right arrows to set the opacity level then press **Close**. The selected setting appears on the Opacity button. The available range is 0 (low) to 10 (high).<br><br> |
| As Applied | Toggles between show (check mark) or hide (no check mark) as-applied coverage on the map. |
| Applied Color Map | Display the Applied Color Map panel where you set applied color map options.<br><br>The rates and colors you set here are illustrated in the Applied Color Legend section of the Product Rate panel (see below). The low rate (green) is at the left of the color bar and the high rate (red) is at the right.<br><br><br><br>To set the values/colors for High Rate and Low Rate:<br><br>• Rate values - Press the left side of the corresponding button, enter a value in the keypad, then press **Done**.<br><br>• Rate colors - Press the right side of the corresponding button (the small color box), then press a color. The color changes on the button. |
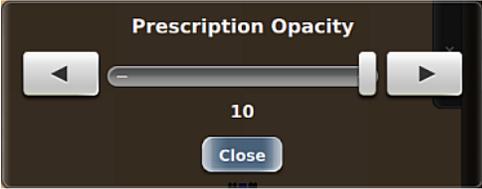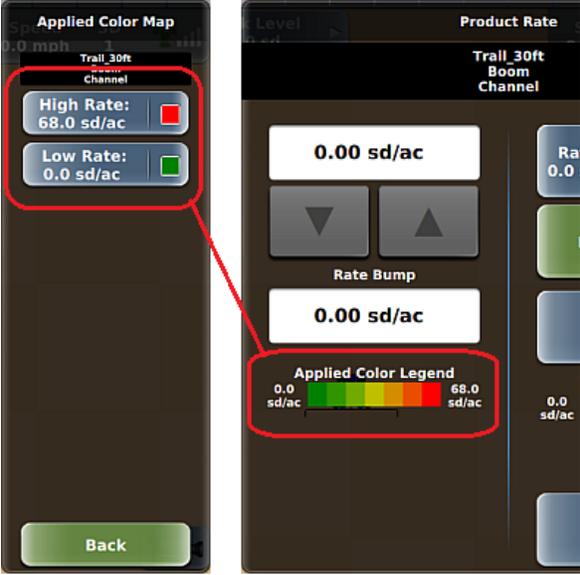
# Using Event Markers

An event marker refers to any item you want to mark in a field, such as a pole, a rock, a tree or any other obstacle. Markers appear as flags on the screen with the following identifiers:

- Color - by default each event marker type is a different color, such as green for a tree or blue for water
- Label - accompanying text that identifies the marker type, such as 'rock' or 'ditch'

The example below shows a tree marker.
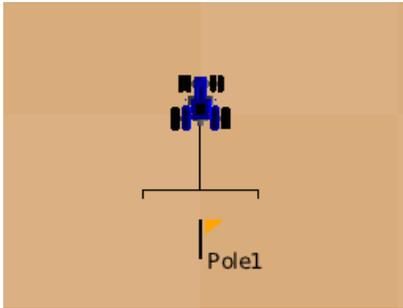


Using the Event Markers panel (> Event Markers), you can drop a marker, edit a preset marker, and delete a dropped marker. You must have an active job to drop or delete a marker (otherwise, the Drop Preset Markers and Delete Marker buttons are disabled); however, you can edit a preset marker with or without an active job. REBEL includes preset markers for the following obstacles: Tree, Rock, Pole, Water, Ditch, and Obstacle.

The table below describes how to use the buttons on the Event Markers panel.

| Button | Description |
|--------|-------------|
| Edit Preset Markers | You can change both the label (text) and color of a preset marker. For example, if you rarely use the Ditch (gray) marker but have a need for a Fence marker, you can change the Ditch marker text to 'Fence.' Editing a preset marker does not affect any previously dropped markers.<br><br>To edit a preset marker:<br><br>1. Press [icon] > **Event Markers > Edit Preset Markers** to display the Edit Preset Markers panel.<br><br>2. To change the marker text, press the left side of the button, enter a new value, then press **Done**.<br><br>3. To change the marker color, press the right side of the button (color box), then press a color.<br><br>4. Press **Save**, then close or hide the panel. |
| Drop Preset Markers | Dropping a marker refers to placing a marker in your current location. You must have an active job to drop a marker.<br><br>To drop a marker:<br><br>1. Press [icon] > **Event Markers > Drop Preset Markers** to display the Drop Preset Markers panel.<br><br>2. Press a marker. The marker appears as a flag on the map with an incremented text label and color of the marker. For example, if you drop a Pole marker (gold color) and this is the first marker you dropped then a gold 'Pole1' marker appears on the map at that point. If you then drop another Pole marker that marker is named 'Pole2' (also gold).<br><br>3. Repeat step 2 as necessary as you are driving, then close or hide the panel. |

| Button | Description |
|---|---|
| Delete Marker | *Caution: Once you delete a marker from a job it is permanently removed from that job; you cannot retrieve a deleted marker.*<br><br>You can delete an individual marker (such as Pole2) from the active job. Deleting a marker does not change the numbering of other, higher-numbered markers and new markers will continue to increment from the last (highest) number used.<br><br>To delete a marker:<br><br>1. Press  **> Event Markers > Delete Marker** to display the Delete Marker panel that shows all dropped markers for the active job.<br><br>2. Press the up/down arrows to scroll through the list of markers (if necessary) then select the marker you want to delete. The marker is removed from the map and the Delete Marker panel.<br><br>3. Repeat step 2 as necessary then close or hide the panel. |

# Returning to a Point

REBEL can provide guidance to an existing point in the active job—such as the Last Apply point, any A or B point, or any dropped marker in your field. Keep in mind that REBEL does not automatically steer you to this point—you only receive guidance (distance and bearing) to the point and you must manually steer to the point.

To return to a point:

1. With your preferred job active, press  **> Return To Point**. The Return To Point panel appears (shown at right) showing available points to return to for the active job.

2. Use the up/down arrows to scroll through the list of return points (if necessary) then select your preferred point.

   The panels close and a Return To Point window appears showing the distance and bearing to the point (below top). As you get closer to the return point the distance and bearing reflect this (below bottom).
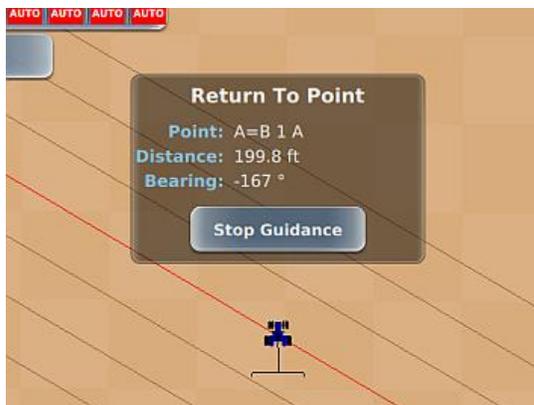




3. When you no longer need guidance to the point press **Stop Guidance**.

# Map Settings

Use the Map Settings panel (Menu > Settings > Map Settings) to:

- Show A=B lines (parallel lines or grid pattern) or hide A=B lines
- Set grid spacing (for when A=B Lines is set to show a grid pattern)
- Edit preset markers (same result as using the Mapping Options panel)

See the following sections for information on setting these options:

- "Straight Paths Options" on page 150

- "Using Event Markers" on page 138

# Chapter 6: Boundaries

This section provides an overview of boundaries. See "Setting a Boundary" on page 145 and "Managing Boundaries" on page 146 for information on setting and managing boundaries.

Typically, you complete the first operational pass to set and record the boundary of the field. REBEL enables you to create boundaries to record field perimeters and save them for future operations—allowing boundary information to remain consistent from job to job, season after season. You can include multiple boundaries in a single field. When a field is divided into multiple areas (each defined by a boundary), REBEL adds the areas defined by the boundaries to calculate the total task area. A boundary that adds to the total area is called an 'include' boundary. Conversely, you can create an 'exclude' boundary to have REBEL deduct that area from the total area calculation. For example, you may want to create an exclude boundary around a body of water in your field.

Additionally, you can pause and then resume a boundary—for example, if you run out of spray while creating the boundary you can go back, refill your tank, then come back and resume the boundary at the point where you paused it. You do not have to return to the exact point you pressed Pause because REBEL continues the boundary at the point you press Resume—if you are not at the exact Pause location when you press Resume, REBEL fills in the boundary line by connecting the Pause point and the Resume point.

The figure below shows a small exclude boundary (red border) within a larger include boundary (blue border).



Use the Field Boundary panel (Menu > Boundaries) as the starting point for working with boundaries. Referring to the figure on the next page, you can:

- Start, pause/resume, and finish boundaries. When you press:
    - Start Boundary: REBEL starts the boundary, the top right three buttons on the panel are disabled, and the Pause Boundary button appears above the Finish Boundary button.
    - Pause Boundary: REBEL pauses the boundary (stops calculating the boundary area) and the Resume Boundary button replaces the Pause Boundary button.
    - Resume Boundary: REBEL resumes calculating the boundary area and the Pause Boundary button replaces the Resume Boundary button.
    - Finish Boundary: REBEL completes the boundary, the top right three buttons are enabled, the Boundary List button appears, and the Boundary Area field displays the area of the completed boundary.
- Specify where the boundary is marked relative to the implement (middle button). Press the button repeatedly to cycle through the three options:
    - Left, boundary calculations start from left edge of the swath
    - Center, boundary calculations start from center of the swath
    - Right, boundary calculations start from right edge of the swath
- Specify whether the boundary should be part of the total area calculation ('include' boundary) or deducted from the calculation ('exclude' boundary).

# Setting a Boundary

*Note: You must have an active job to set a boundary.*

To set a boundary:

1. Drive to the starting position of the field.

2. Press **Menu > Boundaries** to display the Field Boundary panel.

3. Press the top green button (showing Center at right) then select Left, Center, or Right to determine if the calculations should start from the left edge, center, or right edge of the swath width.

4. Press the bottom green button (showing Include at right) then select:

   - Include to get the total area calculation
   - Exclude to subtract the defined area from the total area calculation

5. Press **Start Boundary**. REBEL starts the boundary, the top three buttons on the panel are disabled, and the Pause Boundary button appears above the Finish Boundary button.

6. Drive around the outside of the field as accurately as possible. A solid black line indicates a boundary in progress. The example below left shows a Right Include boundary in progress. You can perform actual work while creating the boundary (Apply On) or drive around the field with Apply Off. The boundary is created from the edge or center of the current Implement swath, regardless of whether Apply is On or Off.

   You should close the perimeter as close to the starting point as possible. The boundary automatically closes anytime the vehicle is within a swath width of the boundary's starting point. However, to manually close the boundary at any time press **Finish Boundary**. A finished boundary is indicated by a solid blue line (Include boundary) or a solid red line (Exclude boundary). The example below shows a finished Right Include boundary.
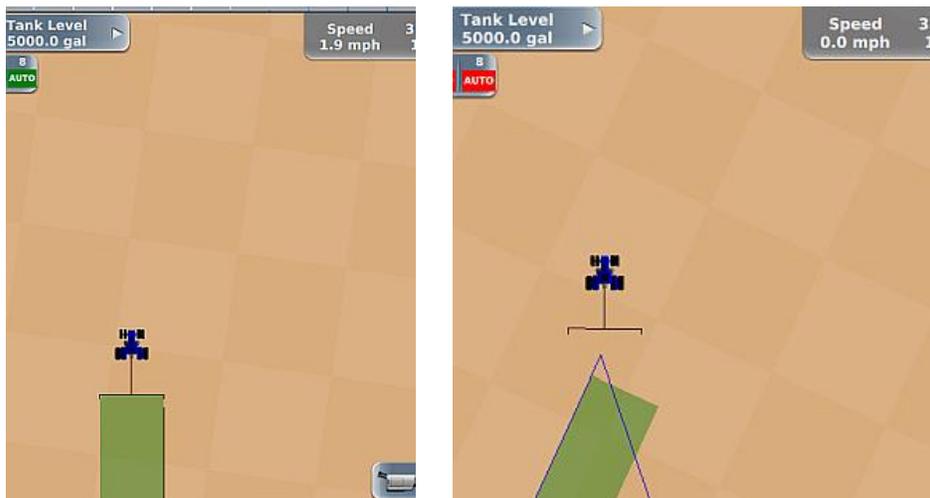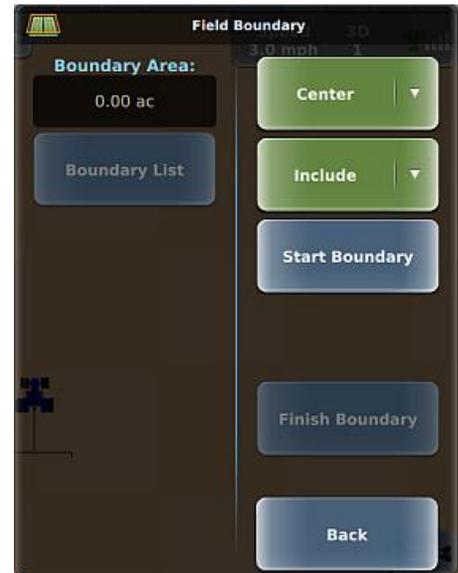
# Managing Boundaries

When you create multiple boundaries for a job, you can select only those boundaries that apply to your current work. For example, if you created two boundaries (one 'include' and one 'exclude') and you only want to work with the 'include' boundary, you can deselect the 'exclude' boundary and remove it from the map.

To manage boundaries in a job:

1.  In the active job (with boundaries), press **Menu > Boundaries > Boundary List**. The Boundary List panel appears (top of panel shown below).

2.  By default, all boundaries are selected—each boundary button on the panel has a green check mark (below left). For each boundary you do not want to appear on the map press the button to remove the check mark and immediately remove the boundary from the map (below right). Only the 'checked' boundaries appear on the map.

3.  Press **Select**. The Boundary List panel closes, and the Boundary Area field is updated. For example, if you removed an 'exclude' boundary, the boundary area increases.

| *Two boundaries selected and both appear on map, area calculation reflects subtraction of interior (red exclude) boundary* | *One boundary selected and it appears on the map, area calculation reflects just that boundary* |
|---|---|
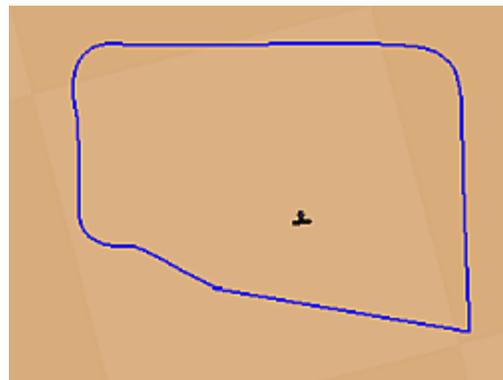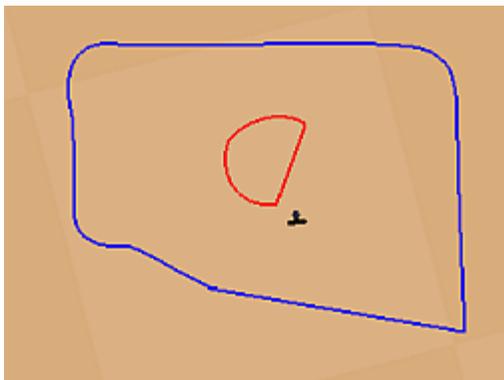
# Chapter 7: Path Planning

You cannot create any new guidance lines or recall previous guidance lines while engaged on a guideline. You must disengage steering before setting any new or previous guidance lines. You cannot automatically engage any guideline. If you are already on a guideline, you can manually disengage the guideline by pressing the engage button, or you can steer off of the guideline, at which point the automatic steering disengages. You then must manually press the engage button to reengage the steering on a guideline.

To perform path planning functions, press [image] on the map or press Menu > Path Planning to display the Path Planning panel. REBEL supports various guidance modes and you can switch to any guidance mode at any time as long as you are not engaged on a guideline. The guidance mode buttons are disabled while engaged on a guideline.

*Note: You must have an active job to display the Path Planning panel; otherwise, the Path Planning button (on the map and on the Menu Options panel) is disabled.*

The links below provide information on path planning, such as setting up your initial pass lines, driving along contours, and using eTurns to make automated turns.

Basic path procedures:

- "Setting Paths Overview" on page 148
- "Reusing a Path" on page 159
- "Adjusting Paths" on page 160

Other path options:

- "Contour Lock" on page 170
- "Shuttle Shift and Re-engaging on a Line" on page 172
- "Preplanned Guidance" on page 171
- "eTurns" on page 173

# Setting Paths Overview

*Note: You must have an active job before using path planning; otherwise, the Path Planning button* ![ ] *is disabled.*

A path in REBEL is a line you follow while driving your vehicle. REBEL supports the following types of paths (described below and available from the Path Planning panel shown at right):

- Straight path (see "Straight Paths" on page 149)

- *A=B path* - an imaginary line that passes through two points that you set (Point A and Point B) to define the first pass

  *A + Direction path* - where you define a beginning point (Point A) and enter a heading angle (the direction)

- Pivot (circular) path (see "Setting a Pivot Path" on page 154)

- Contour (freeform) path (see "Setting and Following Contour Paths" on page 157)

- AB Contour path (see "Setting an AB Contour Path" on page 155)

# Straight Paths

## *Straight Paths Overview*

With REBEL, you create straight paths that you can reuse when needed. To first work with a straight path:

1. Create straight path (A=B path or A + Direction path). REBEL starts straight guidance.

2. Engage automated steering. REBEL automatically steers you along your guideline.

3. Once an A=B path or A + Direction path is established REBEL provides adjacent swath lines, so all other passes are perfectly spaced on both sides of the first pass.

Use the following links to learn more about setting straight paths:

- "Straight Paths Options" on page 150

- "Setting an A=B Path" on page 152

- "Setting an A + Direction Path" on page 153

## *Straight Paths Options*

Before working with straight paths, verify the two straight path settings (A=B Lines and A=B Grid Spacing) available from the Map Settings panel (Menu > Settings > Map Settings). There are three A=B Lines display options available: On, Grid, and Off. Grid lines are parallel guidance lines that are perpendicular to the A=B line (and its parallel guidance lines)—thus forming a grid. When Grid is selected the distance between the grid lines is based on the value set in the A=B Grid Spacing field.



**A=B Lines = On**

Guidance lines are displayed parallel to and on both sides of A=B line



**A=B Lines = Grid**

Guidance lines are displayed parallel to and on both sides of A=B line and perpendicular grid lines are displayed with user-defined spacing
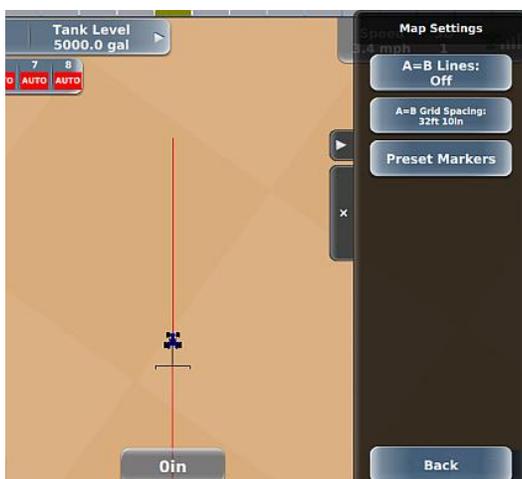


**A=B Lines = Off**

No guidance lines are displayed

The following table describes the buttons on the Map Settings panel.

| Button | Description |
| --- | --- |
| A=B Lines: On | Cycles through the three options: On, Off, Grid. |
| A=B Grid Spacing: 32ft 10In | Displays a data entry window, where you enter a value then press **Done**. <br><br> *Note: If you set your system to display U.S. units, the data entry window has two fields: one for feet and one for inches—press each field and enter a value. If you set your system to display metric units, there is only field for meters. See "Setting the Language, Units, and GMT Offset (Local Time)" on page 21 for information on setting units of measure.* |
| Preset Markers | Although unrelated to straight path options, see "Using Event Markers" on page 138 for information event markers. |

## *Setting an A=B Path*

When you set the first line of an A=B path:

- Both the A and B points are labeled on the map (at the implement position) as you set them.

- The line is named A=Bx, where x is a digit starting at 1. This name appears in the Current Path field on the Path Planning panel. The A and B points of use this naming convention as well; for example, for path A=B 1, the A and B points are A=B 1 A and A=B 1 B, respectively.

The first straight path (A=B or A+ Direction) you create in a job is A=B 1 and the 1 is incremented for each additional straight path you set for that same job. For example, for a job where you define only A=B paths, the number following the B is incremented as follows:

- First A=B path: A=B 1 A and A=B 1 B

- Second A=B path: A=B 2 A and A=B 2 B

- Third A=B path: A=B 3 A and A=B 3 B, and so forth

You can rename an A=B path—see "Renaming a Path" on page 168 for more information.

*Note: The last step of the procedure below describes using AutoEngage or eTurns to engage on subsequent guidelines of your A=B path. Review "Auto-Engage" on page 48 and "eTurns" on page 173 to familiarize yourself with the functionality that applies to your system.*

To set an A=B path:

1. Position the vehicle at the beginning of the first pass.

2. Press [icon] **> Straight > A=B**. The A=B panel appears (top of panel at right).

3. Start driving the first pass, wait until the implement on the map trails straight, then press **Point A**. 'A' appears on the map marking point A, the Point A button is disabled, and the Point B button is enabled.

4. At the end of the pass, press **Point B**. The panels close and A=B 1 A and A=B 1 B appear on the map marking the A and B points. In the example below, swath lines appear because A=B Lines is set to On.

   If all automated steering requirements are met, the engage button is as shown below (state of 'ready to engage'). The button must be in this state to engage autosteering.

5. Press the engage button to engage automated steering. REBEL steers your vehicle along the A=B line.

6. At the end of the current pass turn around and engage on the next guideline (use AutoEngage or eTurns if applicable).

## *Setting an A + Direction Path*

When you set the first line of an A + Direction path:

- The A point is labeled on the map (at the implement position) as you set it.

- The line is named A=Bx, where x is a digit starting at 1. The first straight path (A=B or A+ Direction) you create in a job is A=B 1, the second is A=B 2, and so forth. This name appears in the Current Path field on the Path Planning panel.

You can rename an A + Direction path— see "Renaming a Path" on page 168 for more information.

*Note: The last step of the procedure below describes using AutoEngage or eTurns to engage on subsequent guidelines of your A=B path. Review "Auto-Engage" on page 48 and "eTurns" on page 173 to familiarize yourself with the functionality that applies to your system.*

To set an A + Direction path:

1. Position the vehicle at the beginning of the first pass.

2. Press ![icon] **> Straight > A + Direction**. The A + Direction panel appears (top of panel shown at right).

3. Press **Point A**. 'A' appears on the map, the Point A button is disabled, and the Direction button is enabled.

4. Press **Direction**, then in the Enter Path Direction data entry window enter an angle and press **Done.** The panels close, and A=B 1 A and the A + Direction guideline appear on the map. In the example below, adjacent swath lines appear because A=B Lines is set to On.

   If all automated steering requirements are met, the engage button is as shown below (state of 'ready to engage'). The button must be in this state to engage autosteering.



5. Press the engage button to engage automated steering. REBEL steers your vehicle along the A + Direction line.

6. At the end of the current pass turn around and engage on the next guideline (use AutoEngage or eTurns if applicable).

# Setting a Pivot Path

*Note: You must have an active job before using path planning; otherwise, the Path Planning button* [image] *is disabled.*

Pivot guidance is similar to straight guidance except that you define the circumference of a circle rather than a straight line. To do so, drive as much of the circumference of a representative circle as possible. The more of the circumference you drive, the better the accuracy.

To set a pivot path:

1. Position the vehicle at the beginning of the first pass.

2. Press [image] **> Pivot**. The Pivot panel appears (see at right).

3. Press **Start Pivot** and begin driving the circle. 'Logging pivot data...' appears below the Start Pivot button (left figure below). When REBEL has collected enough data to calculate the circumference of the circle being driven 'Pivot OK' appears below the Start Pivot button and the Finish Pivot button is enabled (right figure below).



4. Press **Finish Pivot**. The panels close and the pivot path (with swath lines radiating outward) appears on the map.

   If all automated steering requirements are met, the engage button is as shown below (state of 'ready to engage'). The button must be in this state to engage autosteering.



5. Press the engage button to engage automated steering. REBEL steers your vehicle along the pivot guideline.

6. When you have finished one circle move to either the right or left of the original circle and steer your vehicle to the next guideline. When that guideline turns red, press the engage button to engage automated steering.

# Setting an AB Contour Path

*Note: You must have an active job before using path planning; otherwise, the Path Planning button* [image] *is disabled.*

AB contour path functionality enables you to create a reference guideline along a contour path—think of it as a curved A=B path. For example, if your field requires a curved path around an obstacle, you can create an AB contour where each swath line is parallel to the initial curved guideline. The figure below shows a zoomed-out view of a vehicle engaged on an AB contour path.



To set an AB contour path:

1. Position the vehicle at the beginning of the first pass.

2. Press [image] **> AB Contour > New AB Contour**. The New AB Contour panel appears (see at right).

3. Press **Start Contour** and begin driving. As shown below, the Start Contour button is disabled, your path is shown as a dotted line, and after driving a short distance the End Contour button is enabled.

4. Finish driving your path, then press **End Contour**. The panels close, your current guideline appears in red, and swath lines appear because A=B Lines is set to On.

If all automated steering requirements are met, the engage button is as shown below (state of 'ready to engage'). The button must be in this state to engage autosteering.
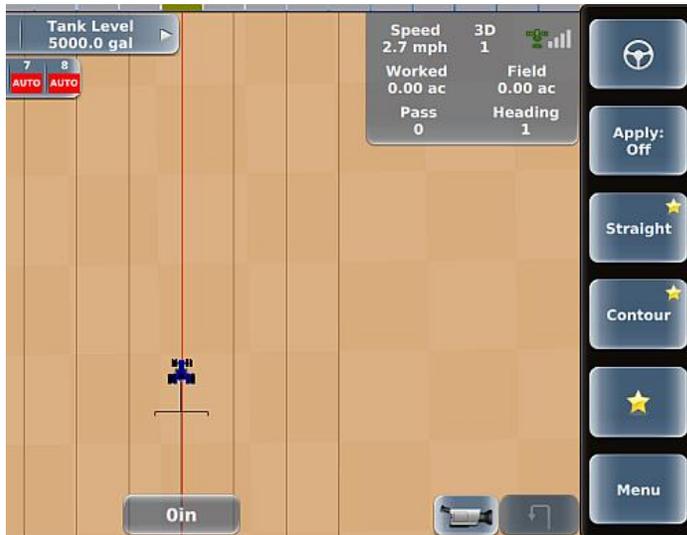


5. Press the engage button to engage automated steering. REBEL steers your vehicle along the AB contour line.

6. At the end of the current pass turn around and engage on the next guideline (use AutoEngage or eTurns if applicable).

# Setting and Following Contour Paths

Use Contour guidance to drive a freeform path or have REBEL provide guidance along any previously applied path, typically when working with borders, turn areas, and following the contours created by obstacles. To receive Contour guidance along an existing path, you must steer your vehicle within an implement's width of the guideline to enable automated steering.

Occasionally, a situation may arise in the middle of a job when you need to make a pass that follows a different path than the previous passes. Drive the new path; REBEL will recognize you are defining a new pass and subsequent passes are guided from this newly defined pass.

*Note: Unlike straight, pivot, and AB contour paths, no additional swath lines appear to the left or right of the guideline in Contour mode.*

To set a Contour path:

1. Position the vehicle at the beginning of the first pass.

2. Press [image] **> Contour**. The panels close and Contour guidance mode is enabled (the unlocked lock appears in the lower right).

3. Press **Apply** (set it to On) then make your initial pass.



*Note: To guide along subsequent adjacent passes, any time your vehicle is within a half swath width of a previously logged pass, you can engage automated steering. See the following steps for instructions.*

4. At the end of your pass press **Apply** (set it to Off) then turn around and drive toward the location of the adjacent left or right swath. As you get near the adjacent swath, a red line appears indicating the guideline to follow, and the lightbar and crosstrack error indicator both indicate the direction you need to turn to follow the guideline.
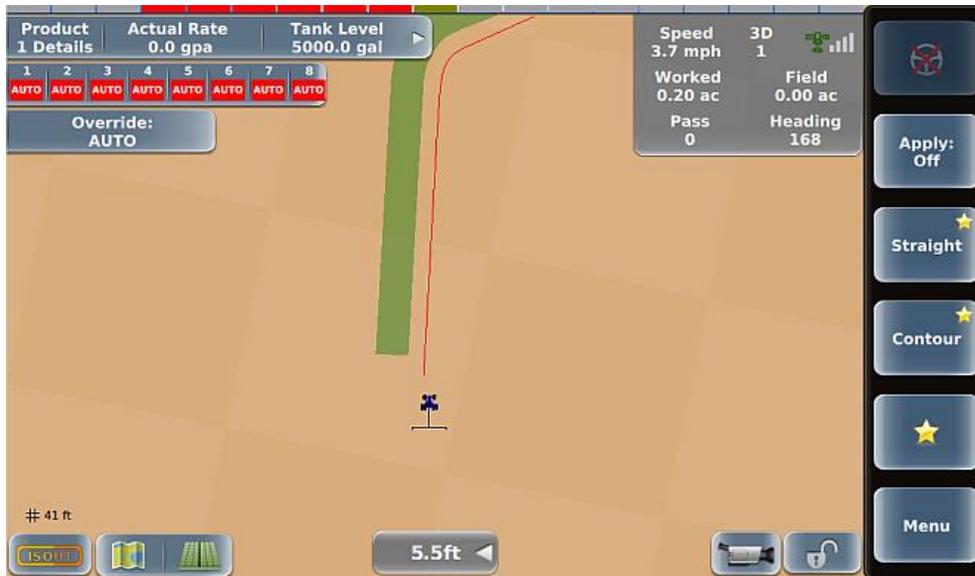
5.  As you get closer to the red contour line, autosteering is enabled.

6.  Press the engage button to engage automated steering and turn Apply on. REBEL steers your vehicle along the contour and lock button is green and locked.

7.  At the end of your pass press **Apply** (set it to Off) then turn around and drive toward the location of the adjacent left or right swath. During this time, the lock button is green and unlocked.

8.  Repeat steps 6 and 7 as needed.

To use Contour guidance to follow a previous applied path:

1.  Press [image] **> Contour**. The panels close and Contour guidance mode is enabled.

2.  Drive toward a previously applied path. When a red guideline appears indicating a guideline you can follow, press the engage button to engage automated steering. See steps 6 through 8 above.

# Reusing a Path

REBEL saves all straight, pivot, and AB contour paths you create per job and provides two ways to access them to use them for guidance:

- Previous Path feature: Enables you to select from a list of <u>all</u> straight (A=B or A + Direction), pivot, and AB Contour paths previously created for the active job.

- Last Path feature: Enables you to quickly select the <u>most recent</u> straight, pivot, or AB Contour path for the active job.

To use a previous path for guidance:

1. Press [icon] **> Previous Paths**. The Previous Paths panel appears and the button for the current path is green (see at right).

2. Use the up/down arrows to scroll through the list of paths (if necessary) then select your preferred path. The selected path is represented on the map and the path name appears in the Current Path field of the Path Planning panel.

3. Close or hide the panel.

To use the most recent path for guidance:

1. Press [icon], then press of the following sequences to access the most recent path:

   Straight > Last A=B
   Pivot > Last Pivot
   AB Contour > Last AB Contour

   The most recent path is represented on the map and the path name appears in the Current Path field of the Path Planning panel.

2. Close or hide the panel.

# Adjusting Paths

Use the Path Adjustment panel (           > Path Adjustment) and the links below to adjust straight (A=B or A + Direction), pivot, or AB Contour paths. While receiving guidance in these modes you can adjust the guideline on-the-go (without interrupting normal guidance operation). This feature is especially useful to correct for DGPS drift over time.

*Note: You cannot adjust a path while an eTurn is in progress.*

- **Path Offset**
  Move the guideline up to 1/2 implement width relative to the original guideline. See "Entering a Path Offset" on page 162.

- **Snap Here**
  Move (snap) the guideline to the vehicle's current location parallel to the original guideline. This feature is best used to insert a required gap between consecutive parallel swaths (for example, a conservation barrier strip). The amount of the snap from the original guideline is displayed in the Path Offset amount. For example, if you steer off the guideline by 3 ft 6 in and press Snap Here, the Path Offset displays 3 ft 6 in. Setting the Path Offset back to zero returns you to the original guideline. See "Snapping a Guideline to Your Current Location" on page 163.

- **Shift**
  Move the guideline left or right (up to 1/2 implement width relative to the previous shift) in small increments rather than re-establishing a new guideline. The sum of all shifts is displayed in the Path Offset amount. For example, three shifts of 2 ft to the right are displayed as a Path Offset of 6 ft to the right. Setting the Path Offset back to zero returns you to the original guideline. See "Shifting a Guideline" on page 164.

- **Update B**
  If you need to correct Point B in an A=B line, you can adjust the A=B line by pressing the Update B button on the initial pass. See "Updating Point B" on page 165.

- **Detour Contour**
  When driving along an AB contour you can create a detour path around the obstacle. You then decide whether to end your path after steering around the obstacle or merge into the original AB contour after driving around the obstacle—in both instances you have created a new AB contour that combines the original AB contour and the detour. See "Using Detour and Merged AB Contours" on page 166.

- **Rename Path**
  Rename a straight (A=B or A+ Direction) or AB Contour path. See "Renaming a Path" on page 168.

- **Save Path Offset**
  After applying a path offset (see first bullet above), use Save Path Offset to save the offset as a new path.

- Saving a Path Offset" on page 169.

*Note: The Path Adjustment panel is the only place where you can adjust the guidelines and maintain engaged steering. Any other guideline change requires disengaging the steering. All path adjustments are removed when you close a job and the original guidelines are restored when you continue the job.*

# Entering a Path Offset

While using a straight path (A=B or A + Direction) or pivot path, you can enter a path offset to move a guideline by any amount to the left or right. The offset must be within the allowable range (between zero and half the current implement width); otherwise, REBEL displays an error and you must re-enter the offset.

To enter a path offset:

1. Press  **> Path Adjustment > Path Offset** to display the Path Offset panel.

2. Press the left or right arrow (arrow turns green) to set the position of the offset relative to the guideline, use the keypad to enter an offset value, then press **Done**.

   The guideline on the map moves by the selected direction and offset amount and a path offset indicator appears (see below) to the left or right (based on the offset direction) of the crosstrack indicator (path offset of 2 feet appears below as 24 inches).
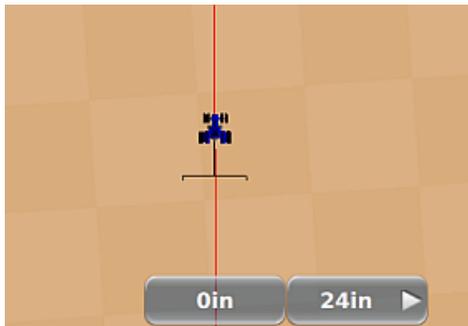


3. Close or hide the panel.

## Snapping a Guideline to Your Current Location

While using a straight path (A=B or A + Direction) or pivot path, you can 'snap' the guideline to the vehicle's current location parallel to the original guideline.

To snap a guideline to your current location:

1. Press  **> Path Adjustment > Snap Here**.

   The guideline on the map moves to your current location and a snap distance indicator appears (see below) to the left or right (based on the direction the guideline move) of the crosstrack indicator. In the example below the guideline snapped 3.3 feet to the right of the original guideline.
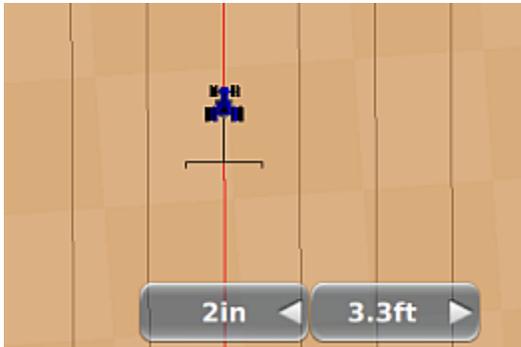
   

2. Close or hide the panel.

# Shifting a Guideline

While using a straight path (A=B or A + Direction) or pivot path, you can shift (move) a guideline by any amount to the left or right.

To shift a guideline:

1. Press  **> Path Adjustment > Shift** to display the Shift panel.

2. Use the keypad to enter a shift value then press the left or right arrow to shift the guideline relative to the original guideline. A shift indicator appears on the panel below the arrows. You can press the arrow repeatedly to increase the shift by the same increment each time (or press the other arrow to 'back off' the amount if you shifted too far).



The guideline on the map moves by the selected direction and shift amount and a shift indicator appears (see below) to the left or right (based on the shift direction) of the crosstrack indicator (figure below shows a shift left of 3 feet).
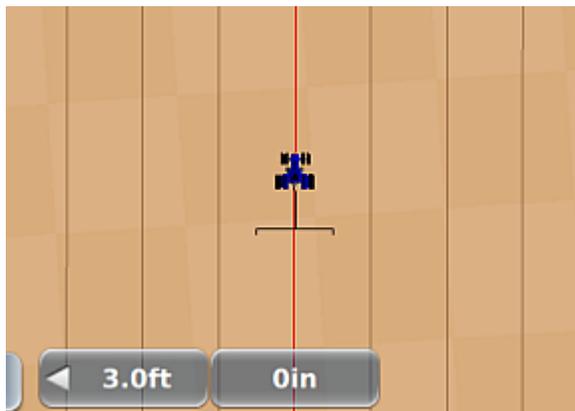


3. Close or hide the panel.

# Updating Point B

While using a straight path (A=B or A + Direction), you can use your current location as the new Point B as long as you are within a half swath width of the original A=B line (Pass 0 as shown on the real-time status tab, see at right). If you are more than 1/2 swath width away from Pass 0, this functionality is disabled.



To update Point B:

1. Make sure you are within 1/2 swath width of Pass 0 of your straight path.

2. Press  **> Path Adjustment > Update B**. Your new Point B appears on the map.
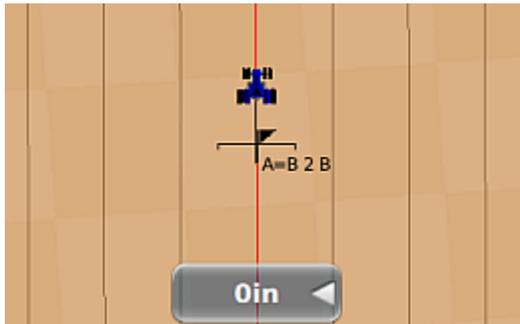


3. Close or hide the panel.

# Using Detour and Merged AB Contours

When driving along an AB contour you may need to steer around an obstacle (such as a tree line or water area). You can adjust your AB contour path by creating a detour path around the obstacle. You then decide whether to end your path after steering around the obstacle or merge into the original AB contour after driving around the obstacle—in both instances you have created a new AB contour that combines the original AB contour and the detour as follows:

- A merged AB contour is where REBEL combines your original AB contour (before your detour), your detour, and the continuation of the original AB contour (where you merge back onto the original contour (left figure below)

- A new (End) AB contour is where REBEL combines your original AB contour (before your detour) and your detour (right figure below)

Original and New (Merged) AB Contour                     Original and New (End) AB Contour
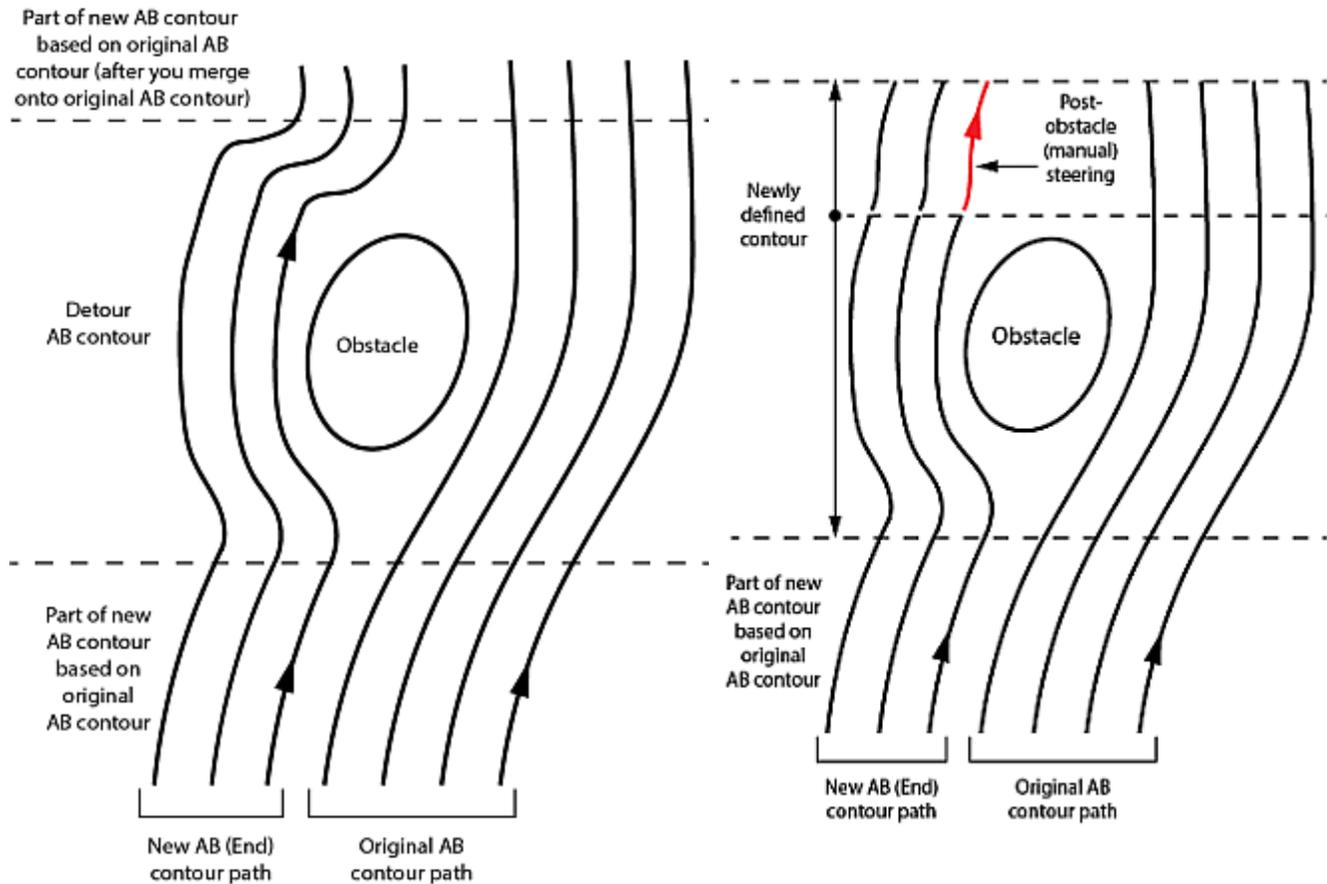
To create a detour:

1.  Drive along your AB contour.

2.  As you approach an obstacle, press [image] **> Path Adjustment > Detour Contour** to display the Detour AB Contour panel.

3.  Press **Start Detour** (disengages autosteering) and drive off the AB contour to avoid the obstacle. The Start Detour button is disabled, and the End Detour button is enabled.



4.  After you pass the obstacle you can do one of the following:

    -   Press **End Detour** to create a new AB contour.

    -   Drive toward the original AB contour, engage autosteering, wait for the Merge Contour button to be enabled, then press **Merge Contour** to create a new merged AB contour.

# Renaming a Path

REBEL enables you to rename a straight path (A=B or A+ Direction) or an AB Contour path. For example, if you have three A=B paths named A=B1, A=B2, and A=B3 you can use more descriptive names such as Barn Side, Hill, and Valley. You can only rename the current path. To rename a different path, make that path the current path.

To rename a path:

1. Press . The Path Planning panel appears with the Current Path showing the path name.
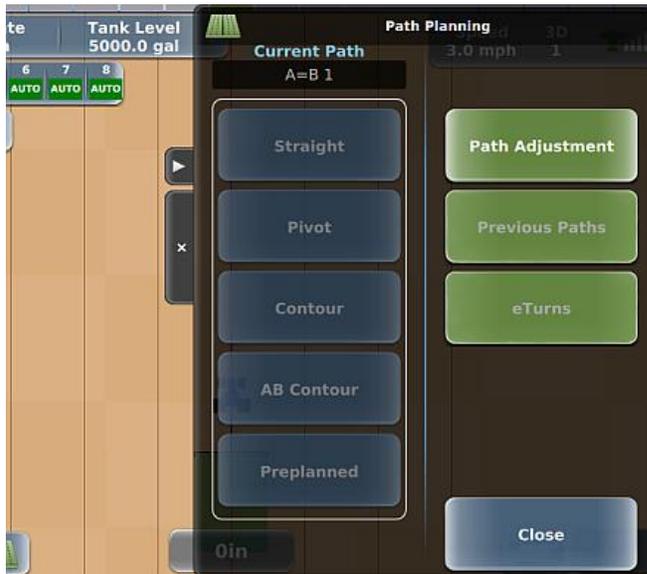


2. Press **Path Adjustment > Rename Path**, enter a new path name (such as Side Hill), then press **Done**.

3. Press **Back** to return to the Path Planning panel. The new path name appears in the Current Path field.



The updated name also appears on the map in the A and B points as shown below.

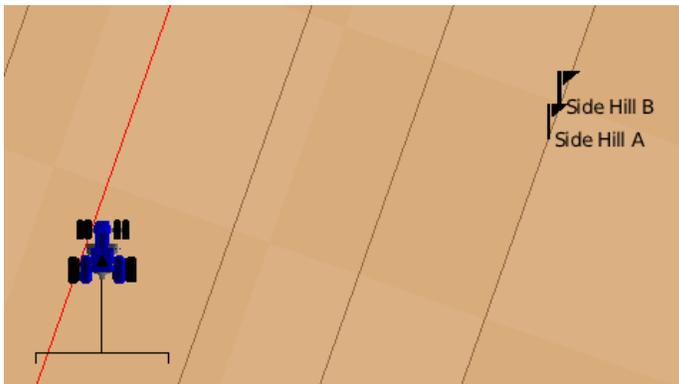# Saving a Path Offset

While using a straight path (A=B or A + Direction) or pivot path, and after you enter a path offset, snap a guideline to the vehicle's location, or shift a guideline, REBEL enables you to save the new current path. The path name is incremented from the previous path. For example, if you are guiding on A=B 1 and you shift the guideline to the right by 1 m, pressing Save Path Offset saves this new path as A=B 2. See the following sections for more information.

- "Entering a Path Offset" on page 162
- "Snapping a Guideline to Your Current Location" on page 163
- "Shifting a Guideline" on page 164

To save a path offset:

1. Enter a path offset, snap the guideline to your current position, or shift the guideline. For example, if you shifted the guideline 2 ft to the right, the shift indicator (right of crosstrack indicator) appears. Press **Back** to return to the Path Adjustment panel. The Save Path Offset button is enabled.



2. While still on the Path Adjustment panel, press **Save Path Offset**. The offset indicator disappears, the Save Path Offset button is disabled, and REBEL disengages.

3. Re-engage on the guideline.

4. Close or hide the panel.

# Contour Lock

When using Contour guidance, REBEL constantly searches for the nearest swath from which to provide guidance. Contour Lock enables you to stop REBEL from searching for the closest swath. In Contour Lock mode (shown below), guidance:

- Remains locked on its current swath until you manually unlock it
- Automatically unlocks if you drive offline by 2 m (or 10% of the swath width) and begins searching for the closest swath again



Contour Lock is helpful when you use guidance in close proximity to multiple swaths, such as when working with "point-rows." In these situations, without Contour Lock, guidance could jump around and guide you on the wrong path whenever other swaths come close to your current one. With Contour Lock, you can decide to stay on the current swath all the way until the end of the field or let REBEL continue searching for the closest swath.

*Note: When not in Contour Lock mode and when searching for the closest path, REBEL only picks up a different path if it is at a small angle to the path you are on. For example, if you cross a path at right angles, REBEL will not 'find' the crossed path and switch guidance to it. Only paths at a small angle (close to parallel) to the path you are on may be selected*

To use Contour Lock:

1. In Contour guidance mode when on or approaching the required guidance contour press the blue (unlocked) Contour Lock button.

   This puts you in Contour Lock mode (lock engaged) and the Contour Lock button shows a locked padlock. REBEL stops searching for, and providing guidance on, passes for other defined contours (no matter how close).

   If you move more than 2 m off the current guideline, Contour Lock, while still engaged, becomes inactive and the padlock appears unlocked. REBEL resumes its contour search and locks again when you are within 2 m of any guideline.

2. To deactivate Contour Lock, press the green Contour Lock button—Contour Lock can be active (padlock locked) or inactive (padlock unlocked) when you disengage it.

   The button turns blue with the padlock unlocked.

# Preplanned Guidance

Preplanned guidance enables you to use an externally created job template with guidelines to efficiently work your field. Typically, a third-party company will create the template and you import the template just as you would any other job or job template. See "Importing a Job" on page 124 for information on importing jobs and job templates. When creating your preplanned templates, use a name you will recognize to easily identify them in the Use Templates list (there may be other non-preplanned templates in the list). Consider prefacing each preplanned template with something like "PP_" or "Pre_" or "Plan_". For example, you may name a preplanned template for Farm1 as "Pre_Farm1".

To use preplanned guidance:

1. Press **Menu > Jobs > Templates > Use Template** to display the Use Template panel (see near right).

2. Select the preplanned template you want to use (PrePlanned or 50_Contours shown at right). For more information on filtering for and selecting a template, see "Creating a Job from a Job Template" on page 130.

   After you select the template the panels close, a 'Loading Template' message appears briefly, and a new job is started.

3. Press ![icon] on the map to display the Path Planning panel (see left side of panel, far right). When using a template, the last path that was created for the template will be the Current Path as shown in the Path Planning panel (until you change it).

4. Press **Preplanned**. The panel closes and the template appears on the map. The example below shows a boundary (blue), guidelines (gray/brown), and nearest guideline (red). When a guideline is red you can engage on that line using autosteering (provided all engage conditions are met).
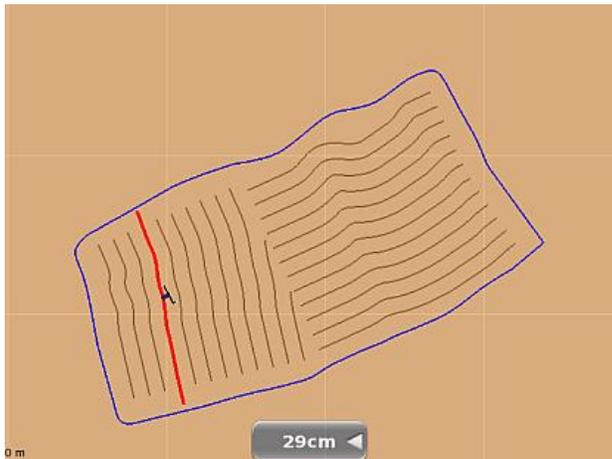


5. Press the engage button to engage automated steering. REBEL steers your vehicle onto then along the guideline. The engage button must be in a state of 'ready to engage' (shown below) before you press it to engage automated steering.



6. At the end of the current pass turn around and engage on the next guideline (use AutoEngage or eTurns if applicable).

# Shuttle Shift and Re-engaging on a Line

For vehicles with shuttle shift functionality, you can shift between forward and reverse gears without using the clutch, enabling you to shift direction more quickly and easily. If you are engaged on a straight (A=B or A + Direction), pivot, or contour path, you can automatically re-engage on your guideline when switching from forward to reverse and vice versa. For example, you may use shuttle shift to line up in a headland when turning around.

The following scenario describes how shuttle shift works.

1. While engaged on a line, slow down and come to a stop. As you come to a stop REBEL disengages autosteering (the engage button starts flashing between 'engaged' and 'ready to engage' states).

   *Engaged      Ready to engage*

   You have approximately five seconds to automatically re-engage autosteering (by driving forward or in reverse); this is when the engage button is flashing.

2. Start driving in reverse. The engage button briefly flashes then REBEL automatically re-engages on the line (engage button 'engaged').

3. When you are ready to go in a forward direction again, slow down and come to a stop. As you come to a stop REBEL disengages autosteering (engage button flashes between 'engaged' and 'ready to engage').

4. Start driving forward. The engage button briefly flashes then REBEL automatically re-engages on the line (engage button 'engaged').

# eTurns

eTurns enables the vehicle to automatically execute a turn at the end of a swath (you determine which swath to turn onto). The key points about eTurns are:

- eTurns are applicable only to Straight guidance operations (A=B, A + Direction, and AB Contour paths).
- eTurns calibration is required for each implement.
- You can operate with a fixed turn configuration or change the configuration in real time for individual turns.
- eTurns guides the vehicle's turning path, not the implement's turning path.
- The headland prompt, if used, is based on the vehicle's position, not the implement's position.

Use the sections below to learn about eTurns.

*Note: eTurns is an eDriveXC-only feature. If your system uses eDriveXD, see "Auto-Engage" on page 48 for information on engaging on subsequent guidelines of your straight or AB contour path.*

# Calibrating eTurns

*WARNING! Due to potential for damage to machinery if using a larger implement with the calibration data recorded for a smaller implement, you need to recalibrate eTurns for different implements. When making the left and right turns during eTurns calibration, make the minimum radius turns possible for the current implement.*

*Note: eTurns calibration is not required for rigid implements.*

To calibrate eTurns:

1. Create or load your preferred vehicle and implement.

2. Press **Menu > Implement Profiles > Current Implement > Calibration**. The first eTurns Calibration panel appears (far left panel below, Step: 1 of 5).

   From this point on REBEL guides you through the calibration process using a series of five panels, with each panel being a step in the process. Each panel clearly states the step you are on and provides precise instructions on what to do in that step.

   - On the panels for steps 1 through 4, a speed bar indicates if you are driving within the required speed range to complete the step. If you are driving too slow or too fast, it shows a red bar; if you are driving within the correct range it shows a green bar (below right).

   | *Speed too slow* | *Speed too fast* | *Speed OK* |
   |:---:|:---:|:---:|
   |  |  |  |
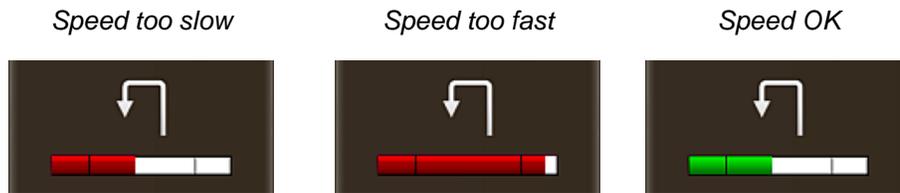
   - On steps 1 (shown below) and 3, drive within the required speed range then press **Next** to proceed to the next step.
   - On steps 2 (shown below) and 4, REBEL automatically proceeds to the next step when finishing calibrating for that step.
   - On step 5 (shown below), review the calibration results (minimum turning circles of the vehicle on left and right lock).
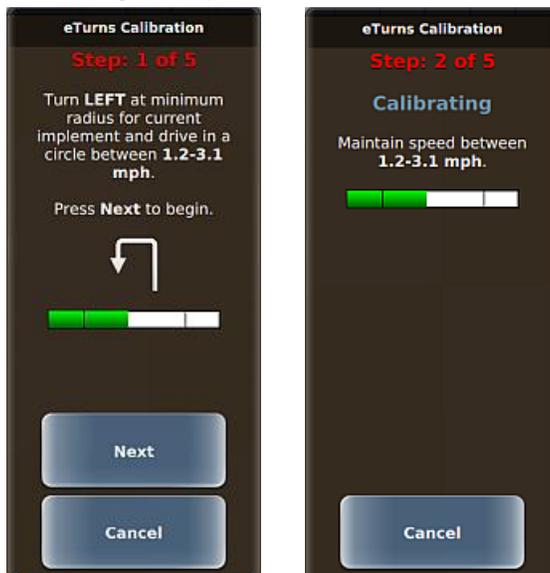


3. Press **Done**, then press **Save** to save the implement (with eTurns calibrated).

4. Close or hide the panel.
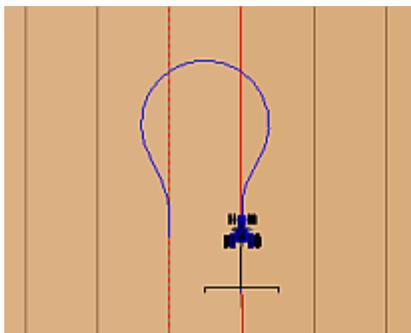
# Configuring and Making eTurns

*Note: eTurn functionality is enabled only when all the following are true: a job is active, you are engaged on a straight (A=B or A+ Direction) or AB Contour path, and you are not currently making an eTurn.*

After calibrating your implement for eTurns, you configure eTurns with the eTurns Setup panel that you access by pressing eTurns Setup on the eTurns Control panel. You can configure an individual eTurn in real time or use the same configuration for each eTurn.



As shown below, a predicted eTurn is what you see on the map during setup before you make the eTurn and the eTurn path is blue. When you make the eTurn (pressing Go on the eTurns Control panel), the panels close, the map shows the predicted eTurn path in red, and the eTurn begins.

*eTurns predicted path*                              *eTurns actual path*
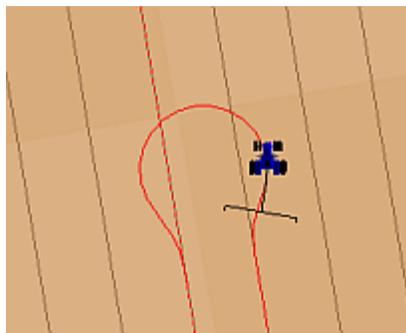


To configure and make eTurns (using the table after this procedure as a guide):

1.  When eDriveX is ready to engage press the engage button. The eTurns button is enabled (blue).

2.  Press . The eTurns Control panel appears, the predicted eTurn appears on the map, and the eTurn direction on the map corresponds to green/selected Turn Direction arrow.

3. Press **eTurns Setup** to display the eTurns Setup panel, then configure eTurns using the table starting on the next page as a guide.



4. Press **Ok** to return to the eTurns Control panel, verify an acceptable speed (green speed bar at top of panel) and the correct turn direction, then press **Go**. The panels close and you begin making the eTurn. The eTurn button on the map is disabled during an eTurn and re-enabled when the eTurn is complete.

5. Repeat 2-5 as needed.

| Parameter | Description |
|-----------|-------------|
| Max Speed | Speed at which you want your vehicle to execute the eTurn. The Speed and the Headland Distance combine to determine the linear distance from the headland that the prompt appears. If, during an eTurn, you exceed the speed you set (here or on the eTurns Control panel), automated steering (so the eTurn also) will disengage. The predicted and actual eTurns paths are determined by the speed at which you set the eTurn to be made (and the curvature calibration for the tractor/implement combination). The two figures below show how the speed determines the eTurn path (slow eTurns speed on left; fast eTurns speed on right). |

*slow eTurns speed*                              *fast eTurns speed*
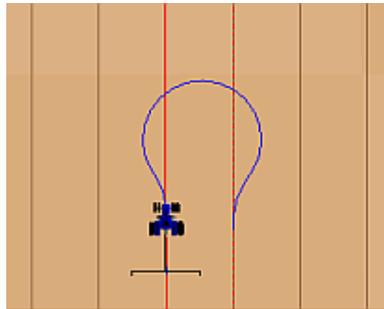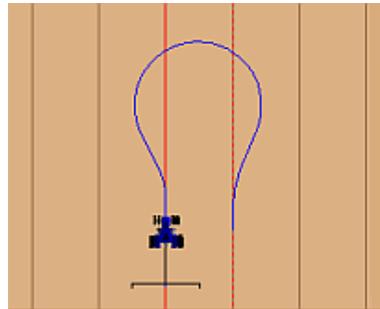
| Parameter | Description |
|-----------|-------------|
| Next Pass | Order in which rows are worked (or 'steered to' - also known as the 'swath pattern'). Pressing the up/down arrows displays the following options: |

- Current Pass - automatically turn back onto the current row
- Next Pass - automatically turn onto the adjacent row
- Skip Rows: # - skip the number of adjacent rows specified (for example, for Skip Rows: 1, the vehicle will automatically turn on the pattern 1, 3, 5, 7 etc.)

As you press the buttons the eTurn path on the map changes and 'Next Pass' changes to 'Skip Passes' (followed by the number of times you press either button that corresponds to how many passes to skip). The first figure below shows skipping one pass to the left (after pressing the up arrow); the second figure below shows skipping two passes to the left (after pressing the up arrow again). To return to skipping no passes and turning onto the next pass, press the down arrow twice.
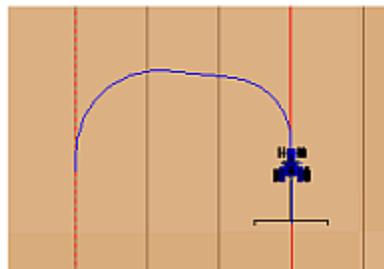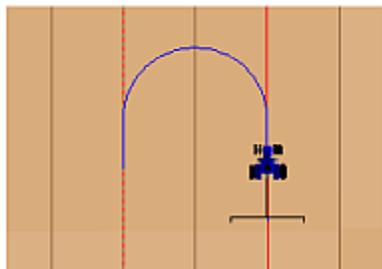
| Parameter | Description |
|-----------|-------------|
| Turn Direction | Direction to turn (left or right). When you press a button the eTurn path changes to the appropriate side of the of the current swath. |

| Parameter | Description | |
|-----------|-------------|---|
| Place Turn |  | • Under Vehicle - REBEL starts the eTurn in front of the vehicle. <br><br> • On Headland - REBEL starts the eTurn when the vehicle enters the headland and the vehicle is able to drive outside a boundary. While performing this type of eTurn, eDriveX will disengage autosteering if the vehicle speed exceeds the Max Speed value noted near the top of the eTurns Setup panel. <br><br> • Inside Boundary - REBEL starts the eTurn so that the turn is inside the boundary—you must have a boundary in place for this feature to work. While performing this type of eTurn, eDriveX will disengage autosteering if the vehicle speed exceeds the Max Speed value noted near the top of the eTurns Setup panel. |
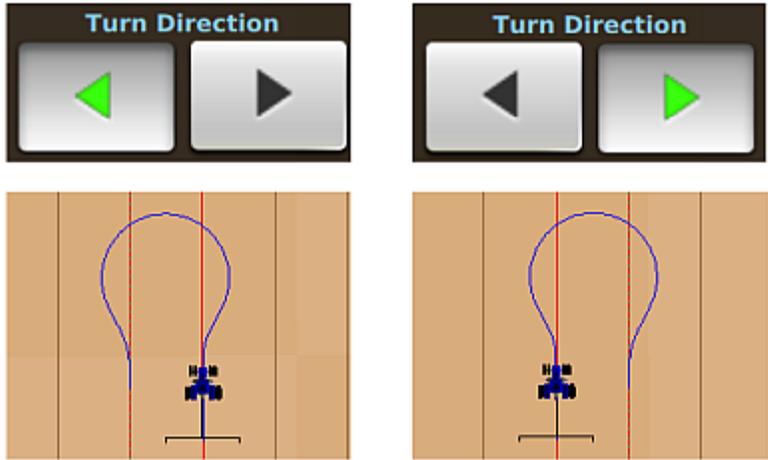
*Example - On Headland*
*Right boundary (blue line on outside edge of swath). Place Turn is set to On Headland. Predicted eTurn (blue vehicle path) will turn the vehicle when it enters the headland (A).*
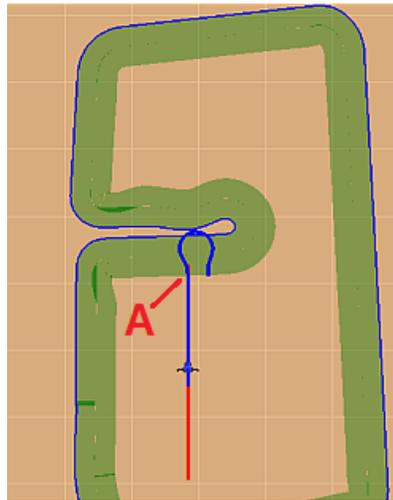


*Example - Inside Boundary*
*Right boundary (blue line on outside edge of swath). Place Turn is set to Inside Boundary. Predicted eTurn (blue vehicle path) will turn the vehicle so the right edge of the implement will be just inside the blue boundary line.*

| Parameter | Description |
| --- | --- |
| Headland Prompt Time | When set to a non-zero value, (check mark appears in box) the headland prompt appears on the map during operations. REBEL will show the predicted eTurn based on what you select from the Place Turn drop-down. When you approach a headland at less than 45° (see below) REBEL will not automatically display the eTurns Control panel—you must press the eTurns button (see below top) on the map. The eTurn is generated in front of the vehicle—press Go at the point you want to perform the eTurn.<br> |
| Skip Setup | Skips the eTurns Setup panel when making eTurns and displays the eTurns Control panel. |
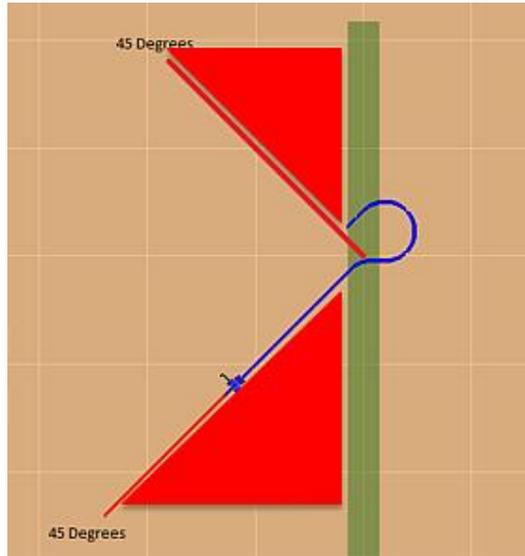
*See* "eTurns Settings and Resulting Actions" on page 181 *for information on how the Headland Distance and Skip Setup settings determine what appears onscreen when making eTurns:*

# eTurns Settings and Resulting Actions

Exactly how you activate an eTurn depends on how you set up eTurns. The table below details the actions you take for each configuration. In all cases, the predicted eTurn path (blue) is shown until you press Go in the eTurns Control panel. The predicted eTurn path travels with you until you press Go.

| eTurns Settings | Result | |
|---|---|---|
| Skip Setup selected<br>Headland Prompt Time not set (zero) | 1. On the map press the eTurns button. | |
| | 2. On the eTurns Control panel press **Go**. | |
| Skip Setup selected<br>Headland Prompt Time set (non-zero) | 1. On the eTurns Control panel press **Go**. | |
| | 2. On subsequent passes the eTurns Control panel will automatically appear based on the Headland Prompt Time setting. | |
| Skip Setup Not Selected<br>Headland Prompt Time not set (zero) | 1. On the map press the eTurns button. | |
| | 2. On the eTurns Setup panel adjust the setup parameters then press **Ok**. | |
| | 3. On the eTurns Control panel press **Go**. | |
| Skip Setup Not Selected<br>Headland Prompt Time set (non-zero) | 1. Adjust the setup parameters on the eTurns Setup panel and press **Ok**. | |
| | 2. On the eTurns Control panel press **Go**. | |
| | 3. On subsequent passes the eTurns Control panel will automatically appear based on the Headland Prompt Time setting. | |
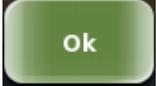
*Note: If you are in Skip Setup mode (previously selected Skip Setup on the eTurns Setup panel) and want to adjust your eTurns configuration settings press* **Menu > Settings> eTurns Setup***.*

# Chapter 8: Using Rate and Section Control

REBEL supports rate control and section control via two types of systems (electronic control units, or ECUs): Outback AC110 and ISOBUS. See the sections below to use rate and section control.

- "Rate Control and Section Control Tabs/Buttons" on page 184

- "Using Rate Control" on page 186

- "Loading or Deleting Prescription (Rx) Maps" on page 189

- "Using the Switchbox" on page 193

Before using rate and section control, you need to properly set them up—see the following sections:

- "Adding an AC110 Implement - Rate Control Settings Overview" on page 101

- "Connecting and Configuring an ISOBUS Implement Overview" on page 113

# Rate Control and Section Control Tabs/Buttons

Before using rate and section control, familiarize yourself with the related tabs/buttons that appear along the top left of the map.



The following table describes the rate/section control tabs and buttons.

| Tab/Button | Description |
|---|---|
| Rate control tab | 

The rate control tab has two sections:

- **Product Details button:** press to display the Product Rate panel



- **Rate/Tank button** - press either the Actual Rate section or the Tank Level section to expand the rate control tab (see below); once expanded, press the left arrow on the right end of the tab to contract the tab



The additional indicators are defined as:

    ○ Actual Rate - current actual flow rate calculated from the flow meter (when the actual rate is off by 20% from the target rate the actual rate appears in red and the terminal beeps; when not off by 20% the Actual Rate appears in white)

    ○ Target Rate - your designated target rate

    ○ Pressure (liquid rate control pressure) or Spinner (dry rate control spinner speed)

    ○ Tank Level - current tank volume (decreases as you spray); you reset this value when refilling the tank |

| Section control tab |  |
|---|---|
| | Displays section related information and allows you to set each section manually to ON, AUTO (shown above), or OFF by pressing the section repeatedly to cycle through the settings. |

The color of the indicates not spraying (red background) or spraying (green background).

Keep the following in mind when working with sections:

- AUTO: turns sections On and Off based on previously applied areas
- OFF: section remains Off even if in an unapplied area
- ON: section remains On even if in a previously applied area

If you are using dry rate control (you select Spreading as the Operation for the implement), the section control tab defaults to one section and you cannot change the number of sections.



For more information on using the section control tab, using the optional switchbox, and how the operate together, see "Using the Switchbox" on page 193.

---

| Override button | Press repeatedly toggle between an AUTO state and forced ON (opens all section valves) state. If you change the state of specific sections (such as pressing sections on the section control tab), the Override button changes to a MANUAL—pressing the Override button at this point enables you once again toggle between AUTO and ON for all sections (override the previous manual change). To turn all sections off, press and hold the Override button for approximately three seconds. For more information on using the Override button, see "Using the Switchbox" on page 193. |
|---|---|

---

# Using Rate Control

Using rate control starts with the rate control tab along the top left of the map. Press the Product Details button (circled below) to display the Product Rate panel.

The following table describes the buttons and fields in the diagram above to help you use rate control.

| Button/Field | Description |
| --- | --- |
| Product Details button | As shown above, press the Product Details button to display the Product Rate panel (described below). |
| Product Rate panel (left side) | • The top field shows the target rate. <br>• The bottom field shows the actual rate. <br>• Press the up/down rate bump arrows to incrementally adjust the target rate. As you change the rate here, the Target Rate indicator on the rate control tab changes as well. Each button increments/decrements by the amount you set using the Rate Bump Settings button on the Rate Control panel (see further down in this table). |

| Button/Field | Description |
|---|---|
| | Applied color legend |
| |  |
| Product Rate panel (right side)  |  Press a button to set a rate to use. <br><br>• Green indicates the currently selected rate. <br><br>• Rx is enabled only when a prescription map is loaded—see "Loading or Deleting Prescription (Rx) Maps" on page 189. |
| |  Shows the low rate (left), high rate (right), and color gradation of Rx map rates throughout the range of application. This section appears only when a prescription map is loaded— see "Loading or Deleting Prescription (Rx) Maps" on page 189 |

| Button/Field | Description |
|---|---|
|  | For each of the following (except Reset Tank To), enter a value by pressing the button, entering a value in the keypad, then pressing **Done**. <br><br>• Rate 1 and Rate 2: Set the target rates for Rate 1 and Rate 2. <br><br>• GPS Position Lost Rate and Out of Field Rate: Set product application rates for when GPS position is lost and when you are outside a defined field, respectively. During either of these conditions the Target Rate on the rate control tab shows one of these values (per the condition). <br><br>• Tank Level: Use Tank Level to enter the volume of product in the tank. You will need to adjust this value after each load. While spraying, REBEL subtracts the applied volume from this value and this current volume appears on the rate control tab. <br><br>• Reset Tank To: Use Reset Tank to reset the tank level to the original level you entered for the Tank Level. This enables you to reset the tank level to full with one button push when refilling the tank; otherwise, you have to re-enter the value for a full tank via Tank Level. |
| | Rx Maps and Delete Rx Maps: Use to load and delete prescription maps— see "Loading or Deleting Prescription (Rx) Maps" on page 189. |
| | Rate Bump Settings: Displays the Rate Bump Settings panel where you can bump (incrementally adjust) the target rate by value (default) or by percentage. To change the bump type, press **Rate Bump** then select an option from the drop-down. The Rate Bump type you select determines the function of the Bump Rate button (value or percentage). To set the value or percentage, press **Bump Rate**, enter a value in the keypad, then press **Done**. |

# Loading or Deleting Prescription (Rx) Maps

*Note: This section describes how to load and delete prescription (Rx) maps. See "Map Layers - Rx Maps and Applied Color Maps" on page 136 for information on using/displaying Rx maps. The ISOBUS standard has a specific Rx map format. Therefore, adhere to the following to ensure accurate data: 1) If using an ISOBUS implement, use only ISOBUS standard Rx maps, and 2) If using an AC110 implement, use only shapefile Rx maps.*

An Rx map is a map of a particular land area divided into sections of different application rates. You use Rx maps in conjunction with rate control functionality to automatically spray different areas of your field at different flow rates. You can only load a Rx map when you have an active job—you are loading the map for use during that job. If this is the first time you are loading a specific Rx map you must load the map from a USB drive. When the map is loaded it is:

- Stored on the REBEL hard drive
- Attached to the active job (REBEL automatically loads that Rx map whenever you open that same job as long as that Rx map remains on the hard drive)

Once the Rx map is stored on the REBEL hard drive you can load that map for use during a different job (when that job is active). During this process you load the map from the hard drive. When you first load a Rx map from a USB drive, you actually load a shape (.shp) file—a popular map format for GIS software commonly used for rate control maps. You then select a data type and rate. REBEL then converts the .shp file into an Rx map (.pmh file) and stores it on the hard drive. Therefore, when you load an Rx map from the hard drive you load a .pmh file, not a .shp file (because REBEL has already converted the file for use).

*Note: AC110 cannot use ISOBUS Rx maps. ISOBUS ECUs should not use shapefile Rx maps.*

To load an Rx map:

1. Press either of the following to display the Rx Map Files panel:

   Menu > Settings > Rate Control > Rx Maps
   Product 1 Details > Rate Control > Rx Maps

2. Press the green button at the top of the panel, then select **Hard Drive** or **USB**. Hard Drive appears only if you previously loaded the .shp file from a USB drive and REBEL converted the file to a .pmh file and stored it on the hard drive. The panel list shows the Rx map files in the selected location appear (USB example at right).

3. Use the up/down arrows to scroll through the list of files (if necessary) then select your preferred file (.pmh file or .shp file).

   - If you are loading a previously loaded Rx map (.pmh file), the panels close and the Rx map appears.

   - If you are loading an Rx map for the first time (.shp file), the Rx Map Layers panel appears. Select your preferred data type, then on the Rx Map Units panel select your preferred units. The panels close, REBEL converts the .shp file, then the Rx map appears.

**Caution:** *Once you delete an Rx map it is permanently removed from memory; you cannot retrieve a deleted Rx map.*

To delete a Rx map:

1. Press **Menu > Settings > Rate Control > Delete Rx Maps** to display the Delete RxMaps panel (at right).
2. Use the up/down arrows to scroll through the list of Rx maps (if necessary) then select the maps you want to delete; to delete all maps press **Select All**.
3. Press **Delete**. The Rx maps are deleted and the panels close.
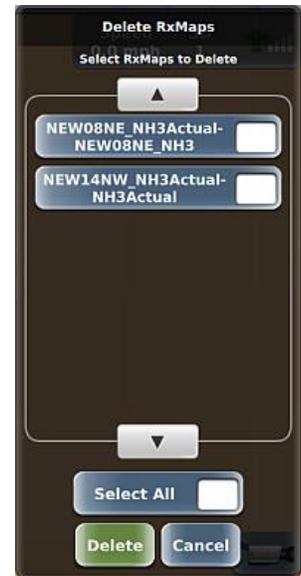
# Chapter 9: Other Optional Features

The following sections contain information on using other optional features.

- "Using an External Camera" below

- "Using the External Lightbar" on page 192

- "Using the Switchbox" on page 193

## Using an External Camera

REBEL supports an external camera to remotely view an area around your vehicle. With a camera connected, a camera button appears in the lower right of the map (just left of the sidebar). Press the camera button to display the camera window as shown below (black background because no video is transmitting).



When you first display the camera window it is the default size with two buttons (resize and Close).

- The resize and Close buttons are visible by default. However, if you do not press the camera window or either button within three seconds, the buttons disappear. Press the camera window to redisplay the resize and Close buttons (again, visible for three seconds).

- Press the resize button to switch to full screen view (see below). Press Close to close the camera window.



- Full screen view works similarly to default view: with no camera buttons visible press the camera window to display the two buttons.

- You can drag the default window around the map then let go when the window is in your preferred location.

# Using the External Lightbar

The red and green lights on the external lightbar work just like the red and green bars on the onscreen lightbar. See "Understanding the Parts of the Touchscreen" on page 1 for information on the onscreen lightbar.

The examples show the onscreen and external lightbar under similar scenarios.

Vehicle centered on guideline

Vehicle steering right of guideline

Vehicle steering very far right of guideline

Vehicle steering left of guideline

Vehicle steering very far left of guideline

# Using the Switchbox

The optional external switchbox enables you to perform tasks that you would typically perform via the REBEL terminal.



1    Turn Apply ON or OFF

2    Toggle sections between ON (up), OFF (down), and AUTO (middle)

3    Toggle between Rate 1, Rate 2, and prescription map (Rx or variable rate)

4    Manually adjust (bump) selected rate

*See "Chapter 8: Using Rate and Section Control" on page 191 for more information on rate control and section control.*

When you connect the switchbox:

- Section control tab (onscreen) is read-only (functionality is controlled via switchbox)
- Override button is not displayed
- Rate 1, Rate 2, and Rx buttons (onscreen) are disabled (functionality is controlled via the switchbox)
- Section switches, Rate1/2/Rx, and Rate Bump are linked to the lead boom/channel

The Manual button on the touchscreen is still available and is the only way to turn Manual mode ON or OFF— press the Manual button once to turn it ON and press it again to turn it OFF and return the rate to whatever is selected on the switchbox.

Use the flowchart on the next page to familiarize yourself with how the switchbox works in conjunction with external switches.

```
                              ┌──────────────┐
                              │  Switchbox   │
                              │  connected?  │
                              └──────┬───────┘
               ┌────Yes──────────────┴──────────────No────┐
               │                                           │
      ┌────────────────┐                          ┌────────────────┐
      │ AC110 external │                          │ AC110 external │
      │section switches│                          │section switches│
      │   selected?    │                          │   selected?    │
      └────────┬───────┘                          └────────┬───────┘
     ┌──Yes────┴────No──┐                                Yes
     │                  │                                  │
```

**Same as "No switchbox, yes switches" but with following AC110 restrictions**

1. Cannot set AC110 as the lead boom
2. Remote Master works only if switchbox Apply ON/OFF switch is ON

**Apply switch (ON/OFF)**

ON disables the onscreen Apply button and controls the apply state (same functionality as the Apply button)

**(7) Section switches (ON/AUTO)**

Control AC110 implement only (select External Switches on Implement Settings panel to enable)

Notes:

1. If AC110 is the lead boom, Remote Master switch controls apply on/off.

2. If AC110 is not the lead boom, the Remote Master switch can still control apply on/off unless the switchbox is connected.

2a. If the optional switchbox is connected, the Remote Master switch can turn apply on only if the switchbox is on (but it can always turn apply off).

**Section control switches (ON/AUTO/OFF)**

Control the section groups of the lead boom

**Onscreen Sections tab**

Must be used to turn off individual sections. External switches can be used to turn them back to ON/AUTO. To turn all sections off, press and hold the Override button for approximately 3 seconds.

**RATE switch (R1/R2/Rx)**

Select the predefined rate of the lead channel (channel[0]) of the lead boom

**Remote Master switch (ON/OFF)**

When ON, joystick disables onscreen Apply button and remotely turns all booms on/off (select Remote Master box on Rate Control Settings panel to enable)

**BUMP switch (+/-)**

Change the rate of the lead channel (channel[0]) of the lead boom by adding the predefined value or percentage

**Section grouping**

Sections will be grouped into a maximum of 7 sections per group

**Section grouping**

Sections will be grouped into a maximum of 10 sections per group

**Onscreen Sections tab**

Read-only with switchbox connected

**Restriction**

If AC110 already set as lead implement, you cannot enable external switches

# Chapter 10: Diagnostics and Troubleshooting

Use the Diagnostics panel (Menu > Diagnostics) to view status and diagnostics screens that enable you to verify certain settings and troubleshooting issues. Some buttons (such as GPS) display a panel from which to access multiple status/diagnostic screens, while others (such as Terminal Diagnostics) take you directly to a screen.

*Note: The eDriveX button appears only if eDriveX is communicating with the terminal—that is, eDriveX is connected to the terminal and powered on. If eDriveXC is connected, the button shows eDriveXC; if eDriveXD is connected, the button shows eDriveXD.*

If an error indicator  appears on the engage button, press the indicator to display the eDriveX Status screen to help you troubleshoot any issues.

Use the Diagnostics panel and the links below work with status and diagnostics information.

Status/diagnostics information:

- "GPS Status" on page 197
- "Terminal Diagnostics" on page 205
- "Updating Terminal Software" on page 207
- "eDriveX" on page 209
- "AC110 Diagnostics" on page 223
- "ISOBUS Diagnostics and Troubleshooting" on page 225

Other helpful information:

- "Capturing Screen Images" on page 227

# GPS

The GPS panel (Menu > Diagnostics > GPS) provides GPS, receiver, corrections, and subscription information. The top three buttons on the panel are always available. If you selected RTK or e-Dif as the correction type, a fourth button appears corresponding to that correction type (such as RTK Status in the figure at right). No button appears if SBAS is the correction type (SBAS-related information appears on the GPS Status screen). Use the links below for more information on the GPS Settings panel.

| Always visible: | Visible depending on correction type: |
|---|---|
| "GPS Status" on page 197 | • "RTK Status" on page 201 |
| • Receiver Status" on page 199 | • "e-Dif Status" on page 203 |
| • "Viewing and Entering Subscriptions" on page 32 | |
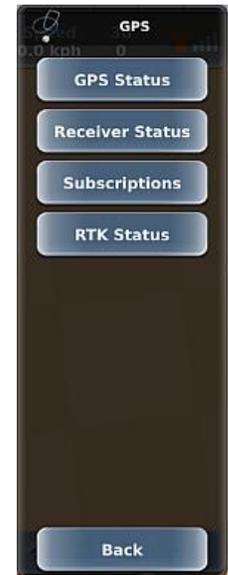
## GPS Status

The GPS Status screen (Menu > Diagnostics > GPS > GPS Status) displays read-only GPS information you may find useful, especially if you need to troubleshoot an issue.

**A101 Antenna**



**A325 Antenna**

The following table describes each field on the GPS Status screen. (For Atlas see page 232)

| Field | Description |
|---|---|
| Time | Current time |
| Latitude | Vehicle's current latitude position |
| Longitude | Vehicle's current longitude position |
| Altitude | Vehicle's current altitude |
| Speed | Vehicle's current speed |
| Heading | Vehicle's current heading in degrees |
| Diff Age | Age of the corrections used in the DGPS calculation. Values > 120 seconds require acquiring a new RTK lock. For RTK, the Diff Age is typically 1-2 seconds.  For SBAS, the Diff Age is typically 6 to 10 seconds. |
| Std Dev | (Standard deviation) Pseudo-estimate of the DGPS solution accuracy determined as the RMS value of the positional residual errors. Std Dev is valid only if 6 or more satellites are used in the solution calculation. Typical values for SBAS correction are 0.5 ft – 1.5 ft (0.15m – 0.45m). Typical values for RTK corrections are < 0.1 ft (3 cm). |
| Status | Status of the GPS receiver to receive GPS differential corrections |
| Correction Type | Type of differential correction being used—may be WAAS (for SBAS), RTK, or LBAND |
| Station ID | ID of correction station |
| Sats Used | Number of GPS satellites used to calculate the position |
| Signals | GNSS signals being used |
| Quality | Quality of GNSS signals |
| SBAS PRN | Satellites used by SBAS |
| BER | Bit error rate |
| | Relative strength of the correction satellites. In the case of WAAS, two numbers are shown separated by a hyphen. The number can be from 0 to 500, with 0 being the best and 500 being the worst. |
| | If BER > 20 verify the antenna has a clear view of the sky to properly find and track correction satellites. REBEL tracks multiple correction satellites, each satellite has a different BER, and the value in the BER field represents each value separated by a hyphen. |
| | For example, a value of 8-500 means REBEL has a very good signal on one satellite (BER=8) and is not receiving corrections from the other satellite (BER=500, the lowest reception value). Only one satellite must have a low BER value (less than 20) to provide differential corrections. |
| Available Diff | Differential corrections the receiver is getting |
| Excluded | Differential corrections the receiver is not using (excluded from the differential solution) |
| Modes | Current operating modes that control various GPS tracking parameters |
| Accuracy | RTK accuracy status value |

# Receiver Status

The Receiver Status screen (Menu > Diagnostics > GPS > Receiver Status) displays read-only GPS information related to your REBEL receiver.

### A101 Antenna



### A325 Antenna

The following table describes each field on the Receiver Status screen.

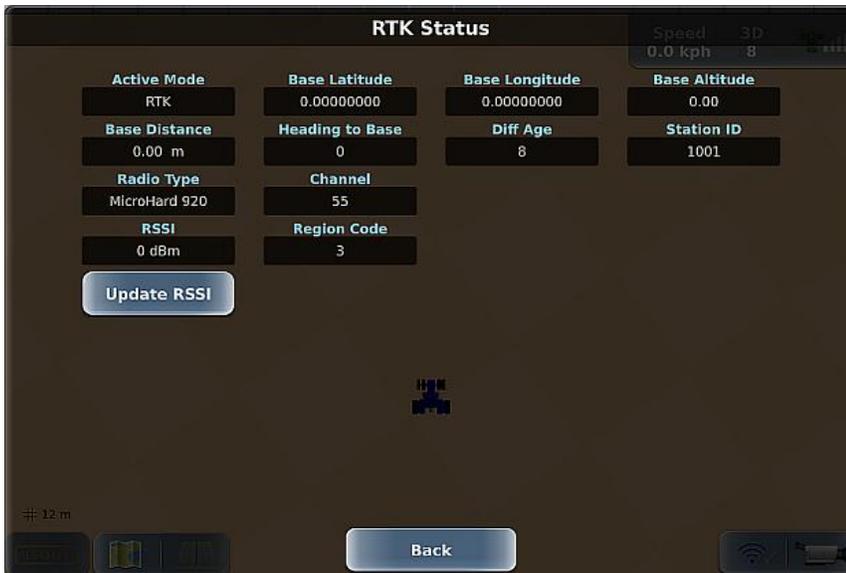| Field | Description |
|---|---|
| Receiver | Receiver technology (board) |
| Applications | Available applications |
| GPS Firmware | GPS firmware version used by REBEL |
| GLONASS State | State of GLONASS subscription, where value is one of the following:<br><br>• Enabled (valid subscription entered in REBEL)<br>• Disabled (no subscription entered) |
| Serial Number | Serial number of the receiver (terminal). Also appears on the Subscriptions screen. See "Viewing and Entering Subscriptions" on page 32 for more information. |
| Active | Active application (see Applications field for available applications) |
| Bootloader | Current boot loader version (used to update the firmware) |
| GNSS Out | Shows if outputting GNSS information in NMEA messages |
| Active Mode | User-selected correction type. See "Correction Type" on page 29 for more information. |
| Fleet | *For troubleshooting purposes only, as directed by Outback Guidance Customer Service.* |
| HW Version | Hardware version of receiver |
| Production Date | Manufacturing date of receiver |
| Diff Age | Age of the corrections used in the DGPS calculation. Values > 120 seconds require acquiring a new RTK lock. For RTK, the Diff Age is typically 1-2 seconds.  For SBAS, the Diff Age is typically 6 to 10 seconds. |
| Subscriptions button | Displays the Subscriptions screen. See "Viewing and Entering Subscriptions" on page 32 for more information on subscriptions. |

# RTK Status

The RTK status screen (Menu > Diagnostics > GPS > RTK Status) shows information related to your RTK subscription and functionality and your antenna option.

**400 MHz radio connected**
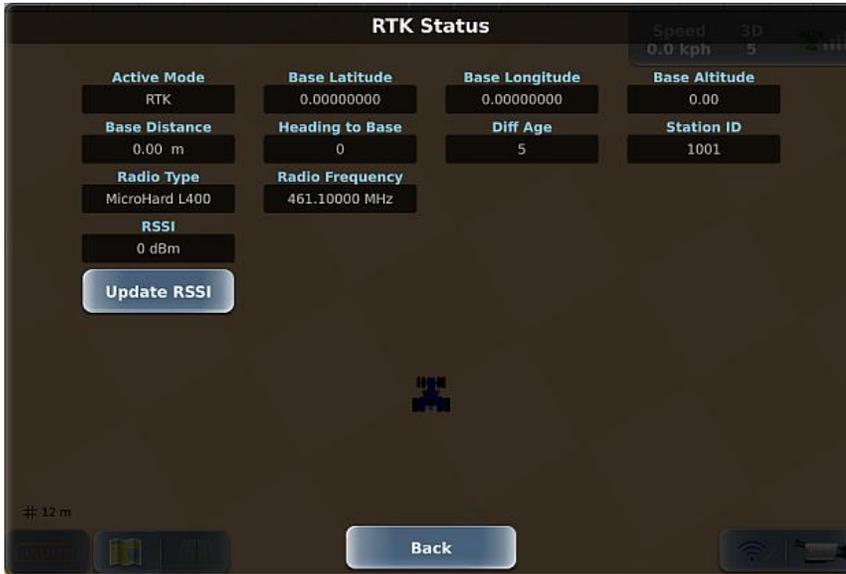


**920 MHz radio connected**

The following table describes each field on the RTK Status screen.

| Field | Description |
|---|---|
| Active Mode | User-selected correction type. See "Correction Type" on page 29. |
| Base Latitude | Latitude of the base station in decimal degrees |
| Base Longitude | Longitude of the base station in decimal degrees |
| Base Altitude | Ellipsoidal height of the base station |
| Base Distance | Distance between base and rover |
| Heading to Base | Angle of heading to base station |
| Diff Age | Age of the corrections used in the DGPS calculation. Values > 120 seconds require acquiring a new RTK lock. For RTK, the Diff Age is typically 1-2 seconds.  For SBAS, the Diff Age is typically 6 to 10 seconds. |
| Station ID | Base station ID |
| Radio Type | Radio type in the rover receiver |
| Radio Frequency | *This field only appears if you have a 400 MHz radio connected.*<br><br>Frequency you entered when setting up your radio; it is the same frequency you entered on your base station radio. See "Radio Link Settings" on page 36. |
| Channel | *This field appears only if you have a 920 MHz radio connected.*<br><br>Channel you entered when setting up your radio; it is the same channel you entered on your base station radio. See "Radio Link Settings" on page 36. |
| RSSI | Received signal strength indicator - actual power in the received radio signal (in dBm). Press **Update RSSI** to update the value.<br><br>*Note: GPS will be lost during an RSSI update.* |
| Region Code | *This field only appears if you have a 920 MHz radio connected and is used for troubleshooting purposes only when directed by Outback Guidance Customer Service.* |

# e-Dif Status

Extended Differential (e-Dif) software enables REBEL to perform with differential-like accuracy for extended periods of time without the use of a differential service. e-Dif models the effects of ionosphere, troposphere, and timing errors for extended periods by computing its own set of pseudo-corrections. e-Dif may be used anywhere geographically and is especially useful where SBAS networks have not yet been installed, such as South America, Africa, Australia, and Asia.

The e-Dif Status screen (Menu > Diagnostics > GPS > e-Dif Status) shows information related to your e-Dif subscription and functionality. e-Dif has a reference point—in e-Dif mode you can save the point, navigate back to that point (distance counts down), and update the e-Dif solution with that point. **See the procedures on the next page for instructions.**



The following table describes each field on the e-Dif Status screen.

| Field | Description |
| --- | --- |
| e-Dif Latitude | Latitude of the reference point in decimal degrees |
| e-Dif Longitude | Longitude of the reference point in decimal degrees |
| e-Dif Altitude | Ellipsoidal height of the reference point |
| e-Dif Distance | Distance from saved e-Dif point |
| Diff Age | Counter that starts counting up when an e-Dif solution is first computed |
| e-Dif Response | e-Dif status; possible values are: "OK" and "FAILED Not Enough Stable Satellite Tracks" |
| Station ID | Pseudo base station ID for troubleshooting purposes |
| Save Point button | Save a reference point |
| Update Point button | Update the e-Dif solution with that point |

## *Selecting e-Dif as the Differential Correction Type*

See "Correction Type" on page 29 for information on selecting e-Dif (or another source) as your correction type:

## *Initialization of e-Dif on Power Up*

After power up, REBEL must track GPS satellites for approximately ten minutes before it can generate differential corrections. The vehicle must be stationary during this time and the antenna should have a clear view of the sky. When REBEL has finished tracking, the eDif Response field displays "OK."

To view e-Dif status information and verify e-Dif is working correctly:

1. Press **Menu > Diagnostics > GPS > e-Dif Status** to display the e-Dif Status screen.

2. Confirm the e-Dif Response field displays 'OK'.



## *Updating e-Dif*

If a job is interrupted/suspended, for hours or days for example, you need to be able to restart the job at the point (exact location) at which it was suspended. In e-Dif you can return to the point and update e-Dif (resetting e-Dif at or as close as possible to the return point). You record (and physically mark as a backup) the point at which the job is suspended. When you are ready to resume the job, REBEL provides onscreen guidance to return to that point (which you can confirm with a physical marker) and at that point, you update the e-Dif correction and resume guidance.

1. At the point at which the job is suspended (where you stop your vehicle and turn Apply Off):

    a. Press **Menu > Diagnostics > GPS > eDif Status** to display the e-Dif Status screen.

    b. Press **Save Point**. REBEL records the vehicle's exact location and the e-Dif Latitude and e-Dif Longitude fields show this location.

    c. Place a physical marker at the exact location.

2. Close the job (the job is saved)—see "Closing a Job" on page 123.

3. When you are ready to return to the point (location) you saved in step 1, load the job—see "Loading a Job" on page 122 for instructions.

4. Select the Last Apply point—see "Returning to a Point" on page 141. REBEL guides you back to the point where it last logged any job data. Since it is important to return to the exact physical location, you should use REBEL guidance and your physical marker to return to that exact location.

5. When you reach the return point, stop the vehicle and confirm REBEL is not logging data (Apply is Off).

6. Press **Menu > Diagnostics > GPS > eDif Status** to display the e-Dif Status screen, then press Update Point. REBEL resets the e-Dif correction.

7. Resume guidance.

# Terminal Diagnostics

The Terminal Diagnostics screen (Menu > Diagnostics > Terminal Diagnostics) displays such information as software version, current work profile (implement, vehicle, task), and last backup date.



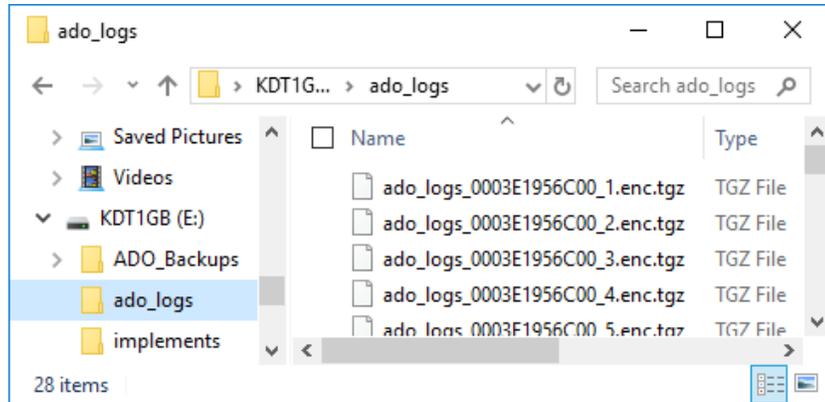The following table describes each field on the Terminal Diagnostics screen.

| Field | Description |
|---|---|
| Software Version | Terminal software version |
| IP Address | IP address of the connected host |
| IP Internal | IP address of terminal as assigned by Wi-Fi hotspot (if Wi-Fi is turned off or not connected to a network, this field is empty) |
| Refresh IP Addresses button | Updates the IP addresses |
| Current Profiles | |
| Implement | Loaded lead implement (also appears as the button with a steering symbol on the Current Implements panel when you press Menu > Implement Profiles > Current Implements). |
| Vehicle | Loaded vehicle (also appears on the Current Vehicle button when you press Menu > Vehicle Profiles). |
| Job | Active job (also appears on the Current Job button when you press Menu > Jobs). |
| Job Information | |
| Field Area | Field size for the job (also appears on the real-time status tab) |
| Worked Area | Area of job worked so far (also appears on the real-time status tab) |
| Log Index | Current console (terminal) log file (unrelated to job data) |

| Field | Description |
|---|---|
| Copy Logs button | *This button is enabled when you insert a USB drive in the terminal.*<br><br>Copies REBEL debug files to the ado_logs folder on a USB drive. To copy REBEL debug files to a USB drive:<br><br>  1. Display the Terminal Diagnostics screen then insert a USB drive into the terminal. The Copy Logs button is enabled.<br><br>  2. Press **Copy Logs**. The screen/panels close and an Exporting Logs progress window appears during export. The figure below provides an example of exported logs.<br><br><br><br>When the export is complete the progress window closes. |

| | | |
|---|---|---|
| Backup Data button | Copies terminal data (such as profiles, jobs, and user configurations/settings) to a USB drive. | *The Backup Data and Restore Data buttons are enabled when you insert a USB drive in the terminal.* |
| Last Backup | Date of backup on the USB drive. | *See "Backing Up and Restoring Data" on page 54 for more information.* |
| Restore Data button | Copies backed up data from a USB drive to the terminal. | |

# Updating Terminal Software

You can update the software via Wi-Fi (over-the-air, or OTA) or USB drive (download the update from the REBEL website then save it to the USB drive). Both methods are described below. REBEL checks for software updates each time you connect to a Wi-Fi network. If an update is available, a red indicator appears on the Menu button and each subsequent button that brings you to the Update Software screen that displays an 'update available' message.



## Updating REBEL Terminal Software via Wi-Fi (OTA)

1. Press **Menu > Diagnostics > Software Update** to display the Update Software screen.
   *Note: If no USB drive is inserted, the USB drive section on the screen below does not appear.*



2. For Network / OTA, press **Check For Updates**. If an update is available, REBEL displays an Update Available message similar to below and the Check For Updates button changes to Download.



3. Press **Yes** to start the download, during which the Download button changes to a % download indicator.
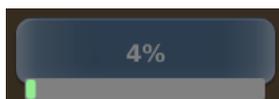


   When the download is complete, the indicator changes to an Install Update button.

4. Press **Install Update**. then follow the onscreen instructions to complete the installation.

## Updating REBEL Terminal Software via USB

1. Insert the USB containing the software update into the REBEL terminal.

2. Press **Menu > Diagnostics > Software Update** to display the Update Software screen.



3. For USB Drive, press **Install Update**, then follow the onscreen instructions to complete the installation.

# eDriveX

The eDriveX panel (Menu > Diagnostics > eDriveXC, or XD) provides access to eDriveX status and diagnostic information and is available only if eDriveX is communicating with the terminal—that is, eDriveX is connected to the terminal and powered on. Use the links below to learn more about these features.

The bottom button that appears on the panel depends on the valve type you select for your vehicle. If you select a Plus+1 valve type, PlusOne appears (see at right); if you select ESi as the valve type, the ESi Diagnostics button appears. The Service and Steer Test buttons are disabled when you are engaged on a guideline.

- "eDriveX Status" on page 210
- "eDriveX Diagnostics" on page 213
- "eDriveX Vehicle Calibration Summary" on page 215
- "eDriveX Implement Calibration Summary" on page 217
- "eDriveX Service" on page 218

"Performing a Steering Test" on page 219

- PlusOne Diagnostics" on page 222
- "ESi Diagnostics and Status" on page 221

# eDriveX Status

The eDriveX Status screen (Menu > Diagnostics > eDriveX > Status) shows the hardware, calibration, and run time status of the eDriveX system. Depending on your vehicle/valve combination and installed autosteering option (eDriveXC or eDriveXD) this screen may look different than the two examples below; however, all possible fields are described in the table on the next page.



One of the following status indicators appears to the left of each status item:

 OK (no issue).

 Error or limitation, such as a part of the system is not ready for guidance/autosteering (ex: Filters Converged not OK) or some aspect of user setup is incomplete (ex: one of the calibration steps is incomplete).

 Information that should be addressed but is not an error. This applies only to the Software status item when eDriveX software is not compatible (incorrect version).

If a status item is underlined, press the underlined text for instructions to resolve the issue.

*Note: A flashing alert also shows on the engage button so you can see that there are 'system not ready' alerts even if you are not viewing the eDriveX Status screen.*

The following tables provide information on status alerts on the eDriveX Status screen. If the recommended action does not resolve the issue, contact Outback Guidance Customer Service.

| Hardware Status Alerts | | |
|---|---|---|
| **Item** | **Reason** | **Action(s) as Applicable** |
| ECU Power | This will never show an alert as you cannot access this screen if eDriveX has no power. | |
| ECU Ready | This will never show an alert as you cannot access this screen if eDriveX is not ready. | |
| ECU Hardware | CPU load (alert shows only on startup). | |
| | High CPU usage. | Wait for two minutes, power cycle eDriveX. |
| | Low free memory. | Power cycle eDriveX. |
| Valve Online (Shown for all vehicles except ESi) | Out of range (current WAS position is outside calibrated values). | Power cycle steering controller. |
| | | Recalibrate WAS. |
| | Short/open circuit. | Check WAS harness connections for damaged wires/pins. |
| | Open/short circuit on one or more of solenoid lines. | Power cycle steering controller. |
| | Current (mA) fault (not achieving the required current - check current and voltage rating on coils). | Check solenoid harness for broken or damaged wires/pins. |
| | WAS fault. | Review WAS troubleshooting. |
| Electric Steer (Only shown for ESi vehicles) | ESi not ready or not aligned. | Turn the wheel to align. |
| DMU Sensor | Roll/Pitch out of range because ECU orientation not set correctly. | Power cycle eDriveX. |
| | | Recalibrate ECU orientation. |
| | Failed DMU sensor. | |
| GPS Sensor | Comms problem with GPS sensor (power problem) | Power cycle eDriveX. |
| | Failed GPS sensor. | |
| CAN Data | Green check mark indicates terminal correctly communicating with eDriveX (no dropped messages)—sync button appears if bad (in error). | |
| Software | REBEL and eDriveX software versions are incompatible. | Update eDriveX software. |

**Calibration Status Alerts**

| Item | Reason for Alert/Action |
|------|-------------------------|
| All fields | Value not set; check calibration and set correct values. |
| | *Note: The Calibration section displays only those parameters that pertain to the currently selected vehicle, valve, and steering override (if required). For example, if you select Pressure Transducer as the Steering Override option (for those vehicle/valve combinations that require you to select this option), Steering Override appears as a parameter on the eDriveX Status screen.* |

**Run Time Status Alerts**

| Item | Reason for Alert/Action |
|------|-------------------------|
| Steer Override: Inactive | Should be active only when the steering wheel is being turned. If active when steering wheel not being turned, problem with override system is indicated. Power cycle the system, check alert state. |
| Wayline | Wayline not set. Select job/template or create new A=B line. |
| Filters Converged | Perform filter converging process (a Help button appears next to this field when you need to take action; press the Help button and follow the instructions). See *Manual driving sequence* in "Converging Filters" on page 63 for more information on manually converging filters. |
| Ready to Engage | Not all Hardware and Run Time items are green (OK). Review items (with red exclamation point) using above tables. |
| Position Estimated | Incorrect configuration. Check ECU orientation and drive machine for a few minutes above 4 kph. |

# eDriveX Diagnostics

The eDriveX Diagnostics screen (Menu > Diagnostics > eDriveX > Diagnostics) shows the current firmware version of eDriveX and measurable details of the eDriveX system. Depending on your vehicle/valve combination this screen may look different than the example below; however, all possible fields are described in the table below.



The following table describes each field on the eDriveX Diagnostics screen. The field values are for the currently loaded vehicle.

| Field | Description |
| --- | --- |
| Firmware | Version: Current eDriveX firmware version. |
| | Identifier: eDriveXC or eDriveXD |
| | Serial Number: eDriveXC/XD serial number. |
| Vehicle Profile | Vehicle Type: Vehicle type. |
| | Valve Type: Valve type. |
| | *Note: For valve types that required you to select either Steering Wheel Switch or Pressure Transducer when adding/editing a vehicle, the Valve Type field displays just the valve type if you selected Steering Wheel Switch or 'P.T' after the valve type if you selected Pressure Transducer.* |
| | See "Adding a Vehicle: Selecting the Vehicle Type and Valve Type" on page 69. |
| Vehicle Dimensions | Wheelbase (or Track Width) / Front Hitch Length / Rear Hitch Length: Values entered on Vehicle Dimensions screen. See "Measuring Vehicle Dimensions" on page 59. |
| Antenna Location | Lateral Offset: Value from Antenna L/R Offset field. |
| | Longitudinal Offset: Value from Antenna Pivot field. |
| | Height: Value from Antenna Height field. |
| | All three values are from the Vehicle Dimensions screen. See "Measuring Vehicle Dimensions" on page 59. |

| Field | Description |
|---|---|
| GPS Heading | Raw: Heading from GPS. |
| | Adjusted: Corrected heading from filters. |
| | Vehicle Direction: Direction of the currently loaded vehicle. |
| Sensor Readings | Roll: How much the system is leaning sideways (in degrees). |
| | Pitch: How much the system is leaning forward/rearward (in degrees). |
| | Yaw: How much the system is twisted left/right along its vertical axis (in degrees). |
| | Wheel Angle: Value the wheel angle sensor provides to the ECU at the time (this field does not appear if ESi is the valve type). |
| Disengage Reason | Last: Reason for the most recent instance of autosteering being disengaged. |

# eDriveX Vehicle Calibration Summary

The eDriveX Vehicle Calibration Summary screen (Menu > Diagnostics > eDriveX > Vehicle Calibration Summary) displays eDriveX vehicle calibration results. Depending on your vehicle/valve combination and installed autosteering option (eDriveXC or eDriveXD) this screen may look different than the example below; however, all possible fields are described in the table below.



See the following sections for information on eDriveX vehicle calibration:

- "Before Calibrating a Vehicle" on page 61 for calibration prerequisites and considerations

- "Adding a Vehicle: Calibrating a Vehicle" on page 71 for the actual calibration steps when adding a vehicle

The following table describes the possible fields on the eDriveX Vehicle Calibration Summary screen. Not all fields apply to each vehicle/valve combination; thus, your screen will display only those fields that pertain to your vehicle/valve combination.

| Field | Description |
|---|---|
| Mount Orientation | Logo: ECU top orientation. |
| | Connector: ECU connector orientation. |
| Wheel Angle Sensor (WAS) | Left/Right/Center: WAS count at left lock (lowest value), center, right lock (highest value). |
| | The wheel angle sensor represents changes in the wheel angle (heading) as changes in voltage, and this voltage is displayed as a count between 250 and 4750, where WAS values are: |
| | • Center - wheel angle 0° (wheels pointed straight ahead) |
| | • Left - wheel angle at maximum left (full left lock) |
| | • Right - wheel angle at maximum right (full right lock) |
| Min Radius | Left/Right: Turning circle of the vehicle at full left lock and full right lock |
| Lateral Acceleration | eTurns will be limited to the calibrated maximum g-force. |

| Field | Description |
|---|---|
| Maximum Heading Rate (Swather and Track vehicle only) | Maximum heading (turn) rate (in rad/s) the vehicle uses when autosteering left/right. |
| Steering Ratio (ESi only) | Ratio of wheel turn to vehicle turn. |
| Steering Override | Set Point: Pressure, determined during calibration, at which an override occurs (that is, the pressure at which REBEL disengages autosteering when manual steering intervention occurs). |
| | Set Point Min: Standby pressure that is constantly seen in the vehicle steering system when there is no steering activity. |
| | Set Point Max: Maximum system pressure. |
| Current or Voltage | (Current) Left/Right: Minimum and maximum currents left/right for steering valve. |
| | (Voltage) Left/Right: Minimum and maximum voltages left/right for steering valve. |
| | *Note: You can configure the Plus+1 for Current mode or Voltage mode—this is visible based on the valve type selected.* |
| Spool Position | Left/Right: Minimum spool position of the valve (millimeters) for the wheels to start moving. |
| Lock to Lock Time | Left to Right: Lock-to-lock time going left to right. |
| | Right to Left: Lock-to-lock time going right to left. |
| P-Gain | A parameter used by the steering actuator. |
| Mount Bias | Roll: Roll mounting bias of the ECU. |
| | Pitch: Pitch mounting bias of the ECU. |

# eDriveX Implement Calibration Summary

The eDriveX Implement Calibration Summary screen (Menu > Diagnostics > eDriveX > Implement Calibration Summary) displays eDriveX implement calibration results.
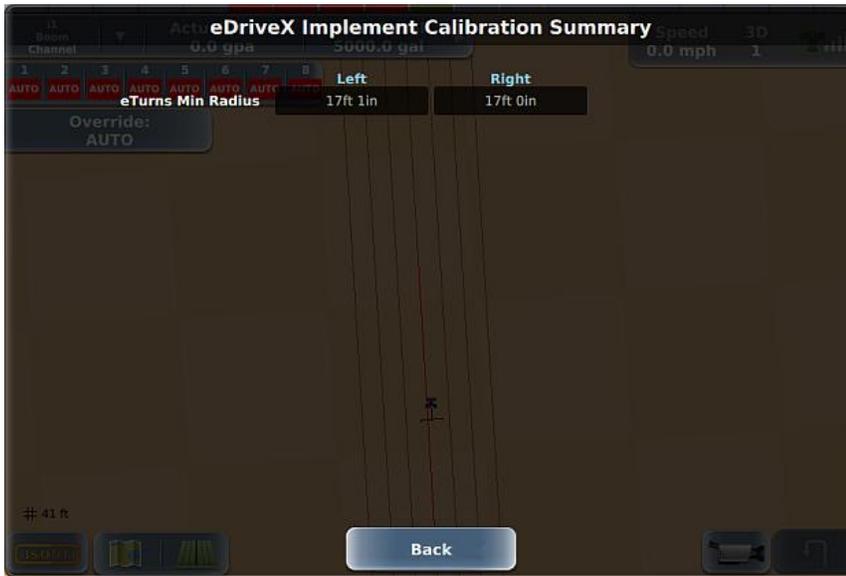


See "Calibrating eTurns" on page 174 for information on eDriveX implement calibration.

The following table describes each field on the eDriveX Implement Calibration Summary screen.

| Field | Description |
| --- | --- |
| eTurns Min Radius | Left: Turning circle (turning left) of the vehicle with the implement attached. |
|  | Right: Turning circle (turning right) of the vehicle with the implement attached. |

# eDriveX Service

The eDriveX Service screen (Menu > Diagnostics > eDriveX > Service) displays the currently installed eDriveX ECU firmware version (and upgrade version) and the ECU log number (for logging ECU data). Use the buttons on the screen to upgrade the ECU firmware and copy ECU log files to a USB drive. For both a Plus+1 and ESi valve type setups, the fields on this screen are the same—except the screen for an ESi setup also includes Current Version and Upgrade Version fields and an Upgrade button (similar to the eDriveX Firmware fields/button).



The following table describes each field on the eDriveX Service screen.

| Field | Description |
|---|---|
| eDriveX Firmware | Current Version: Current eDriveX firmware version. |
| | Upgrade Version: If you insert a USB drive (containing upgrade firmware) into the eDriveX ECU the firmware version appears in this field and the Upgrade button is enabled. |
| | Upgrade button: Enabled when you insert a USB drive (containing upgrade firmware) into the eDriveX ECU. Press Upgrade |
| ESi Firmware<br><br>(Only shown for ESi vehicles) | Current Version: Current ESi firmware version. |
| | Upgrade Version: Available upgrade version of ESi firmware. You do not download this firmware separately; it is part of the eDriveX ECU firmware package. |
| | Upgrade button: Enabled when current or newer version is available. |
| Log Extraction | ECU Log Number: Number associated with current data being logged. |
| | Copy Logs button: Enables you to copy (export) eDriveX log files to a USB drive. This button is active only after you insert a USB drive into the eDriveX ECU. |
| | To copy logs: |
| | 1. Insert a USB drive in the eDriveX ECU USB port. The Copy Logs button is enabled. |
| | 2. Press **Copy Logs**. A progress bar appears (during copying) followed by an export success message. |
| | 3. Press **Ok** to close the message. |
| Subscriptions | Serial Number field and Enter Code button: *For future use only* |
| Simulation | Status and Expiry fields: *For future use only* |

# Performing a Steering Test

*Note: Before performing a steering test, verify the steering wheel switch or pressure transducer (whatever is applicable to your installation) is properly connected.*

Perform a steering test to check the connectivity of the system. You typically perform a steering test when troubleshooting a steering issue or just after installing eDriveXC/XD. If performing the test just after installation, you do not need to perform all the steps of adding a vehicle (for example, you do not need to calibrate the vehicle for this test)—you need only enter the vehicle name, vehicle color, vehicle type, and valve type. See "Adding a Vehicle" on page 66 to complete these steps.

Test the steering with:

- Vehicle moving at no more than 4 kph (2.5 mph)
- eDriveX power switch in the 'AUTO' position

To perform a steering test:

1. Press **Menu > Diagnostics > eDriveX > Steer Test** to display the eDriveX Steer Test screen. If ESi is installed but not ready, 'Electric Wheel not ready' appears at the bottom of the warning.

   *Note: The Steer Test screen is slightly different depending on whether you have eDriveXC or eDriveXD connected—see below. However, the instructions from this point forward are similar.*



2. Review the WARNING at the top of the screen.

3. Start driving your vehicle, maintaining your speed between 0.0 and 4 kph (0.0 and 2.5 mph). The speed bar shows green if your speed is within limits or red if you are going too fast, with the black vertical line on the bar indicating the upper speed limit —see eDriveXC examples below.

- Speed bar is green when driving within the required range
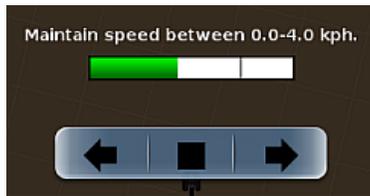


- Speed bar is red when driving too fast



4. Press the left arrow and verify the vehicle steers to the left. Press the stop button (square middle button) as soon as the direction is confirmed.

5. Press the right arrow and verify the vehicle steers to the right. Press the stop button as soon as the direction is confirmed.

If the system does not pass the steering test review the issues/solutions below and re-check your installation.

| Issue | Solution |
| --- | --- |
| Wheels move in wrong direction (left instead of right or right instead of left) | Swap the two cables connected to the solenoids of the eDriveX hydraulic block |
| Wheels do not move | Check for problems with each of the following system components:<br><br>• Hydraulics<br>• Wheel angle sensor<br>• Electronic components<br>• eDriveX harness |

# ESi Diagnostics and Status

*Note: You can display this screen only if you selected ESi as the valve type for your vehicle.*

The ESi Diagnostics and Status screen (Menu > Diagnostics > eDriveX > ESi Diagnostics) displays measurable details of the ESi system and hardware and run time status information.



The following status indicators can appear to the left of each Hardware and Run Time status item:

- Green check - OK (working properly)
- Red exclamation point - error

The following table describes each field on the ESi Diagnostics and Status screen.

| Field | Description |
|---|---|
| Identification | Firmware Version: ESi firmware version. |
| | Serial Number: ESi serial number. |
| | Mode: Mode of operation; displays 'Normal' when ESi is functioning properly. If a value other than 'Normal' appears, contact Outback Guidance Customer Service or your local dealer. |
| Metrics | CPU Load: ESi CPU peak load %. |
| | Temperature: ESi motor temperature. |
| | Up Time: Total cumulative time the ESi has been powered. |
| Hardware and Run Time status | All items will have a green check when the system is operating properly. A red exclamation mark indicates an error—contact Outback Guidance Customer Service or your dealer. |
| | The Aligned (Hardware) item will have a red exclamation point under any of the following conditions until you turn the wheel slightly: |
| | • ESi is first powered on |
| | • eDriveX is rebooted |
| | • Valve type is changed to ESi |

## PlusOne Diagnostics

*Note: You can display this screen only if you selected a Plus+1 valve type (such as AJX HIGH FLOW) for your vehicle.*

The PlusOne Diagnostics screen (Menu > Diagnostics > eDriveX > PlusOne) displays PlusOne steering controller information.



The following table describes each field on the PlusOne Diagnostics screen.

| Field | Description |
| --- | --- |
| Firmware | PlusOne steering controller firmware version. |

# AC110 Diagnostics

*Note: For ISOBUS implements, use the ISOUT window for diagnostics.*

The AC110 Diagnostics screen (Menu > Diagnostics > AC110 Diagnostics) displays such information as software version and flow rate for your AC110 connected implement. The information displayed on this screen depends on whether you are set up for liquid operation or dry operation (as shown below).

**Liquid operation**



**Dry operation**



The following table describes each field on the AC110 Diagnostics screen.

| Field | Liquid | Dry | Description |
| --- | --- | --- | --- |
| Version | X | X | Rate/section control (AC110) software version. |

| Field | Liquid | Dry | Description |
|---|---|---|---|
| Accumulated Volume | X | X | Total volume sprayed since last reset (increases with time)—you reset this value between jobs or for other longer-term calculations. |
| Clear Volume button | X | X | Resets the Accumulated Volume. |
| Boot Loader button | X | X | Update rate/section control (AC110) software. To update the software:<br>1. Make sure the AC110 files are in a folder named 'ac110' that is at the root level of a USB drive.<br>2. Insert the USB drive into the REBEL terminal.<br>3. On the AC110 Diagnostics screen press **Boot Loader**. A message appears instructing you to disconnect the switchbox and lightbar.<br>4. Disconnect the switchbox and lightbar (if installed and connected) then press **Ok**. When the loading process is complete (after a few minutes) a success message appears.<br>5. Press **Ok**. The Version field is updated. |
| Flow | X | X | Current flow rate |
| Pressure 1<br>Pressure 2 | X<br>X | | Pressure 1 and Pressure 2 values. See "Adding an AC110 Implement - Rate Control Settings for Non-Spreading Operations" on page 102 for more information on how this value relates to calibrating your rate control. |
| LowFlow Setting | X | | Current LowFlow value (manually entered). See "Adding an AC110 Implement - Rate Control Settings for Non-Spreading Operations" on page 102 for more information. |
| Spinner Speed | | X | Actual spinner speed |
| Meter Calibration | | X | Displays the value from the Meter Calibration field when calibrating your conveyor. See "Adding an AC110 Implement - Rate Control Settings for Dry Rate Control (Conveyor)" on page 107 for more information. |
| Meter Calibration Adjusted | | X | Actual meter value based on adjustments to the following values:<br>• Density Calibration<br>• Gate Height<br>• Volume Calibration<br>See "Adding an AC110 Implement - Rate Control Settings for Dry Rate Control (Conveyor)" on page 107 for more information. |
| Power Duty Cycle Conveyor | | X | *These fields are used for troubleshooting purposes only when directed by Outback Guidance Customer Service.* |
| Raw Frequency Conveyor | | X | |
| Power Duty Cycle Spinner | | X | |
| Raw Frequency Spinner | | X | |

# ISOBUS Diagnostics and Troubleshooting

The ISOBUS Diagnostics screen (Menu > Diagnostics > ISOBUS Diagnostics, or Menu > Settings > ISOBUS Settings > Diagnostics) lists all ECUs on the CAN bus. Selecting an ECU in the list displays diagnostic information for that ECU. For more information see "ISOUT Overview" on page 50 and "ISOBUS Settings" on page 39.

*Note: You should only need to refer to this screen when directed by Outback Customer Service.*
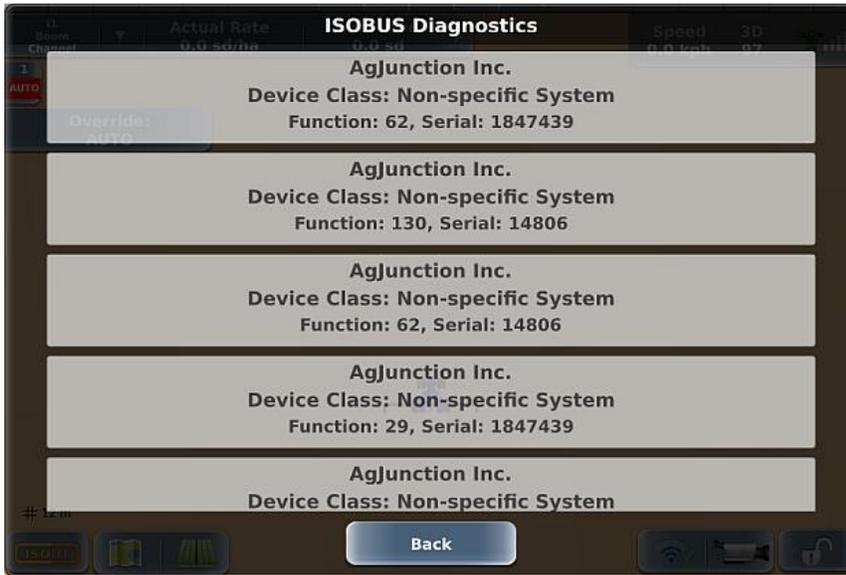


When you select an item in the list a details window appears for that item (ECU) as shown below.
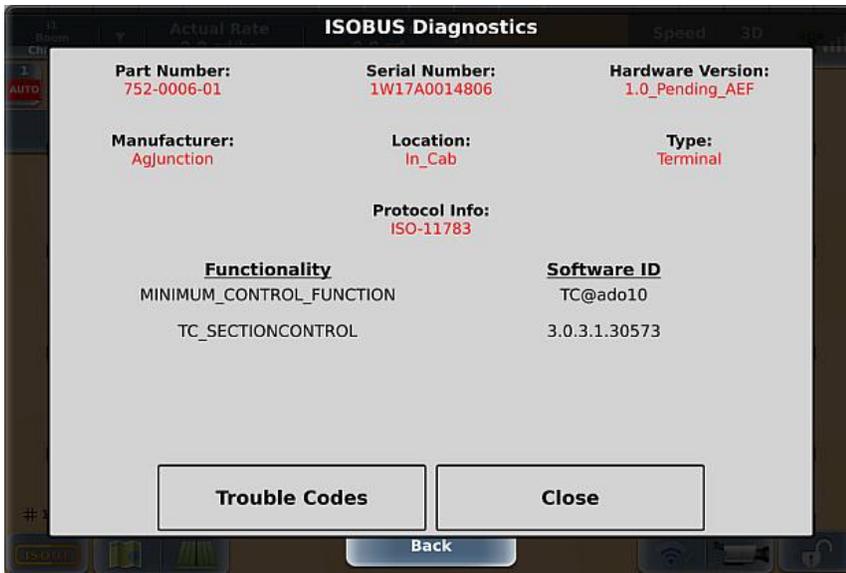


Press **Close** to close the details window (and show the list of ECUs). If you do not close this window the next time you display the ISOBUS Diagnostics screen this window will still be visible.

*Note: Pressing Trouble Codes displays a list of error codes the ECU is reporting. Contact your ISOBUS implement manufacturer or dealer for more information.*

The following table describes each field on the ISOBUS Diagnostics details screen.

| Field | Description |
|---|---|
| Part Number | ISOUT part number |
| Serial Number | ISOUT serial number |
| Hardware Version | ISOUT hardware version |
| Manufacturer | ISOUT manufacturer |
| Location | ISOUT location |
| Type | ISOUT type |
| Protocol Info | ISOBUS protocol |
| Functionality | ISOUT functions/tasks |
| Software ID | ISOUT model<br>ISOUT software version<br>ISOUT server version<br>Task Controller version |

Review the following before troubleshooting ISOUT issues.

- If  appears above the ISOUT button on the map, press it to display the Error/Warning Log screen that has the following buttons:
    - **Dismiss All** closes all errors and returns you to the map (warning button no longer displayed because you dismissed all errors).
    - **Hide** closes the Error/Warning Log screen and returns you to the map (warning button still displayed and the errors/warnings remain).

- If  flashes red, press it to display the ISOUT window then follow any onscreen instructions to resolve the error.

# Capturing Screen Images

If you notice something on the touchscreen that you either do not understand or want to save for later review you can take a screen capture of the entire display. Insert a USB drive (with a "screenshots" folder at the root level) into the terminal and the Favorites button functions as a screen capture tool.

To capture screen images:

1.  Create a "screenshots" folder on a USB drive (case does not matter...for example, "screenshots" and "Screenshots" are both acceptable).
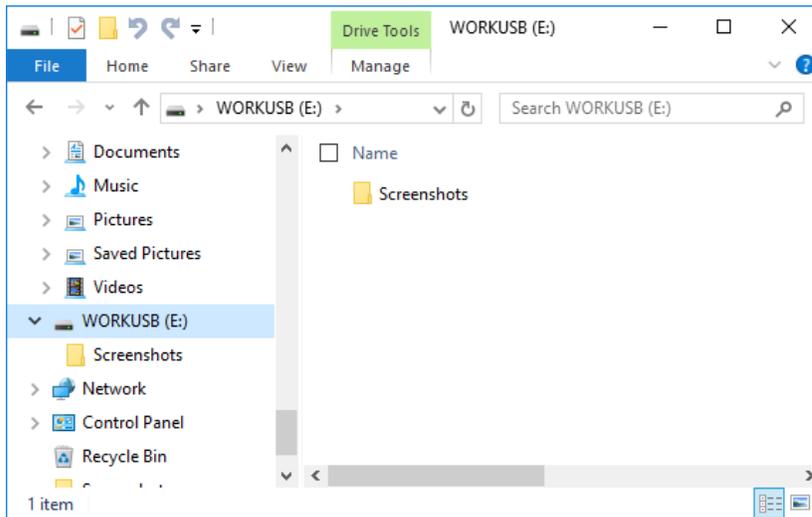


2.  Insert the USB drive in the USB port on the REBEL terminal.

3.  When REBEL displays the screen you want to capture, press the Favorites button. REBEL displays a screenshot message on the display (below) and saves a capture of the entire screen as a .png file in the screenshots folder on the USB drive.



Screenshot Taken:
ado10_29975-11_30_17-18_05_50.png
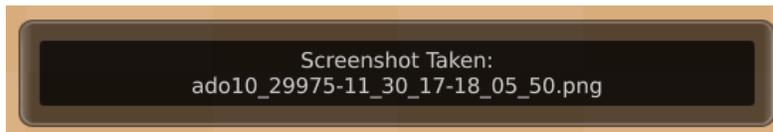
4.  When you view the contents of the USB drive the "screenshots" folder shows the screenshot filename (shown below) as that shown in the screenshot message (see previous step).
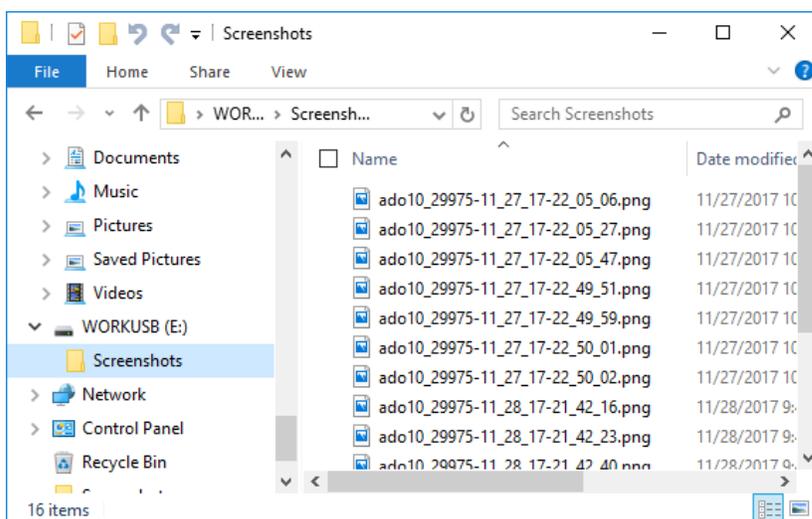
# Registering REBEL

If you did not register REBEL upon first bootup, you can use the Subscriptions screen to register your product. Make sure you are connected via Wi-Fi before registering and follow all onscreen instructions.

To register REBEL:

1.  Press **Menu > Settings > Subscriptions > Registration** to display the first registration screen.

2.  Press **Next**, then connect to your Wi-Fi network—see "Networking Overview" on page 43 for more information.

3.  Upon a successful Wi-Fi connection, press **Next**., then enter your personal information. For each required field in red, press the adjacent **Edit** button to display a keypad, enter a value, then press **Done**. After completing all fields, the field labels turn blue.

4.  Press **Register**. When registration is complete ('Registration Successful' appears on the screen), press **Complete** to return to the Subscriptions screen.

5.  Press **Back** then close/hide the panel or press **Menu** to close the panel.

# Chapter 11: Updates to Rebel

This is information on the new features that are available with software version 3.1.3.4.

Updates covered in this section:

# Atlas Settings

*Note: You must have a valid Atlas subscription to use Atlas corrections for guidance.*

With Correction Type set to Atlas, use the Atlas Settings panel to edit your Atlas settings. However, you will typically use the default settings. For more information the connection type, see the following topic:

To edit Atlas settings:

1.  Press **Menu > Settings > GPS Settings > Atlas Setting**s. The Atlas Settings panel appears. Manual Override is set to Off by default—when set to Off the Baud Rate and Frequency buttons are disabled.
2.  Press **Manual Override** and select **On**. The Baud Rate and Frequency buttons are enabled (see below).
3.  Press **Baud Rate** then select an option.
4.  Press **Frequency**, enter a value, then press **Done**. *Note: You must enter a value between 1500 and 1600 (MHz); otherwise, an error message appears after you press Save in the next step.*
5.  Press **Save**, then close or hide the panel.

*Note: If you edit Atlas settings and then turn Manual Override to Off, REBEL does not retain the edited settings the next time you turn Manual Override to On.*

# Atlas Status

The Atlas Status screen (**Menu > Settings > GPS Settings > Atlas Status, or Menu > Diagnostics > GPS > Atlas Status**) shows information related to your Atlas subscription and functionality.

**Users will notice a change in the Std Dev and Diff Age readings from SBAS and Atlas. The algorithm that has always been used is 1 sigma on SBAS and 2 Sigma on Atlas. The 2 Sigma is the more accurate representation of signal error. For Atlas correction, Diff Age is 10-18 seconds.**

The following table describes each field on the Atlas Status screen:

| Field/Button | Description |
| --- | --- |
| Version | Atlas service library version. |
| Subscription | Atlas subscription. |
| Expiration Date | Subscription expiration date. |
| Tracking | Atlas tracking status. |
| Frequency | Frequency of Atlas satellite. |
| Satellite Longitude | Satellite location (longitude) that covers the area in which you will be working. |
| Satellite Elevation | Elevation of Atlas satellite. |
| Satellite Azimuth | Azimuth of Atlas satellite. |
| BER | (Bit error rate) Relative strength of the correction satellite. The number can be from 0 to 500, with 0 being the best and 500 being the worst. If BER > 20 verify the antenna has a clear view of the sky to properly find and track correction satellites. For Atlas the numbers before and after the hyphen will be the same. |
| Status | Current status level (possible values are Tracking and Converged). |
| Correction Type | User-selected correction type |
| Serial Number | GNSS serial number |
| Station ID | Pseudo base station ID for troubleshooting purposes. |
| Diff Age | Age of the corrections used in the DGPS calculation. For Atlas correction, Diff Age is 10-18 seconds. |
| Atlas Tuning | Spot beam information for Atlas satellite in use by the REBEL receiver. |
| Autoseed button | Set to On to have REBEL automatically use the last known position to reduce Atlas convergence time. Default is On. |

The following table describes each field on the GPS Status screen for ATLAS correction type.

| Field | Description |
| --- | --- |
| Time | Current time |
| Latitude | Vehicle's current latitude position |
| Longitude | Vehicle's current longitude position |
| Altitude | Vehicle's current altitude |
| Speed | Vehicle's current speed |
| Heading | Vehicle's current heading in degrees |
| Diff Age | Age of the corrections used in the DGPS calculation. For ATLAS, Diff Age is 10-18 seconds. |
| Std Dev | (Standard deviation) Pseudo-estimate of the DGPS solution accuracy determined as the RMS value of the positional residual errors. Std Dev is valid only if 6 or more satellites are used in the solution calculation. Std Dev for Atlas: Basic is .5, Atlas BA is .3, and Atlas RC is .1. |
| Status | Status of the GPS receiver to receive GPS differential corrections |
| Correction Type | Type of differential correction being used. Correction Type is Atlas for all Atlas corrections. *(To see current Atlas correction, see Subscriptions page)* |
| Station ID | ID of correction station |
| Sats Used | Number of GPS satellites used to calculate the position |
| Signals | GNSS signals being used |
| Quality | Quality of GNSS signals |
| SBAS PRN | Satellites used by SBAS |
| BER | Bit error rate |
| | Relative strength of the correction satellites. In the case of WAAS, two numbers are shown separated by a hyphen. The number can be from 0 to 500, with 0 being the best and 500 being the worst. |
| | If BER > 20 verify the antenna has a clear view of the sky to properly find and track correction satellites. REBEL tracks multiple correction satellites, each satellite has a different BER, and the value in the BER field represents each value separated by a hyphen. |
| | For example, a value of 8-500 means REBEL has a very good signal on one satellite (BER=8) and is not receiving corrections from the other satellite (BER=500, the lowest reception value). Only one satellite must have a low BER value (less than 20) to provide differential corrections. |
| Available Diff | Differential corrections the receiver is getting |
| Excluded | Differential corrections the receiver is not using (excluded from the differential solution) |
| Modes | Current operating modes that control various GPS tracking parameters |
| Accuracy | RTK accuracy status value |

# Atlas Levels

There are 3 levels to Atlas: Basic (B), Broad-Acre (BA), and Row-Crop (RC).

- Atlas Basic
  - is included with all A222s and is required for Broad-Acre and Row-Crop subscriptions.
  - is a replacement for eDiff.  Only use if SBAS is unavailable.
  - is less accurate then SBAS.

- Atlas Broad-Acre (BA)
  - adds decimeter level GPS accuracy.

- Atlas Row-Crop (RC)
  - adds centimeter level GPS accuracy.

# Atlas Subscriptions

Subscriptions are required for Atlas Broad-Acre and Row-Crop. Atlas Broad-Acre subscription is for 1 year, and Atlas Row-Crop can be a 3 month or 1 year subscription.

Once a subscription expires, the correction type will revert to Atlas Basic, and GPS accuracy level will decrease. In the picture below, the circle shows where the Atlas subscription level and expiration date will be located.  If it shows "Expires: Never", this means it is on Atlas Basic.
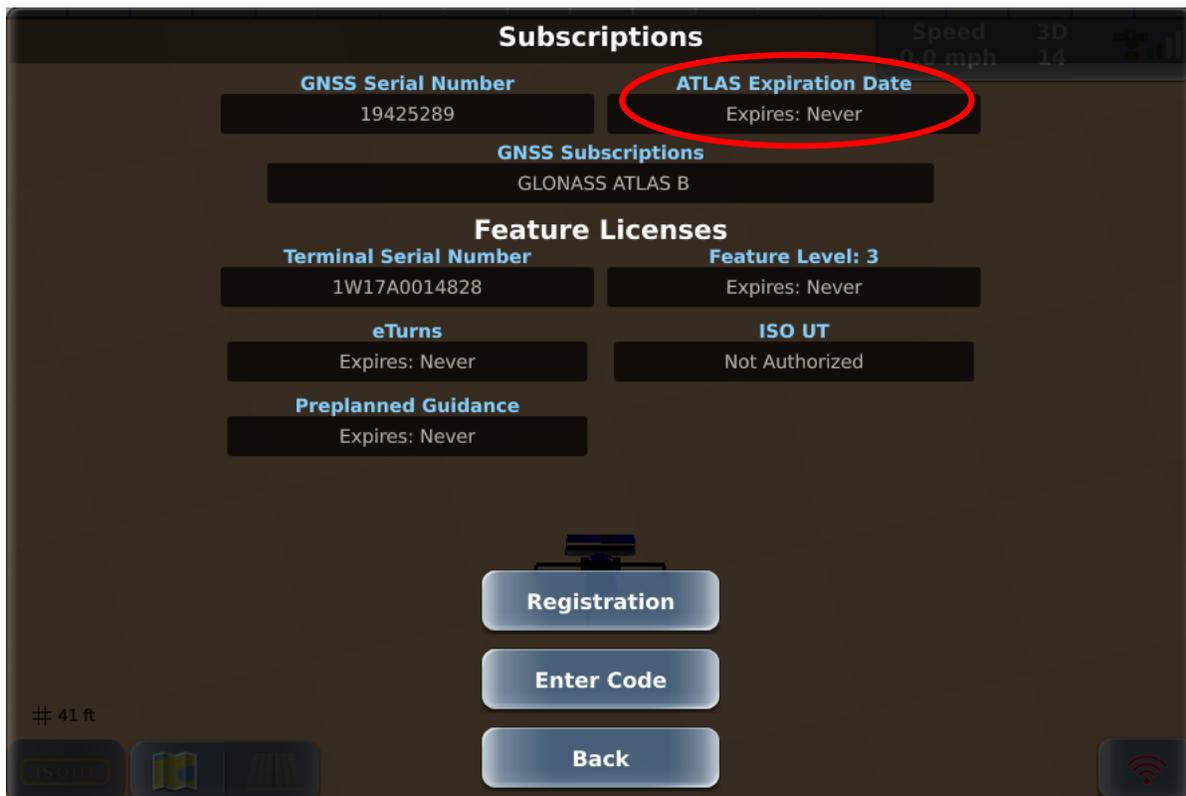
# Atlas Basic

Atlas Basic - GPS Status



Atlas Basic - Receiver Status

Atlas Basic - Atlas Status



Atlas Basic - Subscriptions

# Atlas Broad Acre

Broad Acre - GPS Status



Broad Acre - Receiver Status

Broad Acre - Atlas Status



Broad Acre - Subscription

# Atlas Row Crop

Row Crop - GPS Status



| | | | |
|---|---|---|---|
| **Time** | **Latitude** | **Longitude** | **Altitude** |
| 20:55:26 | 39.84794880 | -95.56245305 | 355.95 |
| **Speed** | **Heading** | **Diff Age** | **Std Dev** |
| 0.00 mph | 176 | 15 | 1.04 |
| **Status** | **Correction Type** | **Station ID** | **Sats Used** |
| 3D Diff Fix | ATLAS | 4715 | 8,0,0,0,1,6 |
| **Signals** | **Quality** | **SBAS PRN** | **BER** |
| L1,L2,G1,G2,B1,E1B | C,D,C,D,D,D | 138, 138, 138 | 0-0 |

| | |
|---|---|
| **Available Diff** | SBAS, ATLAS |
| **Excluded** | SBAS, RTCM2, e-Dif, DFX, CMR, RTCM3, ROX, BEIDOU |
| **Modes** | GLOFIX MIXED SURETRACK |
| **Accuracy** | DIFF_PROB HORZ_POS_POOR POOR_L1_SNR NOT_IN_RTK |

41 ft

Back

Row Crop - Receiver Status



| | | | |
|---|---|---|---|
| **Receiver** | **Applications** | **GPS Firmware** | **GLONASS State** |
| A222 | MFA, MFA | 5.9Aa07x5 | Enabled |
| **Serial Number** | **Active** | **Bootloader** | **GNSS Out** |
| 19425289 | MFA | 161 | GPS, GLONASS, BEIDOU |
| **Active Mode** | **Fleet** | **HW Version** | **Production Date** |
| ATLAS | 20 | 1 | 28032019 |
| **Diff Age** | | | |
| 15 | | | |

| | |
|---|---|
| **Subscriptions** | L2  GLONASS ATLAS B, RC |

41 ft

Back

Row Crop - Atlas Status



Row Crop - Subscriptions

# Text Size (System Preferences)

Use the slider on the System Preferences (Menu > Settings > System Preferences) panel to adjust the text size on the screen (far right slider). As you move the sliders the system provides feedback on the new settings:

- Moving the slider up will increase the size of the text.

- Moving the slider down will decrease the size of the text.
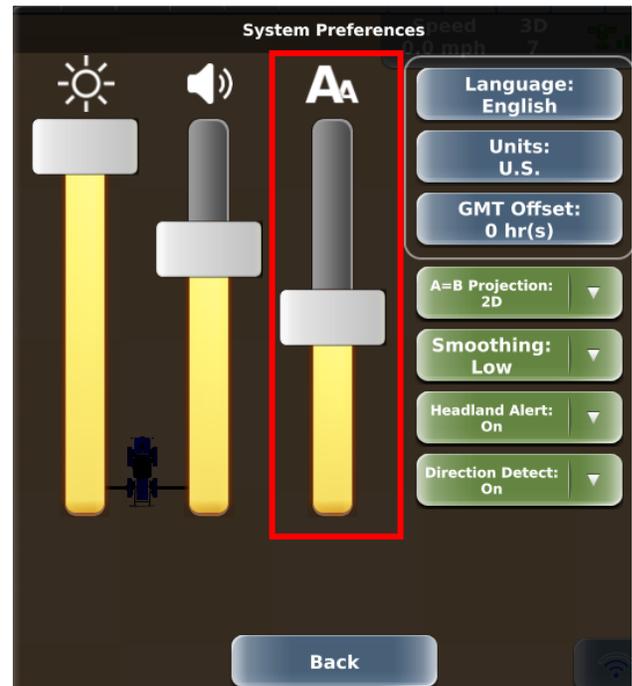
# NMEA Settings Options

The following are the max setting options for NMEA on the Rebel:

Baud Rate:    4800, 9600, 19200, 38400, 57600, and 115200

GGA: 10Hz   VTG: 10Hz    GSA: 10Hz    RMC: 10Hz

ZDA: 10Hz    GLL: 10Hz     RTCM3: 1Hz GSV: 1Hz

GST: 5Hz