



AGRICULTURE

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NextSwath

Note: This feature is optional and requires a license. See [App Central: Installing Licenses from a USB Drive](#).

The Trimble® NextSwath™ feature is used to automatically turn the vehicle at the end of a straight line guidance pattern to align with the next selected swath. Vehicle functions on some specific vehicles can also be used for more efficient operation.

Even if you have used other guidance systems before, Trimble recommends that you spend some time reading this manual to learn about the special features of this product.

The following sections describe how to set up and operate the Trimble NextSwath end-of-row turn technology:

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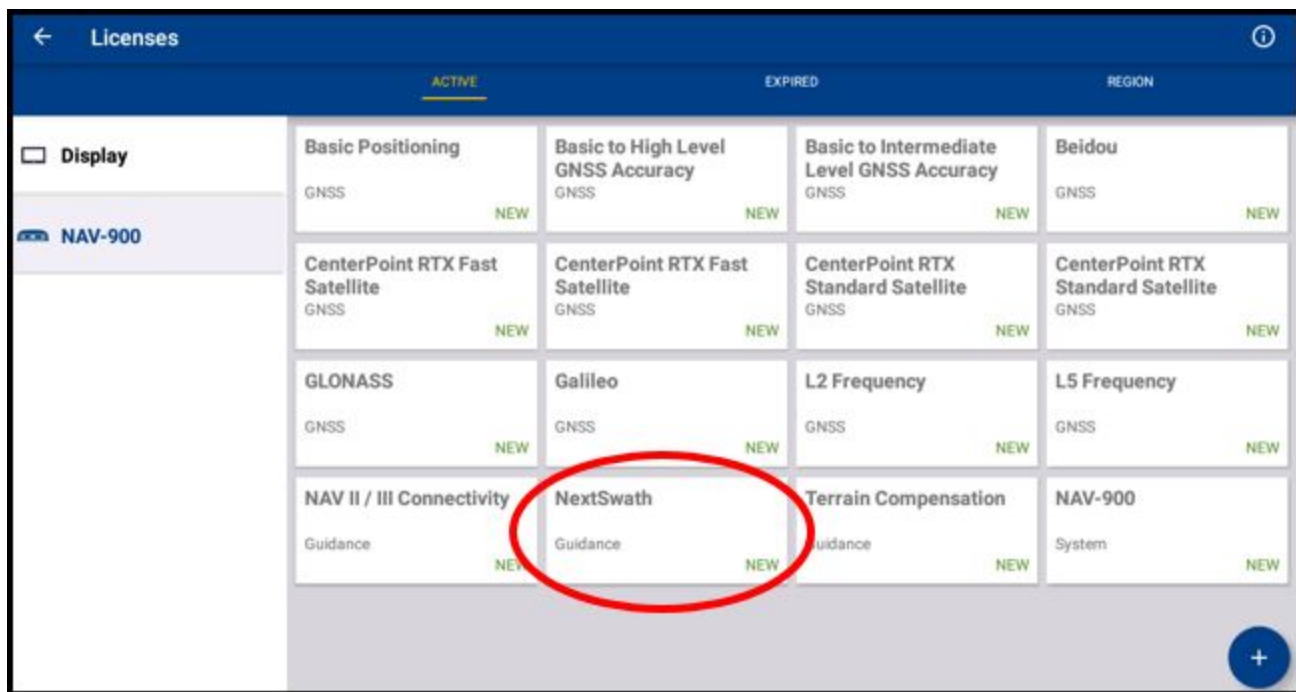
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NextSwath Dependencies

NextSwath requires an installed license into the NAV-900 controller and is managed through the display. The license is found in App Central:



Note: NextSwath is also supported displays (such as the TMX-2050 display) with a connected NavController III.

NextSwath Requirements

The NextSwath feature consists of two parts:

- NextSwath end-of-row technology, which enables both end-of-row turning and simple event timing commands.
- NextSwath Connect, which uses the vehicle's end-of-row operational controls to trigger the interface, is only available with NavController III.

CAUTION!



NextSwath technology cannot be used with Autonomous, SBAS, or OmniSTAR® VBS correction sources. RangePoint RTX Correction Service is the minimum supported correction service.

NextSwath technology within Precision-IQ within TMX-2050/XCN-2050 version 4.6 does not support the RG-100 row guidance system or True Tracker.

The following technologies are required before configuring and using NextSwath:

- NextSwath technology requires the Autopilot steering system to be installed.
- NextSwath technology can be used only with vehicles defined as capable in the supported platforms list.
- NextSwath requires the use of internal vehicle profiles found within the Precision-IQ application.
- OnSwath advanced line acquisition is a requirement for using NextSwath technology.
- NextSwath technology requires one of the following GNSS correction sources:
 - OmniSTAR® XP
 - OmniSTAR HP
 - RangePoint® RTX
 - CenterPoint® RTX (SS, FS, SC)
 - CenterPoint RTK
 - Trimble® VRS Now™

Implement Setup for NextSwath

1. Select an implement type and give the implement a name. On the Implement Hitch screen, the **Hitch Type** and **Hitch to Application Point** values are required.
2. Tap **Next**.
3. On the Implement Measurements screen, update the values that are available for NextSwath technology. The following table describes the options you can configure:

NextSwath Option	Description
Application Width	Enter the width of the operation that is actually performed by the machine or implement. This width is used for determining area covered.
Swath Width	Enter the width that is required for guidance line separation and turn planning.
Left/Right Offset	Enter the left or right offset of the center line of the implement from the center line of the vehicle.
Physical Width	Enter the physical width of the implement.
Physical Length	Enter the physical length from the front to the rear of the implement.

Vehicle Controller Setup for NextSwath

As part of the Autopilot setup, enter additional measurements that are used for modeling purposes for the NextSwath technology and, as required, for the TrueSwath technology. Once you have completed/checked the entries in the *Vehicle / Edit / Guidance - Antenna and Measurements* screen, tap **Next**, and then tap **Save**.

1. On the Vehicle Guidance - Antenna screen, enter values for the following antenna attributes:
 - Antenna Height
 - Antenna Left/Right Offset

- Antenna to Rear Axle: If the antenna is forward of the axle, then the value is positive (+). If the antenna is behind the axle, then the value is negative (-), for example, -1.0 ft 3.0 in.

Tap **Next**.

2. On the Vehicle Guidance - Measurements screen, enter values for the following measurements:
 - Rear axle to tow hitch
 - Rear axle to 3-point hitch
 - Wheelbase
 - Width
3. Enter the following values:

Measurement	Description
Fixed Axle to Tow Hitch	<p>Measure the distance from the control point of the vehicle to the center point of the drawbar hitch pin. The control point depends on the vehicle type:</p> <ul style="list-style-type: none"> ● MFWD: Rear axle ● Tracked tractor: Center of rotation ● Sprayers: Rear axle ● Combine/Harvesters: Front axle ● 4WD/Articulated: Rear axle <p>Note: If you are using a two-point hitch, measure the distance from the fixed axle to the pivot point on the apparatus.</p>
Fixed Axle to 3-Point Hitch	<p>Measure the distance from the control point to the location where the three-point fixture, feeder, house, or boom attaches. This measurement is also used for fixed applications such as harvesting and spraying with a self-propelled sprayer. For front-mounted implements such as swathers, combines, and front-boom sprayers, you must make sure to set the offset to front.</p>
Vehicle Width	Enter the physical width of the widest part of the vehicle.

Configuring NextSwath

When enabled, NextSwath is part of the implement setup in Precision-IQ.

Note: If your implement does not support NextSwath, then this option will not appear.

On the NextSwath screen, tap the on/off slider to enable NextSwath. Tap the Edit button to begin NextSwath configuration.

1. **Turn Pattern:** Set the Turn Pattern values:
 - a. **Type of Path:** There are two options to define the required turn trajectory:
 - Shortest (sharper turn): This is based on the swath width, the steering angle settings for the OnSwath technology, and the minimum turn radius (see below). This setting will turn as short as possible - generally the default.

- **Smoothest (rounder turn):** This is used for large applications (wide spraying, some tillage, and so on) in which a smooth, gentle turn is required. This setting uses the smallest constant radius to make the desired turn. For larger numbers of swaths changed in a turn, the radius expands.
- b. **Turn Pattern:** When the steering system limitations and swath width do not allow a turn to be completed within the distance between swaths, the system must go outside the swath lines. There are three options for how the system will do this:
- Turn wide at start: All turning outside of the swaths is done at the start of the turn.
 - Keyhole: An equal amount of turning outside of the swath region is done on each side of the turn.
 - Turn wide at end: All turning outside of the swath region is done at the end of the turn.

Note: When TrueSwath technology is used with this setting, the path the vehicle must take to bring the pull-type implement online affects the shape of the turn.

- c. **Swath Change Limit:** This defines the largest number of swaths that can be changed during a turn left or right. The value can be set to the smaller of 10 swath widths or a distance of 500 ft (150 m).

NextSwath technology makes a turn perpendicular to the swath direction so that when changing multiple swaths where the swaths intersect the boundary at a sharp angle, the path between the selected swaths will be extended to accommodate the furthest swath end point.

Tap **Next** to continue.

2. **Turn Location:** Set the Turn Location values:

- a. **Shorten or Extend Swath:** When using a headland pattern or turn points determined by a boundary offset, you can select one of the following options to define how the system should make the turn:
- **Minimize headland usage (shorten):** This potentially starts the turn inside the infill area to allow for the full turn to be completed while minimizing use of the headland area. When using NextSwath technology for operations in which the swath lines do not intersect the boundary at a square angle, the point for the line that is closer in will be used.
 - **Maximize infill coverage (extend):** This starts the turn at the boundary between the headland and the infill so that all of the turn happens outside the infill, provided there is space to do so within the headland area/outer boundary. When using NextSwath technology for operations in which the swath lines do not intersect the boundary at a square angle, the point for the line that is further out will be used.

Note: The ability of the vehicle to stay within the headland depends on the number of circuits or offset distances defined by the user.

- b. **Turn Within Boundary:** This parameter can be enabled for the vehicle, the vehicle and implement, or disabled. When set to:
- **Vehicle:** A turn will be planned so that the outside of the vehicle (based on the width entered in vehicle measurements) clears the edge of the boundary by the value entered in the Boundary Clearance field.
 - **Vehicle and Implement:** A turn will be planned so that the outside edge of the vehicle/implement combination (based on the physical dimensions of the vehicle and

implement that have been entered) clears the edge of the boundary by the value entered in the Boundary Clearance field.

- **Disabled:** The turn location will be set by the active swath A and B points.

Note: For boundary clearance to be used the field must have a mapped boundary. If no boundary is available for the field; turn locations will be based on the A and B points of the swath. It is the operator's responsibility to ensure that the mapped boundary is accurate for the field.

WARNING!



Obstacle avoidance is solely the responsibility of the Operator. A trained and qualified operator must be present in the vehicle at all times.

CAUTION!



NextSwath boundary clearance relies on accurate vehicle steering settings and boundary mapping. Inaccurate boundaries will cause inaccurate clearance.

- c. **Boundary Clearance:** Set the distance (inside or outside) by which you want the boundary to be avoided.

Note: Due to geometry limits of field shapes and shrinking/expanding boundary clearance distances; the NextSwath technology may not be able to generate auto-turns based on the clearance distances entered.

- d. **TrueSwath Swath Extension:** When using TrueSwath technology, a distance offset to delay the vehicle turning into the end rows/headland circuit may be required to allow for proper coverage. Adjust this value to alter the distance as required.

Note: The Autopilot system's end-of-row warning distance/end-of-row time dictates when the prompt for acknowledging the automated end-of-row turns appears when approaching the turn point.

Tap **Next** to continue.

3. **Parameters:** Set the Parameters value:

- a. **Turn Speed:** The speed designated for auto turns and the speed for which the turn will be optimized.

If the vehicle travels at a speed that is more than 1.1 mph (0.5 m/s) faster than the entered turn speed value, the NextSwath technology will not start the turn. Any speed that is slower than the turn speed is allowed. If, during the turn, the set speed is exceeded by 1.1 mph (0.5 m/s), the system will disengage and the turn will be abandoned.

It is recommended that you set this value to the highest speed for which turns will be made.

Note: OnSwath settings for the maximum nominal steering angle, maximum nominal steering slew rate, and aggressiveness affect the path of the planned turn.

- b. **Minimum Turn Radius:** This is the minimum turn radius for which the turn will be planned. Determine the radius by driving the vehicle and implement combination in the tightest turn required and then measuring the radius (half of the diameter) of the path of the control point of the vehicle (that is, the path of the center of the rear axle for MFWD or center of front axle for combines, and so on).

If the turn speed and OnSwath settings dictate a larger turn radius than the radius entered, the larger radius will be used.

These settings apply to both regular and TrueSwath-enabled turns. This setting will not affect line acquisition.

- c. **Remote Engage Confirms Auto Turn:** Enable this feature to allow the use of the remote engage button to accept the NextSwath turn as an alternative to touching the Run screen when the end-of-row automated turn notice appears.

Note: Remote engage systems wired directly into the NavController will work with this functionality. CAN-based remote engage systems may or may not work depending on the vehicle manufacturer's message protocol.

Tap **Next** to continue.

4. **Turn Start Actions:** Set Turn Start Actions values. Tap **Add** or a previously configured action row to edit the following event parameters:
- Action:** Select the operation for which you want to set reminders or sequencing.
 - Distance or Time:** Select whether to use a Time or Distance offset for the action.
 - Distance Before or After Turn:**
 - When Time or Distance is selected, enter the action offset value.
 - When When is selected, enter the required offset and whether it should happen before or after the turn is complete, when entering the swath.
 - Reference:** Sets the reference point the action will coordinate with. Choose one of the following:
 - Vehicle, which uses the control point of the vehicle.
 - Implement Application Point, defined in Implement/Measurements.
 - Implement ground contact point, defined in Implement/Measurements.
 - Sound Alert:** Enable or disable an audible alert from the sonalert and display.
 - Text alert:** Determines if the action appears in the list of user prompts during turning activity.

Note: When using "Log when engaged" for managing coverage logging; to stop logging after turning, you must set up a Stop application action. Adjust the "When" value to obtain the proper coverage. It is recommended that you use distance rather than time, as time is affected by travel speed.

Tap **Next** to continue.

5. Turn End Actions: Set the Turn End Actions values. Tap **Add** or a previously configured action row to edit the following event parameters:
 - a. **Action:** Select the operation for which you want to set reminders or sequencing.
 - b. **Distance or Time:** Select whether to use a Time or Distance offset for the action.
 - c. **Distance Before or After Turn:**
 - When Time or Distance is selected, enter the action offset value.
 - When When is selected, enter the required offset and whether it should happen before or after the turn is complete, when entering the swath.
 - d. **Reference:** Sets the reference point the action will coordinate with. Choose one of the following:
 - Vehicle, which uses the control point of the vehicle.
 - Implement Application Point, defined in Implement/Measurements.
 - Implement ground contact point, defined in Implement/Measurements.
 - e. **Sound Alert:** Enable or disable an audible alert from the sonalert and display.
 - f. **Text alert:** Determines if the action appears in the list of user prompts during turning activity.

Note: When using "Log when engaged" for managing coverage logging; to start logging after turning, you must set up a Start application action. Adjust the "When" value to ensure the proper coverage. It is recommended that you use distance rather than time, as time offsets change with speed.

Tap **Next** to continue.

6. **NextSwath Connect:** Set the NextSwath Connect values.

For implementation, you must purchase the NextSwath Connect unlock and use a NavController III to output the signal from the third solenoid. As there is only one solenoid output on the NavController III, only one button can be triggered.

You can use this output to initiate a recorded sequence on the vehicle only. You must set up the timing for the sequences using the interface on the tractor. Refer to the tractor operator's manual for recording methods. You can adjust the timing for the start of the sequences by changing the Occurs Before/After value in the Swath Start Events/Swath End Events tabs for the Sequence A and/or Sequence B event.

Note: You cannot use Vehicle Integration on vehicles that use the third solenoid output for the "On when engaged" function.

7. Tap the **Save** icon to save the settings.

With the configuration settings saved, you are now ready to use NextSwath.

Running NextSwath

This section describes how to run the NextSwath technology.

CAUTION!



The NextSwath technology is designed to only be used with straight AB, A+, and headland infill patterns. It does not work with curve patterns, pivot patterns, freeform, or feature line guidance.



The following topics are provided for running NextSwath:

- [Engaging NextSwath](#)
- [Using NextSwath End-of-Row Auto Turns](#)
- [Setting the End-of-Row Point](#)
- [NextSwath Operating Tips](#)

Engaging NextSwath




From the Home screen, tap the Run button to enter the Run screen. NextSwath is accessed and used from the Precision-IQ Run screen.

The NextSwath slide-out menu provides the interface for you to select an action described in the following table:

NextSwath Action	Description
Enable NextSwath	Tap to enable NextSwath technology. Each time you enter a field or create/load a new swath, you must enable the NextSwath technology and accept the liability warning. Within the same session you can disable/re-enable the NextSwath technology without needing to accept the liability warning.
	Tap to select between an auto-initiated turn or a manually-initiated turn. The system defaults to auto-initiation and will prompt you at the end-of-row warning location if you would like to turn the selected direction. Note: A direction that remains within the field boundary must first be selected. To carry out a manually-initiated turn, select the manual button and then set the turn direction. If the speed requirements are met for a NextSwath turn and you are engaged on a swath, you can tap the manual turn start button.
	Tap to select the turn direction and number of swaths to change. To create an automatic turn, you must select a swath to turn onto. To do this, tap the left or right arrow button to select the direction and by how many swaths the turn will

	<p>be made. The number of swaths allowed each way is entered in the Swath Change Limit field when you set up the system, see Configuring NextSwath.</p> <p>The selected swath appears in yellow with green borders on the Run screen, and the direction and number away from the current swath appear on the panel.</p> <div style="border: 1px solid red; padding: 5px;"> <p>Note: The direction refers to the forward travel direction of the vehicle. The system does not turn around back onto the same swath. Once the first automatic turn is complete, the next automatic turn that is prompted by an end-of-row location will be auto-populated with a turn in the opposite direction but with the same number of swaths changed as the previous turn.</p> </div> <p>If no swath is selected, this is indicated by a dash on the swath number indicator.</p> <div style="border: 1px solid red; padding: 5px;"> <p>Note: The direction refers to the forward travel direction of the vehicle. The system does not turn around back onto the same swath. Once the first automatic turn is complete, the next automatic turn that is prompted by an end-of-row location will be auto-populated with a turn in the opposite direction but with the same number of swaths changed as the previous turn.</p> </div>
Turn Actions	<p>Tap to enable or disable the Turn Actions as configured in Implement Setup for NextSwath. When performing a manually initiated automated turn, and with the Turn Action button enabled, the earliest programmed event will start when you tap the Turn Now button and work toward the turn.</p>
Enable TrueSwath	<p>Tap to enable TrueSwath implement turn compensation. Use the TrueSwath implement turn swath button in association with, or independently of, automated turns.</p> <p>Either when performing an automated turn or during line acquisition, a yellow path for the implement is plotted for drawn implement types in addition to the green path for the vehicle.</p> <p>When used in an automated turn, the TrueSwath swath extension offset is added to the turn point to allow the implement to reach the turn point before the turn is started.</p> <div style="border: 1px solid red; padding: 5px;"> <p>Notes:</p> <ul style="list-style-type: none"> • The parameters entered in the setup for vehicle control point-to-hitch offset and hitch-to-ground contact point dictate the path planned for the implement. Adjust these values to change performance. • Rigid mounted implements (those using the three-point hitch) cannot use the TrueSwath technology. </div>

The **Turn Now** button shows the status of automated turns. The direction of the turn is indicated by the arrow direction. There are three states available for the Turn Now button:

Icon	State	Description
	Ready (yellow)	Automated turns are ready. Tap to start a turn.
	Turning (green)	The system is counting down to a turn or turning. Tap to cancel the automated turn.
	Disabled/error (red)	Automated turns are not available. Turns must be enabled, with a valid direction selected. The vehicle speed must be at or below the turn speed.

Using NextSwath End-of-Row Auto Turns

When the vehicle arrives at the end-of-row location and if the NextSwath technology is enabled, you are prompted to auto turn at the end-of-row point.

The first occurrence requires the operator to indicate the swath to turn to as well as enabling the Turn End/Start events and TrueSwath technology.

Each following turn will auto-populate with the settings of the previous turn except that it will be in the opposite direction (to keep the operation moving in the same cardinal direction).

If it can be generated (based on field geometry and entered offset distances, see Turn Location tab in [Configuring NextSwath](#)), the proposed path appears on the Run screen. The NextSwath technology will not propose paths that turn a vehicle outside of a field boundary.

You can:

- Dismiss the auto turn and either initiate an auto turn at the required location or drive the vehicle manually.
- Adjust the auto turn. Open the NextSwath control panel to adjust the turn settings and/or manually initiate an auto turn.
- Accept the auto turn as presented by pressing the Auto Turn button above the Engage button. The system then proceeds to count down to the auto turn (you can also initiate this function by tapping the remote engage button, if the function has been enabled on the Parameters page).

If the auto turn is accepted, you are notified if your speed is above the defined turn speed. If the speed is not reduced before the auto turn is started, the system will disengage.

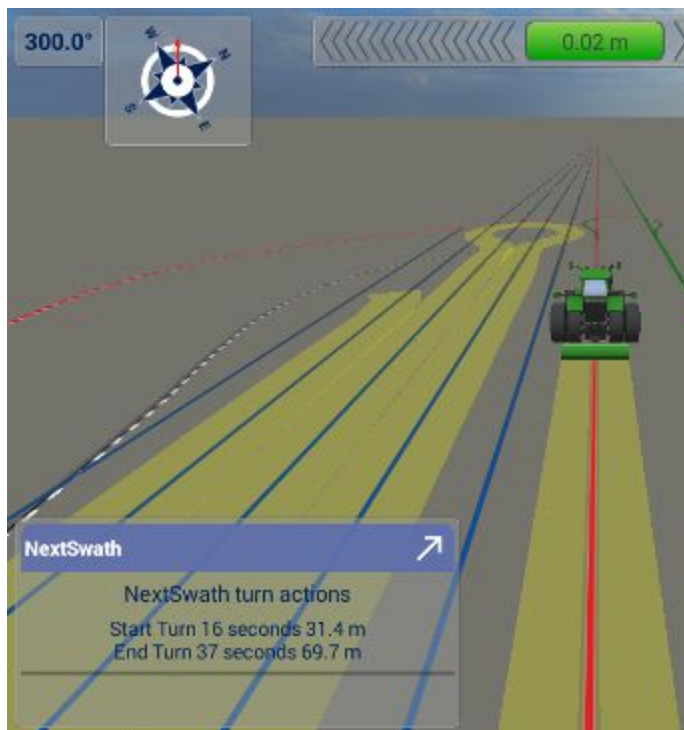
If the vehicle speed increases above the defined turn speed during the turn, you are given a two second warning to slow down. If no action is taken, the system disengages.

Setting the End-of-Row Point

In order for the NextSwath technology to suggest automated end-of-row turns, the end-of-row point must be known. This point is determined by three methods in the following order:

1. Headland pattern infill line intersection with inner boundary. When a headland pattern is used, the intersection of the infill and the inner boundary sets the end-of-row point.
2. Productive area field boundary. If the field has a productive area boundary and the headland pattern is not in use, the end-of-row point is determined by the user-defined distance offset from the boundary along the swath or by the offset distance and clearance options selected. See Turn Location tab in [Configuring NextSwath](#).
3. A and B points for the line. If there is no boundary and a headland pattern is not in use, the A and B points of the line set the end-of-row point. These points adjust every time the Autopilot system is disengaged or when a manually-initiated automatic turn is performed. When this happens, all of the following will have the A or B point updated in accordance to the length of the swath that the vehicle is currently on:
 - The guidance line the vehicle is on.
 - The swath on either side of the guidance line that the vehicle is on.
 - The swath being turned to for an automatic turn will have the A or B point updated (if more than one swath is changed).

During the turn, the NextSwath widget shows the status of the turn. Start Turn and End Turn values are continuously updated based on your vehicle's speed.



NextSwath Operating Tips

Before using the NextSwath technology, OnSwath settings must be properly set up and calibrated. Excessively aggressive OnSwath settings that function well for line acquisition may be too aggressive for the NextSwath technology due to the increased heading change in the maneuvers (up to 90° for line acquisition; generally 180° for the NextSwath technology).

For best results, it is recommended that you use field boundaries or headland patterns as this will make adjustments for the shape of the field.

For AB operation without boundaries, the turn location is based on the end-of-row points that are adjusted to the vehicle's current location by either disengaging or performing a manually-initiated automatic turn. When this happens, the length of the swath you are currently engaged on, the swaths to either side, and the swath being turned to for automatic turns (if different than the swaths adjacent to the current swath) are adjusted.

The smallest radius that the system will turn in is determined by the largest value of:

- Minimum turn radius setting
- Path size determined by OnSwath maximum nominal steering angle and maximum nominal slew rate adjusted by the speed aggressiveness for each.

To decrease a turn radius try the following:

Notes:

- After adjusting the OnSwath Settings, make sure that line acquisition performance is still safe.
- Always verify that the smaller radius turn will not damage equipment.

1. Decrease the minimum turn radius.
2. Increase the OnSwath Steering Angle.
3. Increase the OnSwath Slew Rate.
4. Decrease the speed at which the turn is performed.

Notes:

- The highest the OnSwath steering angle can be is 80% of the vehicle profile's maximum steering angle. If you set it higher than this value, the steering angle used to plan the turn will not increase.
- Different vehicle types may have different turn paths due to platform stability and capability.

When using boundaries, the adjustment of the boundary offset and TrueSwath offset is important to obtain a correct turn point location. This has to be determined empirically by experimentation.

When using boundaries that are not perpendicular to the general swath operation of the field, allow more space for the turns.

When using end rows, a boundary offset around the width of the end rows is a good starting point. For example, using three end rows with a 30 ft planter would use a boundary offset of 90 ft to start with.

When using a three-point/rigid mounted implement, setting the turn pattern to Turn Wide at End for rear-mounted implements and Turn Wide at Start for front-mounted implements is suggested for best results. Also, make sure to set the implement offset direction correctly.

For More Information

Contact your local Trimble Regional Sales Manager.