



# Installation & Operation Manual



**SmarTrax™**

## ***Disclaimer***

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## CHAPTER

# 1

# *Important Safety Information*

## **NOTICE**

Read this manual carefully before installing the SmarTrax system.

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

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

- Be alert and aware of surroundings.
- Do not operate SmarTrax or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Remain in the operator's position in the machine at all times when SmarTrax is engaged.
- Disable SmarTrax when exiting from the operator's seat and machine.
- Do not drive the machine with SmarTrax enabled on any public thorough-fare or main road.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling SmarTrax when the safe working distance has diminished.
- Ensure SmarTrax is disabled prior to starting any maintenance work on SmarTrax or the machine.

Please review the operation and safety instructions included with your implement and/or controller.

 **WARNING**

When starting the machine for the first time, be sure that all persons stand clear, in case a hose has not been completely tightened or air in the hydraulic system causes a wheel to move.

 **CAUTION**

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## *Hydraulic Safety*

Hydraulics may be under pressure. Never attempt to open or work on a hydraulic system with the equipment running. Care should always be taken when first opening a system that has previously been pressurized.

When disconnecting the hydraulic hoses or purging is required, be aware that the hydraulic oil may be extremely hot and under high pressure. Caution must be exercised. Any work carried out on the hydraulic system must be performed in accordance with the machine manufacturers's approved maintenance instructions. Raven Industries recommends that appropriate protective equipment be worn at all times when working on the hydraulic system. When installing SmarTrax hydraulics or performing diagnostics, maintenance, or routine service, ensure precautions are taken to prevent any foreign material or contaminants from being introduced in the machine's hydraulic system. Objects or materials that are able to bypass the machine's hydraulic filtration system will adversely reduce performance and possibly damage the SmarTrax hydraulic valves.

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## *Electrical Safety*

Do not reverse power leads. Doing so could cause severe damage to the equipment. Always make sure that the power leads are connected to the correct polarity as marked. Ensure that the power cable is the last cable to be connected.

## CHAPTER

# 2

## *Introduction*

Congratulations on your purchase of the Raven SmarTrax™ system!

When you first install your system, it will need to be calibrated to your controller and your specific vehicle. While calibrating and operating SmarTrax, it is important to make sure the machine is running at working engine RPM so that the hydraulic pump is able to supply full flow to the hydraulic system.

The following instructions are designed to assist you in the proper calibration of your SmarTrax system with the Cruiser. Installation should be fully completed before calibrating the system. If you have any questions regarding the installation of your SmarTrax system, see the installation manual for instructions.

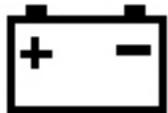
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### *Installation Guidelines*

Refer to the machine specific installation manual for instructions on installing the SmarTrax hydraulic valve block and hoses.

	<p><b>⚠ WARNING</b></p> <p>Read all safety requirements and precautions in the machine specific installation manual prior to operating a machine equipped with the SmarTrax feature. Failure to follow safety precautions may lead to damage to equipment, injury, or death.</p>
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Prior to using the SmarTrax feature with your console, you must setup and calibrate the SmarTrax node.

	<p style="text-align: center;"><b>⚠ CAUTION</b></p> <p>Do not reverse the power leads. Doing so will cause severe damage to the equipment. Always check to make sure that the power leads are connected with the correct polarity. Ensure that the power cable is the last cable to be connected.</p>
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**Note:** *Ensure that the SmarTrax node is mounted solid and square with the machine.*

*If using a Cruiser, set communication port speed to 115200 baud.*

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## Updates

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

[www.ravenprecision.com](http://www.ravenprecision.com)

Sign up for e-mail alerts and we will notify you when updates for your Raven products are available on the Raven web site.

1. Download the Cruiser Install folder to the root directory of the thumb drive.
2. Locate 'Port A' connector on the back of the Cruiser II console and disconnect any cable connection.
3. Connect the 'SmarTrax Update' connector to port A on the back of the Cruiser II console.
4. Insert the thumb drive into the Cruiser and then enter the tools menu.
5. Select the updates button and then select the Smartrax file to update.
6. Then press the start button and the node will automatically update and the Cruiser II will display progress of the update at the bottom of the screen. When update is complete, reconnect cables to original position. Remove the thumb drive before touching the green check mark (the update will restart if the green check is selected while the thumb drive is still inserted).

## CHAPTER

# 3

## *Cruizer Calibration and Operation*

Use this procedure the first time you calibrate a SmarTrax system with the Cruizer or if the default settings have been restored.

**Note:** *When calibrating or operating SmarTrax with a Cruizer console, make sure to set the baud rate for port A and B to 115,200. Refer to the Cruizer Guide for instructions on changing the baud rates.*

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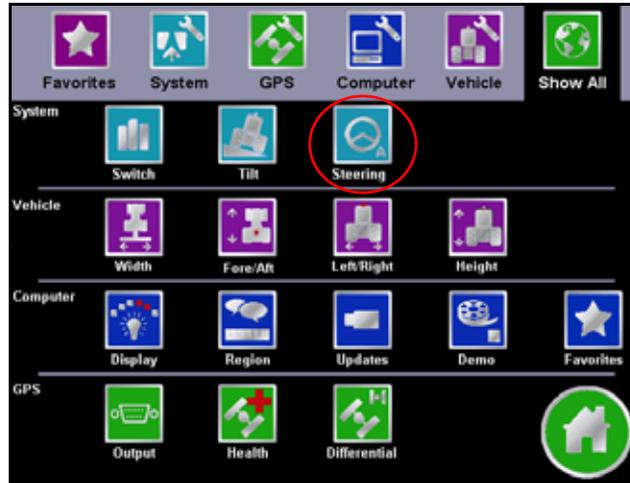
### *Initial Startup*

1. To calibrate the CAN SmarTrax, touch the **Tools** icon from the Home Screen.



Tools Button

2. To begin the calibration, touch the **Steering** icon to access the Setup Wizard Menu.

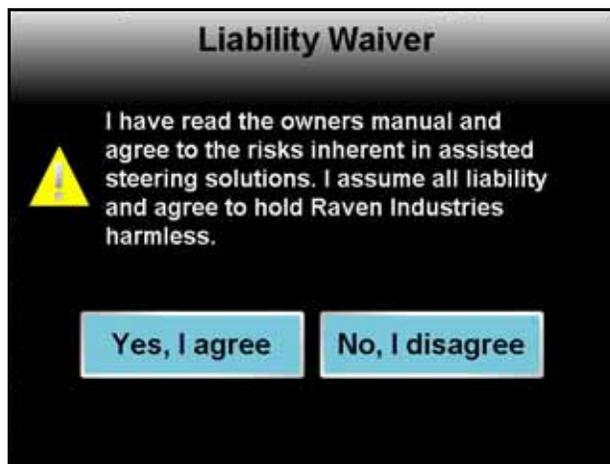


**Note:** The Cruizer II console features a steering setup wizard which is accessible via the 'Wizard' icon and then selecting the 'Autosteer Setup Wizard' icon. Selecting the Steering icon from the System menu offers the same functionality.

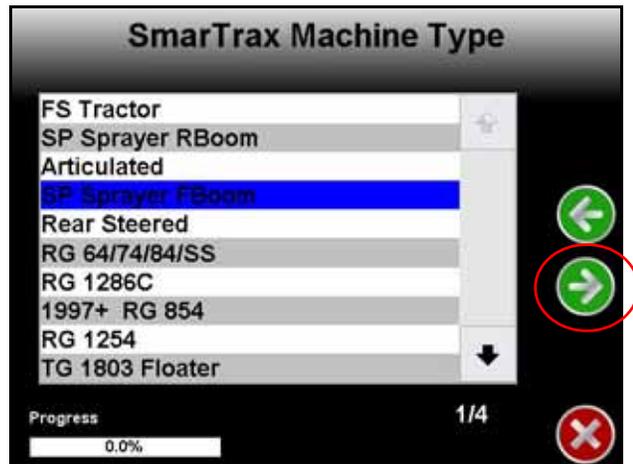
*During the initial start up of the system, language data must be transferred from the SmarTrax node to the console. Allow several minutes to transfer this data before calibrating the system.*

3. The Liability Waiver screen appears next, This screen is to inform the operator of their personal responsibility while operating SmarTrax. Touch **Yes, I agree** to continue with the calibration or **No, I disagree** to discontinue the calibration.

**Note:** The Liability Waiver screens appears the first time a job is started or when the SmarTrax screens are accessed after each power up.



- Next, select your machine type. If your specific machine is not listed, select either FS (Front Steered) Tractor, SP Sprayer FBoom (Self Propelled, Front Boom), SP Sprayer RBoom (Self Propelled, Rear Boom), Articulated, or Rear Steered.



- Touch  to advance.

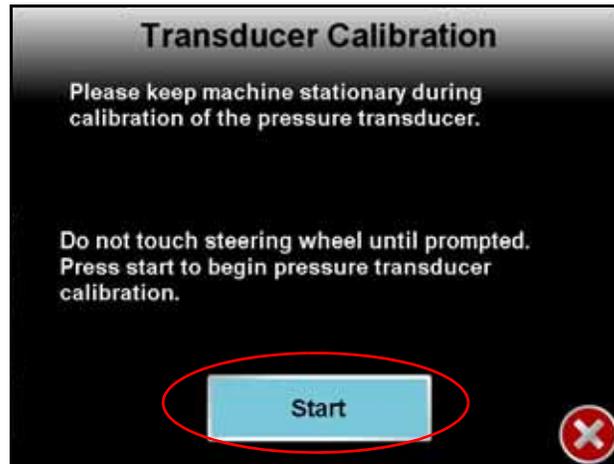
- Select your Control Device. Select either Raven Hydraulic (Raven Supplied Hydraulic), SmartSteer, or Steer Ready (only available on select machines).



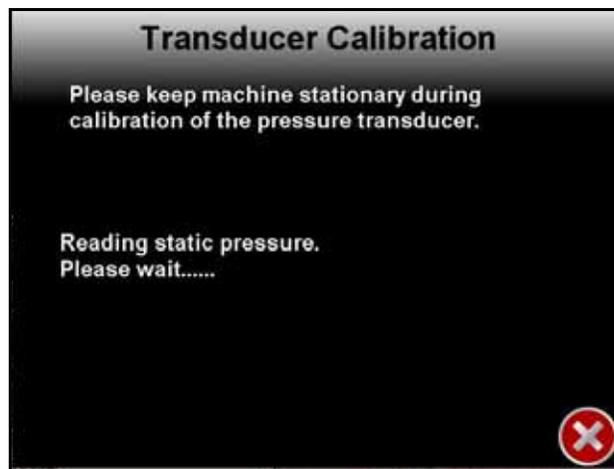
- Touch  to advance.



8. If the machine is equipped with a pressure transducer, the following screen appears. If your system is not equipped with the pressure transducers skip to step 15. For SmarTrax systems, skip to step 14.



9. Touch **Start** and follow the instructions as they appear.
10. Wait for the system to determine pressure reading when no steering inputs are present.



11. When prompted, turn the steering wheel in order for the system to sense the pressure when steering inputs are present.

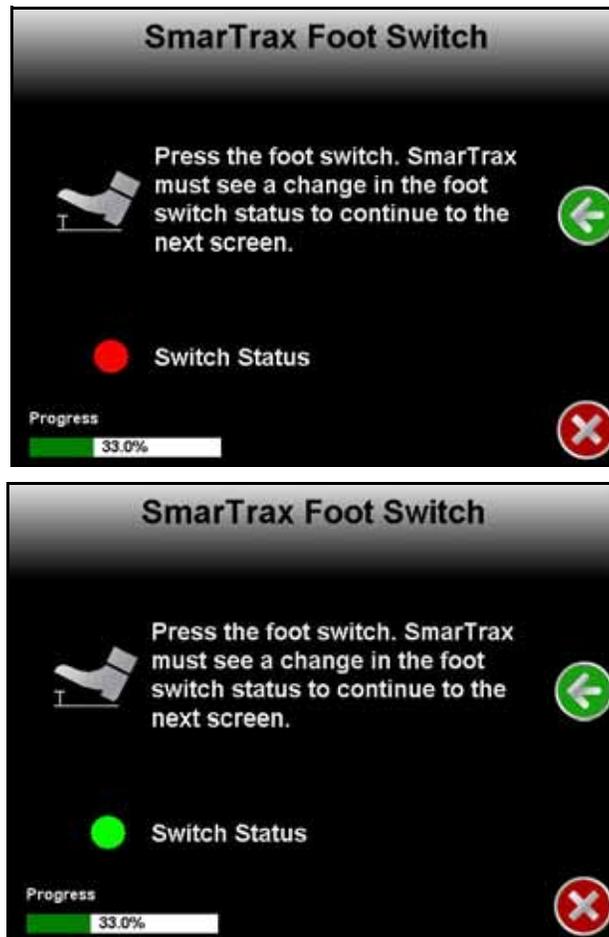


- Turn the steering wheel at the normal speed in which you usually turn at the end of a row. Verify the wheel status is changing, when the steering wheel is turned. If the status does not change with the turning of the steering wheel the “Disengagement Setting” will need to be adjusted.

**Note:** *Increasing the disengage setting requires more steering input in order for the system to disengage. Decreasing the disengaging setting requires less steering input in order for the system to disengage.*

- Touch  to advance.

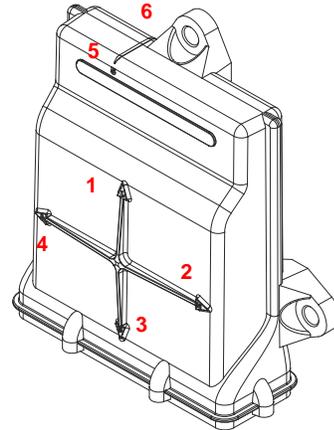
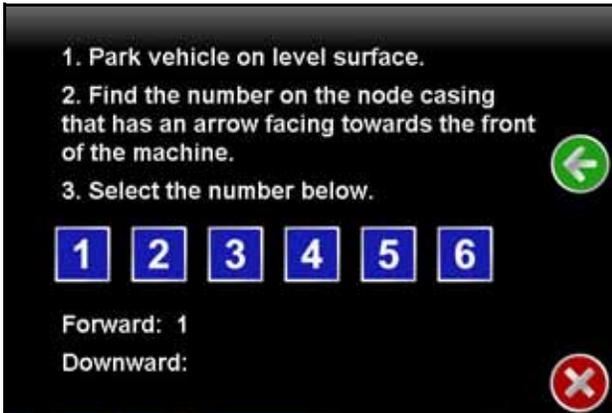
- Press and release the foot switch. This ensures the foot switch is installed correctly.



**Note:** The Node Orientation screen automatically appears when the foot switch is detected.



- Follow the instructions to determine the number on the node box facing forward. The SmarTrax system automatically detects the downward number.



- Wait while the node calibrates the terrain compensation sensors. Once calibration of the sensors is complete, the system automatically advances to the next screen.

### Wheel Base and Antenna Offsets

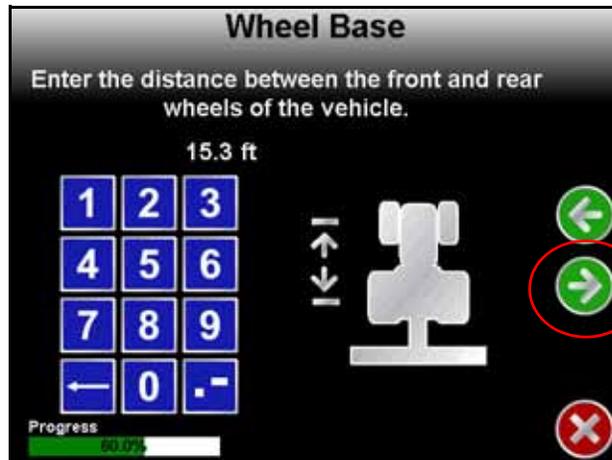


NOTICE

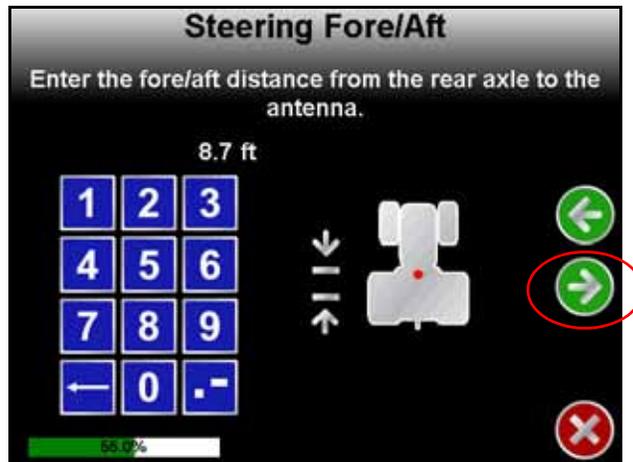
The wheel base, antenna position and antenna height values are critical to the operation of the SmarTrax system. Be sure to measure these dimensions accurately for optimal performance.

**Note:** *The wheel base, antenna position and antenna height measurements must be entered using the display units currently selected on the console. The units in which the measurements should be entered is displayed on the screen for reference.*

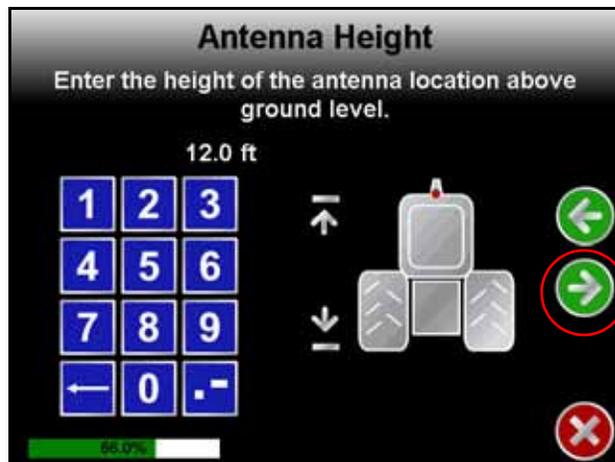
- If a specific machine is selected, the Wheel base is filled in automatically. If a generic Machine type is selected, enter the Wheel Base. The Wheel Base measurement is the distance from the center of the front axle to the center of the rear axle. For articulated machines, measure both sides and average the number. The SmarTrax system requires accurate measurements in order to perform at an optimum level.



2. Touch  to advance.
3. Use the keypad to enter your antenna's fore or aft position. Enter the Antenna Position. The Antenna Position is the distance the antenna is in front (+) or behind (-) the rear Axle. Raven recommends mounting the antenna on the center line of the vehicle at the front of the cab.



4. Touch  to advance.
5. Enter the Antenna Height. The Antenna Height is critical for compensating for machine roll. Measure from the ground to the mounting base plate of the antenna.



6. Touch  to advance.



## Steering Test

**Note:** The following procedure allows the SmarTrax controller to “learn” the hydraulic capabilities of the vehicle to properly steer the machine in the field.



### NOTICE

To avoid potential calibration problems, the following procedure should be performed in a field or a large open space and during weather conditions similar to normal vehicle operation. If the ground or surface used to complete this process is slippery or muddy, or if the soil is very loose or freshly tilled, the SmarTrax system may “learn” incorrect steering responses for normal operating conditions.

Be sure any boom or implement sections are racked or folded to the full in or raised position during the hydraulic calibration process.

1. Position the vehicle in an open space with several acres of smooth ground to perform the hydraulic calibration.

### Steering Test



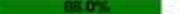
**Move the machine to an open area.**



**Drive ahead at 3 to 6 MPH and press the foot switch. The wheels will turn while the test is in progress.**



**Current Speed**  
4.5 MPH

0% 

Reset Defaults



2. With the engine at working RPM, drive forward at a speed between 3-6 mph [5-9 km/h].
3. Press the foot switch to begin the hydraulic calibration.



### WARNING

Wheels will turn automatically. Make sure the area around the vehicle is clear of people or equipment before engaging the steering system.

During calibration, the vehicle will make 10 turns favoring the left followed by 10 turns favoring the right. Make sure to have several acres of smooth ground available for calibration. The size of the machine and the speed of the hydraulic system determine the amount of space needed.

4. During calibration, the machine will make 10 turns favoring the left followed by 10 turns favoring the right. Turning the steering wheel or tapping the foot switch pauses the calibration for repositioning of the machine.

Tapping the foot switch again restarts the calibration procedure. After the completion of the calibration the SmarTrax Menu displays.



## Error Messages

If the steer switch is activated during calibration, an error message stating “*Steer switch was activated.....*” will appear on the screen. To correct this error:

1. Select **Disengage Setting** at the bottom left corner of the error window.
2. Change the Disengage Setting (Steer Switch Delay) to **990**.
3. Press the **Up** arrow one time to reach 0.

The steering wheel kickout has now been disengaged for calibration only. The foot switch or tractor speed reduction will be needed to disengage AutoSteer.

For other error messages displayed during calibration, make sure:

- To limit the number of starts and stops.
- To have several acres of smooth ground available for calibration.
- The ground is not muddy or icy, so front wheels can't slide.
- If the vehicle being calibrated is a sprayer, the booms are racked.
- The vehicle is at working RPM.

Ensure all these conditions are met and recalibrate the system.

## Completing the Calibration Procedure

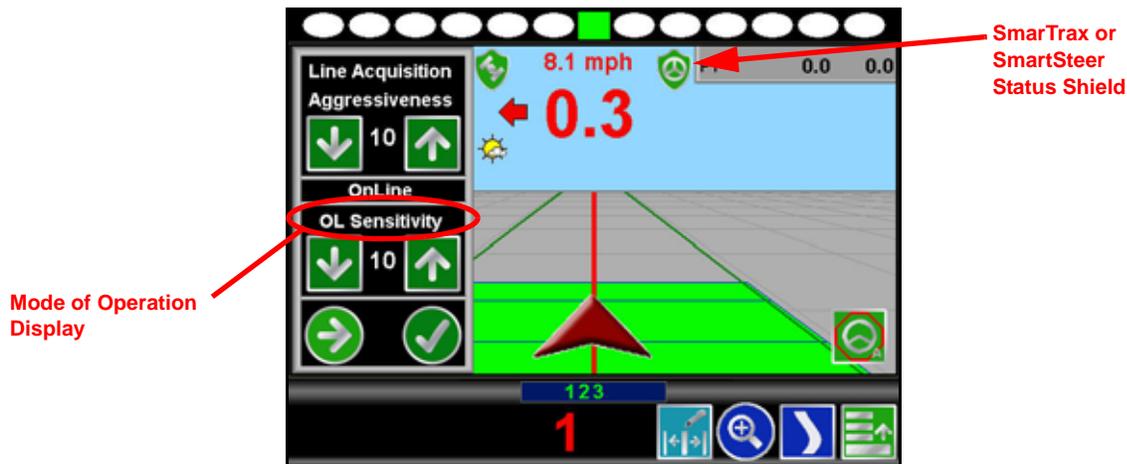
1. To complete the calibration procedure, start a job and set up an A-B guidance line. Refer to the Cruiser Operator's manual for instructions on starting a job.
2. Drive at 8-10 mph [12.8-16 km/h] with the machine at operating RPM.
3. Engage SmarTrax while on the line with either the foot switch or by tapping the steering wheel icon on the right side of the screen.
4. Allow SmarTrax to run for ten minutes until the system automatically adjusts itself.

**Note:** If after ten minutes the machine is not driving at an acceptable level, the system needs to be adjusted in order to correct the problem.

## Steering Response Adjustments

After the initial calibration has been completed, the operator may adjust the response of the SmarTrax system to better account for field or weather conditions or to fine tune the system and improve steering accuracy.

To adjust the steering response, touch the SmarTrax Status icon at the top of the screen to display the SmarTrax sidebar.



The SmarTrax Controller screen will display with the following mode adjustments:

- Line Acquisition Aggressiveness
- OL (On-line) Sensitivity

**Note:** When engaged, the current mode in which the SmarTrax system is operating is displayed in the SmarTrax sidebar in between the Aggressiveness and Sensitivity adjustments.

Touch  to access the SmarTrax or SmartSteer Settings screens or touch  to close the SmarTrax sidebar.

## Line Acquisition Mode and Aggressiveness

The Line Acquisition Aggressiveness value affects how quickly the vehicle will steer toward a displayed guidance line when the system is engaged further than 24 inches [60 cm] from the desired path.

If the vehicle does not approach the guidance line as quickly as desired when SmarTrax or SmartSteer is engaged more than 24 inches [60 cm] from the line, increase the 'Aggressiveness' value one number at a time. Allow the SmarTrax or SmartSteer system at least 30 seconds between adjustments while engaged to implement the change to the aggressiveness value.

Decrease the 'Aggressiveness' in a similar manner if the vehicle tends to steer toward the guidance path too quickly.



**Note:** The screen shown above is an example of a situation where SmarTrax may be operating in Line Acquisition Mode. This mode will be active until the vehicle steers to within 24 inches [60 cm] of the displayed guidance line or path.

## OL (On-line) Mode and Sensitivity

The On-line Sensitivity value affects the response of the vehicle while steering within 24 inches [60 cm] of the displayed guidance line.

If the vehicle tends to weave across the displayed line and does not stay within 24 inches [60 cm] of the desired path, increase the 'OL Sensitivity' one number at a time. Allow the SmarTrax or SmartSteer system at least 30 seconds between adjustments while engaged to implement the change to the sensitivity value.

Decrease the 'OL Sensitivity' in a similar manner if the vehicle tends to over correct or becomes "twitchy" while on line.



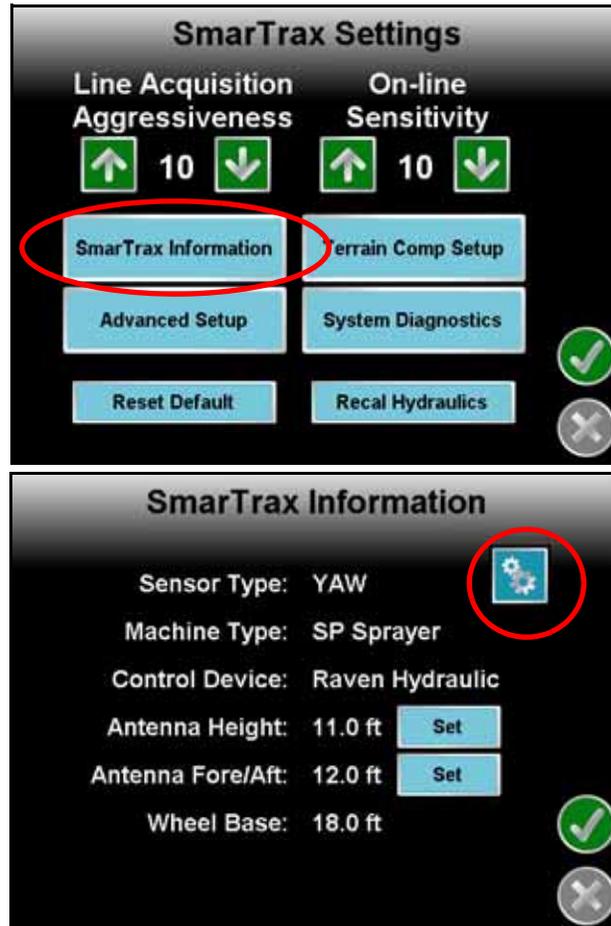
**Note:** The screen shown above is an example of a situation where SmarTrax may be operating in On-line Mode. This mode will be active as long as the vehicle remains to within 24 inches [60 cm] of the displayed guidance line or path.

## Advanced Setup and Diagnostics

1. From the Tools menu, touch the **Steering** icon to access the SmarTrax Settings.



- From the SmarTrax Settings screen, touch **SmarTrax Information** to access the SmarTrax Information screen.



- Touch the **Sensor** icon to access the SmarTrax Sensor Setup screen.

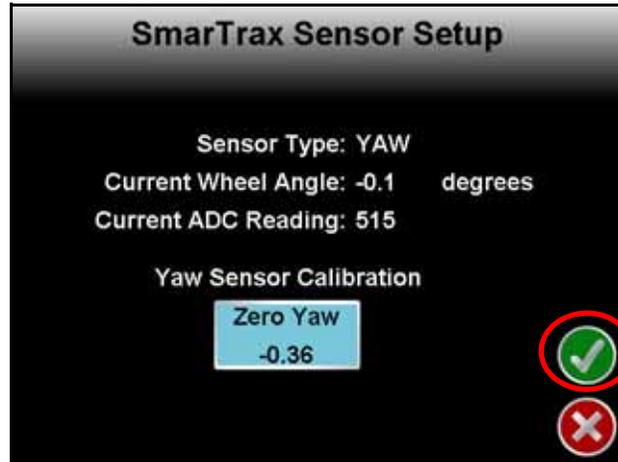
**Machine Type Control Device:** Machine type entered during calibration.

**Antenna Height and Fore/Aft:** The only measurements you can change after calibration.

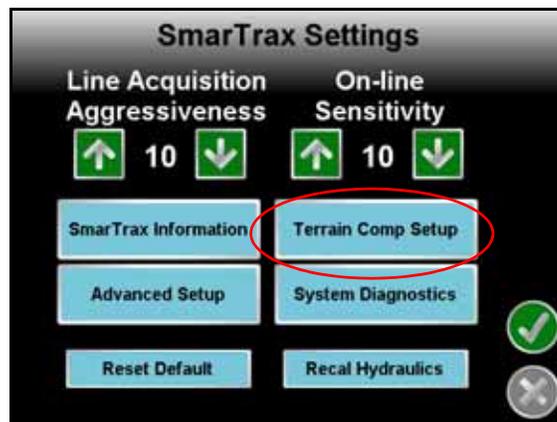
**Wheel Base:** The measurement entered during the calibration process. You must recalibrate the system to change this number.



**Note:** The number may not actually display zero. The number shown is the reading from the yaw sensor as the vehicle drives straight ahead. If you zero the yaw sensor, you must be sitting still.



4. Touch  to return to the SmarTrax Settings screen.
5. From the SmarTrax Controller screen, touch **Terrain Comp Setup** to access the SmarTrax Terrain Compensation information screen.

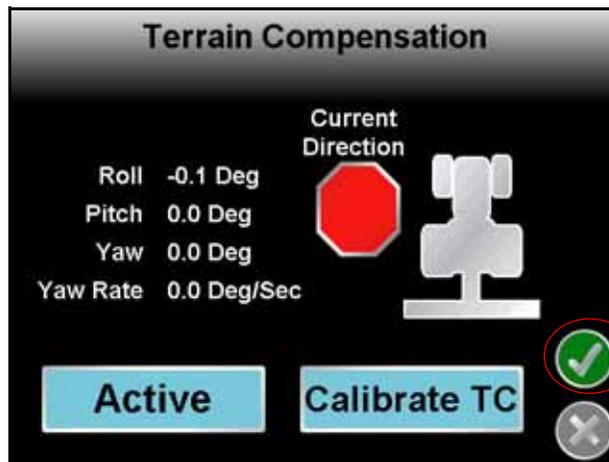


6. If Terrain Compensation has not been activated, the following screen appears.

**Note:** An activation code for this feature can be purchased from your local Raven dealer.



- Real time data displays for the motions being compensated. Roll, Pitch and Yaw Rate can also be zeroed by being in a stationary position on a flat surface and touching **Calibrate TC**.



Direction of travel will show current detected motion of travel while moving. If this direction is incorrect, drive forward and press **Send Forward Command**. Verify driving forward and in reverse are correct while driving.

Forward and Downward will show current configuration of node setup during calibration.

Terrain compensation can be turned on and off by touching **Active**.

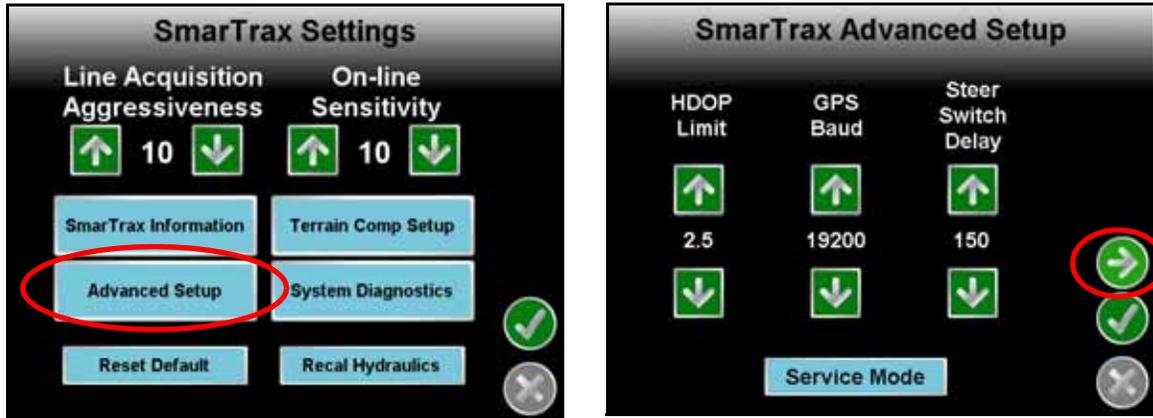
- Touch  to return to the SmarTrax Settings screen.

**Note:** The only measurements that can change after calibration are Antenna height and Fore/Aft. Recalibrate the system to change any other measurements.

- Touch  to return to the Smartrax settings screen.



From the SmarTrax Settings screen, touch **Advanced Setup** to access the SmarTrax Advanced Setup screen.



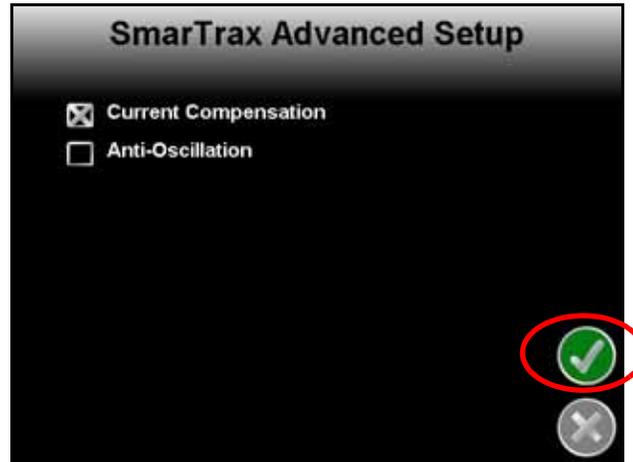
**HDOP Limit:** The HDOP is the horizontal Dilution of Precision and is an indicator of the quality of the GPS signal. A high HDOP indicates that not enough satellites are distributed evenly throughout the sky causing the accuracy of the signal to suffer thus diminishing the accuracy of the guidance system. The number displayed is the maximum HDOP Smartrax will allow to run. Raising this number may degrade performance.

**GPS Baud:** The GPS Baud is the baud rate that the SmarTrax uses to communicate with the GPS receiver, typically 19200.

**Steer Switch Delay:** Increasing the Steer Switch Delay setting increases the amount of steering input required to disengage the system. Decreasing the Steer Switch Delay Setting decreases the amount of steering input required to disengage the system.

**Service Mode:** The service page is only used for software programming purposes. A code is required to enter this menu. When selected, the SmarTrax software version currently installed on the node may be viewed.

9. Touch  to view the next Advanced Settings screen.



**Current Compensation:** Current compensation is only used with certain non steer-ready machines. This feature automatically turns on when an approved machine is selected. Enabling with unapproved machines may degrade performance.

**Anti-Oscillation:** Anti-Oscillation is a feature only used with Articulated machines and should not be enabled with any other machine type. This feature automatically turns on when an articulated machine is selected. Enabling on other machines may degrade performance.

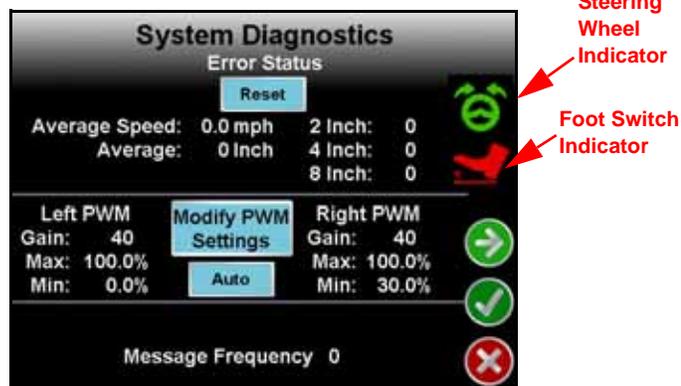
10. Touch  to return to the Advanced Settings screen.
11. Touch  to return to the SmarTrax Settings screen.

## System Diagnostics

1. From the Home screen, touch the Tools Menu icon and select the Steering icon from the System Menu.



2. From the SmarTrax Settings screen, touch **System Diagnostics** to access the System Diagnostics screen.



This screen displays the following diagnostic information:

- SmarTrax hydraulic valve PWM min, max and gain values
  - Steer switch and foot switch engage switch status indicators
  - Message frequency: GGA input message rate
3. Touch **Reset** to set the 2", 4" and 8" on hour averages to zero (the average speed and error are calculated over the last engaged hour).
  4. Touch **Auto** or **Man** to allow the system to automatically adjust the PWM min values or to manually adjust the PWM values.
  5. Touch **Modify PWM Settings** to manually adjust the PWM settings.



Manual adjustment of the PWM valves is typically not necessary. Raven recommends leaving these values as configured by the SmarTrax system unless a technician instructs you to modify these settings.

- To adjust the Left, Right or PWM Frequency values manually, touch the up or down arrows on this screen. If the PWM minimums are adjusted, the system will no longer learn the PWM minimums. Touching the manual icon, on the previous screen, switches the manual system to Auto mode.

**Note:** *If the Left or Right Min, or minimum, values are adjusted, SmarTrax will no longer 'learn' the PWM minimums. Touch the 'Manual' button on the System Diagnostics screen to allow the SmarTrax system to automatically tune the PWM minimum values during operation.*

- Touch  to display SmarTrax Manual Steering screen.



- The **Left** and **Right Manual Steer** feature may be used to manually test the SmarTrax hydraulic steering system. Select one of the available values or the **Min** or **Max** buttons to steer the vehicle. If the vehicle does not respond as expected, the PWM values may need to be adjusted.
- Touch  to return to the SmarTrax PWM Setup screen and adjust the PWM values if necessary.
- Touch  to return to the SmarTrax System Diagnostics screen.
- Touch  again to exit the SmarTrax Settings screen.



## CHAPTER

# 4

## *Troubleshooting*

This chapter lists some potential problems you could encounter and how to correct them. In this chapter you will see:

- The purpose of the status LEDs on the control node.
- A list of error messages displayed by the controller, what those error messages mean, and how to resolve the error.
- A list of mechanical problems and the action to take to correct the problem.
- A list of operational problems and the action to take to correct the problem.

### *Status LEDs*

LED	Purpose
LOGIC POWER	This LED shows if logic power is connected properly. This LED should always be on when system is on.
HC POWER	This LED shows if high current power is connected properly. If the machine is powered on, the LED should always be on.
MICRO 1Hz	Shows if the processor is running the software. This LED should be blinking one time every second.
CAN RX	LED blinks every time the node receives CAN data. This can be used to diagnose a CAN communication problem.
CAN TX	LED blinks every time the node transmits CAN data. This can be used to diagnose a CAN communication problem.
DIAG 1	Tells if the controller node is receiving valid GGA messages. This does not verify the display console is receiving GPS. This LED must be on in order to engage SmarTrax.
DIAG 2	Tells if terrain compensation is available. LED will be on if it is a SmarTrax Node or if a terrain compensation activation key is correctly entered. This does not show if terrain compensation is active. To verify that it is active, enter the Terrain Comp. Setup menu.

## Error Messages

Error messages can appear if the SmarTrax system is not installed or set up correctly or if settings are incorrect. The table below lists the possible error messages and gives solutions to mitigate the error.

Error Message	Problem	Solution
TC Error	Terrain compensation has been disabled because a gyro has failed but the SmarTrax can still be used.	Contact your Raven Dealer.
Too Slow	The vehicle is moving too slow and the controller has turned itself off.	Increase the speed of the vehicle and re-engage.
Too Fast	The vehicle is moving 28 mph and will shut down in 9 seconds.	Decrease the speed of the vehicle.
Too FAST	The vehicle is moving over 28 mph and the controller has shut down.	Decrease the speed of the vehicle and re-engage the SmarTrax controller.
Road Mode	The roading switch is in the off position (Steering Ready machines only).	Flip the roading switch to the on position.
XDucer Er	There is a problem with the pressure transducer(s).	Verify connections to pressure transducer(s). Replace transducer(s).
Yaw Error	Yaw rate sensor values are out of range.	Replace the SmarTrax Node.
Low Sats	Not enough satellites are being seen by the receiver.	Wait a few minutes to see if more satellites are found.
No Diff	GPS Differential signal has not been found.	If problem persists check receiver differential settings.
Swath Jmp	The guidance points being sent from the field computer has jumped swaths. Steering has been disengaged.	Make sure that the guidance line on the field computer is not switching between lines.
No GPS	No GPS information is being received.	Verify proper GPS setup.
No A-B Msg	The A-B line has not been set on the field computer.	Set the A-B line so that the controller has a line on which to drive.
High HDOP	Insufficient GPS signal.	Wait a few minutes to see if signal improves.

Error Message	Problem	Solution
Guide Com	Guidance points are no longer being received by the SmarTrax.	Verify connections between the SmarTrax and field computer.
No VTG	No VTG messages are being received.	Check receiver settings.
No GGA	No GGA messages are being received.	Check receiver settings.
No Cal	SmarTrax has not been calibrated.	Calibrate the SmarTrax using the calibration wizard.

## Mechanical Problems

Mechanical problems with the vehicle can cause the SmarTrax systems to work improperly. Before you start troubleshooting the system, trace all hoses and wires to make sure that they are connected to the proper ports and connectors. You can avoid many potential problems by making sure that all wires and hoses are properly connected.

**Note:** *Make any adjustments to the hydraulic components in small increments so that you can identify problems and solutions correctly. Perform only one change at a time to better troubleshoot the issue.*

The following table lists some common mechanical problems and the corrective action needed to fix the problem.

Mechanical Problem	Solution
SmarTrax will not power up.	<ul style="list-style-type: none"> <li>• Check Power.</li> <li>• Check the fuses.</li> <li>• Check the battery connections.</li> <li>• Test for +12VDC using a voltmeter.</li> <li>• Replace the controller.</li> </ul>
System does not engage by pressing the foot switch.	<ul style="list-style-type: none"> <li>• Check LED's on Node.</li> <li>• Verify there are no current error messages.</li> <li>• Ensure that the steer switch override is not active. If it is, adjust the disengage settings.</li> </ul>
The system does not disengage when you turn the steering wheel.	<ul style="list-style-type: none"> <li>• Adjust the disengage setting in the advanced setup menu.</li> </ul>
Wheels turn the wrong way with the steering wheel	<ul style="list-style-type: none"> <li>• Switch the left and right hoses at the orbital or tees.</li> </ul>

<b>Mechanical Problem</b>	<b>Solution</b>
Valve makes noise or 'squeaks' in stand-by mode	<ul style="list-style-type: none"> <li>• Turn the Pressure Relief (RV) adjustment on the SmarTrax valve in until the noise stops.</li> </ul>
Cannot pulse left or right	<ul style="list-style-type: none"> <li>• Check the hose and cable connections.</li> <li>• Check the Controller status lights for High Current (HC) Power.</li> <li>• Check the solenoids for proper connection and voltage (12 VDC).</li> <li>• Make sure Max's are set and max box is checked.</li> </ul>
When power is on, the wheel turns by itself	<ul style="list-style-type: none"> <li>• Make sure that the hoses are connected to the correct ports.</li> <li>• Check all electrical cables.</li> </ul>
Steer Switch does not activate when wheel is turned	<ul style="list-style-type: none"> <li>• Adjust the disengage setting down in the advanced setup menu.</li> <li>• Check the wiring and hose connections to make sure they are correct and tight.</li> </ul>
System pulses the wrong way	<ul style="list-style-type: none"> <li>• Check the solenoid connections and change them if they are hooked up backwards.</li> <li>• Check the hydraulic hose connections and switch them if they are hooked up backwards.</li> </ul>

## *Operational Problems*

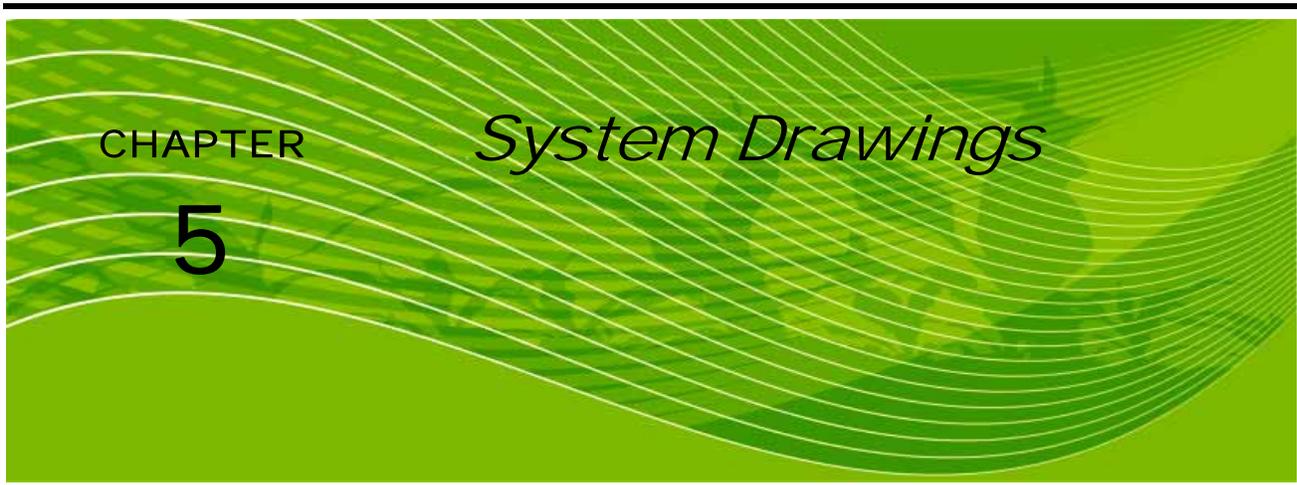
The following table describes some common operational problems and the solution to fix the problem.

<b>Operational Problem</b>	<b>Solution</b>
The system will not find the line.	<ul style="list-style-type: none"> <li>• Make sure that SmarTrax is engaged.</li> <li>• Make sure that you have an unobstructed GPS signal.</li> <li>• Increase the Line Acquire Aggressiveness or Online sensitivity.</li> </ul>
Wheels 'chatter' while on line.	<ul style="list-style-type: none"> <li>• Decrease the OnLine Sensitivity.</li> </ul>
System slowly oscillates while on line.	<ul style="list-style-type: none"> <li>• Increase the OnLine Sensitivity.</li> </ul>
Vehicle consistently drives to the left or right of the swath line.	<ul style="list-style-type: none"> <li>• Check and adjust the antenna height, if necessary.</li> <li>• Reset yaw sensor while sitting still.</li> <li>• Increase the line acquire Aggressiveness or online sensitivity.</li> </ul>

Operational Problem	Solution
System disengages when the auxiliary hydraulic functions are operated	<ul style="list-style-type: none"> <li>• Increase the disengage setting in the advanced setup menu.</li> </ul>
Wheels do not turn fast enough when acquiring a new line	<ul style="list-style-type: none"> <li>• Increase the Line Acquire Aggressiveness or Online Sensitivity.</li> </ul>
Steering wheel is difficult or 'fights' when you attempt to turn the vehicle	<ul style="list-style-type: none"> <li>• Increase the disengage setting in the advanced setup menu.</li> <li>• If SmarTrax is not engaged when this behavior is encountered, verify that the load sense lines on the SmarTrax hydraulic valve are connected correctly.</li> </ul>



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The header graphic features a vibrant green background with a pattern of white, wavy, curved lines that create a sense of motion and depth. The text is positioned in the upper left and center of this graphic.

# CHAPTER 5

## *System Drawings*

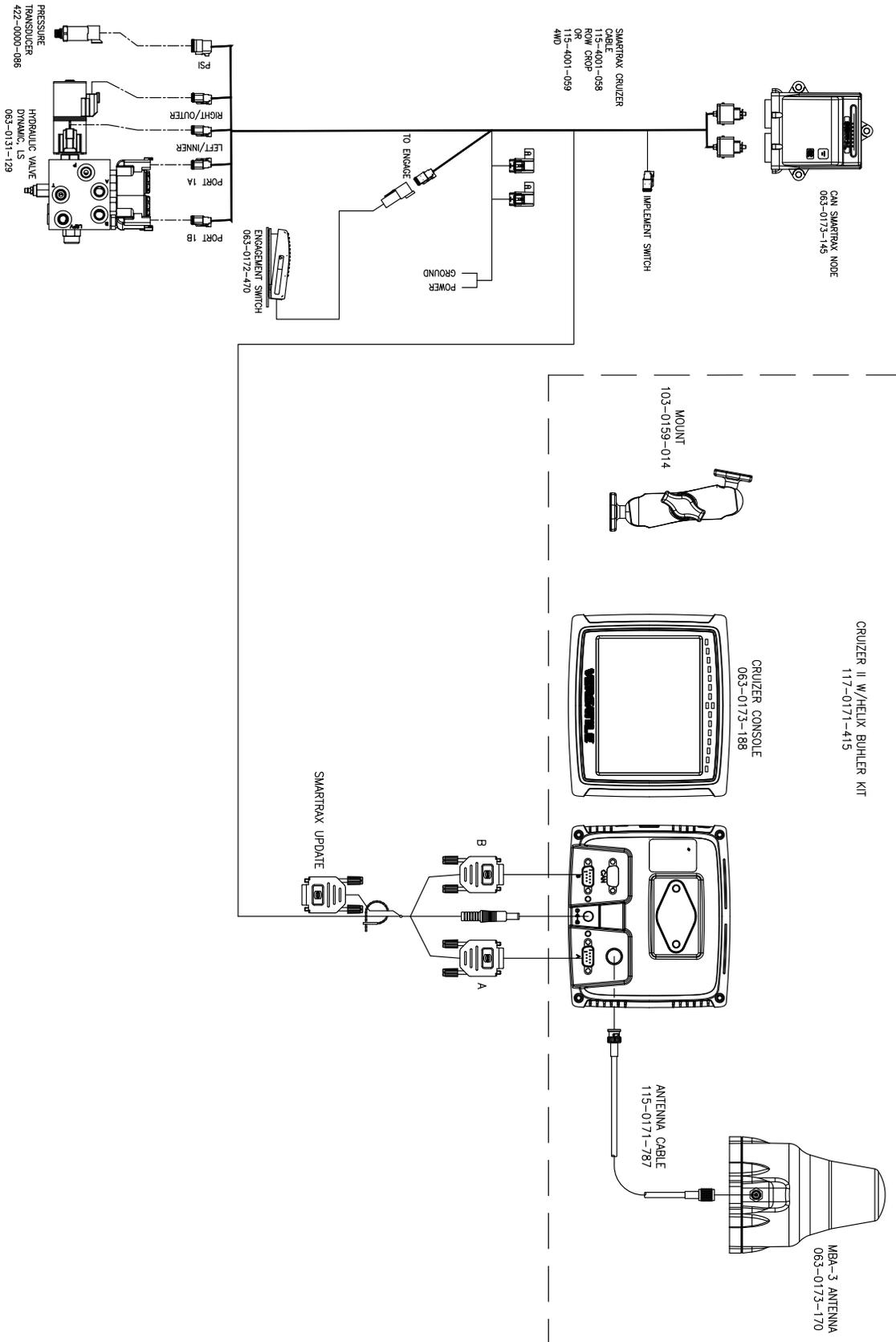
The following diagrams may be helpful for installing or troubleshooting the SmarTrax system. The following diagrams may show optional features or components not required for operation and will not apply to your system if the required hardware has not been installed.

Contact your local dealer for purchasing or more information on components shown in the following diagrams.

Additional system diagrams are available from the Raven Industries web site:

[www.ravenprecision.com](http://www.ravenprecision.com)

FIGURE 1. Cruiser II with Helix Antenna and SmarTrax 3D



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**RAVEN**

# **RAVEN INDUSTRIES**

## **Limited Warranty**

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### ***What Does this Warranty Cover?***

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

### ***How Long is the Coverage Period?***

Raven Applied Technology Division products are covered by this warranty for 12 months after the date of purchase. This warranty coverage applies only to the original owner and is nontransferable.

### ***How Can I Get Service?***

Bring the defective part and proof of purchase to your Raven dealer. If your dealer agrees with the warranty claim, the dealer will send the part and proof of purchase to their distributor or to Raven Industries for final approval.

### ***What Will Raven Industries Do?***

Upon confirmation of the warranty claim, Raven Industries will, at our discretion, repair or replace the defective part and pay for return freight.

### ***What is not Covered by this Warranty?***

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

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.



SmarTrax™  
Calibration & Operation Manual  
(P/N 016-0171-377 Rev C 4/11 E17093)



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