SmartYield™ Pro Calibration & Operation Manual

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Chapter 1 *Important Safety Information*..... 1

..... Instructions for Wire Routing 1
Instructions for Hose Routing 3
..... 4

Chapter 2 *Introduction*..... 5

SmartYield™ Pro Overview 5
AccuHeader 6
Updates 6
Care and Maintenance 7

Chapter 3 *Initial Startup and Harvester Calibration*..... 9

Raven Display Setup 9
Control Interface 9
Guidance Width 10
Offsets 10
Sections 11
SmartYield™ Pro Initial Harvester Configuration 11
Machine Type 12
Header Height Sensor Setup 13
Moisture Sensor 13
Temperature Sensor 14
Control Node Installation Orientation Recommendations 14
Yield Sensor Setup 15

Chapter 4 *SmartYield™ Pro Display Settings and Initial Crop Calibration*..... 19

Optional Raven Display Settings 19
Smoothing 19
Off Percent 19
Moisture Legend 20
Yield Legend 21
Crop Configuration 22
Crop Type 22
Crop Density 22
Moisture Settings 23
Header Cutout Height (Crop Specific) 23
Crop Cal 24
Diagnostics Settings 24

Chapter 5 *SmartYield™ Pro Operation and Adjustment* 27

Pre-Harvest Checklist 27
Beginning a Job 28
Initial Field Calibrations 29
Envizio Pro Guidance Display 30
Yield Information Displays 30
Reference Maps 31
Field Review Mode 31
In-Job Weight Calibration Screen 32
Harvest Checklist and In-Field Calibration 33
Set Tare 33
Moisture Correction Factor 34
Storage Moisture Value 36
Test Weight (Working Density) 36
Load Weight and Crop Cal 37
AccuHeader On-Screen Switch Box 39
Reporting 40
Slingshot Export 40
Job File Export 40

Chapter 6 *Troubleshooting* 43

CHAPTER 1

Important Safety Information

NOTICE

Read this manual carefully before operating the SmartYield™ Pro system.

- Follow all safety information presented within this manual.
- If you require assistance with any portion of the installation or service of the SmartYield Pro system, contact a local Raven dealer for support.
- Follow all safety labels affixed to 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 a local Raven dealer.

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

- Be alert and aware of surroundings at all times.
- Do not operate any agricultural equipment while under the influence of alcohol or an illegal substance.

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

⚠ CAUTION

Electrical Safety

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

Instructions for Wire Routing

The word harness is used to mean all electrical leads and cables, bundled and unbundled. When installing harness, secure it at least every 30 cm (12in) to the frame. Follow existing harness as much as possible and use these guidelines:

Harness should not contact or be attached to:

- Lines and hoses with high vibration forces or pressure spikes
- Lines and hoses carrying hot fluids beyond harness component specifications

Avoid contact with any sharp edge or abrading surfaces such as, but not limited to:

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads
- Ends of adjustable hose clamps
- Wire exiting conduit without protection, either ends or side of conduit
- Hose and tube fittings

Routing should not allow harnesses to:

- Hang below the unit
- Have the potential to become damaged due to exposure to the exterior environment. (i.e. tree limbs, debris, attachments)
- Be placed in areas of or in contact with machine components which develop temperatures higher than the temperature rating of harness components
- Wiring should be protected or shielded if it needs to route near hot temperatures beyond harness component specifications

Harnessing should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in steering and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For harness sections that move during machine operation:

- Allow sufficient length for free movement without interference to prevent: pulling, pinching, catching or rubbing, especially in articulation and pivot points
- Clamp harnesses securely to force controlled movement to occur in the desired harness section
- Avoid sharp twisting or flexing of harnesses in short distances
- Connectors and splices should not be located in harness sections that move

Protect harnesses from:

- Foreign objects such as rocks that may fall or be thrown by the unit
- Buildup of dirt, mud, snow, ice, submersion in water and oil
- Tree limbs, brush and debris
- Damage where service personnel or operators might step or use as a grab bar
- Damage when passing through metal structures
- High pressure wash

Instructions for Hose Routing

The word hoses is used to mean all flexible fluid carrying components. Follow existing hoses as much as possible and use these guidelines:

Hoses should not contact or be attached to:

- Components with high vibration forces
- Components carrying hot fluids beyond hoses component specifications

Avoid contact with any sharp edge or abrading surfaces such as, but not limited to:

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads
- Ends of adjustable hose clamps

Routing should not allow hoses to:

- Hang below the unit
- Have the potential to become damaged due to exposure to the exterior environment. (i.e. tree limbs, debris, attachments)
- Be placed in areas of or in contact with machine components which develop temperatures higher than the temperature rating of hose components
- Hoses should be protected or shielded if it needs to route near hot temperatures beyond hose component specifications

Hoses should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in steering and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For hose sections that move during machine operation:

- Allow sufficient length for free movement without interference to prevent: pulling, pinching, catching or rubbing, especially in articulation and pivot points
- Clamp hoses securely to force controlled movement to occur in the desired hose section
- Avoid sharp twisting or flexing of hoses in short distances

Protect hoses from:

- Foreign objects such as rocks that may fall or be thrown by the unit
- Buildup of dirt, mud, snow, ice, submersion in water and oil
- Tree limbs, brush and debris
- Damage where service personnel or operators might step or use as a grab bar
- Damage when passing through metal structures
- High pressure wash

CHAPTER 2

Introduction

This document is provided to assist with the proper connection of the SmartYield™ Pro system with a Raven control console such as a Envizio Pro series field computer.

⚠ CAUTION

Before calibrating the SmartYield Pro system, be sure that all installation procedures have been completed. Contact a local Raven dealer for additional assistance.

To provide accurate yield information for harvest operations, calibrate the Raven controller and the SmartYield Pro system for the machine. Review all instructions for the specific Raven control console and use the table of contents for assistance with locating additional information and system diagrams.

SmartYield™ Pro Overview

The Raven SmartYield Pro may be used with the following Raven control consoles:

- Envizio Pro™, Envizio Pro II®, or Envizio Pro XL™

Setup and operation of the SmartYield Pro system is performed through the Raven control console for ease of operation and for data logging functions.

Additional features of the SmartYield Pro system are detailed in Chapter 4, *SmartYield™ Pro Display Settings and Initial Crop Calibration*, for details on the SmartYield Pro screen displays.

AccuHeader

To accurately calculate the yield per area, the width of the header currently cutting crop, or the working width, must be adjusted as the header passes in and out of uncut crop. To simplify this task during harvest operations, the Raven SmartYield Pro system features AccuHeader, automatic header section monitoring.

During a harvest operation, the Raven SmartYield Pro system monitors the location of the header and each header section. As a section passes out of uncut crop, the AccuHeader feature automatically reduces the working width which is used to tally the coverage area. As the section passes back into uncut crop area, the AccuHeader feature expands the working width. This feature allows the SmartYield Pro system to accurately tally the coverage area while monitoring the harvest yields for the field area.

Refer to the *Sections* section on page 11 or the *AccuHeader On-Screen Switch Box* section on page 39 for more information on configuring or operating the AccuHeader feature during harvesting operations.

Updates

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

www.ravenhelp.com

Sign up for e-mail alerts to receive notice when updates for your Raven products are available on the Raven web site.

At Raven Industries, we strive to make your experience with our products as rewarding as possible. One way to improve this experience is to provide us with feedback on this manual.

Your feedback will help shape the future of our product documentation and the overall service we provide. We appreciate the opportunity to see ourselves as our customers see us and are eager to gather ideas on how we have been helping or how we can do better.

To serve you best, please send an email with the following information to

techwriting@ravenind.com

-SmartYield™ Pro Calibration & Operation Manual
-P/N 016-0171-567 Rev. C
-Any comments or feedback (include chapter or page numbers if applicable).
-Let us know how long have you been using this or other Raven products.

We will not share your email or any information you provide with anyone else. Your feedback is valued and extremely important to us.

Thank you for your time.

Care and Maintenance

To achieve the best accuracy from the Raven SmartYield™ Pro system, perform daily and seasonal system maintenance:

- When harvesting particularly oily crops, make sure that the grain sensor lenses and moisture sensor stay reasonably clean.
- Cross-check moisture readings and grain density settings by measuring reference samples of the crop when first starting harvest operations.
- Check and, if required, tare (zero) the yield reading with the clean grain elevator running empty.
- The clean grain elevator chain should be in good condition and properly tensioned before starting harvest operations.

CHAPTER 3

Initial Startup and Harvester Calibration

The following sections are provided to assist with the initial set up and calibration of the SmartYield™ Pro system on the Raven controller. Perform the steps in this manual before harvesting using the SmartYield Pro system.

Raven Display Setup

The SmartYield Pro system comes from the factory ready to interface with the Raven Envizio Pro field computers. Refer to the following sections to setup the Raven display for operation with the SmartYield Pro system.

Control Interface

When controlling the SmartYield Pro system with the Envizio Pro field computers, the Control Interface setting must be set to ‘SmartYield Pro.’

To change the Control Interface from the Home screen:

1. Touch the Tools Menu icon.
2. Select the Control Interface icon from the System menu.
3. If necessary, use the scroll buttons next to the list of available control types to locate and select the ‘SmartYield Pro’ option.
4. Touch the to accept the ‘SmartYield Pro’ setting and return to the Tools Menu.

Note: *The ‘SmartYield Pro’ option is only available on field computers with software version 3.7 or newer. Refer to the Updates section on page 6 or the Envizio Pro Installation and Operation Manual for more information.*

The SmartYield Pro option will only appear if the Envizio Pro detects the SmartYield Pro on the CANbus.

Guidance Width

If a Raven controller will be used to provide swath guidance during harvest operations, set ‘Guidance Width’ calibration value for the width of the header on the combine.

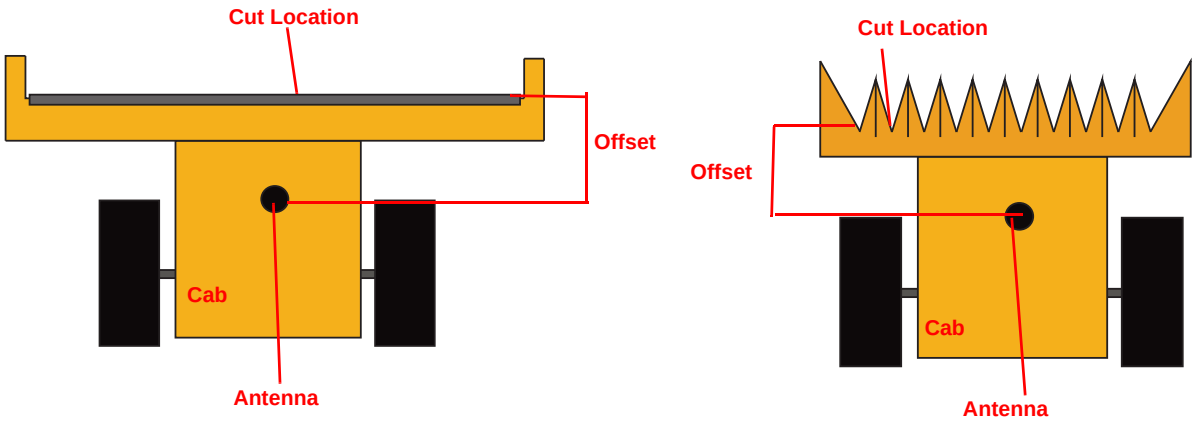
To change the guidance width setting from the Home screen:

1. Touch the Tools Menu icon.
2. Select the ‘Guidance Width’ icon from the Vehicle menu.
3. Use the on-screen keypad to enter the measured width of the header in the units displayed on the screen.

Offsets

The ‘Offsets’ settings are used to calibrate the Raven display to the relative location of where the header cuts the crop in the case of harvesting equipment and combines.

FIGURE 1. Measuring Offsets (Top View)



Note: *Refer to the specific Raven display manual for additional instructions on measuring the antenna offset values.*

To access the ‘Offset’ settings from the Home screen:

1. Touch the Tools Menu icon.
2. Select the ‘Offsets’ icon from the Vehicle menu.
3. Be sure the ‘Implement in Front’ option is selected to configure the offset for a front mounted header.
4. Touch the desired setting to modify and use the on-screen keypad to enter the new offset value in the units displayed on the Offsets Setup screen.

Sections

Set the Section Configuration for the header used for harvesting operations.

Note: *Refer to Off Percent section on page 19 to set the turn off percent for AccuHeader, automatic header section status, control during harvesting operations.*

To access the Section Configuration from the Home screen:

1. Touch the Tools Menu icon.
2. Select the Sections icon from the Vehicle menu to display the Combine Summary screen.
3. Review the Guidance Width and Header Width values on the first screen.
4. To configure header sections for the AccuHeader feature, touch the icon to view the Number of Sections screen and proceed with the following instructions to complete the header section setup.
5. If the header width displayed on the Combine Summary screen does not match the programmed guidance width, touch the Header Width button and use the on-screen keypad to enter the header width.
6. Use the up or down arrows to adjust the number sections up to 16 individual header sections.The controller will divide the header width into equal sections based upon the number of sections programmed.

Note: *Keep in mind the accuracy of corrections used on the combine during harvesting operations and the row width (if applicable). The header should not be divided into sections smaller than one row or than the differential source can accurately provide GPS location.*

SmartYield™ Pro Initial Harvester Configuration

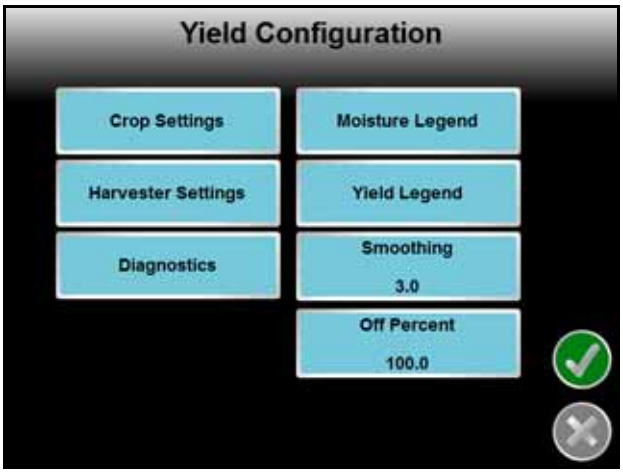
During the initial system configuration, the operator will enter the harvester or combine settings for the machine on which the system is installed.

Note: *Additional settings will be required before each harvesting operation to configure the system for specific crops. Refer to Crop Configuration section on page 22 for additional assistance with configuring required crop settings.*

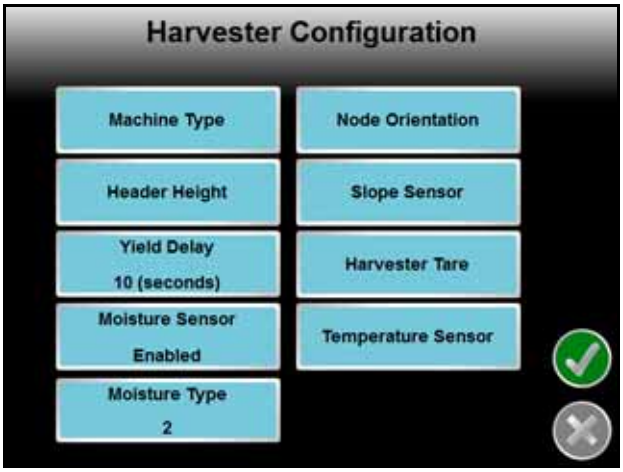
To begin configuring the SmartYield Pro system on a Raven display:

1. Touch the Tools Menu icon on the Home screen.

2. Touch the ‘Yield’ icon in the System menu. The Yield Configuration screen will be displayed.



3. Touch the ‘Harvester Settings’ button to access the Harvester Configuration screen.



4. Refer to the following sections to complete the harvester configuration.

Machine Type

SmartYield Pro provides an extensive list of machine preset configurations with which the system has been previously calibrated. If a specific machine is available from the preset list, selecting the combine make and model will automatically populate various settings.

From the Harvester Configuration screen:

1. Touch the Machine Type button.
2. Use the Make and Model drop down lists to select the appropriate harvester from the list of available machines.

   If the specific make or model is not available, select the “Default” harvester make. For the harvester model, select “Vertical” if the grain elevator is in a completely vertical orientation or “Pitched” if the grain elevator is mounted at an angle.

Header Height Sensor Setup

The header height setup allows the operator to configure the type of header height sensor and set the header raised and lowered positions.

Note: *Refer to the Header Cutout Height (Crop Specific) section on page 23 for assistance with the header height cutout position configuration.*

Header Height Switch (On/Off)

To set up the header height switch or sensor type:

1. Touch the Header Height button.
2. Select the Switch type for the height sensor.
3. If necessary, raise or lower the header into either a transport or cut position.
4. Touch the Header Position button to toggle the current header switch status until it matches the current header position.

Note: *Prior to starting a field operation with a header switch type sensor, verify that the switch status is displayed correctly on the Diagnostics screen when the header is raised or lowered.*

Rotary Potentiometer Sensor (Variable Signal)

To set up the variable type header height sensor:

1. Touch the Header Height button.
2. Select the Variable type for the height sensor.
3. Raise the header to the transport or highest position.
4. Touch the Set Max button to set the maximum height for the header.
5. Lower the header to the ground or the lowest cut position.
6. Touch the Set Min button to set the minimum height for the header.

Note: *It may be necessary to adjust the sensor linkage to achieve an accurate reading. The voltage reading is treated as a sensitivity reading and should be set so the voltage fluctuates between zero and five volts easily without exceeding five volts. Adjust the rotary potentiometer to achieve high sensitivity while remaining in the desired voltage range.*

Moisture Sensor

Note: *If a moisture sensor is not installed, set the sensor field to 'Disabled.' During harvesting operations with the sensor disabled, the system will use the entered storage moisture for monitoring yield information.*

The moisture sensor voltage is available on the Diagnostics screen and may be used to determine if the sensor is functioning properly.

If the moisture and temperature sensor is installed with the SmartYield Pro:

1. Touch the Moisture Sensor button to toggle and Enable the Moisture Sensor.

2. Touch the Moisture Type button and use the on-screen keypad to enter the moisture sensor type value. For Rev. Y sensors, enter a sensor type value of one. For all other sensor types, enter a value of two.

Note: *Refer to the SmartYield Pro Installation Manual for assistance with identifying the moisture sensor revisions.*

Temperature Sensor

The moisture sensor also senses temperature of the grain to maintain the correct moisture content measurement.

Note: *The temperature at the moisture sensor location may be significantly greater than ambient temperature.*

To configure the temperature sensor:

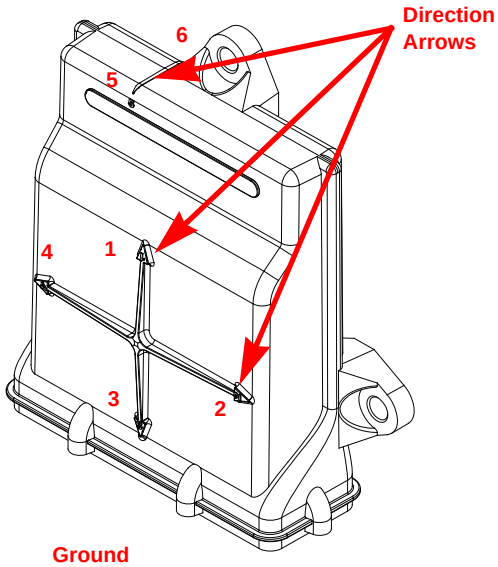
1. From the Harvester Configuration screen, select the Temperature Sensor button.
2. Touch the Set button to the right of the displayed Temperature.
3. Measure the temperature at the sensor location.
4. Use the on-screen keypad to enter the current temperature measured at the moisture sensor location.

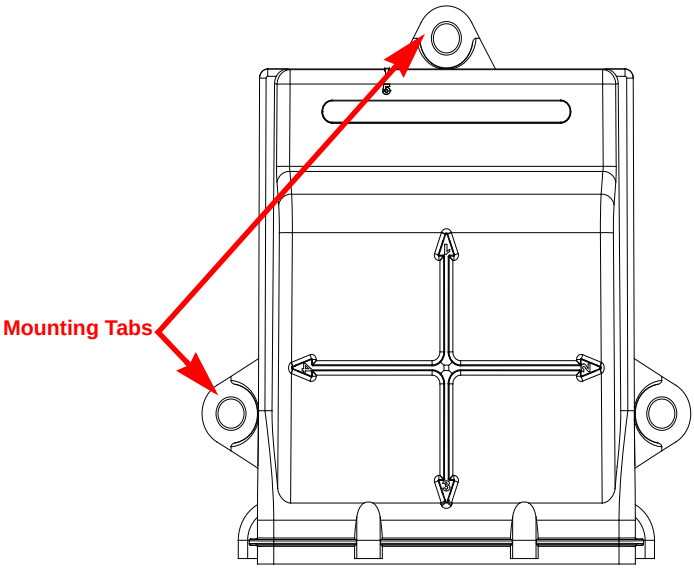
Note: *Contact a local Raven dealer for additional assistance with using the temperature gain and offset values for further adjustment of the temperature sensor if necessary. The default gain and offset values set for each crop type have been determined by a series of calibration tests and normally will not require modification.*

Control Node Installation Orientation Recommendations

Keep the following items in mind when selecting a location to mount the SmartYield™ Pro control node:

- Mount the control node where it will not interfere with normal machine operation. The box must not be jarred or struck by any vehicle components during operation.
- The node features an internal tilt sensor. The node must be mounted with the connectors (direction arrow #3) pointing towards the ground.



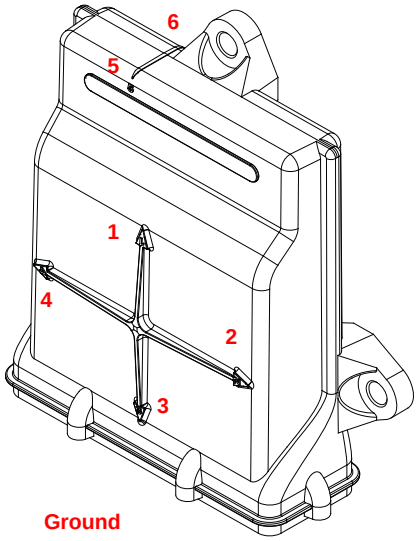


- When installing the node harness and routing sensor cables, ensure that the cables will not interfere with normal equipment operation. Make sure that the cables will not be damaged by moving components and secure cables using the supplied cable ties. Route cables to avoid tripping hazards and pinch points.
- Always apply dielectric grease to any connectors exposed to weather, harsh chemicals or other sources of moisture.

To complete the orientation configuration, from the Yield Configuration screen:

1. Locate the SmartYield Pro node and note the numbered arrow which is pointing toward the front of the harvester or machine (either 2, 4, 5, or 6).

FIGURE 2. SmartYield Pro Control Node Orientation



Note: *The number 3 arrow must be pointing toward the ground.*

2. On the Envizio Pro, touch the Node Orientation button.
3. Select the number for the arrow pointing toward the front of the harvester.

Slope Sensor Setup

Calibrate the slope sensor to accurately measure the harvester pitch and roll during an active harvest operation. To calibrate the slope sensor:

1. Move the machine to known level ground and stop the vehicle.
2. From the Harvester Configuration screen, select the Slope Sensor button.
3. Touch the ‘Zero’ buttons in the Angle Settings area at the bottom of the screen to zero the left/right tilt and forward/backward pitch of the machine.

Note: *Contact a local Raven dealer for assistance with using the slope compensation values for further adjustment of the slope sensor if necessary.*

Yield Sensor Setup

Note: *Before setting the yield sensor, be sure to select the harvester type. Refer to the Machine Type section on page 12.*

Harvester Tare Configuration

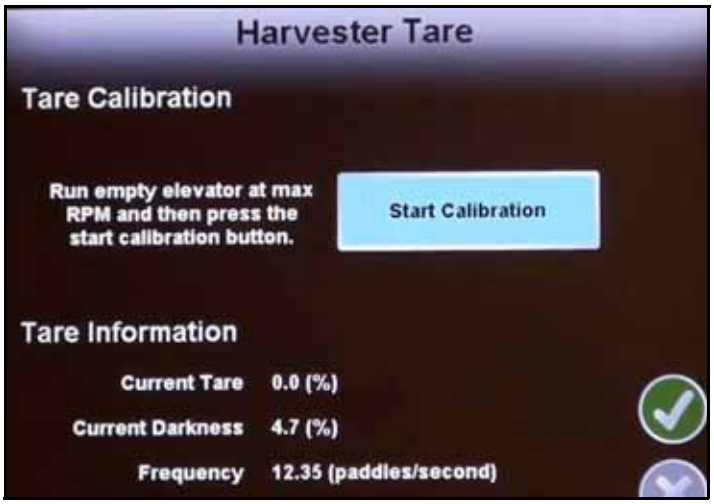
Configure the tare throughout the season as part of a regular maintenance routine.

The SmartYield Pro system will automatically calculate the Tare value for the harvester. To begin calculating the tare:

1. From the Harvester Configuration screen, select the Harvester Tare button.
2. With the machine running at maximum operating RPM, and the clean grain elevator running empty, touch the Start Calibration button.

   The SmartYield Pro system will calculate the yield measurement for an empty clean grain elevator and set the system to a zero condition. When the calibration is complete, the 'Current Darkness' value should be nearly zero (within 0.5%) with a tare value of greater than five.

FIGURE 3. Tare Configuration



3. Repeat step 2 at least three times and verify the tare does not change more than 5%.

Note: *If the current darkness value is inconsistent or greater than 0.5%, verify the installation. It may be necessary to tighten the chain, add the paddle extension plates, or adjust the sensor location. If the current darkness is zero and the paddle rate is correct, verify that the angle (tilt) sensors are calibrated.*

Yield Delay

The yield delay value is the time it takes for harvested grain to reach the yield sensor in the clean grain elevator.

Note: *While the yield delay is required to complete the calibration of the SmartYield Pro system on the harvester, it is recommended to adjust or tune this value during the initial harvest operation using the SmartYield Pro system.*

Due to their mounting location on the harvester, the yield sensors are measuring grain which was cut several seconds prior to passing the sensor. To properly log the yield data and create an accurate map of harvest

operations, a yield delay value must be programmed to match the work rate for the machine. This setting is critical for a correct display of the yield map on the Raven control console.

Note: *The default yield delay is two seconds. It is important to adjust this value to display accurate position information and yield maps on the Raven control console. The typical range for yield delay values is between eight and 15 seconds.*

To adjust the delay time:

1. During a harvesting operation, note the time interval between the header entering uncut crop area and when the yield sensor begins monitoring grain.
2. At the end of the swath, note the time between the header leaving the uncut crop and when the yield begins to drop off.
3. Calculate the average time interval.
4. From the Yield Configuration screen, touch the Harvester Settings button and select the Yield Delay button.
5. Use the on-screen keypad to enter the average time interval as the yield delay.

CHAPTER 4

SmartYield™ Pro Display Settings and Initial Crop Calibration

Optional Raven Display Settings

To access optional settings for use with the SmartYield Pro system from the Raven display Home screen:

1. Touch the Tools Menu icon.
2. Select the 'Yield' icon from the System menu to display the Yield Configuration screen.

The following sections provide information on the settings and features available on this screen.

Smoothing

The smoothing feature may be used to reduce fluctuations in the yield information displayed on the Raven display. Set the smoothing value to the amount of time to average the yield display on the console between one and ten seconds.

Note: *Default time for smoothing feature is three seconds.*

A value of one means there is no "smoothing" or averaging. A value of five means there is five seconds of filtering.

Off Percent

The off percent value sets the width of a header section that must be in a previously harvested area before the AccuHeader™ feature automatically reduces the header width. The default value for the off percent value is 100.

Using the default setting, when 100% of a header section is no longer harvesting crop, AccuHeader will no longer use the section width when tallying covered area and therefore provide more accurate yield per area data for the actual header width currently harvesting crop.

Moisture Legend

During harvesting operations, the SmartYield Pro system collects moisture data and creates an as-harvested, or coverage, map containing the moisture content percentage information of the harvested crop.

The map legend, as well as the as the coverage map, may be adjusted during a harvest operation by touching the Moisture Legend button and adjusting the minimum and maximum moisture values. The display will automatically divide the entered range into six equal moisture ranges and adjust the legend and coverage map for the user settings.

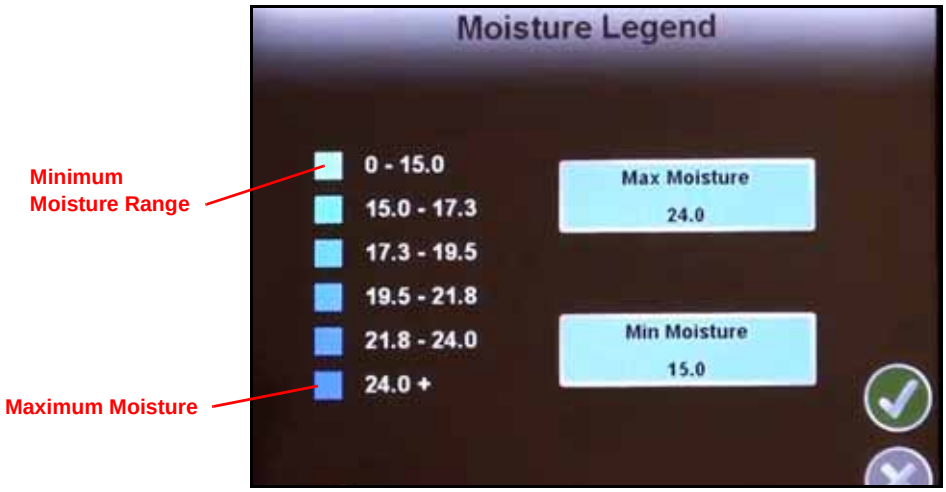
Note: *Adjust the moisture legend to display the smallest range of moisture values while accurately portraying yield data for the entire field. Make adjustments as early in the harvesting operation as possible to avoid delays due to processing the existing coverage map information.*

Minimum (Min) Moisture

The minimum moisture value sets the top value for the minimum moisture range. For example, a minimum value of 15% means the Raven controller will show moisture content between 0% and 15% using the lowest moisture range color as shown in the moisture legend.

Enter the lowest expected moisture content before starting a harvest operation and making small adjustments from the initial value as necessary to display the desired moisture ranges during the harvest operation.

FIGURE 1. Moisture Legend Settings



Maximum (Max) Moisture

The maximum moisture value sets the low value for top moisture range displayed on the moisture content map. For example, a maximum value of 24% means the Raven display will show moisture content at or above 24% using the highest moisture range color as shown in the moisture legend.

Enter the highest expected moisture content before starting a harvest operation and making small adjustments from the initial value as necessary to display the desired moisture ranges during the harvest operation.

Yield Legend

During a harvest operation, yield data is collected and displayed on the Raven field computer in an as-harvested, or coverage, map containing the yield per area for the harvested crop.

The yield legend, as well as the coverage map, may be adjusted during a harvest operation by touching the Yield Legend button and adjusting the minimum and maximum yield values. The Raven display will automatically divide the entered range into six equal yield ranges and adjust the legend and coverage map for the entered settings.

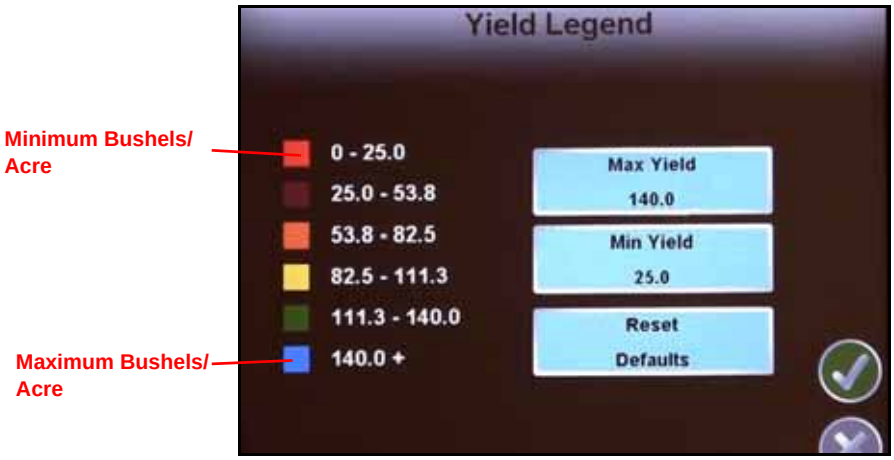
Note: *Adjust the Yield Legend to display the smallest range of yield values while accurately portraying data for the entire field. Make adjustments early in the harvesting operation to avoid delays due to processing the existing coverage map information.*

Once adjusted, the yield legend will be stored with the crop type and will be reloaded for the next harvest operation with the selected crop.

Minimum (Min) Yield

The minimum yield value sets the maximum yield per area for the lowest yield range displayed on the coverage map.

FIGURE 2. Yield Legend



For Example:

A minimum value of 25 bushels/acre [1500 kg/ha] means the Raven display will show yield data between zero and 25 bushels/acre [0 and 1500 kg/ha] using the lowest yield range color as shown in the yield legend.

Enter the lowest expected yield before starting a harvest operation and make small adjustments from the initial value to display the desired yield ranges during the harvest operation.

Maximum (Max) Yield

The maximum yield value sets the minimum yield per area for the highest yield range displayed on the coverage map.

For Example:

A maximum value of 140 bushels/acre [8,680 kg/ha] means the Raven display will show yield data at or above 140 bushels/acre [8,680 kg/ha] using the highest yield range color as shown in the yield legend.

Enter the highest expected yield before starting a harvest operation and making small adjustments from the initial value as necessary to display the desired yield ranges during the harvest operation.

Reset Defaults

Press the Reset Defaults button to reset the default yield min and max yield values for the selected crop type.

Crop Configuration

Note: *Complete crop configuration for each crop type. As well as verifying the following crop calibration, check the harvester settings and change header and guidance widths, the cutout height, and perform tares for each crop to ensure best results with the SmartYield Pro system.*

Review the following sections for assistance with configuring the SmartYield Pro system before starting harvesting operations for each crop.

To access crop configuration settings for use with the SmartYield Pro system from the Raven display Home screen:

1. Touch the Tools Menu icon.
2. Select the 'Yield' icon from the System menu to display the Yield Configuration screen.
3. Touch the Crop Settings button to access the Crop Configuration screen. Review the following sections:

Crop Type

The SmartYield Pro system has pre-configured settings for a variety of crops. The pre-configured crop settings may require some adjustment for specific crops and crop conditions. The SmartYield Pro system also offers two user defined crop types which may be used to configure the system for a crop not already configured in the SmartYield Pro system.

Note: *Names of the user defined crop types cannot be edited. The crop type or guidance width settings cannot be adjusted during a job. To make adjustments during a job, close the job, make the necessary adjustments and resume the job file previously in progress.*

Refer to the following sections for assistance with crop density and moisture content settings for more information about adjusting these settings for each crop type.

Crop Density

Standard Crop Density

This is the USDA standard crop density, or weight per bushel, for each crop and is pre-configured and displayed in pounds per bushel [kg/hL] on the Crop Configuration screen. Do not adjust the standard crop density.

Test Weight or Working Density

This is a field specific measurement. The test weight or working density (lbs./Bu. [kg/hL]) is used to calibrate the SmartYield Pro system for the measured crop density observed during harvest operations.

Note: *Do not adjust the test weight information at the same time as performing a calibration. When fine-tuning the system, adjust only one variable at a time.*

During operation of the SmartYield Pro system, check the test weight regularly and adjust the working density value displayed on the Calibration screen as necessary. An incorrect working density value will cause inaccurate yield data.

To adjust the working crop density, touch the Working Density button and use the on-screen keypad to enter or adjust the measured crop test weight.

Note: *Adjusting the working density value does not correct or adjust previously accumulated data.*

Moisture Settings

Moisture Settings

Touch the Moisture Settings button and verify that the gain and offset values are not all set to zero. Verify that the Sensor Status is set to “Enabled” if a moisture sensor is installed.

Storage Moisture

The storage moisture content used to calculate the corresponding dry yield. A default value is entered for the storage moisture content value for each crop type.

Note: *If the harvest moisture content falls below the programmed storage moisture content, the harvest weight will remain at the dry weight value.*

To adjust the storage moisture content value, touch the Storage Moisture button on the Crop Configuration screen and use the on-screen keypad to enter the new storage moisture content value.

Header Cutout Height (Crop Specific)

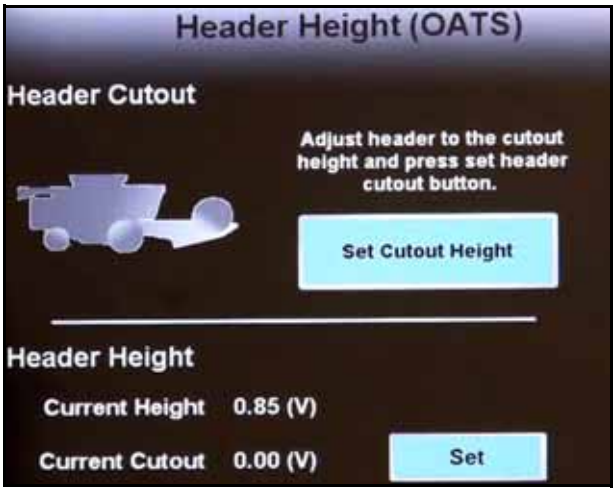
Note: *The Header Height button will only be available if a variable type header height sensor is configured for monitoring the header position during field operations.*

When using a variable height sensor to monitor the header position during harvesting operations, set the cutout height for the operation. While harvesting, the SmartYield Pro system will disable area and yield data accumulation if the header is raised above the cutout position.

To set the cutout position:

1. Raise the header to the maximum cut height for the crop to be harvested.
2. From the Yield Configuration screen, touch the Crop Configuration button and select the Header Height button.
3. Touch the Set Cutout Height button. The system will disable area accumulation when the header is raised above the set height.

FIGURE 3. **Header Height Adjustment**



To manually adjust the cutout height, touch the Set button to the right of the Current Cutout value and enter the voltage at which the sensor should toggle the area and yield accumulation.

Note: *If using an automatic header height control feature, set the cutout height just below the up position. Setting the cutout height too low may result in intermittent recording due to the header bouncing as the harvester travels through the field.*

Crop Cal

Do not manually change the Crop Cal since the values are updated during SmartYield Pro calibration. Crop cal adjusts the SmartYield Pro system for the actual yield from a given crop. The default value is set using test information (if available) for the specific make and model of combine. Due to natural variations within a particular crop, crop varieties, and operating characteristics of each individual combine, select the appropriate crop cal for each specific harvest operation.

Note: *Refer to the Load Weight and Crop Cal section on page 37 to adjust the crop cal during active harvesting operations.*

Refer to the *Initial Field Calibrations* section on page 29 for assistance with the initial crop and load weight tuning processes. Performing additional calibrations throughout the harvesting season will help to improve and maintain accuracy of the SmartYield Pro system.

Diagnostics Settings

The SmartYield Pro system provides diagnostic features to monitor and verify the working condition of the system.

To access the Diagnostics screen and information from the field computer Home screen:

1. Touch the Tools Menu icon.
2. Select the 'Yield' icon from the System menu to display the Yield Configuration screen.
3. Touch the Diagnostics button to access the Diagnostics screen.

Review the following sections for details on the diagnostic information available on this screen.

Width. The width value is the current header width used by the SmartYield Pro system with any AccuHeader controlled sections removed. In uncut crop areas, this value should match the width value on the first Diagnostics page. As the header moves out of uncut crop area, this width should decrease as header sections enter cut crop areas.

Note: *The width value will be zero when the harvester is not moving or if a job is not in progress on the field computer.*

L/R Angle. This value indicates the current left or right roll as monitored by the tilt sensor on-board the SmartYield Pro control node. Refer to the *Slope Sensor Setup* section on page 15 to calibrate the roll angle for level ground prior to using the SmartYield Pro to monitor harvesting operations.

F/R Angle. This value indicates the current forward or backward pitch as monitored by the tilt sensor on-board the SmartYield Pro control node. Refer to the *Slope Sensor Setup* section on page 15 to calibrate the pitch angle for level ground prior to using the SmartYield Pro to monitor harvesting operations.

Percent Darkness. The percentage of time which the yield sensors are blocked. This value may be used to help fine tune the yield delay setting or to assist with diagnosing issues with the yield sensors.

Percent Darkness 2. This value will be used on machines equipped with a second set of optical yield sensors (typically installed in the tailing elevator).

Paddle Frequency. This value is the frequency of paddles (paddles per second) detected by the yield sensors and may be used to assist with diagnostics of the yield sensors.

Moisture Voltage. The moisture sensor outputs a maximum signal of five volts during operation.

During harvesting operations, the moisture information should fluctuate as grain passes the moisture sensor. If the moisture remains at a consistent value, or remains at a high moisture content (signal voltage over 3.5), the sensor face may be dirty. Wipe the sensor surface of any debris and verify that the sensor signal voltage changes.

If the voltage remains high or continues to stay constant during harvester operation, contact a local Raven dealer for additional assistance.

Temperature Voltage. The temperature voltage displays the signal voltage as monitored by the moisture sensor. The temperature voltage may be used to assist with diagnostics of the moisture sensor and verify that the sensor is monitoring temperature changes properly during harvest operations.

Header Height Voltage. If a variable header height sensor is configured for monitoring the height of the header during operation, this voltage indicator should change as the header is raised and lowered.

Header Status. The header status indicates the current position of the header as configured in the Crop and Harvester Settings. Verify that the header status toggles as the header is raised above or below the desired cut height. Refer to the *Header Height Sensor Setup* section on page 13 for assistance with configuring the switch type and calibration or the *Header Cutout Height (Crop Specific)* section on page 23 to set the cutout height for a variable height sensor.

Node Yield Data

Page two of the Diagnostics screen information displays the following information as monitored by the SmartYield Pro control node.

Moisture. The moisture information displayed in this area is the grain moisture content as monitored by the moisture sensor. This information is displayed on the guidance screen during harvesting operations.

Temperature (Temp). The moisture sensor provides a built-in temperature sensor and displays the temperature monitored at the sensor location during harvest operations.

Spot Weight. This information field displays the weight of grain monitored over the last second of yield monitoring operations.

Yield. This value displays the grain weight per acre [hectare] for the current harvesting operation.

Harvest Rate. The harvest rate value displays the current grain weight monitored per hour during the harvest operation.

Density. The density value is the user entered working test weight configured for the current crop.

Width. This width value is the same as the value displayed on the previous screen. Review the *Width* section on page 25 for details on the displayed width.

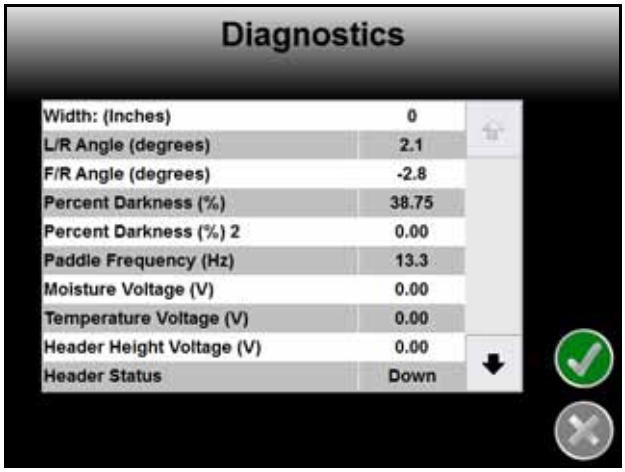
CHAPTER 5

SmartYield™ Pro Operation and Adjustment

Pre-Harvest Checklist

Before starting to harvest crops using the SmartYield Pro system, verify that the SmartYield Pro sensors and switches are operating correctly. Each of these may be checked via the diagnostics screen. To check the sensors and switches:

1. Touch the Tools Menu icon on the Home screen and select the “Yield” button from the System menu.
2. Touch the Diagnostics button to display the Diagnostics screen.



3. Check the Header Cutout by raising the header to the full up position. The Header Status should display ‘Up’ on the Diagnostics screen. Lower the header fully down. The Header Status should toggle to ‘Down’ automatically.
    - If a header cutout switch is installed, lift the header to a suitable trip height and adjust the header cutout switch to toggle at this position. The switch should toggle just above the actual cut height for the specific crop being harvested.
    - If a variable height sensor is connected, select the appropriate crop setting and lift the header to the desired cut height.

      The Header Height Voltage will also increase or decrease as the header is raised or lowered. Configure the cutout height for the variable sensor as described in the *Header Cutout Height (Crop Specific)* section on page 23.
4. Check the Yield Sensor(s) by operating the combine at normal harvesting RPM with the clean grain elevator empty. The Paddle Frequency will indicate the number of elevator paddles passing the sensors each second and a corresponding percentage of time which the sensor beam is broken by the paddles. The Percent Darkness will indicate the percentage of time the yield sensor beam is broken by the paddles.

Operation of the yield sensors may be verified by observing the LEDs on each sensor body. The green LED on the sensor will be illuminated when the sensor is powered and the orange LED will flash when the sensor beam is broken by a paddle or harvested grain.

5. Check the Angle Sensor with the harvester on a known level surface. The L/R and F/R Angle values should indicate zero when the machine is on level ground.
6. Check the Moisture Sensor (if installed) by observing the Moisture Voltage value. If the sensor is clean, the moisture voltage will display a value of zero. If a hand is placed over the moisture sensor, the moisture voltage should increase.

   If the moisture voltage does not change, refer to the *Moisture Sensor* section on page 13 and verify that the moisture sensor is enabled.
7. Check the Temperature Sensor by observing the Temperature Voltage value. A voltage reading indicates that the sensor is functioning.

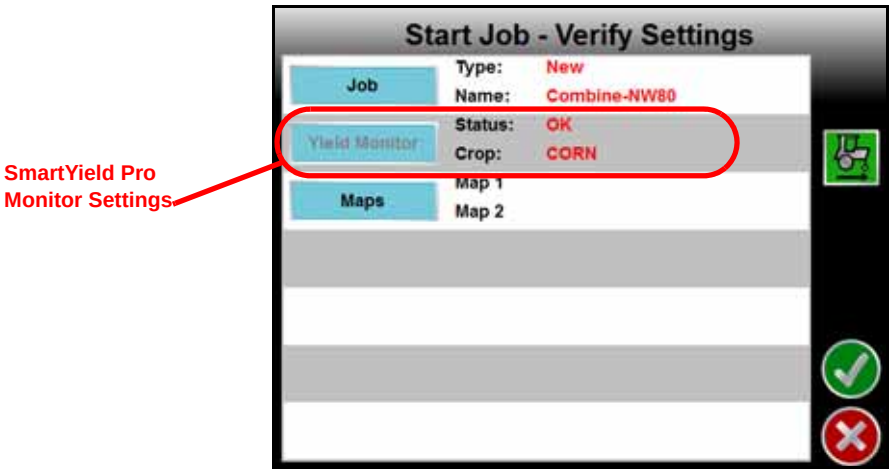
Beginning a Job

Once the pre-harvest checklist is complete, and the machine is located in the field where harvesting operations will be monitored, the Raven SmartYield Pro system may be used to collect yield data and create as harvested maps.

A job must be started to begin mapping yield data. A job also allows the operator to utilize the guidance features of the console and create harvest reports for review or printing on a home or office PC. Refer to the Raven control console operation manual or operator's guide for detailed job set up instructions. The following sections cover specific SmartYield Pro job set up and use features.

Note: *Verify that the SmartYield Pro system is set up properly on the SmartYield Pro settings screens prior to beginning a job.*

The Start Job - Verify Settings screen on the Envizio Pro with the SmartYield Pro screen displays the current crop type selected and the communication status with the SmartYield Pro system.



To begin a new job:

1. Touch the ‘Job’ button and select a new or existing job file for the harvest operation. Refer to the *Envizio Pro Installation and Operation Manual* for more information on setting up jobs and job names.

Note: *Rename new job files for future reference. Enter field location, crop, or any other information which may help identify specific job files. Names of job files entered on the field computer cannot begin with a space.*

2. Touch the Maps button to select up to two maps (e.g. population or variety) to load into the SmartYield Pro job.

   Store the maps on the field computer in a shapefile format. When loaded into the job, the maps may be used by the vehicle operator to compare the yield information to the crop input maps.

3. Verify that the displayed settings or maps are correct and then touch the to begin the job.

Note: *When resuming a previous harvest operation, the field computer will resume the last load started by the operator.*

Initial Field Calibrations

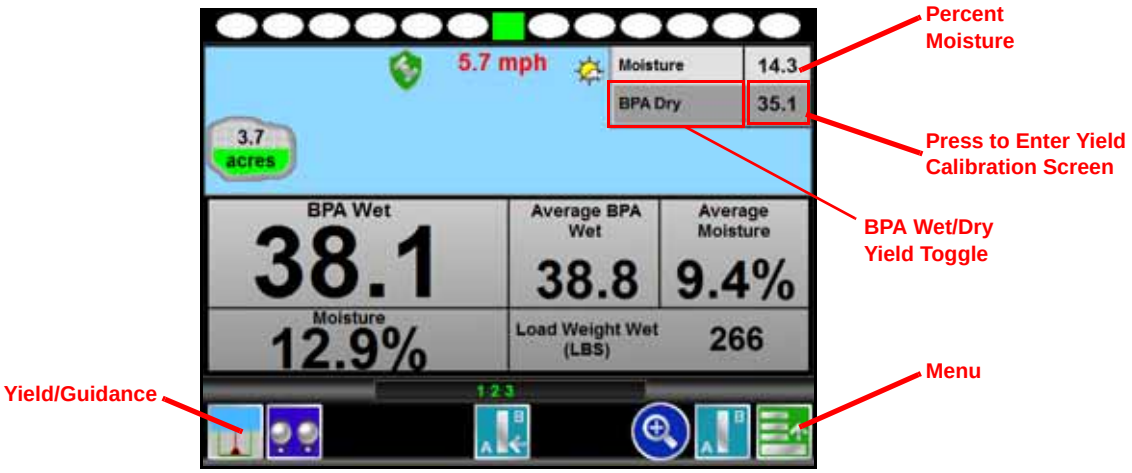
Complete the following procedure to calibrate the SmartYield Pro system after installation, or the first time harvesting a specific crop type:

1. Perform a load weight calibration, and check the moisture correction factor on the first full load. Refer to the *Load Weight Spot Check and Calibration* section on page 37 for assistance.
2. Enter the test weight/working density from an elevator scale ticket or hand held tester on the second load. Refer to the *Test Weight (Working Density)* section on page 36 or the *Moisture Correction Spot Check and Calibration* section on page 35 for assistance.
3. Perform two additional load weight calibrations with loads three and four.

Note: *After the initial crop calibration, load weight calibrations will only need to be performed periodically during normal harvesting operations. Review the best practices and recommendations for each procedure before beginning the initial calibration.*

Envizio Pro Guidance Display

Once the job is open, the guidance screen displays the yield (wet and dry) and moisture information in the upper, right corner.



Touch the yield or moisture data to access the in-job weight calibration screen or the Yield Configuration menus.

Touch the Yield/Guidance icon in the lower, left corner of the screen to toggle the display between the standard field guidance screen and a detailed yield data (as shown in the image above).

Note: *Yield information is only available after grain is measured by the yield and moisture sensors. Refer to the Yield Delay section on page 16 to properly adjust the system for the harvester on which the SmartYield Pro system is installed. Review the field computer operation manual for more information on using swath guidance features.*

Yield Information Displays

The following information will be displayed in the information area in the upper, right corner of the guidance display:

Moisture. The percent moisture value is the measured moisture level in the harvested grain.

Wet/Dry Yield. Touch the wet or dry yield display to toggle the display between measured wet yield or a calculated dry yield.

Refer to the *Storage Moisture Value* section on page 36 and enter a storage moisture content value to allow the SmartYield Pro system to calculate the dry yield during the harvest operation.

Note: *Touch the Moisture or Yield values in the upper, right corner of the Guidance screen to quickly access SmartYield Pro settings during a job.*

A legend of the yield rates is available by accessing the 'Field Review Mode' through the Menu icon in the lower, right corner of the Guidance screen. Refer to the Envizio Pro Installation and Operation Manual for more information about using the guidance displays.

The following information will be displayed in the detailed yield monitor display by touching the yield data display in the lower, left corner of the guidance screen:

Dry/Wet Yield. In the detailed yield information display, the display shows the wet or dry yield opposite of the yield value shown in the upper, right corner. Touching the yield area in the upper, right corner will toggle the yield value shown in the detailed yield view.

Moisture. The same moisture value shown in the moisture and yield area is available in the detailed display.

Average Moisture and Yield. The detailed yield window displays the average moisture and average yield figures for the active job. These totals will reset when a new job is started.

Load Weight. The weight of the current load is displayed in the information prompt.

Note: *Any previous loads in progress will be continued when resuming a previous harvest operation.*

Reference Maps

If a population or variety map is loaded into the job, the map will be displayed on the guidance and field review screen on a layer displayed underneath of the harvest coverage map. Refer to the *Envizio Pro Guidance Display* section on page 30 for assistance with loading reference maps into a new job file.

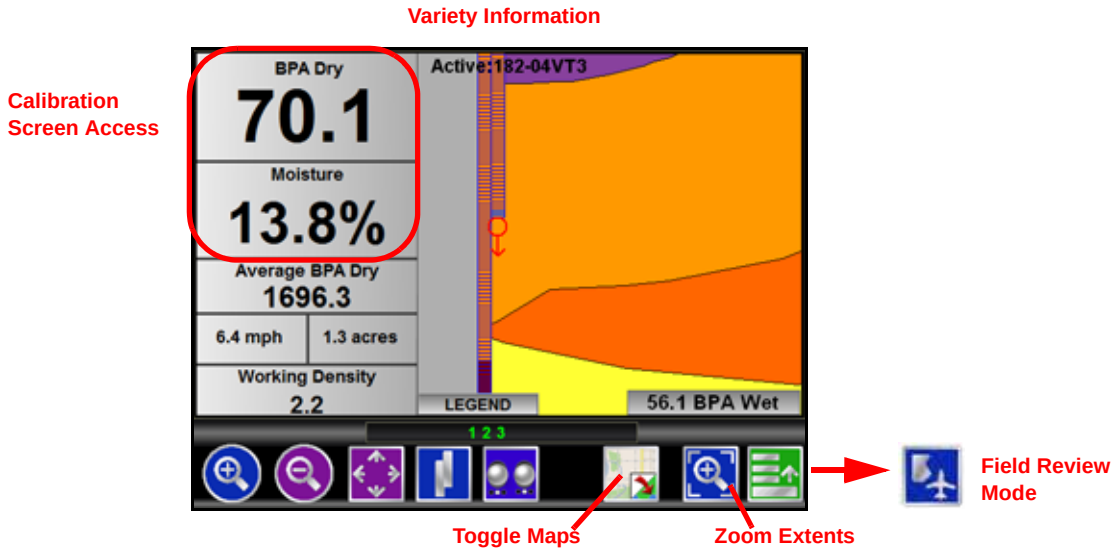
Field Review Mode

While operating with the SmartYield Pro system, the Field Review screen may be used to compare the harvest coverage map with any loaded crop input maps.

Note: *Review the Envizio Pro Guidance Display section on page 30 for more information about loading maps for SmartYield Pro harvest operations.*

As the coverage map is completed during the harvest operation, the loaded maps will be covered. The input map information will not be accessible once the coverage map is completed.

To access the Field Review screen, touch the Menu icon in the lower, right corner of the Guidance screen and select the Field Review icon.



If a second map was selected during the start job procedure, the Toggle Maps icon will be available at the bottom of the Field Review screen. Touch the icon to toggle the active map and access the information available in the next input map.

Zoom Extents

During a harvest operation, the zoom extents button is available to quickly zoom and center the display on the area harvested

Calibration Screen

Touch the yield or moisture display area in the Field Review mode to access the load calibration screen.

Variety Map Information

The current variety information is displayed on the Field Review mode display during harvesting operations. As the harvester travels through various variety zones on the map, the field computer will display information for the variety currently entering the header.

Press the displayed variety map in the Field Review mode to display variety information for the selected zone or area. Touch the variety information display to return to the active variety display.

In-Job Weight Calibration Screen

The Weight Calibration screen allows the harvester operator to track load weights and calibrate the harvester crop cal.

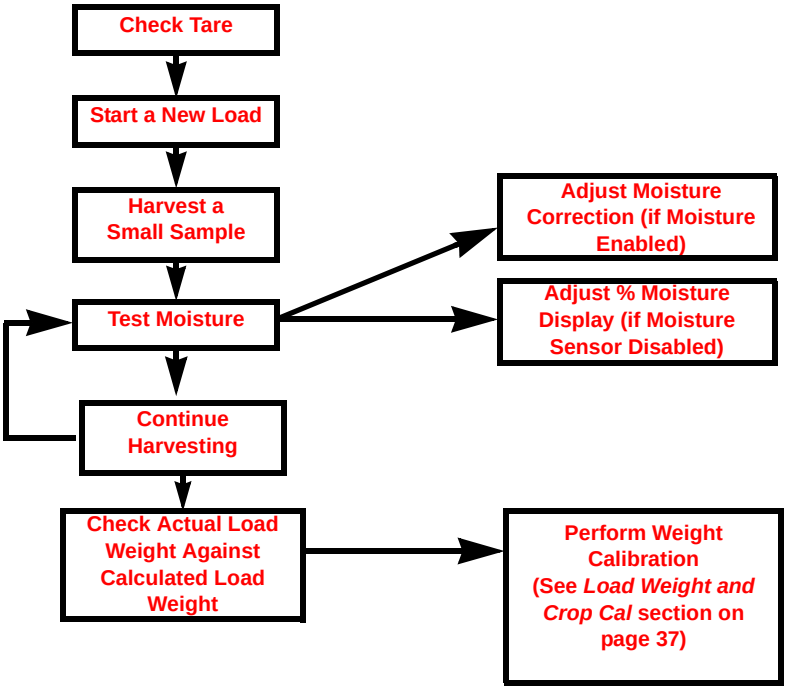
Refer to the *Harvest Checklist and In-Field Calibration* section on page 33 for assistance with performing weight calibrations or adjusting the yield monitor during harvesting operations.

Harvest Checklist and In-Field Calibration

Perform the following procedures periodically during harvesting operations.

Due to natural variations in crop conditions, check moisture content and crop density at regular intervals during harvest operations. If a moisture sensor will be used to monitor yield of oily or green crops, check for unusual moisture readings which may indicate that the moisture sensor requires cleaning. Use the flow chart in Figure 1 on page 33 as a reference daily system checks and testing.

FIGURE 1. Harvest Checklist



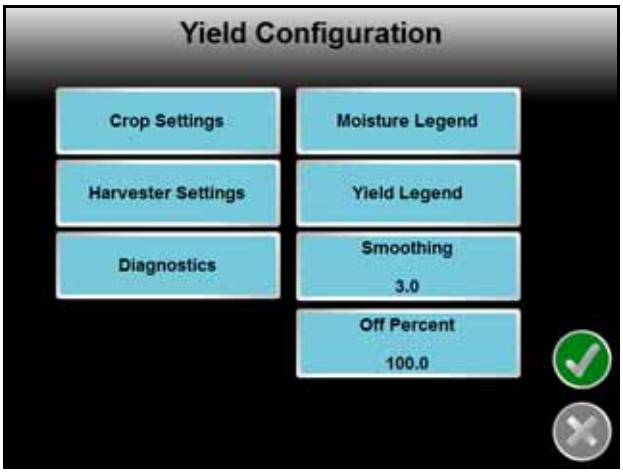
Set Tare

Check the tare at the beginning of each new field. When harvesting oily or dirty crops, the tare should be checked more frequently to avoid errors. Significant yield errors may occur as a result of build up of crop residues or a poorly adjusted elevator chain.

Tare Calibration

1. Park the combine on level ground.
2. Run the harvester at normal threshing RPM with the clean grain elevator empty.
3. On the Envizio Pro field computer, touch the moisture/yield values displayed in the upper, right corner of the guidance screen.

4. Touch the ‘Next’ icon to access the Yield Configuration screen.



5. Select the Harvester Settings button and touch the Harvester Tare button.

   The current tare value is displayed as a percentage of time that the sensor beam is broken by elevator paddles or any material on the grain elevator.

6. Run the harvester at operating RPM and the clean grain elevator at maximum RPM.
7. Touch the ‘Start Calibration’ button to perform tare.

   The console will recalibrate the tare value for the observed clean grain elevator conditions. The ‘Current Darkness’ values should be nearly zero (within 0.5%) when the calibration is complete.

8. If the ‘Current Darkness’ value is not less than 0.5% after performing a tare, the tare calibration should be redone.

Moisture Correction Factor

The moisture correction factor must be calculated for each crop by subtracting the SmartYield Pro moisture reading from the reference meter reading. Enter the difference as the correction factor.

Note: *The moisture sensor may report false readings if extraneous materials begin collecting on the sensor. Check and clean the sensor periodically to avoid inaccuracies in the yield statistics.*

Best Practices and Recommendations

- The moisture correction factor is only required if a moisture sensor is installed.
- During normal operations, check the moisture correction percent once per day, or as necessary for dirty or oily crops.

Moisture Correction Spot Check and Calibration

1. Test the crop moisture using a reference meter. Refer to the instructions provided with the specific moisture meter for assistance.
2. If the moisture reading is different from that of the reference moisture meter, enter or adjust the moisture correction percentage. On the field computer, touch the moisture or yield values in the upper, right corner of the guidance display.

3. Touch the up or down arrows displayed in the lower, left corner of the weight calibration screen to increase or decrease the moisture correction percent in increments of 0.25%.

For Example:

TABLE 1. Moisture Correction Example

Correction Number	SmartYield Reading (SY)	Reference Meter Reading (RM)	Difference (D)	Current Correction (CC)	New Correction (NC)
1	20.0%	18.5%	-1.5%	0.0%	-1.5%
2	16.0%	20.0%	4%	-1.5%	2.5%

Note: *Moisture adjust based on previous corrections. In the example above, the new correction is the difference between the current correction (from the previous correction) and the difference of the second correction number.*

Reading Formulas: RM-SY+CC*=NC **(EQ 1)**

*For the first reading, enter 0 as the Current Correction (CC).

Note: *If a large offset is required, check and clean the moisture sensor before adjusting the moisture correction factor. If the sensor is clean, the sensor may need to be re-calibrated.*

If the system does not have a moisture sensor installed (or the sensor is disabled in the Tools Menu), the moisture sensor will not report the storage moisture for that crop.

Storage Moisture Value

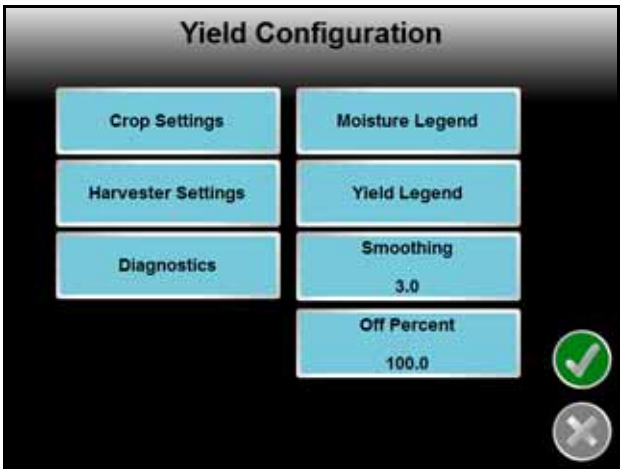
The storage moisture value is used to calculate the corresponding dry yield. A default value is entered for the storage moisture for each crop type.

Note: *If the harvest moisture falls below the programmed storage moisture, the wet and dry yield will be the same.*

Note: *Only adjust the storage moisture value for a user defined crop. Keep all other storage moistures at the USDA standard.*

To adjust the storage moisture value:

1. On the Envizio Pro field computer, touch the moisture/yield values displayed in the upper, right corner of the guidance screen.
2. Touch the 'Next' icon to access the Yield Configuration screen.



3. Touch the Crop Settings button and select the Storage Moisture button.
4. Use the on-screen keypad to enter the storage moisture value for the system to use when calculating the dry yield.

Test Weight (Working Density)

The test weight or working crop density (lbs/bu [kg/hL]) should be checked and adjusted regularly during harvest operations. During operation, the configured working density value is available on the in-job weight calibration screen.

Note: *An incorrect working density value will cause inaccurate yield data from the SmartYield Pro monitoring system.*

Best Practices and Recommendations

- Perform test weight procedures for each crop type.
- Do not adjust the weight calibration on the same load when a test weight sample was entered. Test weights should only be entered for loads not used for load weight calibration.
- During normal operations, check the test weight once per field or per seed variety to maintain high accuracy.

Note: *Adjusting the working density value does not correct or adjust previously accumulated yield data.*

Load Weight and Crop Cal

The load weight spot check and calibration procedures performed during harvesting operations will tune the crop cal during active harvest operations. The crop cal adjusts the SmartYield Pro system for the actual yield from a given crop. The default value is set using test information (if available) for the specific make and model of combine. Due to natural variations within a particular crop, crop varieties, and operating characteristics of each individual combine, the crop cal should be checked and adjusted for each specific harvest operation.

Best Practices and Recommendations

- Perform a weight calibration for each crop type.
- Do not adjust the test weight on the same load when a weight calibration is performed. Test weights should only be entered for loads not used for load weight calibration.
- Start all loads with the harvester hopper empty and without grain passing the yield sensors. To properly calibrate the load weight, all grain harvested during the load must be weighed at a certified or calibrated scale. Load weights should not contain any partial loads or samples.
- Stop the harvester when unloading for load weight calibrations. Cart weigh scales tend to be more accurate when stationary. For this reason, it is recommended to unload and weigh the load with the harvester and grain cart stopped.
- For best results, weight calibration loads should be approximately 2,500 pounds [1,134 kg] or larger.
- Use an in-field weigh scale calibrated to a certified scale and enter the weight calibration immediately upon load completion.
- During normal operations, perform a load weight calibration once per field to maintain high accuracy.

Load Weight Spot Check and Calibration

Note: *Adjusting the load weight does not correct or adjust previously accumulated yield data. Only perform load weight calibrations on complete loads started after an adjusted load weight is entered.*

1. With the grain hopper and clean grain elevator completely empty, start a new load.
2. Harvest the load and unload all grain harvested during the load onto the scale.
3. If the scale weight is different from the monitored yield weight, perform a load weight calibration.

Note: *If a calibrated in-field scale is available, weigh the load and enter the load weight calibration immediately. If an in-field scale is not available, transport all grain harvested during the load to the*

certified scale location, weigh the load, and enter the load weight calibration before resuming harvesting operations.

Harvesting operations may be continued if necessary while waiting for the weight ticket from the certified scale. However, loads started before the corrected weight calibration is entered cannot be used for future weight calibrations. A new load must be started after the corrected weight calibration is entered to properly tune the SmartYield Pro system. Review the "Best Practices and Recommendations" section on page 37 for additional considerations with starting new loads.

4. On the Envizio Pro field computer, touch the moisture/yield values displayed in the upper, right corner of the guidance screen. The weight calibration screen will be displayed.

5. Touch the load number or weight value for which the calibration will be performed to automatically input the load weight for the Monitor weight to the right side of the screen.

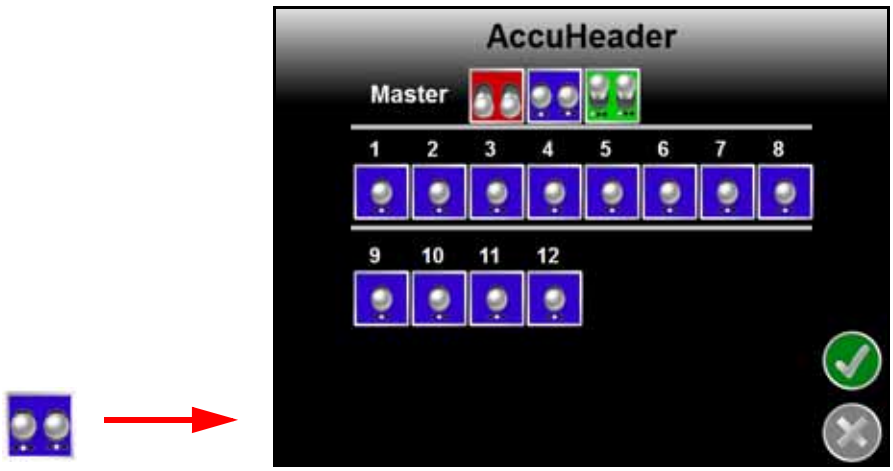
   To manually enter the monitor weight, touch the Monitor weight in the Weight Calibration area and use the on-screen keypad to enter the monitored weight to use for the load calibration.

6. Touch the Scale weight field and use the on-screen keypad to enter the weight provided from the scale.

7. Touch the Calibrate button to recalibrate the SmartYield Pro monitoring system for the calibrated weight. The field computer will calculate the adjusted crop calibration value and display a prompt for the operator when the new calibration has been set.

AccuHeader On-Screen Switch Box

By default, the AccuHeader feature is configured to automatically adjust the header working width during field operations. If necessary, the operator can manually override sections on or off using the on-screen switch box. To display the on-screen switch box, touch the AccuHeader switch icon along the bottom of the screen.



AccuHeader On-Screen Switch Box

The section or master switch is off. If a section switch is in the off position, the section will not be included in the header working width and the AccuHeader feature will not automatically include the section when increasing the working width.

If the master switch is set to off, the AccuHeader feature is manually overriding all sections off. The AccuHeader feature will not automatically increase or decrease the working width as sections cross in or out of uncut crop areas.

The master switch icon on the Guidance screen will display off if one or more header sections are in the manual off position.

Section or master switch is on. If the master switch is toggled on, the AccuHeader feature will not automatically increase or decrease the working width.

The master switch displays on if one or more sections are in the manual on position.

The On/Off icon will be displayed if at least one section is in the manual on position and at least one section is in the manual off position.

Section or master switch is in the automatic position. The AccuHeader feature will automatically increase or decrease the working width based upon previous coverage.

This icon is only displayed for the master switch status if all sections are set to the automatic mode.

5

Reporting

Note: *Refer to the Envizio Pro Series Operation Manual or Quick Reference Guide for additional assistance with performing file maintenance.*

When using a USB flash drive for job file transfer, use a drive with at least 512 MB of memory (maximum 4 GB) for transferring these files.

Raven field computers are capable of outputting yield monitor information reports in a point shapefile format for use in many GIS (geographic information system) software packages.

Slingshot Export

The recommended file output for SmartYield Pro yield monitor data is in the Slingshot export file. This file output provides a quick export of the yield data and allows shapefiles to be generated via the free Slingshot web utility on a home or office PC.

To sign-up for a free Slingshot user account, visit the Slingshot web site:

www.ravenslingshot.com

Job File Export

Job files are not normally necessary to export for SmartYield Pro harvest operations. The job file will be necessary to export a bitmap file of the harvest coverage or to export the harvest operation to another Envizio Pro field computer to start or resume the job.

Note: *Depending upon the size of the completed job(s), exporting the job file may take several minutes to complete. A typical job of 200 acres should take approximately 15 minutes. Larger fields and coverage maps with variety or population information could take significantly longer.*

Refer to the Raven Help web site below for additional information on the shapefile data columns populated in the report files.

www.ravenhelp.com

Shapefile Format

The file output from the Raven yield monitoring system follows the ESRI Point Shapefile format. This format consists of four separate files, each with the same file name.

Note: *A file with the .shp, .shx, a .dbf, and a .prj file extensions are all essential for the shapefile format to function correctly.*

During harvest monitoring operations, the system will calculate the amount of grain flowing through the system each second. The system records grain flow, and other required information, and assigns the geographic point for which the information should be associated accounting for the user defined yield delay value.

The concept for this format is that enough data can be put into the .dbf file which allows the user or data manager to use the .dbf file alone for data processing with certain GIS tools. This format also allows for file conversion to a .csv file for use with older software tools not compatible with the shapefile format.

Note: *Contact a local agronomist for additional assistance with details on file types required for their services or a software dealer for other assistance with working with personal software packages.*

Shapefile (.shp) File. This is a standard point .shp file. A point file means that instead of using multiple points to create a polygon, the yield monitoring system assigns a single point to geo-reference the yield data collected during harvesting operations.

Shapefile Index (.shx) File. This is a standard point .shx file.

Projection (.prj) File. This is a standard point .prj file that defines the projection.

DBF File. The .dbf file defines the values for which the tools will use to display and calculate the yield for the file. Scale A through D are just possible unit conversions for the generic calculations.

CHAPTER 6

Troubleshooting

During harvesting operations, the SmartYield Pro system may provide the following alerts or warnings on the field computer display. Review the following information for assistance with addressing the conditions which may be causing the alert or error.

TABLE 1. SmartYield Pro Troubleshooting

Alert/Alarm Message	Possible Causes	Solutions
Check Tare	• Tare calibration set to zero.	• Perform a tare calibration with the clean grain elevator empty multiple times to verify calibration. Refer to the *Yield Sensor Setup* section on page 15 for additional assistance.
	• Tare calibration is too high.	• Perform a tare calibration with the clean grain elevator empty multiple times to verify calibration. The tare value should not change my more than ±0.5. Refer to the *Yield Sensor Setup* section on page 15 for additional assistance. • Verify that the yield sensor path is clear and is not obstructed by a bracket or chain in the grain elevator.
Optical Sensor Error	• Yield sensors not detected.	• Check that the status LED on the yield sensors illuminate.
	• Yield sensor cable disconnected or damaged.	• Check the sensor cable and connections for damage and proper connection.
Tilt out of Range	• Tilt recalibration required.	• Recalibrate the tilt sensor. Refer to *Slope Sensor Setup* section on page 15 for additional assistance.
	• Angle of operation greater than 30° from calibrated vertical position.	• The tilt sensor is limited to angles ±30° to vertical. If harvesting on side-hill slopes greater than 30°, the tilt sensor will be unable to provide accurate tilt correction for yield data.
	• Check the node orientation and verify the correct configuration.	• Refer to *Control Node Installation Orientation Recommendations* section on page 14 for additional assistance with the node orientation and proper configuration.
	• Tilt sensor not responding.	• Tilt sensor may be damaged. Contact a local Raven dealer for service or repair.
Moisture Sensor Dirty	• Moisture sensor surface covered by debris.	• Clean the moisture sensor surface. The moisture sensor should be cleaned more frequently when harvesting dirty or oily crop types. Refer to *Diagnostics Settings* section on page 24 for additional assistance. • If this occurs frequently, you may disable the moisture sensor.
Moisture Sensor not Connected	• Moisture sensor cable damaged or not connected.	• Check moisture sensor cable and connections for damage and proper connection.
Incorrect Moisture Gain	• Moisture gain set to zero.	• Access the Crop Settings and enter the correct gain value for the crop being harvested. Refer to *Moisture Settings* section on page 23 for additional assistance. • Write down crop calibration values and reset the default Crop Type settings.
Header Cutout Error	• System is not receiving signal from the variable header height cutout sensor.	• Check header cutout sensor cable and connections for damage and proper connection. • Re-position the variable header height cutout sensor so that a 0V reading is not within the detected range. • Verify a switch type header cutout sensor is not installed. If so, reconfigure the cutout sensor type. Refer to *Header Height Sensor Setup* section on page 13 for additional assistance.

Alert/Alarm Message	Possible Causes	Solutions
Check Cal	• Slope compensation values are greater than ±1.	• Re-configure the slope compensation values. Refer to *Slope Sensor Setup* section on page 15 for additional assistance.
	• Monitored temperature is below -5°F [-20°C] or above +120°F [49° C].	• Re-configure the temperature calibration. Refer to *Temperature Sensor* section on page 14 for additional assistance.
	• Header height minimum and maximum are too close.	• Re-configure the header cutout sensor. Refer to *Header Height Sensor Setup* section on page 13 for additional assistance. • If the sensor range is still too narrow, remount the header height sensor in a different location to allow greater movement of the sensor arm.
	• Crop Cal is set to zero.	• Write down the moisture sensor correction and header cutout values and reset the system defaults. Re-enter the recorded values and perform a weight calibration for the selected crop type.

TABLE 2. Additional Troubleshooting

Issue	Potential Causes	Resolution
Inconsistent Tare/Current Darkness	Dirty or gouged sensor lens	1. Clean the sensor and the lens assembly. 2. Verify the sensor lens is not gouged to the point it may impact the light reading.
Moisture frequently gets dirty (must be cleaned multiple times per day)	Sensor is installed in a location prone to collecting dirt.	1. Reinstall the sensor in the loading auger or higher on the elevator clean out door.
Improper start/stop recording.	The header height cutout value is set incorrectly.	1. Verify the header height is selected for the correct crop. 2. Verify the crop specific cutout setting.
	Mounting located shifted.	1. Inspect header height sensor and linkage for damage or shifting. 2. For additional troubleshooting steps, refer to the troubleshooting document linked at the end of this section.
Takes too long for yield to change.	Yield delay or smoothing set incorrectly.	1. Increase the yield delay setting. 2. Decrease the display smoothing setting (should be less than three).

For additional troubleshooting steps, refer to the Harvest section of the troubleshooting document (found at www.RavenHelp.com) linked below:

Interactive Troubleshooting Guide

C

Calibration
In-Field 33
Load Weight Calibration 37
Moisture Correction Factor 34
Test Weight or (Working Density) 36
Initial Calibration 9
Optional Display Settings 19

I

Important Safety Information 1
Initial Startup and Calibration 9
Raven Display 9
SmartYield Pro 11
Header Height Sensor 13
Machine Type 12
Moisture Sensor 13
Node Orientation and Slope Sensor 14
Temperature Sensor 14
Yield Sensor Tare and Delay 15
Introduction 5
SmartYield Pro Overview 5

J

Junction Box Installation
Recommendations 14

L

Load Weight and Crop Cal 37

M

Moisture Correction Factor
Calibration 35

O

Operation
Check Tare 33
Envizio Pro 28
Harvest Checklist 33
Pre-Harvest Checklist 27

R

Reports
Shapefiles 40

S

SmartYield Pro
Diagnostic Features 24

U

Updates 6