

Raven Rate Control Module (RCM) Operation Manual

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CALIBRATION REFERENCE SHEET

Record settings and calibration values used when programming the system in the fields below and keep this sheet for future reference.

GENERAL IMPLEMENT INFORMATION

UNITS	US (Acres)	SI (Hectares)	Nozzle Spacing	
Speed Cal				

Section Widths (Boom Cal)			
1.	2.	3.	4.
5.	6.	7.	8.
9.	10.	11.	12.
13.	14.	15.	16.

TANK FILL SETTINGS

Tank Capacity		Low Tank Limit	
Fill Flow Meter Cal		Units	

PRODUCT CONTROL SETTINGS

Min. Pump PWM		Max. Pump PWM	
Standby Pump PWM		Pump PWM Frequency	
Minimum Nozzle PWM		Meter Cal	
Units		Response Rate	
Deadband			

PRESSURE SETTINGS

Min. Pressure		Max. Pressure	
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UNIT DEFINITIONS AND CONVERSIONS

UNIT OF MEASURE DEFINITIONS

Abbreviation	Definition
GPM	Gallons per Minute
lit/min	Liters per Minute
dl/min	Deciliters per Minute
PSI	Pounds per Square Inch
kPa	Kilopascal
GPA	Gallons per Acre
lit/ha	Liters per Hectare
ml/ha	Milliliters per Hectare
GPK	Gallons per 1,000 Square Feet
mm	Millimeters
cm	Centimeters

Abbreviation	Definition
dm	Decimeters
m	Meter
MPH	Miles per Hour
km	Kilometers
km/h	Kilometers per Hour
US	Volume per Acre
SI	Volume per Hectare
TU	Volume per 1,000 Square Feet
[]	Metric Numbers
lb/acre	Pounds per Acre
kg/ha	Kilograms per Hectare

UNIT OF MEASURE CONVERSIONS

To convert the meter cal value into the selected unit of measure, divide the original number printed on the flow meter label by the desired conversion value.

Fluid Ounces Conversion Formula	Liters Conversion Formula	Pounds Conversion Formula
$\frac{\text{Original Meter Cal}}{128}$	$\frac{\text{Original Meter Cal}}{3.785}$	$\frac{\text{Original Meter Cal}}{\text{Weight of One Gallon of}}$

Liquid	Length
1 U.S. gallon = 128 fluid ounces 1 U.S. gallon = 3.785 liters 1 U.S. gallon = 0.83267 imperial gallons 1 U.S. gallon = 8.34 pounds (water) 1 U.S. gallon = 10.67 pounds (28% N) 1 U.S. gallon = 11.06 pounds (32% N) 1 U.S. gallon = 11.65 pounds (10-34-0)	1 millimeter (mm) = 0.039 inches 1 centimeter (cm) = 0.393 inches 1 meter (m) = 3.281 feet 1 kilometer (km) = 0.621 miles 1 inch = 25.4 mm or 2.54 cm 1 mile = 1.609 km
Area	Pressure
1 square meter = 10.764 square feet 1 hectare = 2.471 acres or 10,000 square meters 1 acre = 0.405 hectares or 43,560 square feet 1 square mile = 640 acres or 258.9 hectares	1 psi = 6.89 kPa 1 kPa = 0.145 psi

SAFETY

NOTICE

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

- Follow all safety information presented within this manual. Review implement operation with your local dealer.
- Contact a local Raven dealer for assistance with any portion of the installation, service, or operation of Raven equipment.
- Follow all safety labels affixed to system components. Be sure to keep safety labels in good condition and replace any missing or damaged labels. Contact a local Raven dealer to obtain replacements for safety labels.

Observe the following safety measures when operating the implement after installing this Raven system:

- Do not operate this Raven system or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Be alert and aware of surroundings and remain in the operator seat at all times when operating this Raven system.
 - Do not operate the implement on any public road with this Raven system enabled.
 - Disable this Raven system before exiting the operator seat.
 - Determine and remain a safe working distance from obstacles and bystanders. The operator is responsible for disabling the system when a safe working distance has diminished.
 - Disable this Raven system prior to starting any maintenance work on the implement or components of this Raven system.
- Do not attempt to modify or lengthen any of the system control cables. Extension cables are available from a local Raven dealer.

 DANGER

Anhydrous ammonia (NH_3) under pressure. NH_3 can cause severe burning, blindness, sickness, or death. Understand all safety instructions and warnings before operating or servicing equipment.

- Review the properties of NH_3 and the procedures for safe handling, and use with your NH_3 supplier.
 - Contact your NH_3 supplier or the appropriate agricultural department for training on handling, transporting, transferring, and applying NH_3 . Training should be completed at least every three years.
 - Always wear appropriate personal protective equipment (PPE) when installing, inspecting, servicing, and operating the NH_3 system. Appropriate PPE includes, but is not limited to:
 - Liquid proof gauntlet-style gloves impervious to NH_3 .
 - Long sleeved shirt and long pants or protective suit.
 - Indirect vent chemical splash goggles or indirect vent chemical splash goggles with full-face shield.
 - Check operation of system components (e.g. valves, temperature and pressure gages) prior to charging the system with NH_3 .
 - Seek immediate medical attention if symptoms of illness occur during or shortly after use of NH_3 products.
- Use extreme caution when servicing or maintaining a system that has previously been pressurized with NH_3 .
 - Keep a source of clean water (at least five gallons) readily available while working with NH_3 . This source should be in addition to, and separate from, the water source on the nurse tank.
 - Read and follow instructions provided with the application system to properly discharge NH_3 before performing service or maintenance.
 - Pressure gauges can fail, become plugged, or display incorrect pressure. Slowly bleed pressure from a previously charged system by opening valves slightly. Allow pressure to discharge for an extended period of time. Treat every section where NH_3 can be trapped as though it is pressurized.
 - Thoroughly bleed all system lines and disconnect the nurse tank hose to remove NH_3 from the system before transporting the system or beginning service or maintenance. Liquid NH_3 can absorb heat from surroundings and re-pressurize the system. Any bleed valves that are opened to relieve pressure should remain open while transporting the system or maintenance is being performed.
 - Stand 'up wind' when working around NH_3 and related equipment. Never work on NH_3 equipment in confined spaces. Always keep NH_3 equipment away from buildings, livestock, and other people.
 - Before each day's use:
 - Visually inspect all system plumbing components for functionality, excessive wear, and damage.
 - Some components may have recommended "replace by" dates or maximum service periods regardless of visual condition.
 - Replace individual components if excessively worn, visually damaged, or non-functioning, as recommended by the component manufacturer, or as required by regulation, whichever is sooner.
 - Test excess flow valves and document the date and result of tests. Replace any components that do not pass inspection as needed.
 - Never uncouple an NH_3 applicator or intermediate towing vehicle without appropriate parking stands, wheel chocks, or other braking systems if a nurse take wagon is attached.
 - Immediately evacuate the area in case of leak or accidental release of NH_3 . Contact your local fire department, and identify sources of clean water on the unit.

- In case of exposure, flush exposed skin and eyes immediately with large quantities of water for at least 15 minutes and seek immediate medical attention.
- NH_3 can be harmful to the environment if not used properly.
 - Follow all federal, state, and local regulations regarding the handling and use of NH_3 .
- Only NH_3 harness systems, control systems, and on/off valves approved by Raven Industries are recommended for use with NH_3 products. Raven shall not be liable for any damages and this warranty shall not cover defects from:
 - The use of a system with a harness not approved by Raven.
 - The use of a control system not approved by Raven.
 - The use of an on/off valve not approved by Raven.
 - The use of the system in a manner that is inconsistent with the instructions.
 - Unauthorized modification to the system or products used in the system.
 - Follow the best practices for installing and routing hoses provided in *Recommendations and Best Practices* section on page 8.



AGRICULTURAL CHEMICAL SAFETY

Follow all federal, state, and local regulations regarding the handling, use, and disposal of agricultural chemicals, products, and containers. Triple-rinse and puncture or crush empty containers before properly disposing of them. Contact a local environmental agency or recycling center for additional information.

- Always follow safety labels and instructions provided by the chemical manufacturer or supplier.
- Always wear appropriate personal protective equipment as recommended by the chemical and/or equipment manufacturer.
- When storing unused agricultural chemicals:
 - Store agricultural chemicals in the original container and do not transfer chemicals to unmarked containers or containers used for food or drink.
 - Store chemicals in a secure, locked area away from human and livestock food.
 - Keep children away from chemical storage areas.
- Fill, flush, calibrate, and decontaminate chemical application systems in an area where runoff will not reach ponds, lakes, streams, livestock areas, gardens, or populated areas.
- Follow all label instructions for chemical mixing, handling, and disposal.
- Avoid direct contact with agricultural chemicals or inhaling chemical dust or spray particulate. Seek immediate medical attention if symptoms of illness occur during, or soon after, use of agricultural chemicals or products.
- After handling or applying agricultural chemicals:
 - Thoroughly wash hands and face after using agricultural chemicals and before eating, drinking, or using the restroom.
 - Thoroughly flush or rinse equipment used to mix, transfer, or apply chemicals with water after use or before servicing any component of the application system.

HYDRAULIC SAFETY

When installing or servicing a hydraulic system or hydraulic components, be aware that hydraulic fluid may be extremely hot and under high pressure. Caution must be exercised.

- Always wear appropriate personal protective equipment when installing or servicing hydraulic systems.
- Never attempt to open or work on a hydraulic system with the implement running.
- Any work performed on the hydraulic system must be done in accordance with the machine manufacturer's approved maintenance instructions.
- Care should always be taken when servicing or opening a system that has been pressurized.
- The implement or machine must remain stationary and switched off with booms or implement sections unfolded and supported during installation or maintenance.
- Take precautions to prevent foreign material or contaminants from being introduced into the implement hydraulic system. Contaminants that are able to bypass the hydraulic filtration system will reduce performance and may damage hydraulic components.
- Stand clear of the implement when starting the system for the first time after installing or servicing hydraulic components in case a hose has not been properly connected or tightened.

CAUTION

ELECTRICAL SAFETY

- Always verify that power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the Raven system or other components.
- To prevent personal injury or fire, replace defective or blown fuses with only fuses of the same type and amperage.
- Do not connect the power leads to the battery until all system components are mounted and all electrical connections are completed.
- Always start the machine before initializing this Raven system to prevent power surges or peak voltage.
- To avoid tripping and entanglement hazards, route cables and harnesses away from walkways, steps, grab bars, and other areas used by the operator or service personnel when operating or servicing the equipment.

MACHINE SAFETY SYSTEMS

- Use all provided safety systems on the machine when operating the machine with the Raven system.
- Seat belts and restraints must be used when an operator is in the cab.
- Do not disable any machine-provided safety systems, including but not limited to audible alarms, alarm lights, etc.

RECOMMENDATIONS AND BEST PRACTICES

HOSE ROUTING

The word “hose” is used to describe any flexible, fluid carrying components. Use the following guidelines and recommendations when connecting and routing hoses while installing or maintaining this Raven system:

- Leave protective caps/covers over hose ends until connecting the end into the hydraulic system to help prevent contaminants from entering the system.
- Follow existing hose runs already routed on the implement as much as possible. Proper hose routing should:
 - Secure hoses and prevent hoses from hanging below the implement.
 - Provide sufficient clearance from moving components and operational zones around shafts; universal joints and suspension components; pulleys, gears, belts, and chains; moving linkages, cylinders, articulation joints, etc.
 - Protect hoses from field debris and surrounding hazards (e.g. tree limbs, fence posts, crop stubble, dirt clumps or rocks that may fall or be thrown by the implement).
 - Protect hoses from sharp bends, twisting, or flexing over short distances and normal implement operation.
 - Ensure sufficient length for free movement of the implement during normal operation and prevent pulling, pinching, catching, or rubbing, especially in articulation and pivot points. Clamp hoses securely to force controlled movement of the hose.
 - Avoid abrasive surfaces and sharp edges such as sheared or flame cut corners, fastener threads or cap screw heads, hose clamp ends, etc.
 - Avoid areas where the operator or service personnel might step or use as a grab bar.
- Do not connect, affix, or allow hoses to come into contact with components with high vibration forces, hot surfaces, or components carrying hot fluids beyond the temperature rating of hose components.
 - Hoses should be protected or shielded if routing requires the hose to be exposed to conditions beyond hose component specifications.
- Avoid routing hoses in areas where damage may occur due to build up of material (e.g. dirt, mud, snow, ice, etc.).

HARNESS ROUTING

The word “harness” is used to describe any electrical cables and leads, both bundled and unbundled. Use the following guidelines and recommendations when connecting and routing harnesses while installing or maintaining this Raven system:

- Leave protective caps/covers over harness connectors until needed to avoid dirt and moisture from contaminating electrical circuits.
- Secure the harness to the frame or solid structural members at least every 30 cm [12 in.].
- Follow existing harness runs already routed on the implement as much as possible. Proper harness routing should:

- Secure harnessing and prevent the harness from hanging below the implement.
- Provide sufficient clearance from moving components and operational zones around shafts; universal joints and suspension components; pulleys, gears, belts, and chains; moving linkages, cylinders, articulation joints, etc.
- Protect harnessing from field debris and surrounding hazards (e.g. tree limbs, fence posts, crop stubble, dirt clumps or rocks that may fall or be thrown by the implement).
- Protect harnessing from sharp bends, twisting, or flexing over short distances and normal implement operation.
- Connectors and splices should not be located at bending points or in harness sections that move.
- Ensure sufficient length for free movement of the implement during normal operation and prevent pulling, pinching, catching, or rubbing, especially in articulation and pivot points. Clamp harnessing securely to force controlled movement of the harness.
- Avoid abrasive surfaces and sharp edges such as sheared or flame cut corners, fastener threads or cap screw heads, hose clamp ends, etc.
- Do not connect, affix, or allow harnessing to come into contact with components with high vibration forces, hot surfaces, or components carrying hot fluids beyond the temperature rating of harness components.
 - Harnessing should be protected or shielded if routing requires the hose to be exposed to conditions beyond harnessing component specifications.
- Avoid routing harnesses in areas where damage may occur due to build up of material (e.g. dirt, mud, snow, ice, etc.).
- Avoid routing harnesses in areas where the operator or service personnel might step or use as a grab bar.

IMPORTANT: Avoid applying direct spray or pressure washing of electrical components and connections. High pressure streams and sprays can penetrate seals, cause corrosion, or otherwise damage electrical components. When performing maintenance:

- Inspect electrical components and connectors for corrosion, damaged pins or housings, etc. Repair or replace components or harnessing as necessary.
- Ensure connectors are kept clean and dry. Apply dielectric grease to the sealing surfaces of all connections exposed to moisture, dirt, debris, and other contaminants. Repair or replace harnessing as necessary.
- Clean electrical components with pressurized air, aerosol electrical cleaning agent, or low pressure rinse.
- Remove visible surface water from electrical components and connections using pressurized air or an aerosol cleaning agent. Allow components to dry thoroughly before reconnecting cables.

The Raven Rate Control Module (RCM) is a multi-product application control system built on an ISOBUS platform. The Raven Rate Control Module is designed to provide a machine operator the ability to simultaneously monitor and control five product applications such as liquid, granular, NH₃, and direct injection via ISOBUS Universal Terminal (UT) and task control for as-applied documentation, prescription rate, and section control.

This document is intended to provide information regarding the following aspects of the Raven Rate Control Module:

- Initial Setup and Navigation
- Calibration
- Raven Rate Control Module System Operation
- Raven Rate Control Module Alarms
- Updating Raven Rate Control Module Components

NOTE: Prior to using the Raven Rate Control Module control features with any UT display, the Raven Rate Control Module electronic control unit (ECU) must be calibrated for the control system. Refer to Chapter 3, *ISOBUS System Calibration*, for assistance with completing the initial calibration wizard.

This manual assumes that the required control hardware is already installed on supported equipment and is properly connected. Contact a local Raven dealer for additional information on supported equipment configurations.

RAVEN RATE CONTROL MODULE™ FEATURES

DIRECT INJECTION

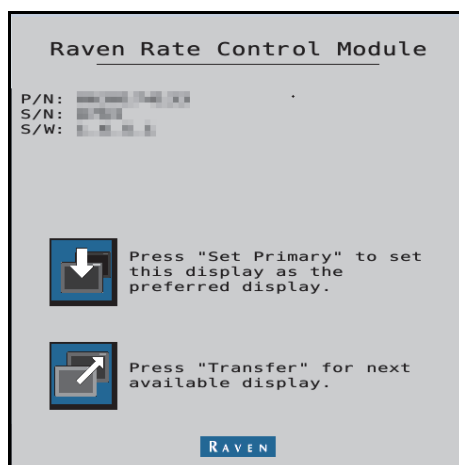
The Raven Sidekick™ Pro ICD provides for an optimal user experience by allowing control of direct injection through the Raven Rate Control Module interface. By using a separate injection module or tank, the system eliminates mixing chemicals in the tank, reduces chemical waste, and simplifies equipment care and maintenance. Connect up to four injection systems to the Viper 4 and ISOBUS to control the whole system through the Raven Rate Control Module user interface screens on the virtual terminal. Purchase a high flow injection system to control a wide range of chemical flow rates from 5 - 200 oz/min. Purchase a low flow injection system to provide chemical flow rates from 1 - 40 oz/min. Refer to the Sidekick™ ICD Manual for additional information on high and low flow injection systems.

Contact a local Raven dealer for additional details on direct injection using Sidekick Pro™ with Raven Rate Control.

MULTIPLE UT SETTINGS

When an RCM is used in a system with more than one UT (universal terminal), the RCM can be assigned a primary UT.

FIGURE 1. Set Primary UT Menu



MACHINE TYPES

The Raven Rate Control Module can be used with:

TABLE 1. RCM Machine List

Machine Type	Application Type	Application Mode
Self-Propelled Sprayer Pull-Behind Sprayer	N/A	Liquid Liquid Tiered (Direct) Liquid Tiered (External) Liquid Constant Flow Tiered Boom - Low Side Drive Liquid - Single Tier
Liquid Fertilizer Tool	Liquid	Liquid Liquid Tiered (Direct) Liquid Tiered (External) Liquid Constant Flow Liquid Slurry Dragline Liquid Slurry Tiered Boom - Low Side Drive Liquid - Single Tier
NH ₃ Tool	N/A	NH ₃ NH ₃ HP+
Self-Propelled Spreader Pull-Behind Spreader	Granular Fertilizer Granular Seed	Dry Manure/Litter Granular Full Width Granular RPM Compensated Granular RPM Maintained Granular Split Tank Dual Control Valve Granular - G4 Edge
Air Cart Generic	Liquid Granular Fertilizer Granular Seed	Liquid Granular Full Width Granular RPM Compensated Granular RPM Maintained Granular Split Tank Dual Control Valve Granular Meter Per Section
Planter	Granular Seed	Planter Section Control Seed Rate Control (/W Clutches) Seed Rate Control (no Clutches)
Scale	NA	NA

CARE AND USE

Always follow equipment manufacturer's recommended maintenance procedures for storing equipment. The following maintenance procedures are generally recommended for storing equipment with the Raven Rate Control Module:

1. Empty product from the chemical supply tank and flush the application system with water.
2. Remove hardened chemical residues or build up by flushing the system with:
 - a. kerosene or fuel oil if the last product applied was petroleum based.
 - b. soap and water if the last product applied was water based.
3. Prime the system plumbing with a 50% water and automotive antifreeze mixture to prevent freezing of components. Freezing will result in damage to the system and other plumbing components on the system.

FEATURE UNLOCKS

Every RCM comes with different levels of unlocks. To purchase additional unlocks, navigate to portal.ravenprecision.com and purchase the desired unlocks. The table below lists unlock levels:

Level	ECU P/N	Features
0	063-0173-940	• Single product liquid and granular control. • Task controller interface capability and section control. • Generic single channel scale/no application control. • Multiple Sidekick Pro™ ICD control support (up to 4) without as-applied documentation where supported. • Blockage monitoring capability with RBM. • Subsequent Products - no control valve (monitoring only with documentation). • ISO Class 3 slurry dragline speed control.
1	063-0173-941	• Single product control with section shut-off. • Liquid NH₃(AccuFlow™ HP Plus)/Granular. • Dual valve control (no support for multiple rate control sections). • Spinner/fan control (two channel). • No scale support (product or general purpose) with products enabled. • Multiple Sidekick ICD control supported • Task controller support for ground drive transmission (section control, as-applied documentation) • Planter section control - up to 16 sections/clutches • Generic four channel scale/no application control
2	063-0173-756	• Multi-product application control (up to five products) • Scale support in conjunction with application control • Tiered boom (two tiers) • Multiple rate control sections (with or without VRA capability) • Planter section control - up to 32 sections/clutches
3	063-0173-953	• Granular Meter per Section • Planter Seed Rate Control (with clutches) • Planter Seed Rate Control (without clutches) • Manure/Litter spreader
3 Stack Tiered Boom	077-0180-202	• Enable for three stacks or tiers (A, B, and C or a combination thereof).
3 Stack Blockage Monitoring	077-0180-201	• Enable interfacing to a third party blockage monitoring system to provide section awareness from RCM.

COMPLIANCE

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UPDATES

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

<https://portal.ravenprecision.com>

The Raven Service Tool and a laptop PC are required to perform software updates of the Raven Rate Control Module. Refer to the Raven Service Tool Operation manual for additional assistance with updating the Raven Rate Control Module.

Sign up for e-mail alerts to receive notifications 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

- Raven Rate Control Module (RCM) Operation Manual
- 016-0171-637 Rev. H
- 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.

CHAPTER

LIQUID OPERATION

3

LIQUID MACHINE LIST

TABLE 1. RCM Liquid Machine List

Machine Type	Application Type	Application Mode	Application Mode Uses
• Self-Propelled Sprayer • Pull-Behind Sprayer	• Liquid	Liquid	Conventional Liquid application. Application rate is entered and documented as gallons/acre (liters/hectare).
		Liquid Tiered (Direct)	Tiered boom liquid application in which two-way boom valves are controlled directly by signals provided by the Rate Control Module (RCM).
		Liquid Tiered (External)	Tiered boom liquid application in which two-way boom valves are controlled by an external module using section and tier signals by the RCM.
		Liquid Constant Flow	Single boom liquid application using three-way boom valves that divert flow back to tank in the off position.
		Tiered Boom - Low Side Drive	The RCM will activate tiers by supplying a ground (earth) signal that can be connected to the return (low side) of the valve bank. The signal will float when the tier is off, causing the connected valve bank to turn off.
• Liquid Fertilizer Tool	• Liquid	Liquid Slurry Dragline	Liquid application for products that do not have a control valve and require a large application rate like liquid manure.
		Liquid Slurry	Conventional liquid application for products that require a large application rate like liquid manure.

LIQUID FERTILIZER CONFIGURATION

This section provides a liquid fertilizer configuration example. Depending on machine configuration the following screens will vary.

1. Select the desired sprayer type from the Machine Type drop down.

FIGURE 1. Name Profile Page

2. Enter a name for the profile in the Profile Name field.
3. Select the application width.
4. Select the Next button.
5. Select the appropriate ECU # from the drop down. The lower the ECU number, the higher priority the ECU will have when paired with an injection system.

FIGURE 2. Setup System Page

ECU S/N	ECU #	Number of Products
RCM - 47	2	1

6. Select the Next button.
7. Select the Application Mode from the drop down.

FIGURE 3. Setup Application Type Page

Setup Application Type

Product 1 Liquid

Application Mode

* Liquid

Application Mode - Liquid

Conventional Liquid application.
Application rate is entered and
documented as
Gallons/Acre(Liters/Hectare)

Navigation buttons: Left arrow, RAVEN, Right arrow

8. Select the Next button.
9. On the Setup Sections screen, enter the Number of Sections and select the Section Valve Type.

FIGURE 4. Setup Sections Page

Setup Sections

Number of Sections * 10 ?

Section Valve Type 3-Wire

Equal Width Sections ☒

Fence Rows Enable ☒

Navigation buttons: Left arrow, RAVEN, Right arrow

10. If desired, select the Equal Width Sections and Fence Rows Enable check boxes.
11. Select the Next button.
12. Select the fence row driver for each fence row (if selected earlier).

FIGURE 5. Setup Fence Row Drivers Page

13. Select the Next button.

14. Review the section width information on the Setup Section Width screen.

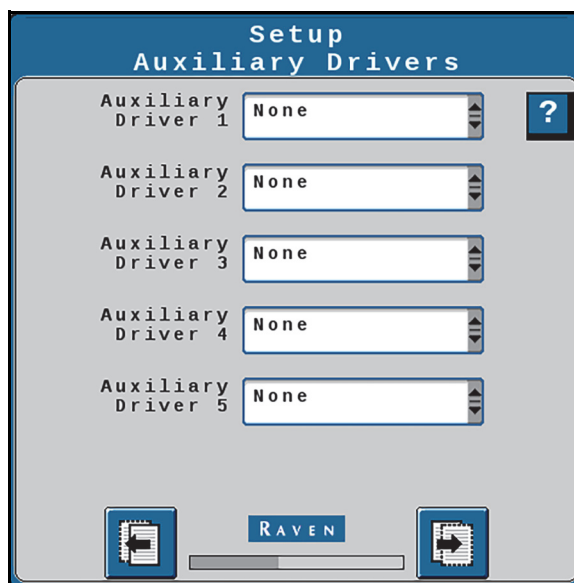
FIGURE 6. Setup Section Width Page

15. If needed, adjust the section widths.

16. Select the Next button.

17. If desired, configure auxiliary drivers on the Setup Auxiliary Drivers screen. Auxiliary drivers are additional switches that provide a 12 V signal to a device.

FIGURE 7. Setup Auxiliary Drivers Page



18. Select the Next button.

FIGURE 8. Auxiliary Drivers Page



19. Enable the check box option to latch the Aux Driver output. If the option is enabled, the auxiliary driver will be on until the operator selects the Aux button again. If left unchecked, the output will only be on while the aux driver button is held.

20. Select the Next button.

21. Review the information on the Section Summary screen.

FIGURE 9. Section Summary Page

Section Summary

100.000 (ft)

Product 1

10	10	10	10	10	10	10	10	10	10
1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10

Liquid Section width Granular Section width Wired Signal Driver Switch Number

RAVEN

22. Select the Next button.

23. Select the appropriate pressure sensors configuration for each pressure sensor.

FIGURE 10. Setup Pressure Sensors Page

Setup Pressure Sensors

Product 1 Liquid

Pressure Sensor 1: 0-250psi (1-5V)

Pressure Sensor 2: 0-250psi (1-5V)

Verify Pressure Calibration after Setup Wizard. For "Custom" sensor types refer to Advanced Pressure Calibration.

RAVEN

24. Select the Next button.

25. If desired, set the Min and Max pressures and select the Alarm? check box for each pressure sensor.

FIGURE 11. Setup Pressure Alarms Page

	Min	Max	Alarm?
Pressure 1 (PSI)	0	0	☐
Pressure 2 (PSI)	0	0	☐

26. Select the Next button.
27. If an agitator is installed and will be used, select the Agitator Installed check box and configure the Agitator Duty Cycle. Also select the Flow Return Installed check box if equipped or to disable flow unexpected alarm when master off.

FIGURE 12. Setup Auxiliary Functions Page

28. Select the Next button.
29. On the Setup Control Valve page, configure the information for the product. This includes selecting the Control Valve Type, Valve Response Rate, and Control Deadband.

FIGURE 13. Setup Control Valve Page

Setup Control Valve

Product 1 Liquid ?

Control Valve Type: Standard

Valve Response Rate (1-100): 50

Control Deadband (%): 3

Valve Delay (seconds): 0.0

Valve Advance (seconds): 0.0

Control Effort (%): 35

Navigation icons, RAVEN button, and progress bar.

30. Select the Next button.

31. Configure the rate sensor for the product by entering the Flow Meter Calibration and selecting the Flow Meter Pulses/Units.

FIGURE 14. Setup Rate Sensors Page

Setup Rate Sensor

Product 1 Liquid ?

Flowmeter calibration: 780

Flowmeter Pulse/Units: 10 gal

Navigation icons, RAVEN button, and progress bar.

32. Select the Next button.

33. Select the Tank Fill/Level Sensor and enter the Tank Capacity, Current Tank Level, and Low Tank Level for the product.

FIGURE 15. Setup Tank/Bin Page

Setup Tank/Bin

Product 1 Liquid

Tank Fill/Level Sensor: Tank Level Sensor

Tank Capacity (gal): 1000

Current Tank Level (gal): 1000

Low Tank Level (gal): 50

Alarm? ☐

Navigation: [Left Arrow] RAVEN [Right Arrow]

34. If desired, select the Alarm? check box for the Low Tank Level.
35. Select the Next button.
36. Enter the Preset Rate Values and Rate Bump values for the product.

FIGURE 16. Setup Rates Page

Setup Rates

Product 1 Liquid ?

	Rate 1	Rate 2	Rate 3
Rate Values (gal/ac)	5.0	7.0	9.0

Rate Bump (gal/ac): 1.0

Rate Selection: Predefined or Rx

Display Smoothing: ☒

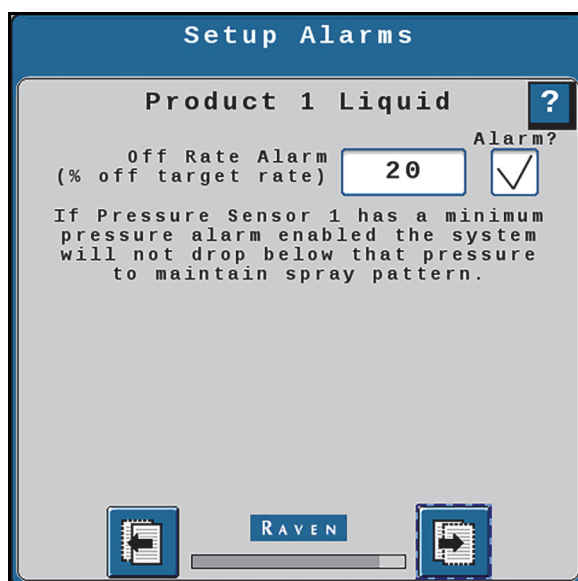
Decimal Shift: 1

Standby Pressure (PSI): 0

Navigation: [Left Arrow] RAVEN [Right Arrow]

37. Select the desired Rate Selection from the drop down.
38. If desired, select the Display Smoothing check box and select the Decimal Shift number.
39. Enter a Standby Pressure.
40. Select the Next button.
41. If desired, enter a Off Rate Alarm percentage and select the Alarm? check box.

FIGURE 17. Setup Alarms Page

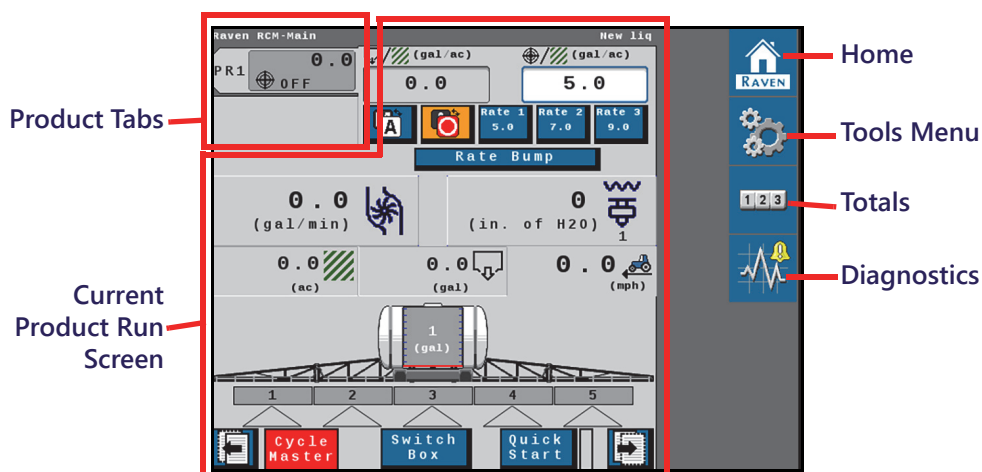


42. Review the information on the Setup Summary page. If the configuration is not correct, select the Back button and make the necessary adjustments. If the configuration is correct, select the Next button.

LIQUID RUN PAGE OVERVIEW

The image below is an example of a typical RCM main screen.

FIGURE 18. Liquid Run Page



PRODUCT TABS

Select the product tab to select the desired product. This will open the product run screen for that product.

CURRENT PRODUCT RUN SCREEN

The current product run screen displays information for the selected product. Each product run screen will vary based on product configuration.

Data Fields display selected settings and can be changed to the operator's preferences.

FIGURE 19. Liquid Run Page

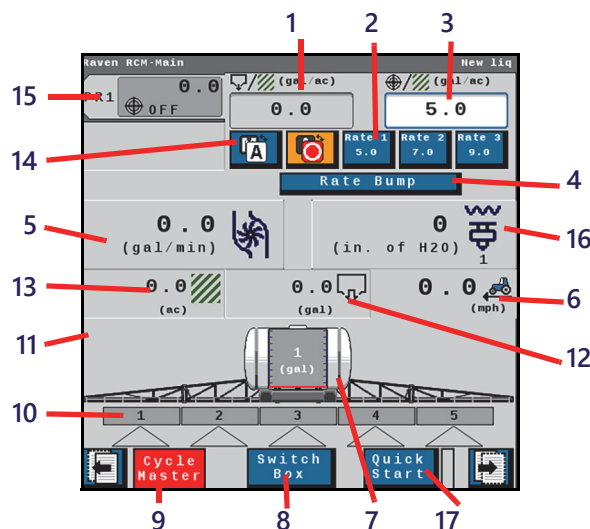
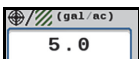
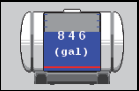


TABLE 2. Liquid Run Screen Information

	Button	Description	Function/Operation
	1.	Actual Rate	Displays the actual application rate.
	2.	Preset Rate Bump	Provides the user the to increase the rate by the preconfigured rates defined during configuration.
	3.	Target Rate	Displays the current target rate. The target rate may be adjusted by selecting the value and using the on-screen keyboard to enter the new desired target rate.
	4.	Rate Bump/Presets	This will either display Rate Bump or Presents. This increases the rate by the rate bump value defined during configuration.
	5.	Flow Rate	Displays the gal/min going through the flow meter.
	6.	Traveling Speed	Shows the implement/machine speed. Touch the speed display to access the Self Test Speed Setup menu.
	7.	Tank Level	Displays the current tank level.

	Button	Description	Function/Operation
	8.	Section Switch Box Button	Indicates if the switch box is on or off: - Green - On - Red - Off Select the switch box button to navigate to a screen that allows the user to turn off the switch boxes for individual sections.
	9.	Master Switch Indicator	The Master Switch Indicator shows the status of the master switch. - Green - On - Red - Off - Orange - Cycle the master switch
	10.	Section Status	Displays the spray status of each section. - Green - On - Gray - Off
	11.	Fence Row	Provides the user the ability to turn the fence rows on or off.
	12.	Application Volume	Displays the tally register volume applied.
	13.	Applied Acres	Displays the number of acres applied.
	14.	Manual/Automatic Mode	Touch the on-screen display to toggle between manual and automatic operation modes.
	15.	Product Tab	Select a tab to view information for that product.
	16.	Low Pressure	Low pressure reading.
	17.	Quick Start	Select this to quickly configure/start a liquid application.

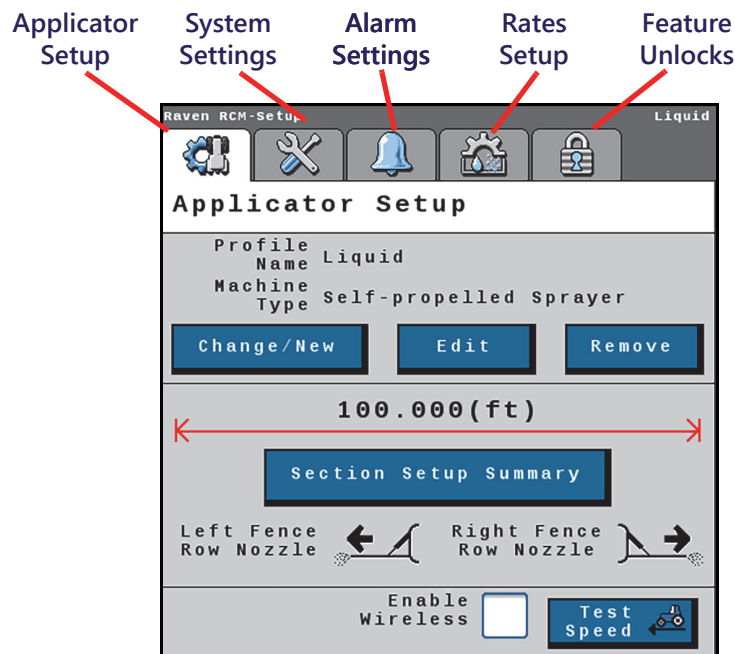
HOME

Select the Home button at any time to return to the main run screen.

TOOLS MENU

Select the Tools button to access settings and options for calibrating or tuning the application system.

FIGURE 20. Tools Menu Tabs



APPLICATOR SETUP TAB

The Applicator Setup tab provides options to create a new, edit, or remove a profile for application equipment. This tab also provides a summary to the section configuration. For more information on the Precision Farming Setup button, refer to Chapter 10, *Precision Farming*.

SYSTEM SETTINGS

The system settings provides many buttons that allow the user to modify the current configuration. The table below describes each button in detail.

TABLE 3. System Settings

Button	Description
Control Valve Setup	The Control Valve button allows the user to adjust the following settings for each product: • Valve Response Rate • Control Deadband • Valve Delay • Valve Advance • Control Effort
Rate Sensor Setup	The Rate Sensor Setup button provides the options to adjust the following settings: • Flow Meter Calibration • Flow Meter Pulse/Units • Flow Meter Low Limit • Tank Fill Flow Meter Calibration • Tank Fill Flow Meter Pulse/Units There is also the option to perform a catch test and applied product calibration.
Tank Fill Settings	This button allows the user to enter the Tank Capacity, Current Tank Level, and Low Tank Level.
Display Setup Menu	The Display Setup Menu allow the user to configure the main run screen.
Pressure Sensor Setup	This button allows the user to modify the alarm Min and Max for any products that have pressure alarms selected.
Auxiliary Functions	The Auxiliary Functions button allows the user to create new or modify existing auxiliary functions such as RPM sensors.
Scale Setup	Scale Setup allows the user to configure scale options.

ALARM SETTINGS

Select the Alarm Settings tab to modify or update alarm settings such as Off Rate Alarm and the Minimum Flow Rate. There is also an option to update the Pressure Alarm.

RATES SETUP

The Rates Setup tab allows the user to adjust the Preset Rate Values, Rate Bump, Rate Selection, and other values that were entered during the original configuration.

FEATURE UNLOCKS

If there are additional features available for the RCM, enter the provided Activation Key to access these features.

TOTALS

The totals button provides options to access a Current Totals, Device totals, and Distance totals tabs.

DIAGNOSTICS

Selecting the Diagnostics button open a window with tabs for the items listed below.

SYSTEM INFORMATION

Displays information about the RCM including the Hardware Serial Number, Hardware Revision, and Software Version Number.

TESTS

The Tests tab allows the user to select various tests from a drop down. These list of tests will vary by product configuration.

DIAGNOSTIC TROUBLE CODES

This tab lists Active and Inactive diagnostic trouble codes as well as the ability to Clear the active codes.

SYSTEM SUMMARY

Displays information configured during the setup process but does not provide the option to modify the configuration.

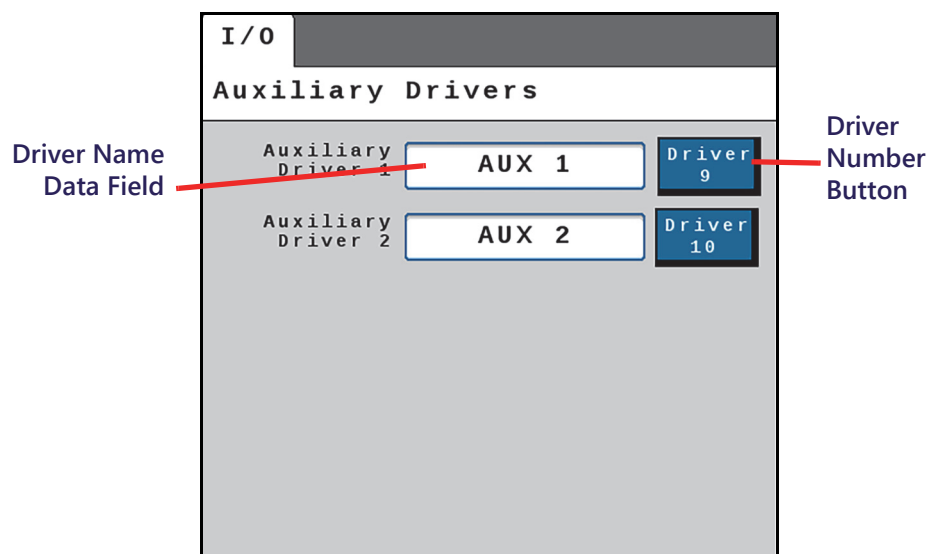
PRODUCT SUMMARY

The Product Summary provides a brief summary for all of the products such as Application Type, Control Valve type, Target Rate, and other settings. This tab does not allow the user to modify the configurations.

AUXILIARY DRIVERS

Auxiliary drivers that were created during configuration are listed in Auxiliary Drivers.

FIGURE 21. Auxiliary Drivers



To give the driver a custom name, select the Driver Name field and, using the keypad, enter the desired name. To activate the auxiliary driver, select the driver number button next to the desired driver.

CHAPTER

4

ANHYDROUS AMMONIA (NH₃) OPERATION

NH₃ MACHINE LIST

TABLE 1. RCM NH₃ Machine List

Machine Type	Application Type	Application Mode	Application Mode Uses
• NH ₃ Toolbar	• NA	NH ₃	NH ₃ applicator or single valve configuration.
		NH ₃ HP Plus	NH ₃ applicator or single valve configuration.

RAVEN ACCUFLOW HP™ PLUS SYSTEMS

OVERVIEW OF OPERATION

The HP+ System utilizes a PWM-controlled hydraulic valve and centrifugal pump to maintain a more consistent system pressure, improving control and increasing standard AccuFlow system capacity. The system is designed to only run the pump when it is needed to achieve target rate.

The pump will control to a target pressure calculated by the Rate Control Module (RCM). The Standby Pressure is the starting point of the Target Pressure calculation. The Standby Pressure should be set to 35 KPA [5 PSI] above the static pressure of the system (Pressure 1 when no product is being applied and all tank valves are open).

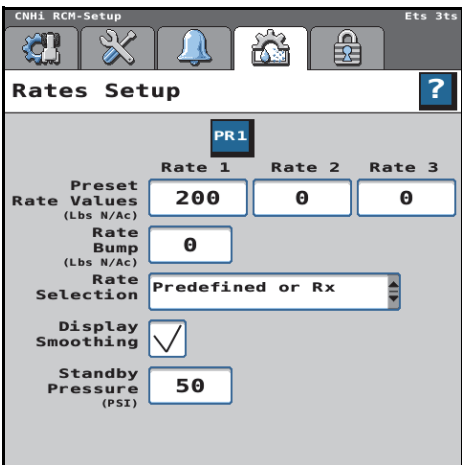
When applying, if the system is not reaching the desired rate, the RCM will increase the Target Pressure it is controlling. It will begin at the Standby Pressure and slowly increase until the rate can be achieved or the PWM has reached its maximum value.

When the machine is stopped the pump will shut off and the Target Pressure will reset to the Standby Pressure.

Standby Pressure is entered at the bottom of the Rates Setup page.

NOTE: To ensure proper performance throughout the season, Standby Pressure may need to be adjusted since the static pressure of the system can significantly change as external environmental temperatures increase or decrease.

FIGURE 1. Rates Setup Menu



CMHI RCM-Setup Ets 3ts

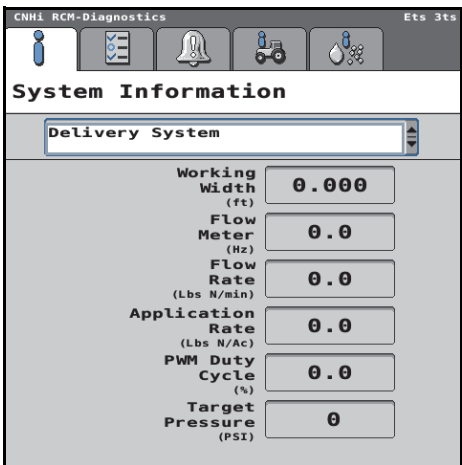
Rates Setup ?

PR1

	Rate 1	Rate 2	Rate 3
Preset Rate Values (Lbs N/Ac)	200	0	0
Rate Bump (Lbs N/Ac)	0		
Rate Selection	Predefined or Rx		
Display Smoothing	☒		
Standby Pressure (PSI)	50		

The RCM Calculated Target Pressure can be viewed at the bottom of the Delivery System page. The Delivery System page can be selected in the System Information drop down menu.

FIGURE 2. System Information Menu



CMHI RCM-Diagnostics Ets 3ts

System Information

Delivery System

Working Width (ft)	0.000
Flow Meter (Hz)	0.0
Flow Rate (Lbs N/min)	0.0
Application Rate (Lbs N/Ac)	0.0
PWM Duty Cycle (%)	0.0
Target Pressure (PSI)	0

PUMP FAULT

The pump fault alarm is triggered when the pump PWM output from the RCM is running, and Pressure Sensor 1 (Gauge Tree) is lower or equal to Pressure Sensor 2 (Pump Inlet). Pressure Sensor 1 is on the output side of the pump and Pressure Sensor 2 is on the inlet to the pump so the difference between these 2 sensors is the pressure increase the pump is providing. This alarm is often caused by either a low or empty tank or a restriction on the inlet of the pump. May also be caused if there is not sufficient flow to the hydraulic valve caused by the tractor SCV is being operated backward or the hydraulic hoses have become disconnected, or the PWM valve not operating correctly.

DELTA PRESSURE SENSOR / VAPOR MONITOR

The Delta Pressure Sensor can be used as vapor monitor. Any AccuFlow™ Vortex cooler being controlled by an RCM can be equipped with this sensor. The sensor can be connected to any unused pressure sensor connection and should be configured as a Delta Pressure-NH₃ Sensor type. The sensor is temperature transmitter. The RCM will calculate if the pressure and temperature of the NH₃ is in the vapor zone or liquid zone of the NH₃ pressure/temperature curve. A negative delta pressure reading indicates that the NH₃ is in the vapor zone and will not meter properly. Common causes for this are plugged strainers, plugged vapor lines, plugged vapor tube orifice or attempting to apply above the capability of the system.

FIGURE 3. Pressure Sensor Setup Menu

The screenshot displays the 'Pressure Sensor Setup' menu. It features four sensor configuration options, each with a dropdown menu. The first two sensors are set to '0-250psi (1-5V)', the third is set to 'None', and the fourth is set to 'Delta Press. NH3'. At the bottom, there are two buttons: 'Calibrate Pressure Sensor' and 'Pressure Assignment Setup'. The CNH logo is visible at the bottom center, and a checkmark icon is in the bottom right corner.

Pressure Sensor Setup	
Pressure Sensor 1	0-250psi (1-5V)
Pressure Sensor 2	0-250psi (1-5V)
Pressure Sensor 3	None
Pressure Sensor 4	Delta Press. NH3

CNH ☒

NH3 CONFIGURATION

1. Select the desired Machine Type from the drop down.

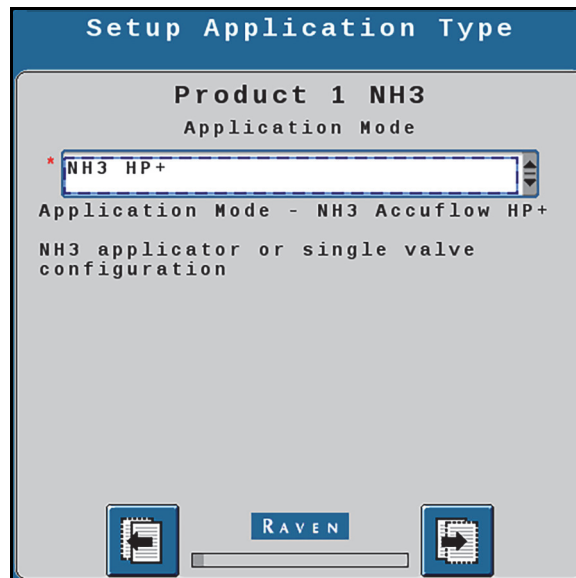
FIGURE 4. Name Profile

2. Enter the desired Profile Name.
3. Enter the Application Width.
4. Select the Next button.
5. Set the appropriate ECU # from the drop-down. This is used to identify, prioritize, and sort RCMs when multiple RCMs are on the same system. For systems with a single RCM, set this to "1".

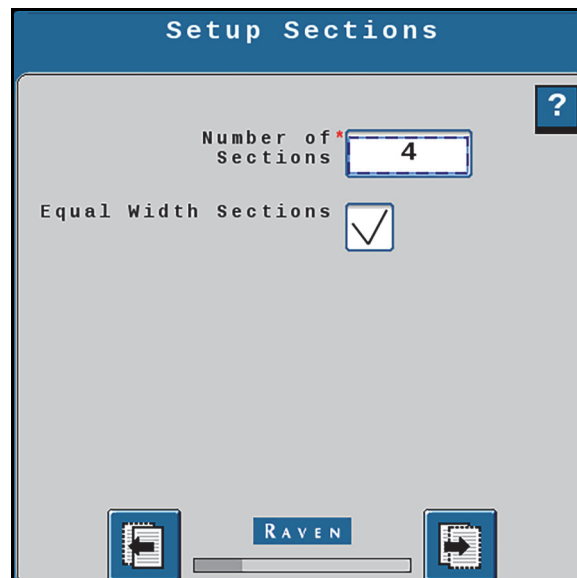
FIGURE 5. Setup System

6. Enter the desired Number of Products.

7. Select the Next button.
8. Select the desired Application Mode for each product.

FIGURE 6. Setup Application Type

9. Select the Next button.
10. Enter the Number of Sections and, if desired, select the Equal Width Sections check box.

FIGURE 7. Setup Sections

11. Select the Next button.
12. Verify the section widths are correct.

FIGURE 8. Setup Section Width

Setup Section Width

Enter the width of the sections

1* 10.000
(ft)

2* 10.000
(ft)

3* 10.000
(ft)

4* 10.000
(ft)

RAVEN

13. Select the Next button.

14. If desired, select an Auxiliary Driver. Auxiliary drivers are additional switches that provide a 12 V signal to a device.

FIGURE 9. Setup Auxiliary Drivers

Setup Auxiliary Drivers

Auxiliary Driver 1

Auxiliary Driver 2

Auxiliary Driver 3

Auxiliary Driver 4

Auxiliary Driver 5

Auxiliary Driver 6

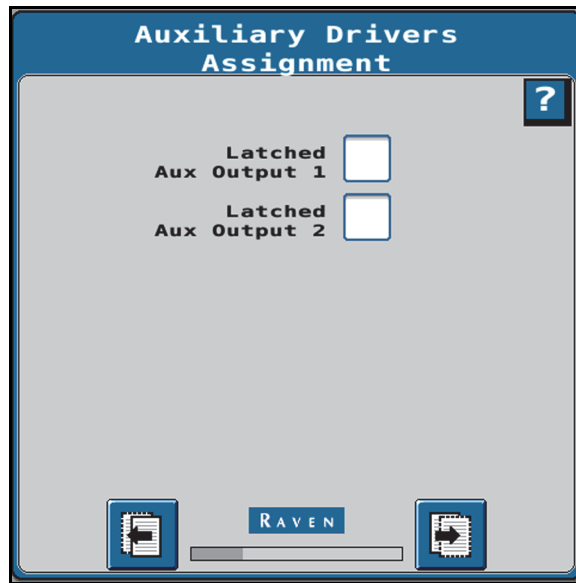
RAVEN

NOTE: Unused section drivers are necessary to set up auxiliary drivers and to run independently of any product control.

15. Select the Next button.

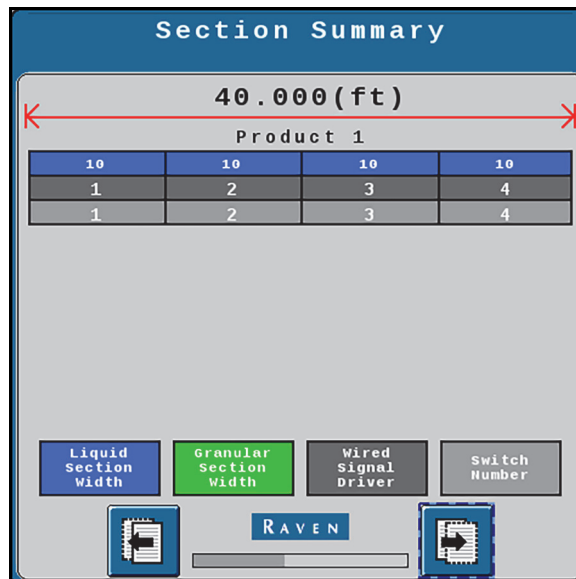
16. Select the Latched Output to allow the driver to stay on until the operator selects the driver button again.

FIGURE 10. Setup Auxiliary Drivers



17. Review the information on the Section Summary screen.

FIGURE 11. Section Summary



10	10	10	10
1	2	3	4
1	2	3	4

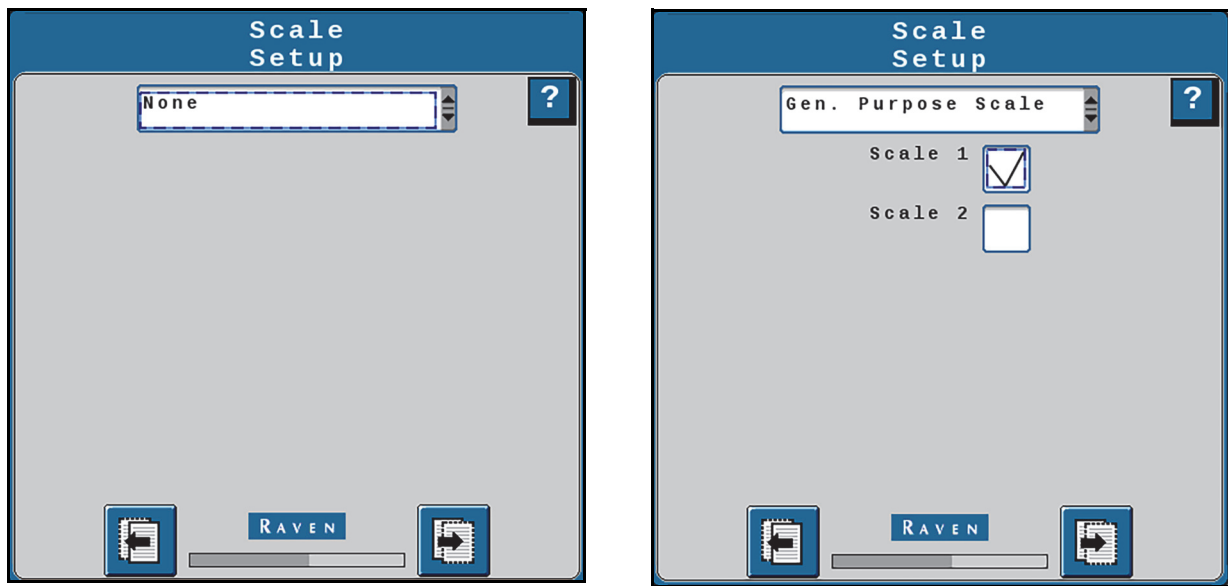
18. If the information is correct, select the Next button. To make adjustments to the configuration, select the Back button and adjust settings as needed.

19. Select the Product Scale type and the corresponding scale(s).

NOTE: General purpose scales are not associated with a product control channel.

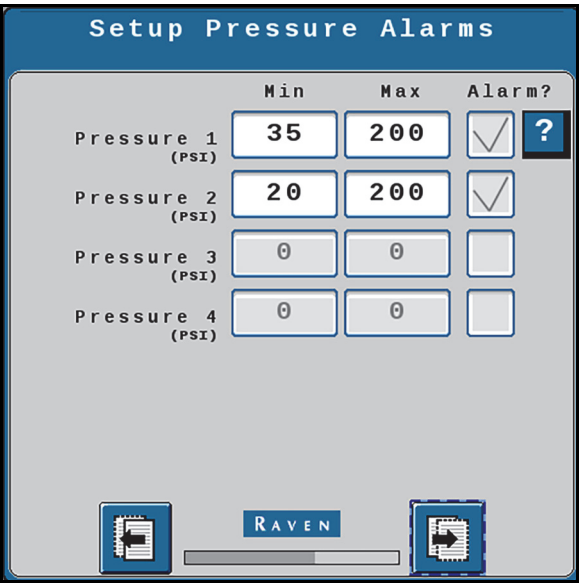
20. Select the desired scale.

FIGURE 12. Scale Setup



- 21. Select the Next button.
- 22. Enter the Min and Max value for the pressure alarms.

FIGURE 13. Setup Pressure Alarms



- 23. Select the Next button.
- 24. Enter the Min and Max values for the pressure alarms.
- 25. Select the Control Valve Type.

FIGURE 14. Setup Control Valve

Setup Control Valve

Product 1 NH₃ ?

Control Valve Type: AccuFlow Single Valve

Valve Response Rate (1-100): 50

Control Deadband (%): 3

Control Effort (%): 3

Navigation buttons: Previous, RAVEN, Next

26. Enter the desired Valve Response Rate, Control Deadband, and Control Effort.

27. Select the Next button.

28. Enter the Flow Meter Calibration.

FIGURE 15. Setup Rate Sensor

Setup Rate Sensor

Product 1 NH₃ ?

Flowmeter* Calibration: 340

Flowmeter calibration units are (Pulses/10lbs of Actual N) for NH₃ applications.

Navigation buttons: Previous, RAVEN, Next

29. Select the Next button.

30. Enter the Tank Capacity, Current Tank Level, and Low Tank Level values.

FIGURE 16. Setup Tank/Bin

Setup Tank/Bin

Product 1 NH3

Tank Capacity (lb n)

Current Tank Level (%)

Low Tank Level (%) ☐ Alarm?

Navigation buttons: [Previous] [RAVEN] [Next]

31. If desired, select the Alarm? check box for the Low Tank Level.

32. Select the Next button.

33. Enter the Preset Rate Values and the Rate Bump value.

FIGURE 17. Setup Rates

Setup Rates

Product 1 NH3 ?

	Rate 1	Rate 2	Rate 3
Preset* Rate Values (Lbs N/Ac)	100	125	150

Rate Bump (Lbs N/Ac)

Rate Selection

Display Smoothing ☒

Standby Pressure (PSI)

Navigation buttons: [Previous] [RAVEN] [Next]

34. Select the Rate Selection and, if desired, select Display Smoothing.

35. Enter a Standby Pressure. This is the pressure the Rate Control Module (RCM) will attempt to maintain when all of the sections are off.

36. Select the Next button.

37. If desired, enter values for the Off Rate Alarm and select the Alarm? checkbox(es) for Off Rate Alarm and the Section Valve Status Feedback Alarm.

FIGURE 18. Setup Alarms

Setup Alarms

Product 1 NH3

Off Rate Alarm (% off target rate) 20

Section Valve Status Feedback Alarm

Alarm?

RAVEN

38. Select the Next button.

39. Review the information on the Setup Summary page.

FIGURE 19. Setup Summary

Setup Summary

Profile Name Nh3

Machine Type NH3 Tool

Number of Products 1

Number of Sections 4

Implement Width(ft) 40.000

Switchbox Present No

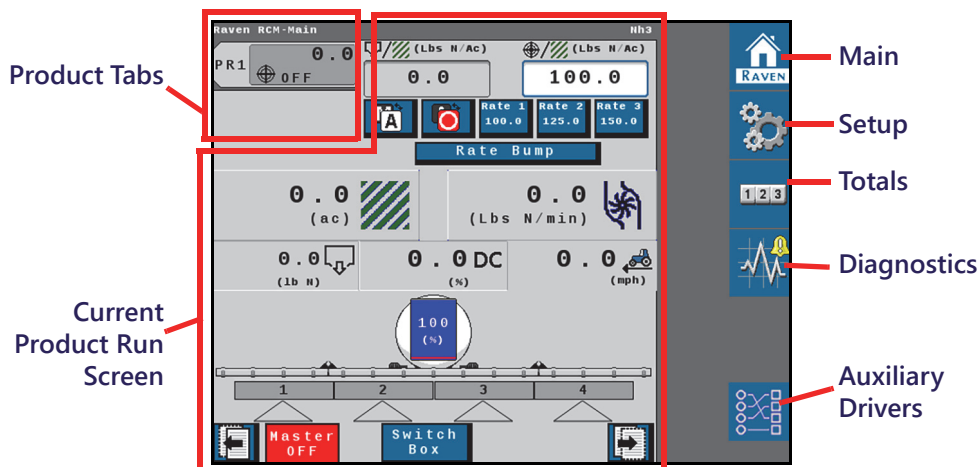
RAVEN

40. If desired, select the Back button to adjust the configuration settings. If the configuration is correct, select the Next button.

NH3 RUN PAGE OVERVIEW

The image below is an example of a typical run screen.

FIGURE 20. NH3 Run Screen



PRODUCT TABS

Select the product tab to select the desired product. This will open the to product run screen for that product.

CURRENT PRODUCT RUN SCREEN

The current product run screen displays information for the selected product. Each product run screen will vary based on product configuration.

Data Fields display selected settings and can be changed to the operator's preferences.

RUN PAGE OVERVIEW

Data Fields display selected settings and can be changed to the operator's preferences.

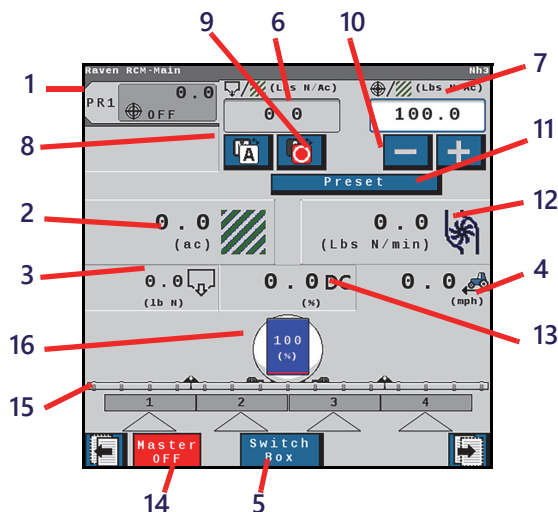


TABLE 2. Raven RCM Run Time Widgets

	Button	Description	Function/Operation
	1.	Product Tabs	Select a tab to view information for that product.
	2.	Applied Area	Displays the number of acres applied.
	3.	Application Volume	Displays the tally register volume applied.
	4.	Traveling Speed	Displays the current machine traveling speed.
	5.	Section Switch Box button	Indicates if the switch box is on or off: - Green - On - Red - Off
	6.	Actual Rate	Displays the actual application rate.
	7.	Target Rate	Displays the target application rate.
	8.	Manual/Automatic Mode	Touch the on-screen display to toggle between manual and automatic operation modes.
	9.	Product On/Off Toggle	Select the product toggle to manually turn a product on or off.
	10.	Preset Rate Bump	Provides the user the to increase the rate by the preconfigured rates defined during configuration.
	11.	Rate Bump/Presets	This will either display Rate Bump or Presents. This increases the rate by the rate bump value defined during configuration.
	12.	Application Rate	Displays the current application rate in pounds per minute.
	13.	Duty Cycle	Displays the current duty cycle.
	14.	Master Switch Indicator	The Master Switch Indicator shows the status of the master switch. - Green - On - Red - Off - Orange - Cycle the master switch
	15.	Implement Sections	Displays if the display section is on or off.
	16.	Tank Level Indicator and Fill Button	Displays the current tank fill level.

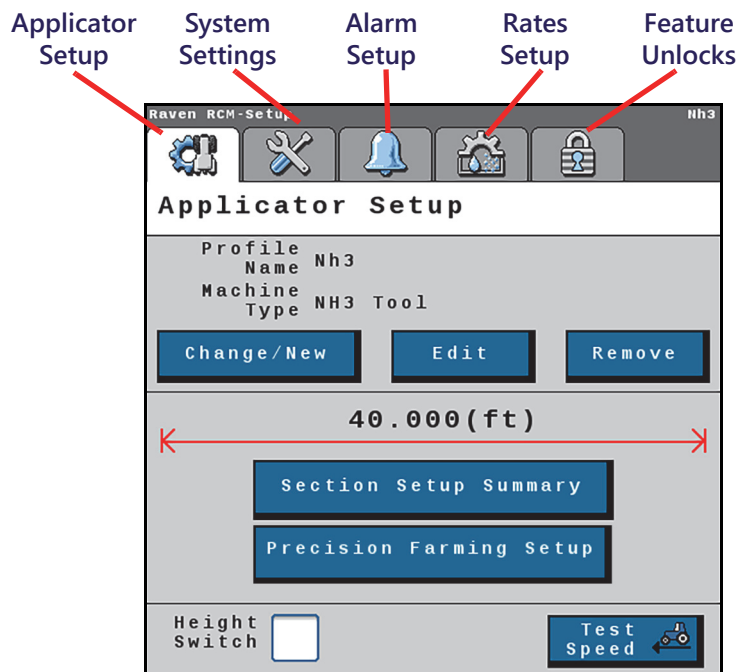
HOME

Select the Home button at any time to return to the main run screen.

TOOLS MENU

Select the Tools button to access settings and options for calibrating or tuning the application system.

FIGURE 21. Tools Menu Tabs



APPLICATOR SETUP TAB

The Applicator Setup Tab provides options to create a new, edit, or remove an applicator. This tab also provides a summary to the section configuration. For more information on the Precision Farming Setup button, refer to Chapter 10, *Precision Farming*.

SYSTEM SETTINGS

The system settings provides many buttons that allow the user to modify the current configuration. The table below describes each button in detail.

TABLE 3. System Settings

Button	Description
Control Valve Setup	The Control Valve button allows the user to adjust the following settings for each product: • Valve Response Rate • Control Deadband • Valve Delay • Valve Advance • Control Effort
Rate Sensor Setup	The Rate Sensor Setup button provides the options to adjust the following settings: • Flow Meter Calibration • Flow Meter Pulse/Units • Flow Meter Low Limit • Tank Fill Flow Meter Calibration • Tank Fill Flow Meter Pulse/Units There is also the option to perform a catch test and applied product calibration.
Tank Fill Settings	This button allows the user to enter the Tank Capacity, Current Tank Level, and Low Tank Level.
Display Setup Menu	The Display Setup Menu allows the operator to configure the main run screen.
Pressure Sensor Setup	This button allows the user to modify the alarm Min and Max for any products that have pressure alarms selected.
Auxiliary Functions	The Auxiliary Functions button allows the user to create new or modify existing auxiliary functions.
Scale Setup	Scale Setup allows the user to configure scale options.

ALARM SETTINGS

Select the Alarm Settings tab to modify or update alarm settings such as Off Rate Alarm and the Minimum Flow Rate. There is also an option to update the Pressure Alarm.

RATES SETUP

The Rates Setup tab allows the user to adjust the Preset Rate Values, Rate Bump, Rate Selection, and other values that were entered during the original configuration.

FEATURE UNLOCKS

If there are additional features available for the RCM, enter the provided Activation Key to access these features.

TOTALS

The totals button provides options to access a Current Totals, Device totals, and Distance totals tabs.

DIAGNOSTICS

Selecting the Diagnostics button open a window with tabs for the items listed below.

SYSTEM INFORMATION

Displays information about the RCM including the Hardware Serial Number, Hardware Revision, and Software Version Number.

TESTS

The Tests tab allows the user to select various tests from a drop down. These list of tests will vary by product configuration.

DIAGNOSTIC TROUBLE CODES

This tab lists Active and Inactive diagnostic trouble codes as well as the ability to Clear the active codes.

SYSTEM SUMMARY

Displays information configured during the setup process but does not provide the option to modify the configuration.

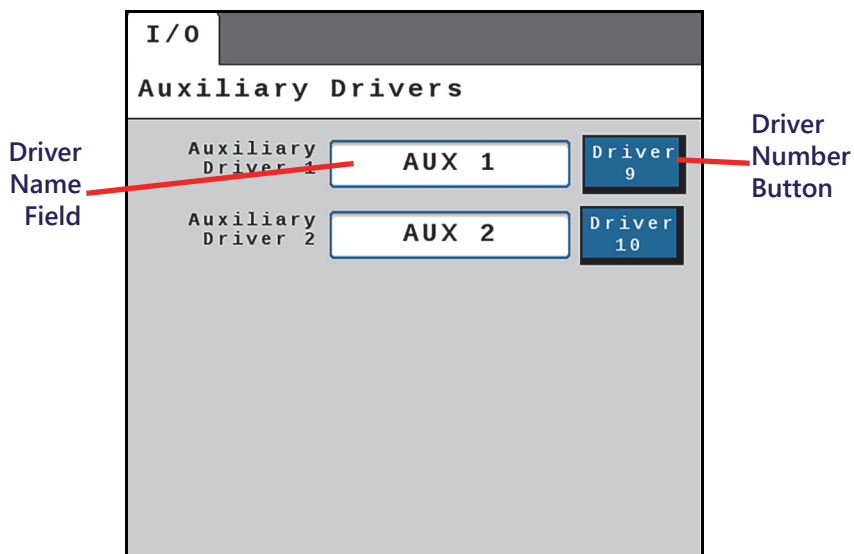
PRODUCT SUMMARY

The Product Summary provides a brief summary for all of the products such as Application Type, Control Valve type, Target Rate, and other settings. This tab does not allow the user to modify the configurations.

AUXILIARY DRIVERS

Auxiliary drivers that were created during configuration are listed in Auxiliary Drivers.

FIGURE 22. Auxiliary Drivers



To give the driver a custom name, select the Driver Name field and, using the keypad, enter the desired name. To activate the auxiliary driver, select the driver number button next to the desired driver.

CHAPTER

SPREADER OPERATION

5

SPREADER MACHINE LIST

TABLE 1. RCM Spreader Machine List

Machine Type	Application Type	Application Mode	Application Mode Uses
• Self-Propelled Spreader • Pull-Behind Spreader	• Granular Fertilizer • Granular Seed	Dry Manure/Litter	Granular full width using product scales to adjust product density on the go during in-field operations.
		Granular Full Width	Dry or seed application using a single shutoff section. Application rate is entered and documented as kg/ha [lbs/acre].
		Granular RPM Compensated	Dry or seed application using multiple shutoff sections. Meter/conveyor RPM is controlled/compensated based upon machine speed and active width as sections turn on and off. Application rate is entered and documented as kg/ha [lbs/acre].
		Granular RPM Maintained	Granular multi-section RPM maintained dry or seed application using multiple shutoff sections. Meter/conveyor RPM is controlled/compensated based upon machine speed. Meter/conveyor RPM is not compensated for changes in active width as sections turn on and off. Meter/conveyor will be stopped when all sections are off. Application rate is entered and documented as kg/ha [lbs/acre].

Machine Type	Application Type	Application Mode	Application Mode Uses
(Cont.) • Self-Propelled Spreader • Pull-Behind Spreader	(Cont.) • Granular Fertilizer • Granular Seed	Granular Split Belt	Dry or seed application using one control valve of a split meter/conveyor RPM is available for each section. Meter/Conveyor RPM is not compensated for changes in active width as left or right sections turn on and off. Meter/conveyor will be stopped when both sections are off.
		Granular Dual Control Valve	Dual Control Valve Dry or seed application using dual PWM control valves to independently control a left and right meter/conveyor section. Encoder feedback of meter or conveyor RPM is available for each section. Meter/conveyor RPM is independently controlled/compensated based on machine speed. Sections are turned off by closing the PWM control valve.

Spreader configuration on the RCM can also support the following legacy applications.

TABLE 2. Legacy Granular Modes

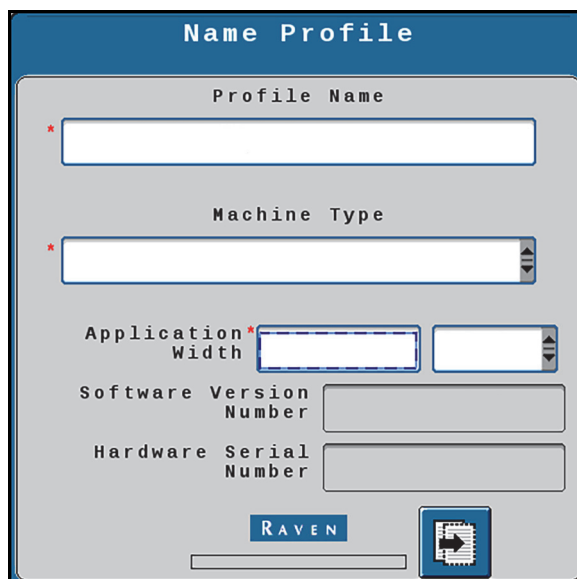
Legacy Granular Application Mode	New Application Mode	Mode Details
Gran 1	Granular Full Width Selection	Dry or seed application using a single shutoff section. Application rate is entered and documented as Pounds/Acre (Kilograms/Hectare).
Gran 2	Granular Section Control RPM Maintained	Dry or seed application using multiple shutoff sections. Meter/conveyor RPM is controlled/compensated based upon machine speed and active width as sections turn on and off. Application rate is entered and documented as kg/ha [lbs/acre].
Gran 3	Granular Split Tank/ Dual Encoder	Dry or seed application using one control valve for a split meter/conveyor with shutoff control of two independent sections. Encoder feedback of meter or conveyor RPM is available for each section. Meter/conveyor RPM is controlled/compensated based upon the vehicle speed. Meter/conveyor RPM is not compensated for changes in active section width as left or right sections turn on and off. Meter/conveyor will be stopped when both sections are off.
Gran 4	Granular Section Control RPM Maintained	The Granular Section Control RPM Maintained is listed above for Gran 2. If this is the correct mode for the Legacy Gran 4, we should be able to copy the mode details from above.
Gran 5	Granular Section Control RPM Compensated	Dry or seed application using multiple shutoff sections. Meter/conveyor RPM is controlled/compensated based upon vehicle speed. Meter/conveyor RPM is not compensated for changes in active width as sections turn on and off. Meter/conveyor will be stopped when all sections are off. Application rate is entered and documented as kg/ha [lbs/acre].
None	Dual Control Valve	Dry or seed application using dual PWM control valves to independently control a left and right meter/conveyor section. Encoder feedback of meter or conveyor RPM is available for each section. Meter/conveyor RPM is independently controlled/compensated based upon vehicle speed. Sections are turned off by closing the PWM control valve.
None	Granular Meter Per Section	Dry or seed application using PWM control valves to independently control a meter/conveyor section. Up to 16 individual control sections can be configured. Encoder feedback of meter or conveyor RPM is available for each section. Meter/conveyor RPM is independently controlled/compensated based upon vehicle speed. Sections are turned off by closing the PWM control valve. NOTE: This mode is only available when the Generic machine type selected or in Air Cart mode.

SPREADER CONFIGURATION

GENERAL PROFILE SETUP

1. Use the **Machine Type** drop down to select the *Self-Propelled Spreader* option.

FIGURE 1. Name Profile Page



The screenshot shows a software window titled "Name Profile". Inside, there are several input fields and a button. The fields are labeled "Profile Name", "Machine Type", "Application Width", "Software Version Number", and "Hardware Serial Number". The "Profile Name" and "Machine Type" fields have a red asterisk to their left. The "Application Width" field is split into two parts: a text box and a dropdown menu. Below these fields is a blue button labeled "RAVEN" and a square button with a right-pointing arrow. At the bottom of the window is a progress bar.

2. Enter the desired **Profile Name**.
3. Enter the Application Width of the implement.
4. Select the **Next** button.
5. Set the appropriate ECU # from the drop-down. This is used to identify, prioritize, and sort RCMs when multiple RCMs are on the same system. For systems with a single RCM, set this to "1".
6. Enter the number of bins for the **Number of Products** field. For example, for a 2 bin machine, enter a value of "2" for the Number of Products.

FIGURE 2. Setup System Page

Setup System

ECU S/N	ECU #	Number of Products
RCM-1039		?

RAVEN

7. Select the **Next** button.

FAN OR SPINNER RPM SENSORS

1. Use the drop-down option to select the desired number of spinner/fan RPM sensors.
2. If desired, select the **Enable Fan/Spinner RPM Control** check box to enable automatic control of fan or spinner speed.

FIGURE 3. Setup Fan/Spinner RPM Page

Setup Fan/Spinner RPM

Select the number of spinner or fan RPM sensors installed on the Implement used for fan or spinner RPM monitoring or control

Enable Fan/Spinner RPM Control ☐

RAVEN

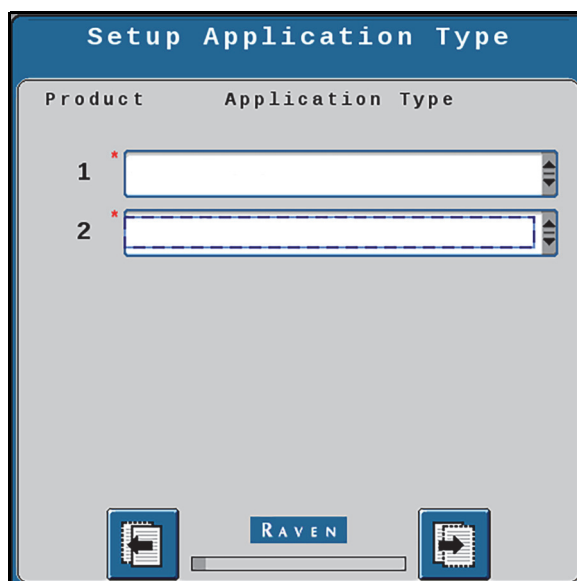
3. Select the **Next** button.

APPLICATION TYPE AND MODE

1. Use the drop-down options for each configured product to select the **Application Type** for each control channel.

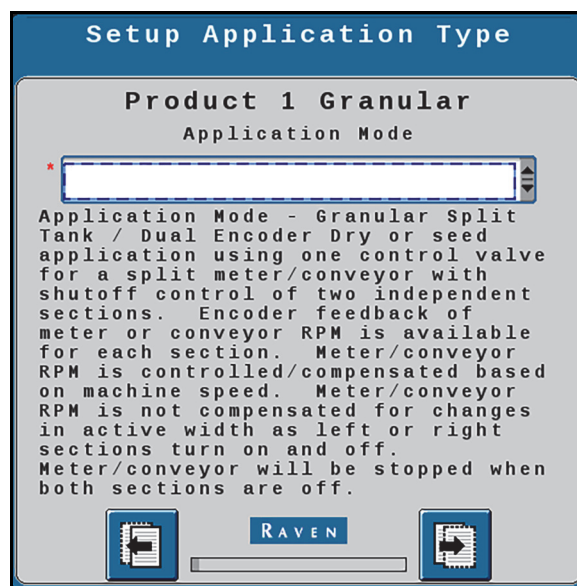
NOTE: The last product control channel will always show as RPM Spinner/Fan. This channel is not configurable.

FIGURE 4. Setup Application Type Page



2. Touch the **Next** button.
3. Use the drop-down options to select the **Application Mode** for each product control channel.

FIGURE 5. Setup Application Type Page Two

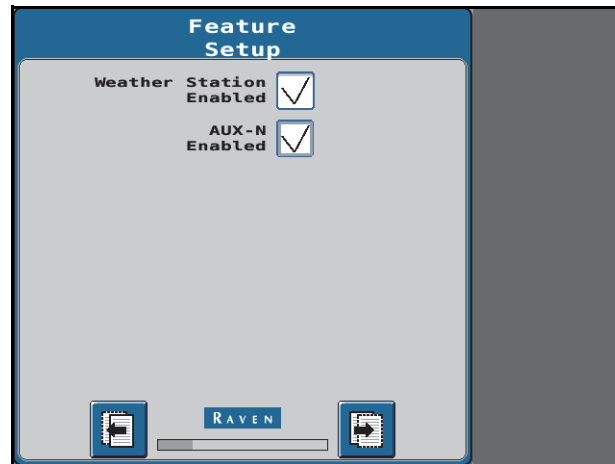


4. Select the **Next** button.

ADDITIONAL FEATURES

1. Review the available options on the Feature Setup page.
 - Enable the Weather Station feature to display the weather button on the RCM main page.
 - If the machine offers Aux-N inputs on the joystick or command arm to allow RCM functions to be assigned to the buttons.

FIGURE 6. Feature Setup Page

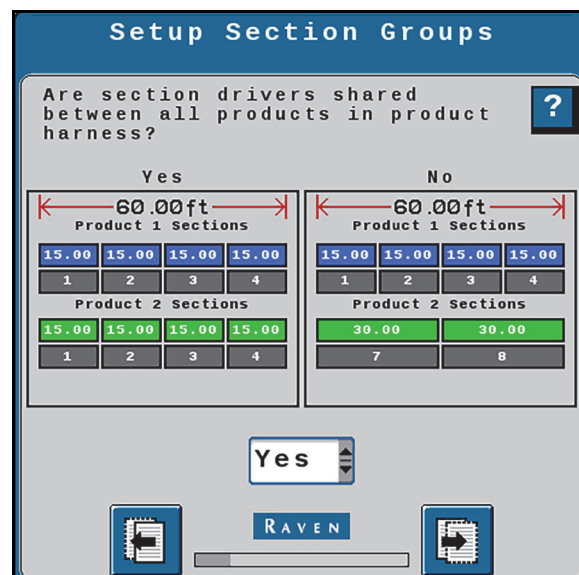


2. Select the **Next** button.

SECTIONS AND SECTION GROUPS

1. Review and confirm the section driver configuration details on the Setup Section Groups page. Toggle the drop-down option to Yes or No for the on-screen display which matches the actual driver configuration.

FIGURE 7. Setup Section Groups Page



2. Select the **Next** button.

3. Enter the **Number of Sections**.

FIGURE 8. Setup Selections Page

Setup Sections

Number of Sections* ?

Equal Width Sections ☐

Granular Product Sections Power to Apply ☐

RAVEN

4. If desired, enable the **Equal Width Sections** check box. When enabled, this option will divide the application width equally between each section.
5. Enable the **Granular Product Sections Power to Apply** if section switches provide 12 V power to turn on the section. If this option is disabled, switches will remove 12 V power to turn on sections.
6. Select the **Next** button.
7. Verify the entered section widths and displayed units are correct.

FIGURE 9. Setup Section Width Page

Setup Section Width

Enter the width of the sections

1*
(ft)

2*
(ft)

RAVEN

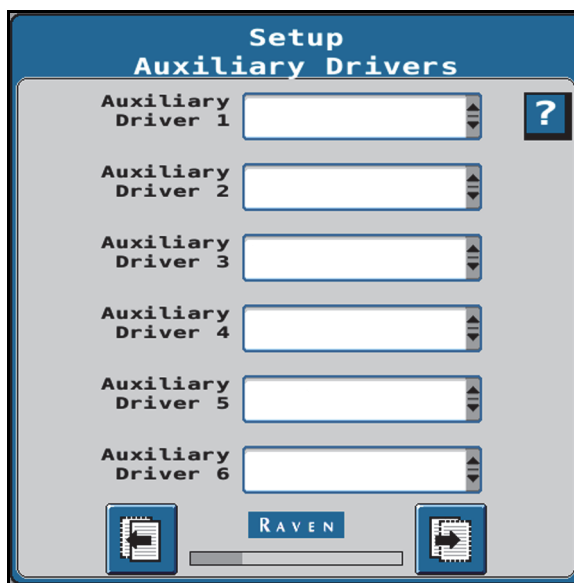
8. Select the **Next** button.

AUXILIARY DRIVERS

1. If desired, use the drop-down options to select an **Auxiliary Driver**.

Auxiliary drivers are additional switches which either provide a +12 V signal or remove a +12 V signal to a component or device (e.g. work lights, tarp control, etc.).

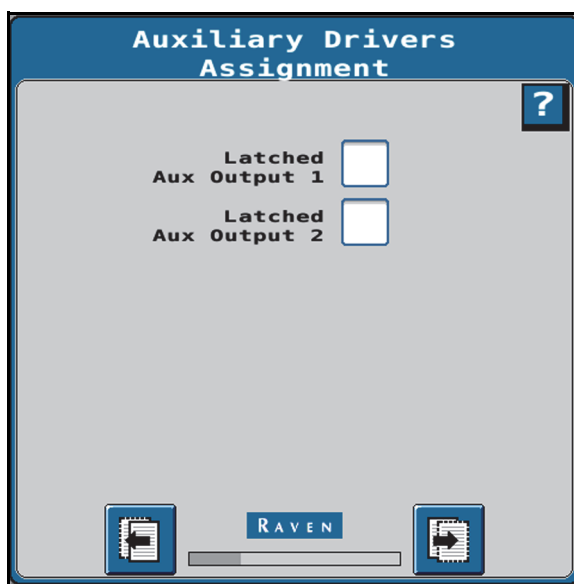
FIGURE 10. Setup Auxiliary Drivers Page



NOTE: Unused section drivers are necessary to set up auxiliary drivers and to run independently of any product control.

2. Select the **Next** button.
3. Enable the **Latched Output** option to allow the auxiliary driver to stay on until the driver button is pressed again.

FIGURE 11. Setup Auxiliary Drivers Page



4. Touch the **Next** button.

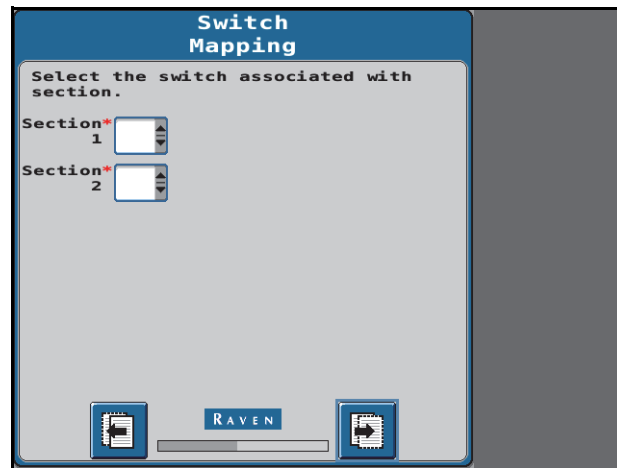
SWITCH MAPPING

1. Use the drop-down fields for each configured section to assign the switch number for each section.

NOTE: This page will not display if switches are not detected. If no switch device is desired for section control (e.g. machine joystick/multi-function handle, ISO switch box, ISO boom sense ECU, etc.), the system will automatically revert to on-screen section switches as well as a master signal input directly into the RCM-U. If section switches are expected, touch the back button and troubleshoot the ISO system power and communication.

Each section must be assigned to a switch before the Next button will be displayed.

FIGURE 12. Switch Mapping Page



2. Select the **Next** button.

SPINNER RPM REDUCTION

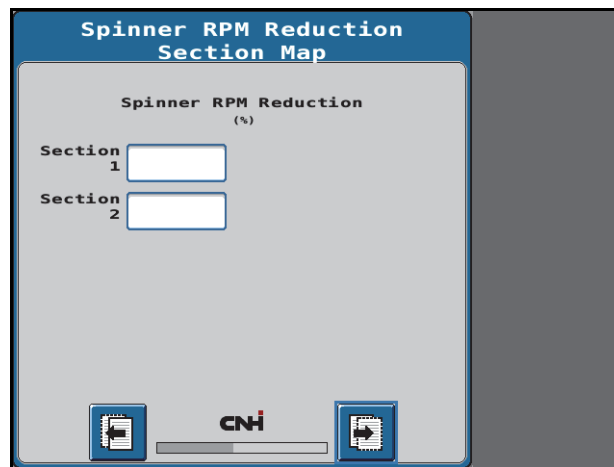
NOTE: Use the RPM reduction to enable spinner fan width control during field applications. For this feature to operate, configure only one section group with an even number of up to 10 sections.

Product 5 corresponds to the left spinner and left most sections. Product 6 corresponds to the right spinner and rightmost sections. During operation, sections may only be turned off from outside to inside for each spinner.

1. Enter the percent by which the spinner speed will be changed as sections assigned to the left or right spinner are toggled on or off.

NOTE: The spinner speed, and other factors, will affect the working width of the spreader. Consult the spreader manufacturer for initial values or guidance on setting the spinner RPM reduction percentage for section widths.

FIGURE 13. Spinner RPM Reduction Section Map Page



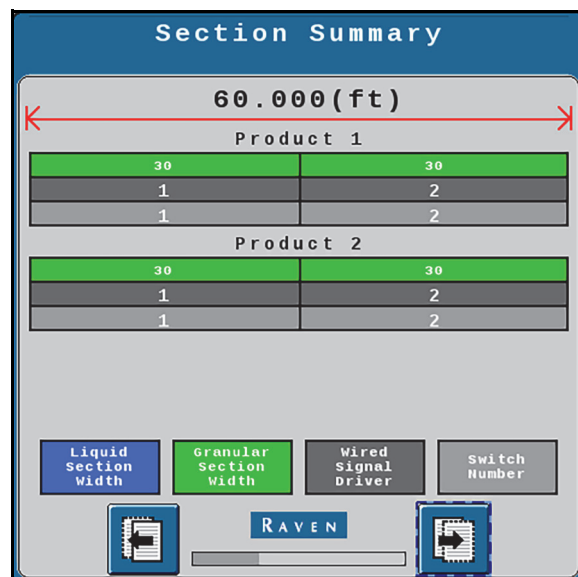
The screenshot shows a control panel titled "Spinner RPM Reduction Section Map". Below the title, it says "Spinner RPM Reduction (%)". There are two input fields labeled "Section 1" and "Section 2". At the bottom, there are two navigation buttons (Back and Next) and a "CNH" logo.

2. Select the **Next** button.

SECTION SUMMARY AND GROUPS

1. Review the section configuration details on the **Section Summary** screen.

FIGURE 14. Section Summary Page



The screenshot shows a control panel titled "Section Summary". At the top, it displays "60.000 (ft)" with a red double-headed arrow indicating the section width. Below this, there are two product configurations:

Product 1	
30	30
1	2
1	2

Product 2	
30	30
1	2
1	2

At the bottom, there are four buttons: "Liquid Section Width", "Granular Section Width", "Wired Signal Driver", and "Switch Number". Below these buttons is a "RAVEN" logo and two navigation buttons (Back and Next).

2. If the information is correct, select the Next button. To make adjustments to the configuration, touch the **Back** button and adjust settings as needed.
3. Review and confirm the section driver configuration details on the Setup Section Groups page. Toggle the drop-down option to **Yes** or **No** to select the displayed option which matches the actual driver configuration.

FIGURE 15. Setup Section Groups Page

4. Select the **Next** button.

SCALE SETUP

- Use the drop-down option to select the type of scale used and assign the corresponding product scale(s).
 - Dynamic Cal: Scales are associated directly with products and can be used to assist in product calibration.
 - General Purpose: Scales are not directly tied to the product and are not available to assist with product calibration.
 - General Purpose Scale: Scales are not associated with any product and only display the scale data.

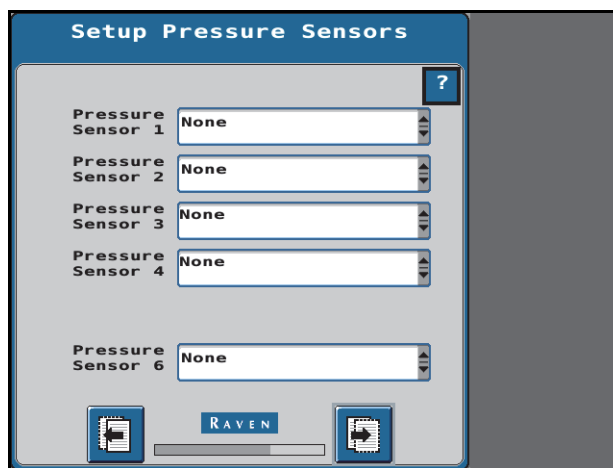
FIGURE 16. Scale Setup Page

2. Select the Next button.

PRESSURE SENSOR

1. Use the drop-down lists for each pressure sensor to select the type of sensor

FIGURE 17. Setup Pressure Sensors

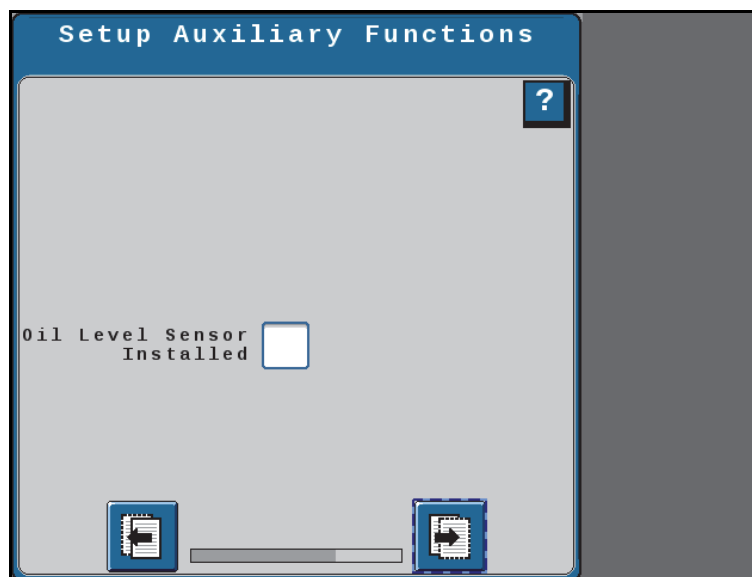


2. Select the Next button.

AUXILIARY FUNCTIONS

1. Enable any applicable auxiliary functions.

FIGURE 18. Setup Auxiliary Functions Page



2. Select the **Next** button.

FAN AND SPINNER CONTROL

1. Enter the fan or spinner speed calibration value as the RPM Calibration.
2. Enter the **RPM Low Limit**, and **RPM High Limit** values to set the minimum and maximum fan or spinner speeds.
3. If desired, enable the **Alarm** check box to enable an on-screen prompt if the RPM exceeds the set limits.

FIGURE 19. Setup Fan/Spinner RPM Calibration Page

Setup Fan/Spinner RPM Calibration

RPM 1 Calibration (Pulse/Revolution) ?

RPM 1 Low Limit (RPM) Alarm? ☐

RPM 1 High Limit (RPM) ☐

RAVEN

4. Select the Next button.
5. Assign the product channels to the configured RPM sensor. Select the check box(es) for the control channels that will be assigned to each RPM Sensor.

FIGURE 20. Setup RPM Sensor Assignment Page

Setup RPM Sensor Assignment

RPM Sensor 1 ?

Product 1

Product 2

RAVEN

6. Select the **Next** button.

CONTROL VALVE SETUP

1. Select the Control Valve Type for the product.

FIGURE 21. Setup Control Valve Page

The screenshot shows a software interface titled "Setup Control Valve". Below the title bar, it says "Product 1 Granular" next to a question mark icon. The interface contains several input fields and checkboxes:

- "Control Valve Type" with a dropdown menu.
- "Valve Response Rate (1-100)" with a text input field.
- "Control Deadband (%)" with a text input field.
- "Enable PWM Smart Control" with a checkbox.

At the bottom of the screen, there are two icons (a document and a circuit board) flanking a central "RAVEN" label and a progress bar.

2. Enter the Valve Response Rate.
3. Enter the Control Deadband.
4. If desired, select Enable PWM Smart Control.
5. When configuring spinner RPM control product(s), set the Enable Constant Control option as desired.
6. Select the **Next** button.

PWM SETUP

If configuring a PWM type valve, the Setup PWM page will be displayed next.

1. Enter the Coil Frequency, PWM High Limit, PWM Low Limit, and PWM Startup for the product.

FIGURE 22. Setup PWM Page

Setup PWM

Product 1 Granular ?

Coil Frequency (Hz)

PWM High Limit (%)

PWM Low Limit (%)

PWM Startup (%)

Navigation: [Left Arrow] RAVEN [Right Arrow]

NOTE: When the Dual Control Valve type application is selected, there will be entries for 2 PWM valves on the page.

2. Select the **Next** button.

RATE CONTROL SETUP

1. Enter the Product Density, Spreader Constant, Pulses/Revolution, and Gate Height. The Gate Height must be between one and three inches.

FIGURE 23. Setup Rate Sensor Page

Setup Rate Sensor

Product 1 Granular ?

Product Density (lb/cubic feet)

Pulses/Revolution

Gate Height Sensor Enable ☐

Spreader Constant (pulses/cubic feet)

Gate Height (in)

Navigation: [Left Arrow] RAVEN [Right Arrow]

2. Select the **Next** button.

PRODUCT TANK

1. Enter the Tank Capacity and Low Tank Level.

FIGURE 24. Setup Tank/Bin Page

2. Enter a non-zero value for the Tank Capacity and Low Tank Level values, if desired.
3. If a non-zero value is entered for the Current Tank Level and Low Tank Level, enable the Alarm option to enable an audible alarm when the product level in the tank reaches the set low tank level during field operation.
4. Enable the Low Bin Level Sensor if an ultrasonic bin level sensor is equipped for monitoring the product remaining in the bin.
5. Select the Mid Bin Level Sensor Type.

NOTE: To test the sensor type, place an object in front of the sensor. If the voltage reads 12 V it is a PNP sensor. If it reads ground, it is a NPN sensor.

6. Select the **Next** button.

RATE SETUP

1. Enter the Preset Rate Values and the Rate Bump value.

FIGURE 25. Setup Rates Page

The screenshot shows the 'Setup Rates' page for 'Product 1 Granular'. The page has a blue header with the title 'Setup Rates'. Below the header, the product name 'Product 1 Granular' is displayed next to a help icon (?). The main area contains several input fields and checkboxes. At the top, there are three columns for 'Rate 1', 'Rate 2', and 'Rate 3'. Below these, there are three input fields for 'Preset* Rate Values (lb/ac)'. Below these, there is a single input field for 'Rate Bump (lb/ac)'. Below that, there is a dropdown menu for 'Rate Selection'. Below the dropdown, there is a checkbox for 'Display Smoothing'. Below that, there is a spinner control for 'Decimal Shift'. At the bottom of the page, there are two navigation buttons: a 'Previous' button (left arrow) and a 'Next' button (right arrow), with the 'RAVEN' logo in the center.

	Rate 1	Rate 2	Rate 3
Preset* Rate Values (lb/ac)			
Rate Bump (lb/ac)			
Rate Selection			
Display Smoothing	☐		
Decimal Shift			

2. Select the Rate Selection and Decimal Shift values.
3. If desired, enable Display Smoothing to allow the system to smooth the rate display during field operation. With this feature enabled, the system will display the target rate as long as the actual rate is within 10% of the actual application rate.
4. Select the **Next** button.

ALARM SETUP

1. If desired, enter values for the Off Rate Alarm and Split Belt/Dual Encoder Alarm and select the Alarm? checkbox(es) to enable audible alarms for the configured conditions.

FIGURE 26. Setup Alarms Page

2. Select the **Next** button.
3. Repeat steps step 1 for each product.

FAN/SPINNER CONTROL VALVE SETUP

1. Configure fan speed or RPM control settings on the RPM Setup Control Valve page.

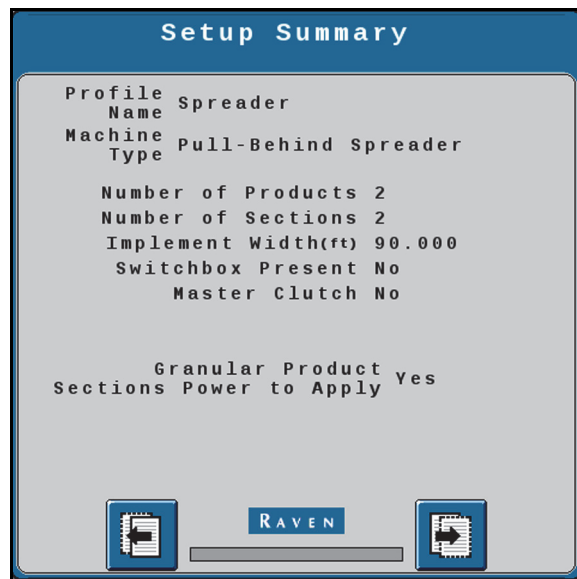
FIGURE 27. Setup Control Valve Page - Product 3 RPM

2. Select the question mark icon in the upper, right corner of the page for more information on these settings.
3. Once all options and values are set, select the **Next** button.

INITIAL SETUP SUMMARY

1. Review the information on the Setup Summary page.

FIGURE 28. Setup Summary Page



2. If desired, select the **Back** button to adjust the configuration settings. If the configuration is correct, select the **Next** button.

MANURE/LITTER CONFIGURATION

When paired with a scale system, the Raven Rate Control Module (RCM) can be used to compensate for varying product density within a spreader load. This capability offers optimal consistency of application even when the product composition is highly variable.

The dynamic calibration feature continually adjusts the "Density Factory" based upon user-entered settings for:

- Adjustment Frequency - amount of product dispensed between adjustments
- Adjustment Sensitivity - percent of adjustment that should be made based upon the sample

In addition, the clean out feature dynamically adjusts the spreader constant for the final port of a load based upon a user-entered trigger weight. This feature increases the PWM duty cycle to a maximum over time to better maintain an even distribution pattern as the load trails off while maintaining the calibration settings for applying a normal load.

A Level 3 RCM is required for these features and is only available for the Litter/Manure application mode configured for a granular spreader equipped with a product scale. Applicable part numbers include:

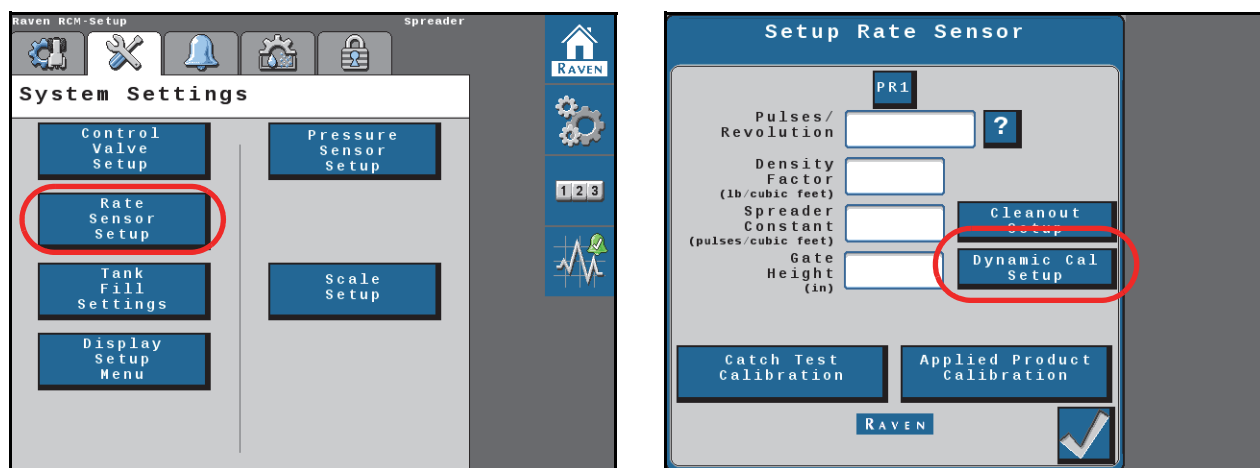
TABLE 3. Litter/Manure Part Numbers

Part Number	Description
063-0173-953	Raven Rate Control Module Level 3
117-7100-007	Kit - RCM LVL 3 Gen 1 ISOBUS ECU Harness
117-7100-008	Kit - RCM LVL 3 Gen 3 ECU Harness

DYNAMIC CALIBRATION

To access settings for Dynamic Calibration, navigate to the Rate Sensor Setup Page:

FIGURE 29. Setup Rate Sensor Page

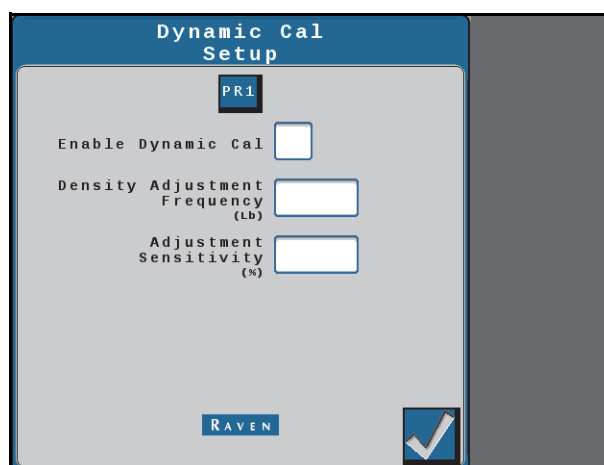


1. On the Setup Rate Sensor screen, set the Density Factor to 1,121 kg/m³ [70 lb/ft³] as a starting point.

NOTE: The other settings on the Setup Rate Sensor screen are specific to the spreader equipment.

2. Select the "Dynamic Cal Setup" button.
3. Set the Adjustment Frequency and Adjustment Sensitivity settings to adjust the Density Factor to the correct apron speed needed to apply at the desired rate.

FIGURE 30. Dynamic Cal Setup Page



DENSITY ADJUSTMENT FREQUENCY

The Adjustment Frequency value is used to determine how often the RCM recalculates the Density Factor. Enter the weight in kilograms [pounds] dispensed before the RCM makes an adjustment. The recommended starting point is 1/20th of the total load weight. This will result in 20 density adjustments per load. On very uneven loads, the Adjustment Frequency weight value can be decreased, however, rate fluctuation may be observed. If excessive rate fluctuation is occurring, increase the value.

ADJUSTMENT SENSITIVITY

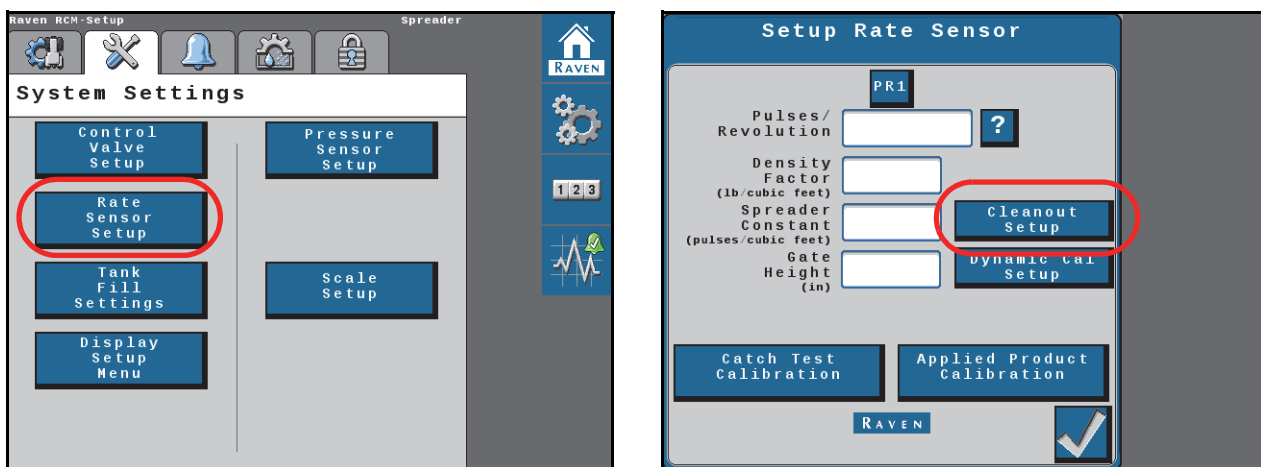
The Adjustment Sensitivity percentage is used to set how aggressively the RCM will adjust the Density Factor. It is recommended to leave this setting at the default setting of 50% unless otherwise instructed.

If the total applied weight displayed on the RCM is not matching the actual scale weight applied, the Sensitivity percentage may be increased (not to exceed 75%). If erratic rates are observed, reduce this value (not to be set below 25%) but may lead to some variation between RCM totals and scale totals.

CLEAN OUT SETUP

1. On the Setup Rate Sensor screen, select the "Clean Out Setup" button to access the Clean Out settings.

FIGURE 31. Setup Rate Sensor Page



CLEAN OUT MODE

The Clean Out Mode is used to compensate for the end of a load when the beaters or spinners are no longer full. The apron chain will continue to speed up until it is at full speed. The RCM will resume normal operation when the spreader has been refilled to above the trigger weight. Configuration of the clean out mode consists of two settings - Trigger Weight and Clean Out Duration.

FIGURE 32. Clean Out Setup Page

TRIGGER WEIGHT

When the scale reaches the weight set in the Trigger Weight field, the clean out mode will start. Set the Trigger Weight to the scale reading when the opening to the beaters or spinners is no longer completely covered.

CLEAN OUT DURATION

Enter the time in seconds during which the RCM will gradually increase the apron chain speed. A value between 15 and 25 is a recommended starting point for the Clean Out Duration setting.

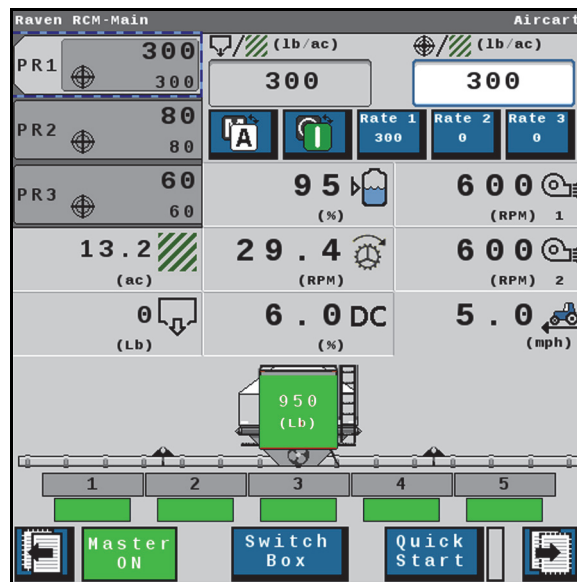
The steeper the angle of the material left in the spreader when the Trigger Weight is reached, the shorter the Duration value should be.

LITTER/MANURE OPERATION TIPS

For greatest accuracy and optimal performance:

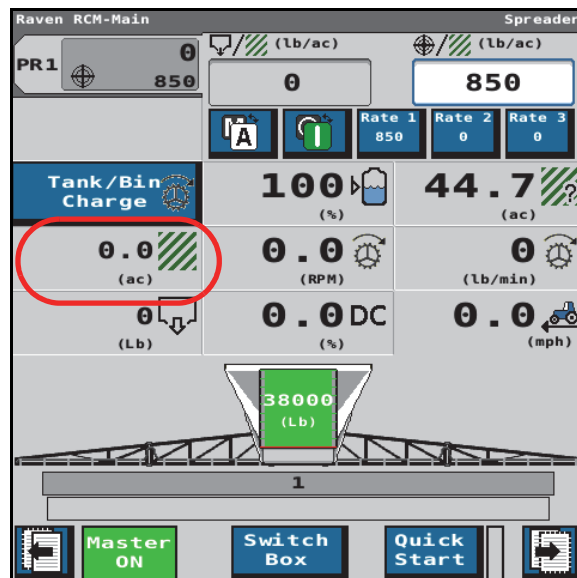
- Use Quick Start feature to prime the Spreader. Toggle the master switch ON and select the Quick Start button in the lower, right corner of the RCM run screen. The Quick Start feature will start the apron to run for up to 15 seconds while the equipment remains stopped. Toggle the master switch OFF to stop if necessary. Allow the apron to run until material starts to come out. Completing the Quick Start process will fill up the dead area between the gate and the beaters and help ensure that material is applied when the system is enabled for in-field application.

FIGURE 33. Quick Start Feature



- Full loads will have better accuracy than partial loads. The RCM will still adjust for a partial load, but the changes in Density factor will be much greater.
- The Density Factor may be monitored by adding a widget to the main run screen. While the widget is not required to operate, it is helpful for monitoring the system. The Density Factor will increase as the beaters are more full or the material is heavier.

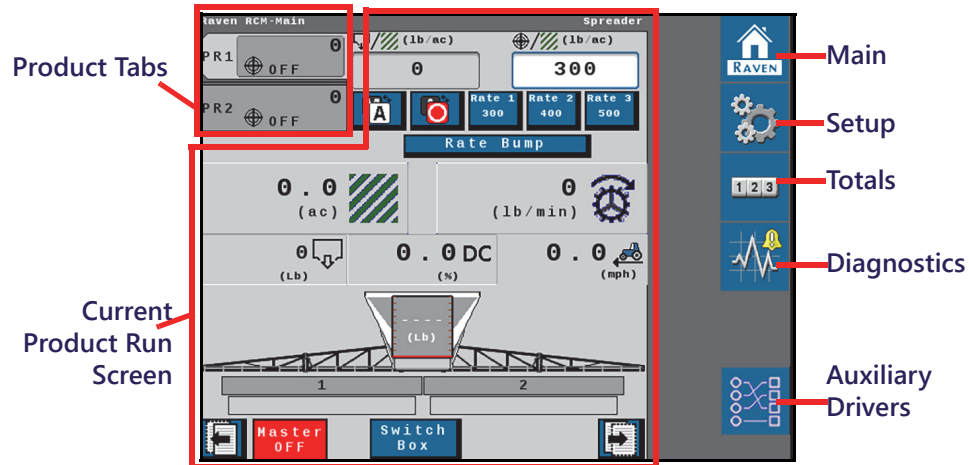
FIGURE 34. Product Density



SPREADER RUN PAGE OVERVIEW

The image below is an example of a typical run screen.

FIGURE 35. Spreader Run Page



PRODUCT TABS

Touch the product tab to select the desired product. This will open the to product run screen for that product.

CURRENT PRODUCT RUN SCREEN

The current product run screen displays information for the selected product. Each product run screen will vary based on product configuration.

Data Fields display selected settings and can be changed to the operator's preferences.

RUN PAGE OVERVIEW

Data Fields display selected settings and can be changed to the operator's preferences.

FIGURE 36. Run Screen

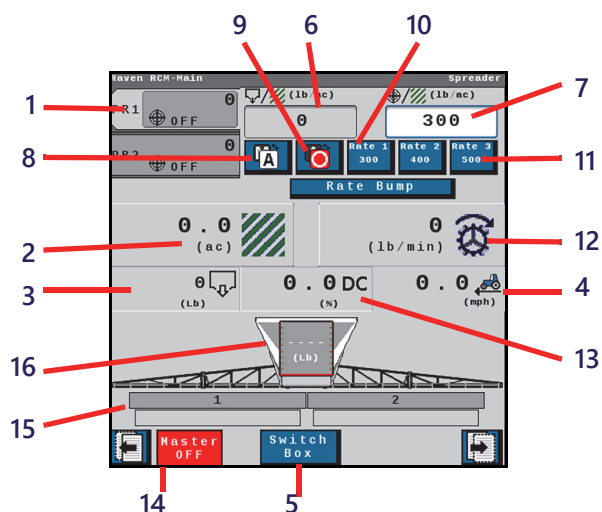
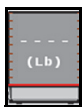


TABLE 4. Raven RCM Run Time Widgets

	Button	Description	Function/Operation
	1	Product Tabs	Select a tab to view information for that product.
	2	Applied Area	Displays the number of acres applied.
	3	Total Volume Applied	Displays the total volume of product applied since the last time the tally was reset.
	4	Traveling Speed	Displays the current machine traveling speed.
	5	Section Switch Box Button	Indicates if the switch box is on or off: - Green - On - Red - Off
	6	Actual Rate	Displays the actual application rate.
	7	Target Rate	Displays the target application rate.
	8	Manual/Automatic Toggle	Touch the on-screen display to toggle between manual and automatic operation modes.
	9	Product On/Off Toggle	Select the product toggle to manually turn a product on or off.
	11	Preset Rate Button	Provides the user the to increase the rate by the preconfigured rates defined during configuration.
	12	Application Rate	Displays the current application rate in pounds per minute.

	Button	Description	Function/Operation
	13	Duty Cycle	Displays the current duty cycle.
	14	Master Switch Indicator	The Master Switch Indicator shows the status of the master switch. - Green - On - Red - Off - Orange - Cycle the master switch
	15	Implement Sections	Displays if the display section is on or off.
	16	Tank Level Indicator and Fill Button	Displays the current tank fill level. NOTE: Tap the bin status display on the Home screen to view bin settings and bin chaining features. Refer to <i>Bin Chaining</i> section on page 39
Quick Start			Enter the number of seconds to override sections status after the automatic section control override feature is enabled. When the quick start is enabled, any sections set to automatic control will turn on for the time entered as the quick start seconds value. This feature may be useful to start application with the equipment at a complete stop or to manually override sections on for a brief time. NOTE: The default quick start seconds value is 15 seconds. The quick start seconds value may only be changed without an active application in progress. If a Raven Viper® 4+ field computer is installed with the system, the operator may use the on-screen widget to change the override seconds. Quick start will only activate sections set for automatic section control. Any sections configured for manual control, or toggled on or off manually, will not be affected by the quick start feature.
		Advances the bin chain.	Advances the bin chain to the next programmed bin in the product chain.
		Charge the first bin	Run the conveyor for the first bin to prime the system.

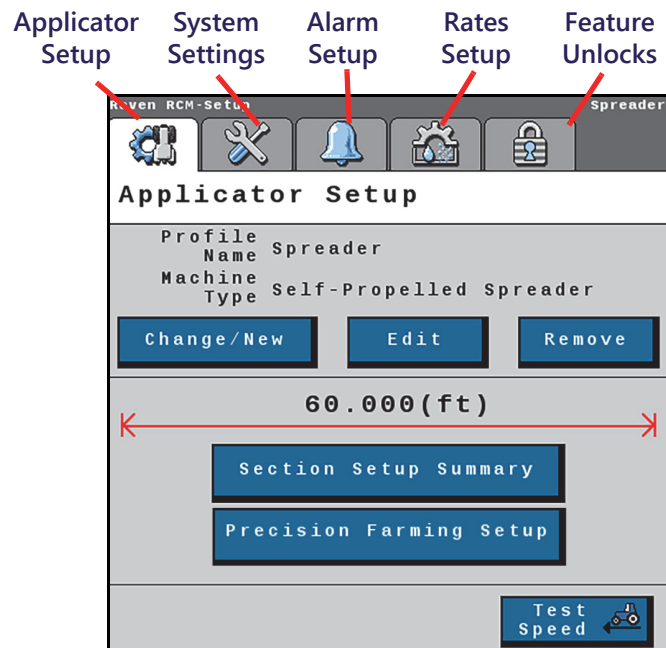
HOME

Select the Home button at any time to return to the main run screen.

TOOLS MENU

Select the Tools button to access settings and options for calibrating or tuning the application system.

FIGURE 37. Tools Menu Tabs



APPLICATOR SETUP TAB

The Applicator Setup Tab provides options to create a new, edit, or remove an applicator. This tab also provides a summary to the section configuration. For more information on the Precision Farming Setup button, refer to Chapter 10, *Precision Farming*.

SYSTEM SETTINGS

The system settings provides many buttons that allow the user to modify the current configuration. The table below describes each button in detail.

FIGURE 38. System Settings Tab

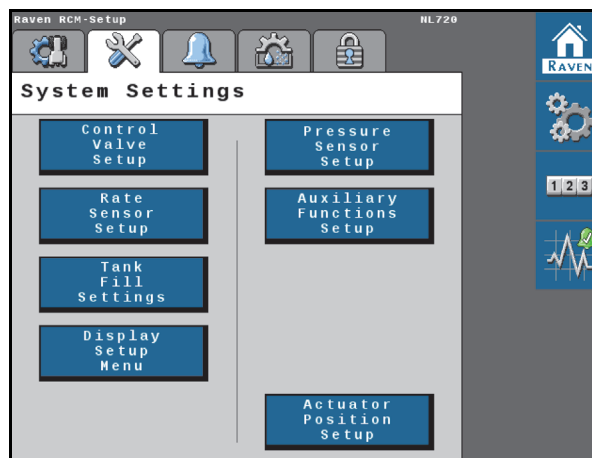


TABLE 5. System Settings

Button	Description
Control Valve Setup	The Control Valve button allows the user to adjust the following settings for each product: • Valve Response Rate • Control Deadband • Valve Delay • Valve Advance • Control Effort
Rate Sensor Setup	Allows the operator to modify/edit the calibration value for the flow meter or encoder used on the control channel.
Tank Fill Settings	This button allows the user to enter the Tank Capacity, Current Tank Level, Bin Chaining, and Low Tank Level.
Display Setup Menu	The Display Setup Menu allows the user to configure the main run screen.
Pressure Sensor Setup	This button allows the user to modify the alarm Min and Max for any products that have pressure alarms selected.
Auxiliary Functions	The Auxiliary Functions button allows the user to create new or modify existing auxiliary functions.
Actuator Position Setup	The Setup menu allows entry of flow rate for each actuator position.

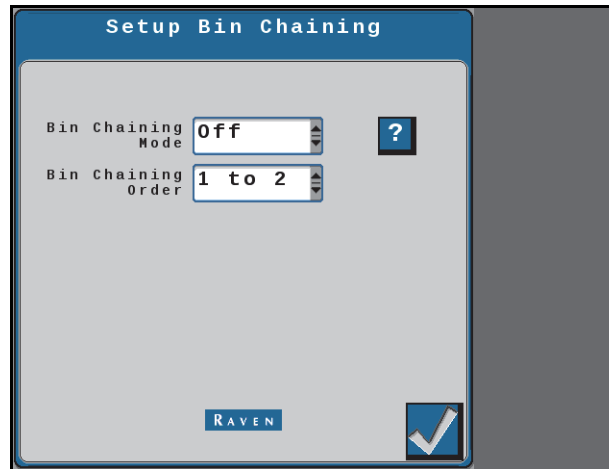
BIN CHAINING

To set up bin chaining:

1. Select the Setup menu from the buttons along the right side of the page.
2. Select the System Settings tab.
3. Select the Tank Fill Settings.

4. Select the Bin Chaining button. The Setup Bin Chaining page is displayed.

FIGURE 39. Setup Tank/Bin Page



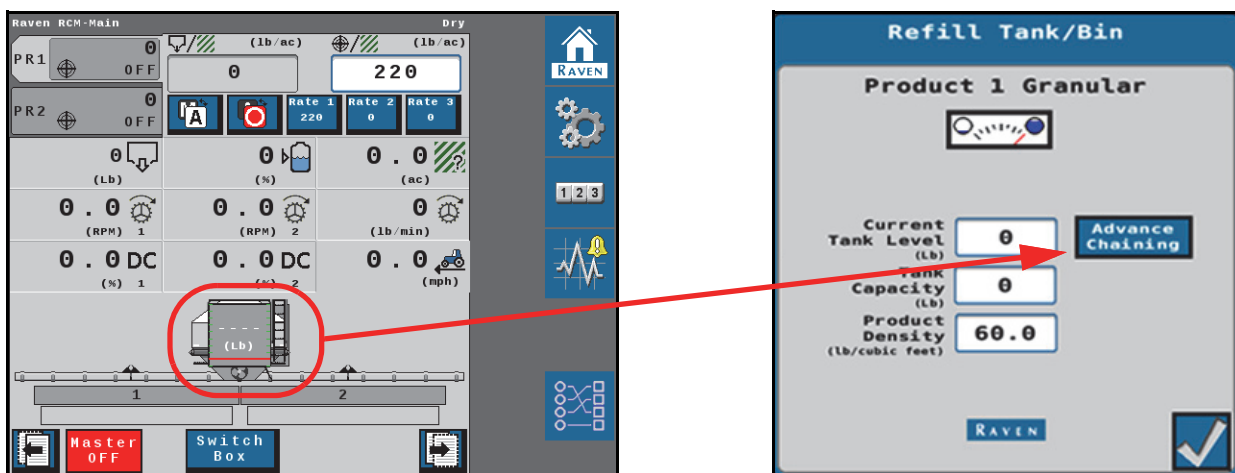
- Mode - Use this drop-down option to set the mode for continuing the product bin chain.
 - Auto - the system will automatically continue to the next product in the product chain based upon a low bin level sensor input.

NOTE: Auto bin chaining mode is only available when a Low Bin Level Sensor is present and enabled on the Setup Tank/Bin page.

- Manual - The machine operator must manually toggle the product chain during field operations.
- Off - no product chain is configured. The system will not associate the bins together for the field operation.
- Order - Use this drop-down option to set the order in which the product bins will be emptied during field operations.

When operating in the Conventional display mode, the Advance Chaining button is available on the Refill Tank/Bin page and allows the operator to manually advance the chain to the next product in the product chain sequence.

FIGURE 40. Advance Chaining



NOTE: A widget is available for Advanced Chaining in software version 25.4 and newer.

PRODUCT BRIDGED ALARM SETUP

FIGURE 41. Product Bridged Alarm Setup Page

- Enable the Product Bridged Alarm to alert the operator when the scale weight does not decrease at the same rate as product is applied.
- The product bridged frequency determines the increment at which the check is performed in units of applied weight.
- The % (percent) Bridged value is the alarm threshold. If the change in scale weight differs from the calculated amount of product applied the alarm will be triggered.

ALARM SETTINGS

Select the Alarm Settings tab to modify or update alarm settings such as Off Rate Alarm and the Minimum Flow Rate. There is also an option to update the Pressure Alarm.

RATES SETUP

The Rates Setup tab allows the user to adjust the Preset Rate Values, Rate Bump, Rate Selection, and other values that were entered during the original configuration.

FEATURE UNLOCKS

If there are additional features available for the RCM, enter the provided Activation Key to access these features.

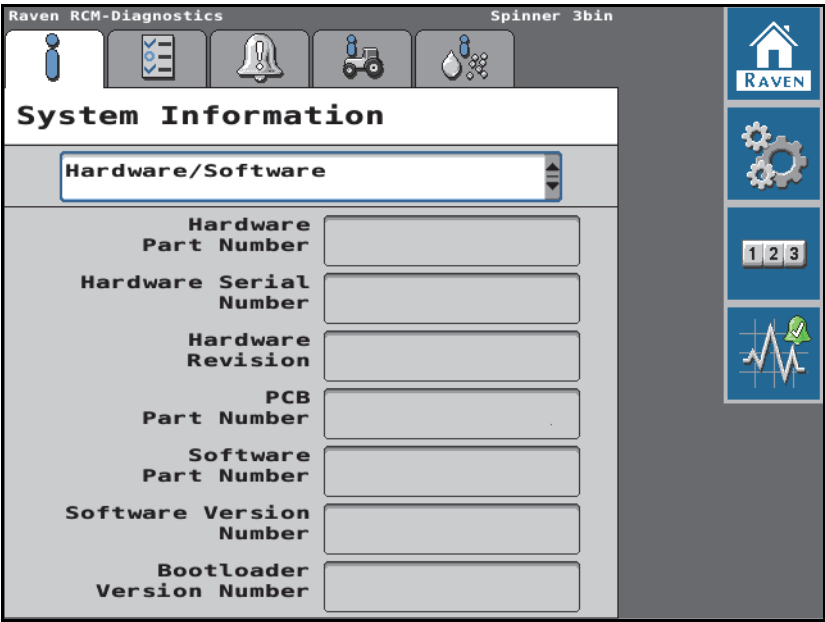
TOTALS

The totals button provides options to access a Current Totals, Device totals, and Distance totals tabs.

DIAGNOSTICS

Select the Diagnostics button along the right side of the page to access active and historical DTCs, optional diagnostic tests, RCM system and product configuration overviews.

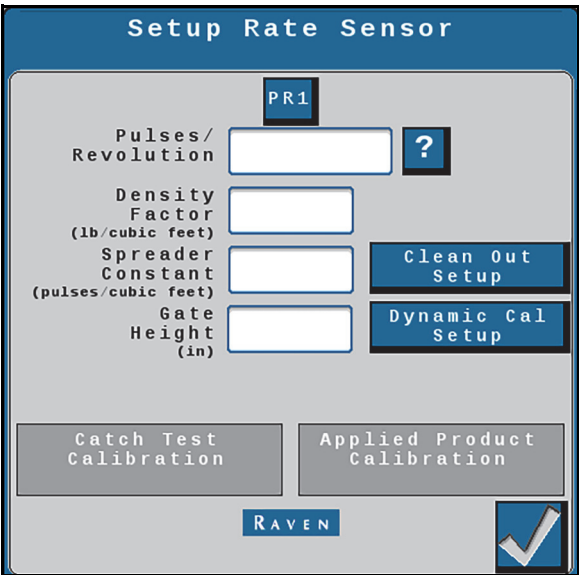
FIGURE 42. Diagnostics Page



MANURE/LITTER SPREADER CONFIGURATION AND SETTINGS

An RCM with level 3 unlocks can apply manure/litter. This is possible by adjusting the density factor in the Dynamic Cal Setup and Clean Out Setup settings during the initial implement configuration.

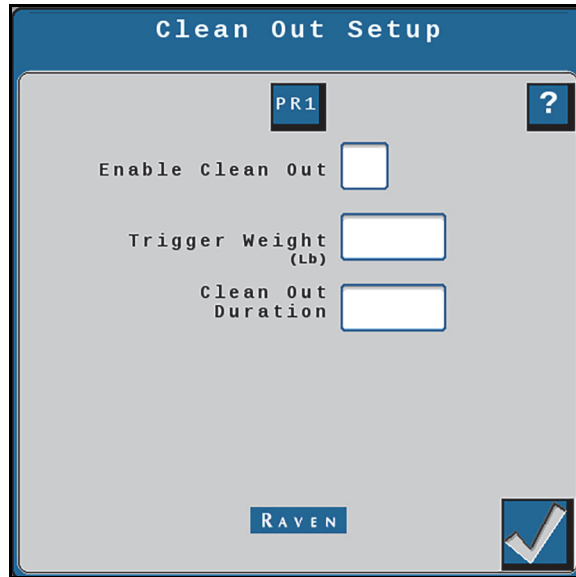
FIGURE 43. Manure/Litter Configuration



CLEAN OUT SETUP

Clean out mode is used to compensate for the end of the of a load when the beaters/spinners are no longer full. The apron chain will continue to speed up until the chain is at full speed. After refilling above the trigger weight, the RCM will resume normal operation.

FIGURE 44. Cleanout Setup



The image shows a 'Clean Out Setup' screen. At the top, it says 'Clean Out Setup' in a blue header. Below the header, there is a 'PR1' label and a question mark icon. The main area contains three settings: 'Enable Clean Out' with a checkbox, 'Trigger Weight (Lb)' with a text input field, and 'Clean Out Duration' with a text input field. At the bottom, there is a 'RAVEN' logo and a checkmark icon.

TRIGGER WEIGHT

Clean out mode will start when the Trigger Weight is met. Set this by watching the end of the load and monitoring the scale reading when the opening to the beaters/spinners are no longer completely covered.

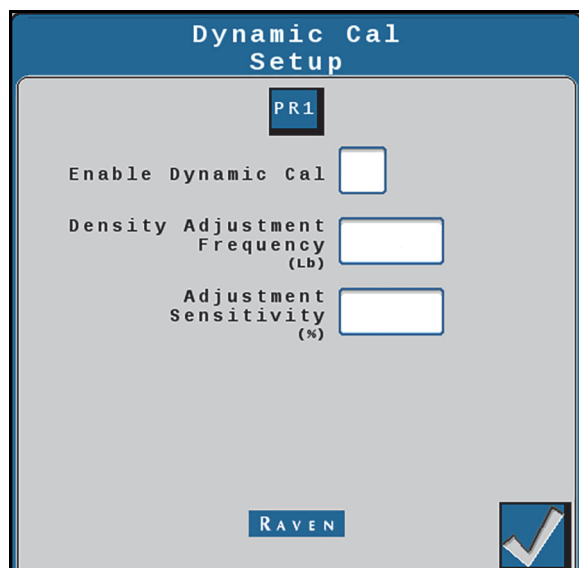
CLEAN OUT DURATION

Clean out duration sets the amount of time the RCM uses to increase the apron chain speed. The steeper the angle of material left in the spreader when the trigger weight is hit, the smaller the duration. Generally a value of 15 to 25 is a good starting point.

DYNAMIC CALIBRATION

Dynamic calibration adjusts the density factor used to determine the desired apron speed.

FIGURE 45. Dynamic Calibration



Dynamic Cal Setup

PR1

Enable Dynamic Cal ☐

Density Adjustment Frequency (lb)

Adjustment Sensitivity (%)

RAVEN 

ADJUSTMENT FREQUENCY

Adjustment Frequency determines how often the RCM recalculates the density factor in kg [lb]. The recommended starting point is 1/20 of the total load weight. This will result in 20 density adjustments per load. On uneven loads this number may fluctuate. If excessive fluctuation is observed, increase the adjustment frequency number.

ADJUSTMENT SENSITIVITY

Adjust Sensitivity sets how aggressively the RCM will change the density factor. A good starting point for this setting is 50% and, unless otherwise instructed, should remain at this number. Increase the sensitivity if the total applied weight displayed by the RCM is not matching the applied scale weight but do not exceed 75%. Lower the number if erratic rates occur but not below 25%.

CHAPTER

AIR CART OPERATION

6

MACHINE TYPES

This section applies to air carts utilizing the following configuration:

TABLE 1. RCM Machine List

Machine Type	Application Type	Application Mode	Application Mode Uses
• Air Cart • Generic	• Liquid • Granular	Liquid	Standard liquid system.
		Granular Full Width	Dry or seed application using a single shutoff section. Application rate is entered and documented as kg/ha [lbs/acre].
		Granular RPM Compensated	Dry or seed application using multiple shutoff sections. Meter/conveyor RPM is controlled/compensated based upon machine speed and active width as sections turn on and off. Application rate is entered and documented as kg/ha [lbs/acre].
		Granular RPM Maintained	Granular multi-section RPM maintained dry or seed application using multiple shutoff sections. Meter/conveyor RPM is controlled/compensated based upon machine speed. Meter/conveyor RPM is not compensated for changes in active width as sections turn on and off. Meter/conveyor will be stopped when all sections are off. Application rate is entered and documented as kg/ha [lbs/acre].
		Granular Split Belt	Dry or seed application using one control valve of a split meter/conveyor RPM is available for each section. Meter/Conveyor RPM is not compensated for changes in active width as left or right sections turn on and off. Meter/conveyor will be stopped when both sections are off.

Machine Type	Application Type	Application Mode	Application Mode Uses
(Cont.) • Air Cart • Generic	(Cont.) • Liquid • Granular	Granular Dual Control Valve	Dual Control Valve Dry or seed application using dual PWM control valves to independently control a left and right meter/conveyor section. Encoder feedback of meter or conveyor RPM is available for each section. Meter/conveyor RPM is independently controlled/compensated based on machine speed. Sections are turned off by closing the PWM control valve.
		Granular Meter Per Section	Dry or seed application using PWM control valves to independently control a meter/conveyor section. Up to 16 individual control sections can be configured. Encoder feedback of meter or conveyor RPM is available for each section. Meter/conveyor RPM is independently controlled/compensated based on machine speed. Sections are turned off by closing the PWM control valve.

Air cart configuration on the RCM can also support the following legacy applications:

TABLE 2. Legacy Granular Modes

Legacy Granular Application Mode	New Application Mode	Mode Details
Gran 1	Granular Full Width Selection	Dry or seed application using a single shutoff section. Application rate is entered and documented as Pounds/Acre (Kilograms/Hectare).
Gran 2	Granular Section Control RPM Maintained	Application Mode - Granular Multi-Section RPM Maintained dry or seed application using multiple shutoff sections. Meter/conveyor RPM is controlled/compensated based on machine speed. Meter/conveyor RPM is not compensated for changes in active width as section turn on and off. Meter/conveyor will be stopped when all sections are off. Application rate is entered and documented as Pounds/Acre (Kilograms/Hectare).
Gran 3	Granular Split Tank/ Dual Encoder	Dry or seed application using one control valve of a split meter/conveyor RPM is available for each section. Meter/Conveyor RPM is not compensated for changes in active width as left or right sections turn on and off. Meter/conveyor will be stopped when both sections are off.
Gran 4	Granular Section Control RPM Maintained	Application Mode - Granular Multi-Section RPM Maintained dry or seed application using multiple shutoff sections. Meter/conveyor RPM is controlled/compensated based on machine speed. Meter/conveyor RPM is not compensated for changes in active width as section turn on and off. Meter/conveyor will be stopped when all sections are off. Application rate is entered and documented as Pounds/Acre (Kilograms/Hectare).

Legacy Granular Application Mode	New Application Mode	Mode Details
Gran 5	Granular Section Control RPM Compensated	Dry or seed application using multiple shutoff sections. Meter/conveyor RPM is controlled/compensated based on machine speed and active width as sections turn on and off. Application rate is entered and documented as Pounds/Acre (Kilograms/Hectare).
None	Dual Control Valve	Dual Control Valve Dry or seed application using dual PWM control valves to independently control a left and right meter/conveyor section. Encoder feedback of meter or conveyor RPM is available for each section. Meter/conveyor ROM is independently controlled/compensated based on machine speed. Sections are turned off by closing the PWM control valve.
None	Granular Meter Per Section	Dry or seed application using PWM control valves to independently control a meter/conveyor section. Up to 16 individual control sections can be configured. Encoder feedback of meter or conveyor RPM is available for each section. Meter/conveyor RPM is independently controlled/compensated based on machine speed. Sections are turned off by closing the PWM control valve.

AIR CART CONFIGURATION

This configuration is an sample air cart configuration. Each configuration will vary so some of the steps shown below may not apply to your configuration or some steps may need to be repeated multiple times.

1. Enter a Profile Name.

FIGURE 1. Name Profile

2. Select Air Cart as the Machine Type.
3. Enter the Application Width and select the desired unit of measure. The application width is typically the boom width.
4. Select the Next button.
5. Set the appropriate ECU # from the drop-down. This is used to identify, prioritize, and sort RCMs when multiple RCMs are on the same system. For systems with a single RCM, set this to "1".

FIGURE 2. Setup System

6. Enter the total desired Number of Products.
7. Select the Next button.
8. Use the Number of Products drop down to select the number of spinners or fans that are monitored or controlled by the ECU from the drop down.

FIGURE 3. Setup Fan/Spinner RPM

9. If desired, select the Enable Fan/Spinner RPM Control check box. This will allow the spinner/fan to be controlled from the main RCM run screen.
10. Select the Next button.
11. Select the desired application type for each product.

FIGURE 4. Setup Application Type

Product	Application Type
1 *	Liquid
2 *	Granular Fertilizer
3 *	RPM Spinner/Fan

12. Select the Next button.

13. Use the Application Mode drop down to select the correct control type for the product. Review Table 1, "RCM Machine List," on page 67 for details on available control types.

FIGURE 5. Setup Application Type

Setup Application Type

Product 1 Liquid

Application Mode

* Liquid

Application Mode - Liquid

Conventional Liquid application.
Application rate is entered and
documented as
Gallons/Acre(Liters/Hectare)

Navigation buttons: Left Arrow, RAVEN, Right Arrow

14. Select the Next button.
15. Select Yes or No from the Setup Section Groups screen. Setting up section groups shares the product drivers in the harness between all products.

FIGURE 6. Setup Section Groups

Setup Section Groups

Are section drivers shared between all products in product harness?

Yes No

60.00ft 60.00ft

Product 1 Sections Product 1 Sections

15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
1	2	3	4	1	2	3	4

Product 2 Sections Product 2 Sections

15.00	15.00	15.00	15.00	30.00	30.00
1	2	3	4	7	8

Yes

Navigation buttons: Left Arrow, RAVEN, Right Arrow

16. Select the Next button.
17. Enter the Number of Sections. This is the number of sections as defined by the harness configuration.

FIGURE 7. Setup Sections

Setup Sections

Number of Sections ?

Equal Width Sections ☒

Master Clutch ☐

Granular Product Sections Power to Apply ☐

Navigation buttons: Left arrow, RAVEN, Right arrow, and a progress bar.

- 18. If desired, select Equal Width Sections. This will evenly divide the machine width into equal sections.
- 19. If desired, select Master Clutch. This applies if there is a master clutch on the air cart that will control a magnetic clutch to engage or disengage the drive.
- 20. If applicable, select the Granular Product Sections Power to Apply check box. Select this if the RCM will provide power on the section signal wire when the section is on. Leave unchecked if the RCM will provide power to the section signal wire when the section is off.
- 21. Select the Next button.
- 22. Select the Starting Section Number for Section Group 1. A section group is a set of sections that will apply the same product at the same rate.

FIGURE 8. Setup Section Harnessing

Setup Section Harnessing

Section Group	Starting Section Number	Number of Sections	Equal Section Widths
1	1	4	☒ ?
2	5	4	☒

Navigation buttons: Left arrow, RAVEN, Right arrow, and a progress bar.

- 23. Enter the Number of Sections for the first section group.
- 24. If desired, select Equal Section Widths.

25. If applicable, enter the Starting Section Number for Section Group 2. In this case, it is five because it must be the first section not being used by the previous section group.
26. Select the Next button.
27. Select the Section Groups for each Product.

FIGURE 9. Setup Section Group Assignment

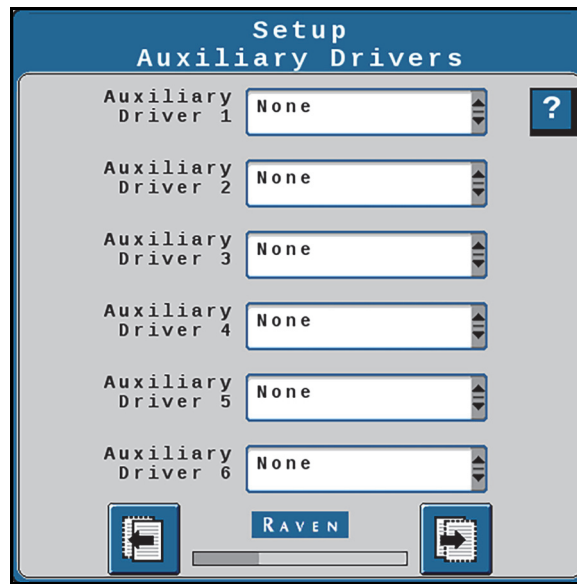
28. Select the Next button.
29. Review the widths for each section. If needed, select the measurement box next to section and enter a different width.

FIGURE 10. Setup Section Width

Section	Width (ft)
1	15.000
2	15.000
3	15.000
4	15.000
5	15.000
6	15.000
7	15.000
8	15.000

30. Select the Next button.
31. If desired, select a function for the Auxiliary Drivers. Auxiliary drivers are additional switches that provide a 12 V signal to a device.

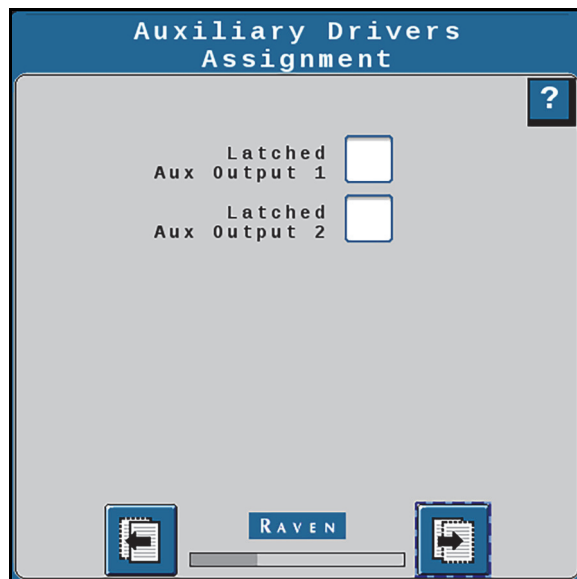
FIGURE 11. Setup Auxiliary Drivers



32. Select the Next button.

33. If desired, select latched for the auxiliary output. Latched means that, once selected, the signal remains constant until the button is pressed again. Leaving the check box unselected means that the signal is only active when the button is being pressed.

FIGURE 12. Auxiliary Drivers Assignments



34. Select the Next button.

35. Review the Section Summary.

FIGURE 13. Section Summary

Section Summary

60.000 (ft)

Product 1

15	15	15	15
1	2	3	4
1	2	3	4

Product 2

15	15	15	15
5	6	7	8
5	6	7	8

Liquid Section Width Granular Section Width Wired Signal Driver Switch Number

RAVEN

36. Select the Next button.

37. Enter the blockage sensor information for each section. The Starting Sensor number must be the next number after the previous section. In the case below, since section five has twelve sensors, the Starting Sensor number for Section 6 would be 13.

NOTE: Blockage sensor setup is only required when configuring an RBM system.

FIGURE 14. Setup Blockage Sensors

Setup Blockage Sensors

Product 2 Granular

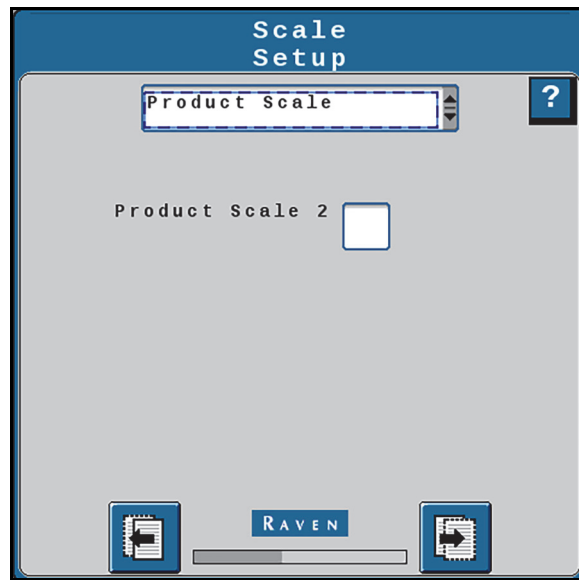
Section	Starting Sensor	Number of Sensors
5	1	12
6	13	12
7	25	12
8	37	12

RAVEN

38. Select the Next button.

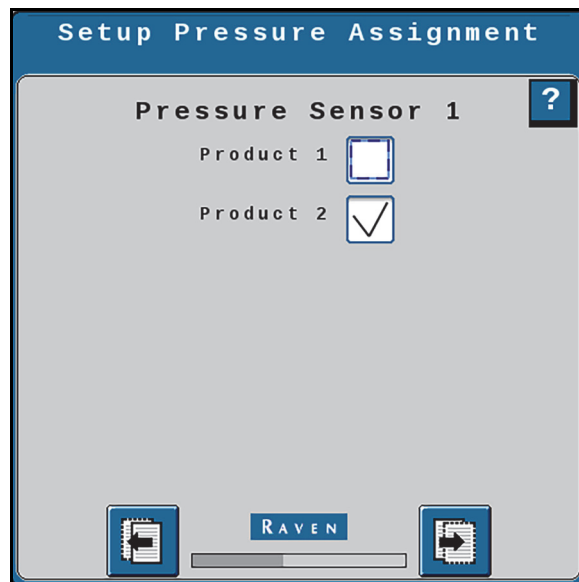
39. Select the desired scale type from the Scale Setup drop down.

FIGURE 15. Scale Setup



- 40. If desired, select the Product Scale check box. This assigns the scale to a product.
- 41. Select the Next button.
- 42. Select the desired product(s) that will have a Pressure Sensor.

FIGURE 16. Setup Pressure Assignment



- 43. Select the Next button.
- 44. Enter the Min and Max pressures for each pressure setting.

FIGURE 17. Setup Pressure Alarms

	Min	Max	Alarm?
Pressure 1 (in. of H2O)	15	35	☒ ?
Pressure 2 (PSI)	0	0	☐
Pressure 4 (PSI)	0	0	☐

45. if desired, select the Alarm? check box to activate alarms.

46. Select the Next button.

47. Assign the RPM Sensor for each of the products.

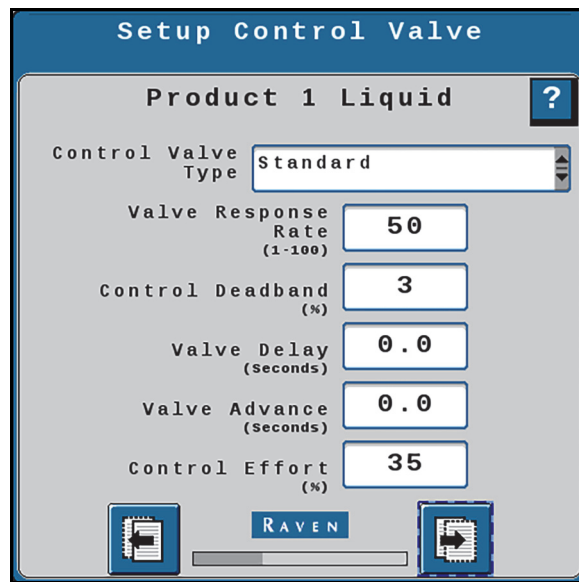
FIGURE 18. Setup RPM Sensor Assignment

RPM Sensor 1 ?	
Product 1	☐
Product 2	☒

48. Select the Next button.

49. Select the Control Valve Type for the first product.

FIGURE 19. Setup Control Valve



Setup Control Valve

Product 1 Liquid ?

Control Valve Type: Standard

Valve Response Rate (1-100): 50

Control Deadband (%): 3

Valve Delay (seconds): 0.0

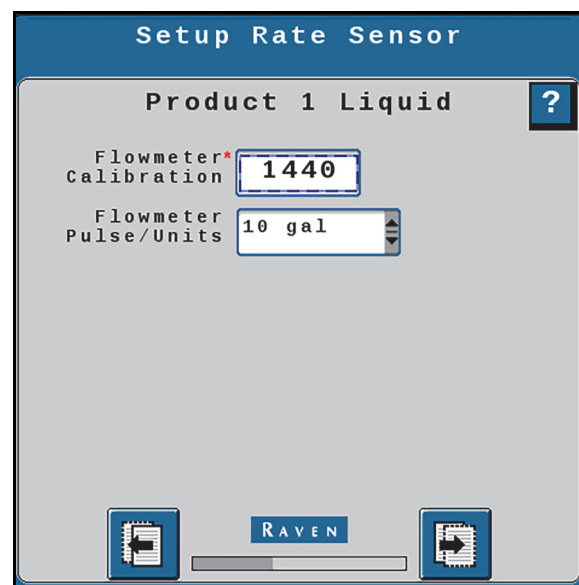
Valve Advance (seconds): 0.0

Control Effort (%): 35

RAVEN

50. Enter the Valve Response Rate.
51. Enter the Control Deadband percentage.
52. Enter the Valve Delay value.
53. Enter the Valve Advance time.
54. Enter the Control Effort percentage.
55. Select the Next button.
56. Enter the Flow Meter Calibration number.

FIGURE 20. Setup Rate Sensor



Setup Rate Sensor

Product 1 Liquid ?

Flowmeter Calibration: 1440

Flowmeter Pulse/Units: 10 gal

RAVEN

57. Select the Flow Meter Pulse/Units.
58. Select the Next button.
59. Enter the Preset Rate Values for each rate.

FIGURE 21. Setup Rates

Setup Rates

Product 1 Liquid ?

	Rate 1	Rate 2	Rate 3
Preset* Rate Values (gal/ac)	10.0	15.0	20.0

Rate Bump (gal/ac): 1.0

Rate Selection: Predefined or Rx

Display Smoothing: ☒

Decimal Shift: 1

Navigation: [Back] RAVEN [Next]

60. Enter the desired Rate Bump increment.
61. Select the Rate Selection.
62. Enable Display Smoothing if desired.
63. Select the Decimal Shift quantity.
64. Select the Next button.
65. Enter the desired Off Rate Alarm percentage.

FIGURE 22. Setup Alarms

Setup Alarms

Product 1 Liquid ?

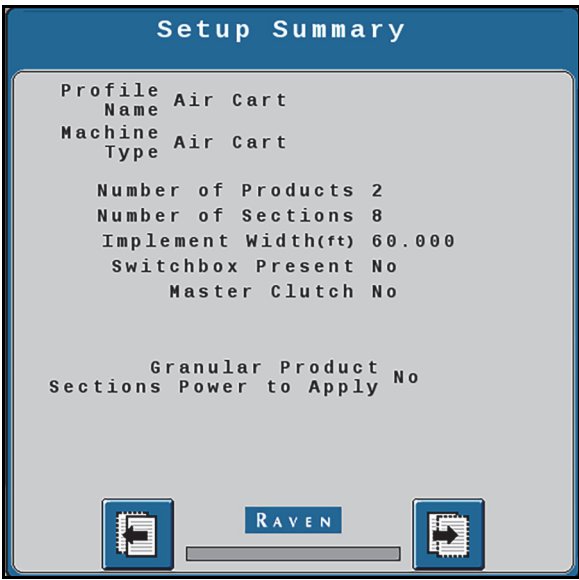
Off Rate Alarm (% off target rate): 20 Alarm? ☒

Enter minimum flow rate required to maintain spray pattern. Minimum Flow Rate: 10.0 (gal/min)

Navigation: [Back] RAVEN [Next]

66. Enter the Minimum Flow Rate.
67. Select the Next button.
68. Review the Setup Summary. If necessary, select the Back button to adjust the settings.

FIGURE 23. Setup Summary

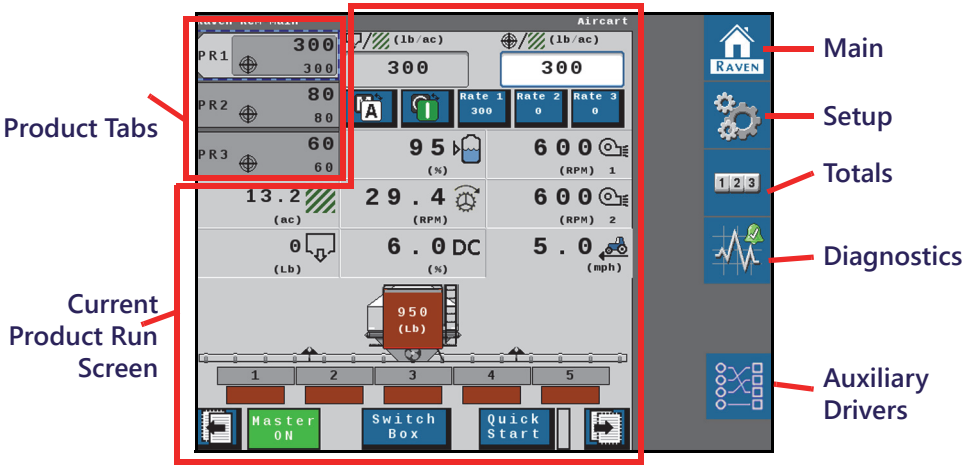


69. Select the Next button.

AIR CART RUN PAGE OVERVIEW

The image below is an example of a typical run screen.

FIGURE 24. RCM Main Screen



PRODUCT TABS

Select the product tab to view the corresponding product detail. This will open the to product run screen for that product.

CURRENT PRODUCT RUN SCREEN

The current product run screen displays information for the selected product. Each product run screen will vary based on product configuration.

Data Fields display selected settings and can be changed to the operator's preferences.

FIGURE 25. Air Cart Run Screen

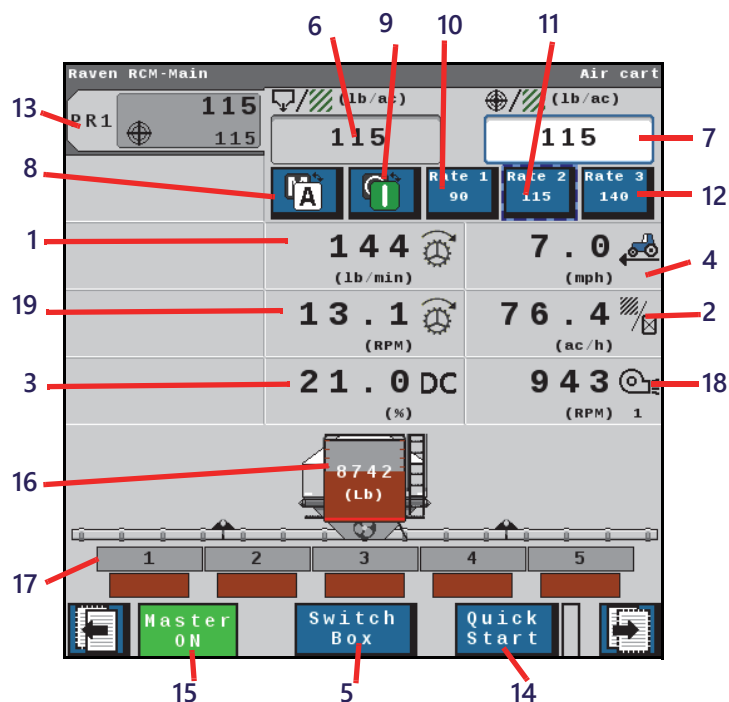
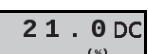
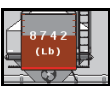


TABLE 3. Air Cart Run Screen Information

	Button	Description	Function/Operation
	1.	Volume Per Minute	Indicates the application rate per minute.
	2.	Area Per Hour	Indicates the how many acres per hour are being applied.
	3.	PWM Readout	Shows the operating percentage of the PWM valve.
	4.	Traveling Speed	Shows the implement/machine speed.
	5.	Section Switch Box Button	Indicates if the switch box is on or off: - Green - On - Red - Off
	6.	Actual Rate	Displays the actual application rate.

	Button	Description	Function/Operation
	7.	Target Rate	Displays the current target rate. The target rate can be adjusted by selecting the number cell and entering a new number.
	8.	Manual/Automatic Mode	Touch the on-screen display to toggle between manual and automatic operation modes.
	9.	Product On/Off Toggle	Select the product toggle to manually turn a product on or off.
	10.	Predefined Rate 1 Button	Select this button to start applying at the rate listed on the button. Refer to "Rates Setup" on page 85 for more information on adjusting rates.
	11.	Predefined Rate 2 Button	Select this button to start applying at the rate listed on the button. Refer to "Rates Setup" on page 85 for more information on adjusting rates.
	12.	Predefined Rate 3 Button	Select this button to start applying at the rate listed on the button. Refer to "Rates Setup" on page 85 for more information on adjusting rates.
	13.	Product Tab	Select a tab to view information for that product.
	14.	Quick Start Button	Select the quick start button to quickly configure a product.
	15.	Master Switch Indicator	The Master Switch Indicator shows the status of the master switch. • Green - On • Red - Off • Orange - Cycle the master switch
	16.	Tank Level Indicator and Fill Button	Indicated the fill level of the tank.
	17.	Implement Sections	Displays the section number. The section status will display below the implement section. • Red - Off • Green - On • Blue - Liquid
	18.	Fan Speed	Indicates the fan speed in RPM.
	19.	Meter/Shaft RPM	Indicates the shaft or meter RPM as read by an encoder.

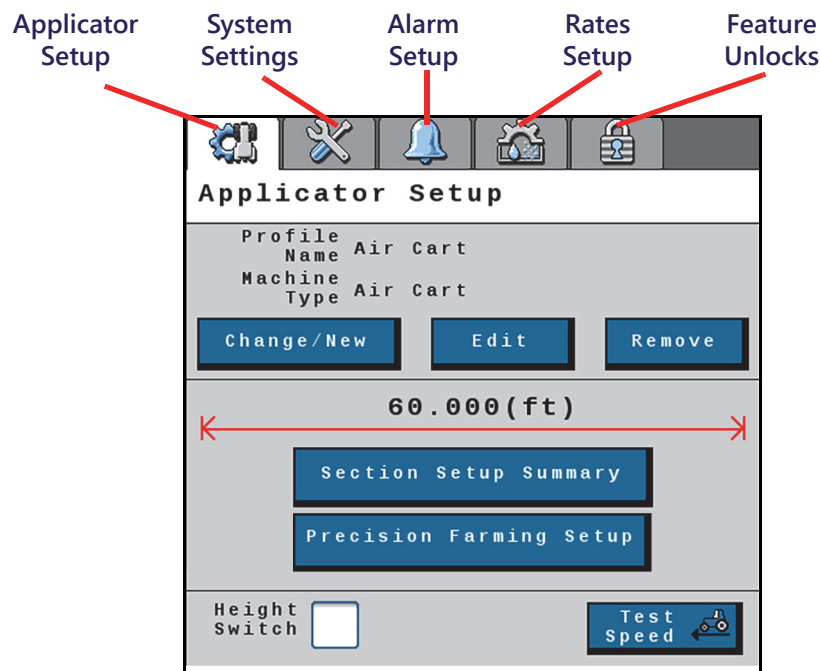
HOME

Select the Home button at any time to return to the main run screen.

TOOLS MENU

Select the Tools button to access settings and options for calibrating or tuning the application system.

FIGURE 26. Tools Menu Tabs



APPLICATOR SETUP TAB

The Applicator Setup Tab provides options to create a new, edit, or remove an applicator. This tab also provides a summary to the section configuration. For more information on the Precision Farming Setup button, refer to Chapter 10, *Precision Farming*.

SYSTEM SETTINGS

The system settings provides many buttons that allow the user to modify the current configuration. The table below describes each button in detail.

TABLE 4. System Settings

Button	Description
Control Valve Setup	The Control Valve button allows the user to adjust the following settings for each product: • Valve Response Rate • Control Deadband • Valve Delay • Valve Advance • Control Effort
Rate Sensor Setup	The Rate Sensor Setup button provides the options to adjust the following settings: • Flow Meter Calibration • Flow Meter Pulse/Units • Flow Meter Low Limit • Tank Fill Flow Meter Calibration • Tank Fill Flow Meter Pulse/Units There is also the option to perform a catch test and applied product calibration.
Tank Fill Settings	This button allows the user to enter the Tank Capacity, Current Tank Level, and Low Tank Level.
Display Setup Menu	The Display Setup Menu allows the user to customize the main run screen object pool.
Pressure Sensor Setup	This button allows the user to modify the alarm Min and Max for any products that have pressure alarms selected.
Auxiliary Functions	The Auxiliary Functions button allows the user to create new or modify existing auxiliary functions.
Scale Setup	Scale Setup allows the user to configure scale options.

ALARM SETTINGS

Select the Alarm Settings tab to modify or update alarm settings such as Off Rate Alarm and the Minimum Flow Rate. There is also an option to update the Pressure Alarm.

RATES SETUP

The Rates Setup tab allows the user to adjust the Preset Rate Values, Rate Bump, Rate Selection, and other values entered during the original configuration.

FEATURE UNLOCKS

If there are additional features available for the RCM, enter the provided Activation Key to access these features.

TOTALS

The totals button provides options to access a Current Totals, Device totals, and Distance totals tabs.

DIAGNOSTICS

Selecting the Diagnostics button open a window with tabs for the items listed below.

SYSTEM INFORMATION

Displays information about the RCM including the Hardware Serial Number, Hardware Revision, and Software Version Number.

TESTS

The Tests tab allows the user to select various tests from a drop down. These list of tests will vary by product configuration.

DIAGNOSTIC TROUBLE CODES

This tab lists Active and Inactive diagnostic trouble codes as well as the ability to Clear the active codes.

SYSTEM SUMMARY

Displays information configured during the setup process but does not provide the option to modify the configuration.

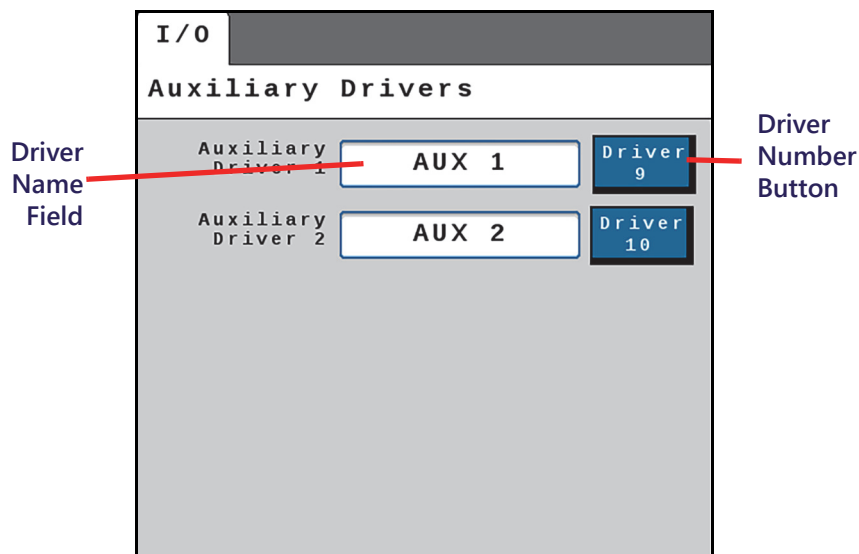
PRODUCT SUMMARY

The Product Summary provides a brief summary for all of the products such as Application Type, Control Valve type, Target Rate, and other settings. This tab does not allow the user to modify the configurations.

AUXILIARY DRIVERS

Auxiliary drivers that were created during configuration are listed in Auxiliary Drivers.

FIGURE 27. Auxiliary Drivers



To give the driver a custom name, select the Driver Name field and, using the keypad, enter the desired name. To activate the auxiliary driver, select the driver number button next to the desired driver.

PLANTER MACHINE LIST

TABLE 1. RCM Machine List

Machine Type	Application Type	Application Mode	Application Mode Uses
• Planter	• Granular Seed	Planter Section Control	RCM interfaces with up to 16 (Level 1) or 32 (Level 3) planter sections. Multiple row clutches can be grouped for each section. Seed rate is manually controlled via ground drive transmission.
• Seeder	• Granular Seed	Seed Rate Control with Clutches	RCM interfaces with up to 4 hydraulic motor drives for seed rate control and up to 24 planter sections. Multiple row clutches can be grouped for each section.
		Seed Rate Control without Clutches	RCM interfaces with up to 16 electric or hydraulic motor drives for seed rate and section control. Multiple rows can be grouped for each hydraulic motor drive.

PLANTER SETUP

There are three possible types on planter configurations. There is a wizard section listed below for each possible configuration.

SECTION CONTROLLED PLANTER SETUP

1. Select Planter as the machine type.

FIGURE 1. Name Profile

2. Enter the Application Width.
3. Select the Next button.
4. Enter the Number of Sections, Row Spacing, and the Number of Rows. The Number of Rows x Row Spacing must equal the Application Width entered in step 2.

FIGURE 2. Setup Selections

NOTE: The number of total sections depends on the task controller capability.

5. If you did not select Evenly Divide, enter the number of rows per section. The Planter run screen will open.

FIGURE 3. Setup Section Width

Setup Section Width

Enter the number of rows in each section.

1* 2 7* 2

2* 2 8* 2

3* 2

4* 2

5* 2

6* 2

RAVEN

SEED RATE CONTROL WITH CLUTCHES PLANTER SETUP

6. Set the appropriate ECU # from the drop-down. This is used to identify, prioritize, and sort RCMs when multiple RCMs are on the same system. For systems with a single RCM, set this to "1."

FIGURE 4. Setup System

Setup System

ECU S/N	ECU #	Number of Products
RCM-1039		

RAVEN

7. Enter the desired number in the Number or Products field.
8. Select the Next button.
9. Select the desired Application Type for the product.

FIGURE 5. Setup Application Type

Product	Application Type
1	Granular Seed
2	Liquid

Navigation buttons: [Left Arrow] [RAVEN] [Right Arrow]

10. Select the Next button.

11. Select the Application Mode for Product 1.

FIGURE 6. Setup Application Type

Product 1 Granular

Application Mode

* Seed Rate Ctrl (/W Clutches)

Seed Rate Control (With Clutches) - Controller interfaces with up to 4 hydraulic motor drives for seed rate control and up to 24 planter sections. Multiple row clutches can be grouped for each section. As-applied coverage recorded in kilo seeds/acre [hectare].

Navigation buttons: [Left Arrow] [RAVEN] [Right Arrow]

12. Select the Next button.

13. Configure the Number of Sections, Row Spacing, Number of Drives, and Number of Rows. If desired, select the Divide Evenly check box to automatically divide the sections widths.

FIGURE 7. Setup Sections

Setup Sections

Enter number of sections, row spacing, number of drives, and number of rows then continue to the next page.

Number of Sections

Row Spacing (in)

Number of Drives

Number of Rows

Divide Evenly ☒

RAVEN

14. Select the Next button.

15. Repeat Figure 9 on page 89 through Figure 13 on page 90 for all products.

NOTE: On the Setup Sections Harnessing screen for additional products, enter the next lowest number not being used by the previous section group. For example, if the first product is using the first eight sections, start the second product on section 9.

16. After completing the product configurations, enter the information on the Setup Sections Width screens.

FIGURE 8. Setup Section Width Screens

Setup Section Width

Enter the number of rows in each section.

1 7

2 8

3

4

5

6

RAVEN

Setup Section Width

Enter the width of the sections

9 (ft)

10 (ft)

11 (ft)

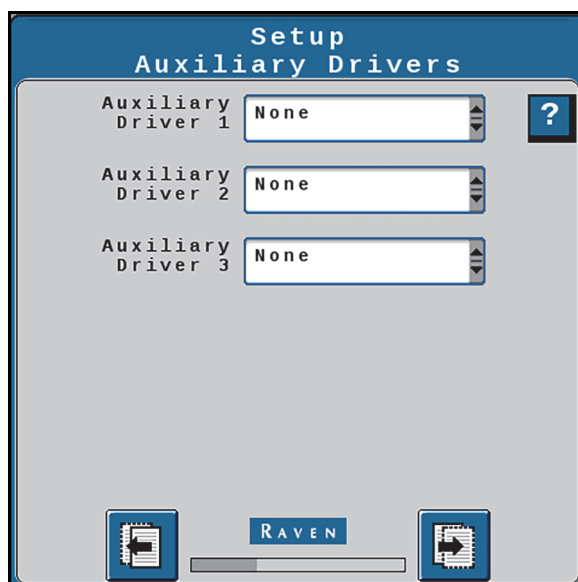
12 (ft)

RAVEN

17. Select the Next button.

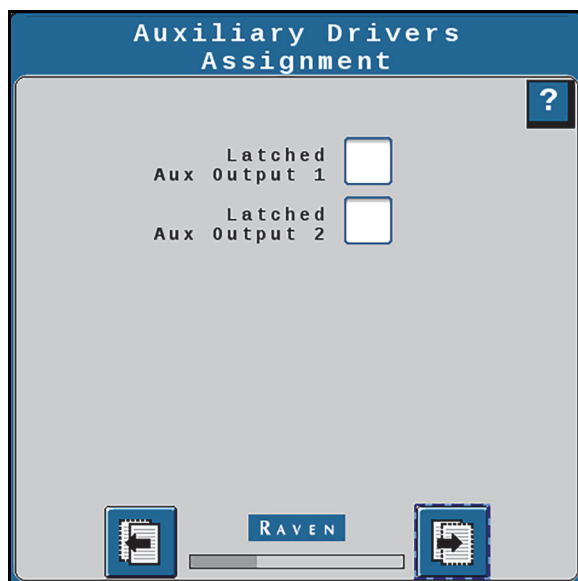
18. Select one of the Auxiliary Driver drop downs on the Setup Auxiliary Drivers page. Auxiliary drivers are additional switches that provide a 12 V signal to a device.

FIGURE 9. Setup Auxiliary Drivers



19. Select the Next button.
20. Select the check box next to the desired Latched Aux Output. Latched means that, once selected, the signal remains constant until the button is pressed again. Leaving the check box unselected means that the signal is only active when the button is held.

FIGURE 10. Auxiliary Driver Drivers



21. Select the Next button.
22. On the Setup Pressure Sensors page, select the appropriate Pressure Sensors for each product from the drop down.

FIGURE 11. Setup Pressure Sensors

Setup Pressure Sensors

Pressure Sensor 1: 0-55 in/H2O (1-3V)

Pressure Sensor 2: 0-250psi (1-5V)

Pressure Sensor 3: None

Pressure Sensor 4: None

RAVEN

23. Select the Next button.

24. Use the check boxes on the Setup Pressure Driver screen to select a Product for the first pressure sensor.

FIGURE 12. Setup Pressure Drivers

Setup Pressure Assignment

Pressure Sensor 1

Product 1: ☒

Product 2: ☐

RAVEN

25. Select the Next button.

26. Repeat Figure 24 on page 93 and Figure 25 on page 93 for all pressure sensors.

27. If desired, configure the alarms for each pressure sensor on the Setup Pressure Alarms screen.

FIGURE 13. Setup Pressure Alarms

	Min	Max	Alarm?
Pressure 1 (in. of H2O)	0	0	☒
Pressure 2 (PSI)	0	0	☐
Pressure 3 (PSI)	0	0	☐
Pressure 4 (PSI)	0	0	☐

28. Select the Next button.

29. On the Setup Control Valve page configure the Control Valve Type, Valve Response Rate, and Control Deadband for the first product. If desired, select the Enable PWM Smart Control check box.

FIGURE 14. Setup Control Valve

30. Select the Next button.

31. On the Setup PWM page, configure the Coil Frequency, PWM High Limit, PWM Low Limit, and PWM Startup for the first product.

FIGURE 15. Setup PWM

Setup PWM

Product 1 Planter ?

Coil Frequency (Hz)

PWM High Limit (%)

PWM Low Limit (%)

PWM Startup (%)

Navigation buttons: [Previous] [Next] RAVEN

32. Select the Next button.

33. Configure the Seeds/Revolution, Motor/Meter Ratio, and Pulses/Revolution on the first Setup Rate Sensor page.

FIGURE 16. Setup Rate Sensor

Setup Rate Sensor

Product 1 Planter

Seeds/Revolution

Motor/Meter Ratio

Pulses/Revolution *

Navigation buttons: [Previous] [Next] RAVEN

34. Select the Next button.

35. Enter the Preset Rate Values, Rate Bump, and Rate Selection on the Setup Rates page. If desired, select the Display Smoothing check box.

FIGURE 17. Setup Rates

Setup Rates

Product 1 Planter ?

	Rate 1	Rate 2	Rate 3
Preset Rate Values (k seed/ac)	30.0	35.0	40.0
Rate Bump (k seed/ac)	2.0		
Rate Selection	Predefined or Rx		
Display Smoothing	☒		

Navigation: [Left Arrow] [RAVEN] [Right Arrow]

36. If desired, enter the Off Rate Alarm percentage and enable the Alarm check box.

FIGURE 18. Setup Alarms

Setup Alarms

Product 1 Planter ?

Off Rate Alarm (% off target rate) 20 Alarm? ☒

Navigation: [Left Arrow] [RAVEN] [Right Arrow]

37. Select the Next button.

38. Repeat Figure 29 on page 94 through Figure 37 on page 96 for each product. Product configuration will vary depending on application type.

39. After all products are configured, a Setup Summary page will open displaying information about the configuration. If needed, select the Back button to adjust the configurations. If the setup seems correct, select the Next button. The run page home screen will open. For additional information on the run page, refer to "Planter Run Page Overview" on page 107.

SEED RATE CONTROL WITHOUT CLUTCHES PLATER SETUP

1. Select Planter from the drop down on the Select Profile Page.

FIGURE 19. Name Profile

2. Select the Next button.
3. Set the appropriate ECU # from the drop-down. This is used to identify, prioritize, and sort RCMs when multiple RCMs are on the same system. For systems with a single RCM, set this to "1".

FIGURE 20. Setup System

ECU S/N	ECU #	Number of Products
RCM-1039		

4. Enter the desired number in the Number or Products cell.
5. Select the Next button.
6. Select the desired Application Type for the product.

FIGURE 21. Setup Application Type

	Product	Application Type
1 *		Granular Seed
2 *		Liquid

Navigation buttons: [Left Arrow] [RAVEN] [Right Arrow]

7. Select the Next button.
8. Select the Application Mode for Product 1.

FIGURE 22. Setup Application Type

Product 1 Granular

Application Mode

* Seed Rate Ctrl (No Clutches)

Seed Rate Control (No Clutches) - Controller interfaces with up to 16 electric or hydraulic motor drives for seed rate and section control. Multiple rows can be grouped for each hydraulic motor drive. As-applied coverage recorded in kilo seeds/acre [hectare].

Navigation buttons: [Left Arrow] [RAVEN] [Right Arrow]

9. Select the Next button.
10. Configure the Number of Sections, Row Spacing, Number of Drives, and Number of Rows. If desired, select the Divide Evenly check box to automatically divide the sections widths.

FIGURE 23. Setup Sections

11. Select the Next button.
12. If necessary, select the Application Mode for additional products.
13. Select the Next button.
14. On the Setup Section Groups screen, select the Number of Section Groups from the drop down.

FIGURE 24. Setup Section Groups

15. Select the Next button.
16. Review the information on the Setup Section Harnessing screen.
17. Select the Next button.
18. On the Setup Section Harnessing screen, enter the Starting Section Number, Number of Sections, and select Equal Section Widths (if desired).

FIGURE 25. Setup Section Harnessing

Section Group	Starting Section Number	Number of Sections	Equal Section Widths
2	1	4	☒

19. Select the Next button.

20. Select the Section Group assignment for each product from the drop down on the Setup Section Group Assignment screen.

FIGURE 26. Setup Section Group Assignment

Product	Section Groups
2	Section Group 2

21. Select the Next button.

22. After completing the product configurations, enter the information on the Setup Sections Width screens.

FIGURE 27. Setup Section Width Screens

Setup Section Width

Enter the number of rows in each section.

1*	2	7*	2
2*	2	8*	2
3*	2		
4*	2		
5*	2		
6*	2		

Setup Section Width

Enter the width of the sections

9*	10.000
10* (ft)	10.000
11* (ft)	10.000
12* (ft)	10.000

RAVEN

23. Select the Next button.

24. If desired, select Setup Auxiliary Drivers. Auxiliary drivers are additional switches that provide a 12 V signal to a device.

FIGURE 28. Setup Auxiliary Drivers

Setup Auxiliary Drivers

Auxiliary Driver 1 None ?

Auxiliary Driver 2 None

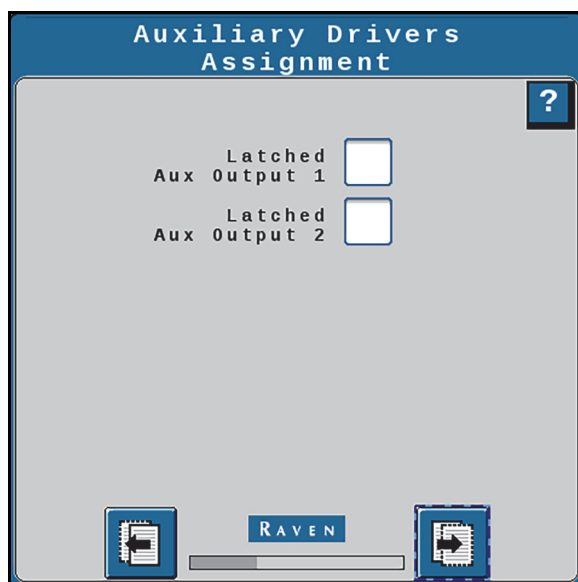
Auxiliary Driver 3 None

RAVEN

25. Select the Next button.

26. Select the check box next to the desired Latched Aux Output. Latched means that, once selected, the signal remains constant until the button is pressed again. Leaving the check box unselected means that the signal is only active when the button is held.

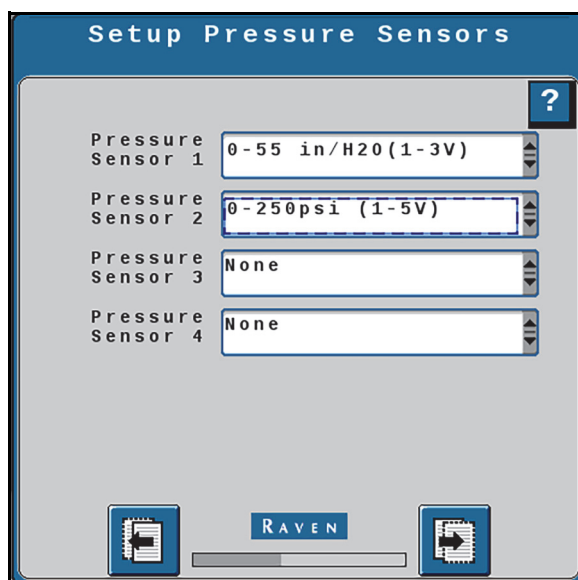
FIGURE 29. Auxiliary Driver Assignments



27. Select the Next button.

28. On the Setup Pressure Sensors page, select the appropriate Pressure Sensors for each product from the drop down.

FIGURE 30. Setup Pressure Sensors



29. Select the Next button.

30. Use the check boxes on the Setup Pressure Assignment screen to select a Product for the first pressure Sensor.

FIGURE 31. Setup Pressure Assignments

31. Select the Next button.
32. Repeat Figure 24 on page 93 and Figure 25 on page 93 for all pressure sensors.
33. If desired, configure the alarms for each pressure sensor on the Setup Pressure Alarms screen.

FIGURE 32. Setup Pressure Alarms

	Min	Max	Alarm?
Pressure 1 (in. of H2O)	0	0	☐
Pressure 2 (PSI)	0	0	☐
Pressure 3 (PSI)	0	0	☐
Pressure 4 (PSI)	0	0	☐

34. Select the Next button.
35. On the Setup Control Valve page configure the Control Valve Type, Valve Response Rate, and Control Deadband for the first product. If desired, select the Enable PWM Smart Control check box.

FIGURE 33. Setup Control Valve

Setup Control Valve

Product 1 Planter ?

Control Valve Type **PWM Close**

Valve Response Rate (1-100) **50**

Control Deadband (%) **2**

Enable PWM Smart Control ☐

Navigation buttons: Previous, **RAVEN**, Next

36. Select the Next button.

37. On the Setup PWM page, configure the Coil Frequency, PWM High Limit, PWM Low Limit, and PWM Startup for the first product.

FIGURE 34. Setup PWM

Setup PWM

Product 1 Planter ?

Coil Frequency (Hz) **60**

PWM High Limit (%) **100.0**

PWM Low Limit (%) **1.0**

PWM Startup (%) **0.0**

Navigation buttons: Previous, **RAVEN**, Next

38. Select the Next button.

39. Configure the Seeds/Revolution, Motor/Meter Ratio, and Pulses/Revolution on the first Setup Rate Sensor Page.

FIGURE 35. Setup Rate Sensor

Setup Rate Sensor

Product 1 Planter

Seeds/
Revolution

Motor/
Meter Ratio

Pulses/
Revolution

Navigation buttons: [Previous] [RAVEN] [Next]

40. Select the Next button.

41. Enter the Preset Rate Values, Rate Bump, and Rate Selection on the Setup Rates page. If desired, select the Display Smoothing check box.

FIGURE 36. Setup Rates

Setup Rates

Product 1 Planter ?

	Rate 1	Rate 2	Rate 3
Preset Rate Values (K seed/ac)	30.0	35.0	40.0

Rate
Bump
(K seed/ac)

Rate
Selection

Display
Smoothing ☒

Navigation buttons: [Previous] [RAVEN] [Next]

42. If desired, enter the Off Rate Alarm percentage and enable the Alarm check box.

FIGURE 37. Setup Alarms

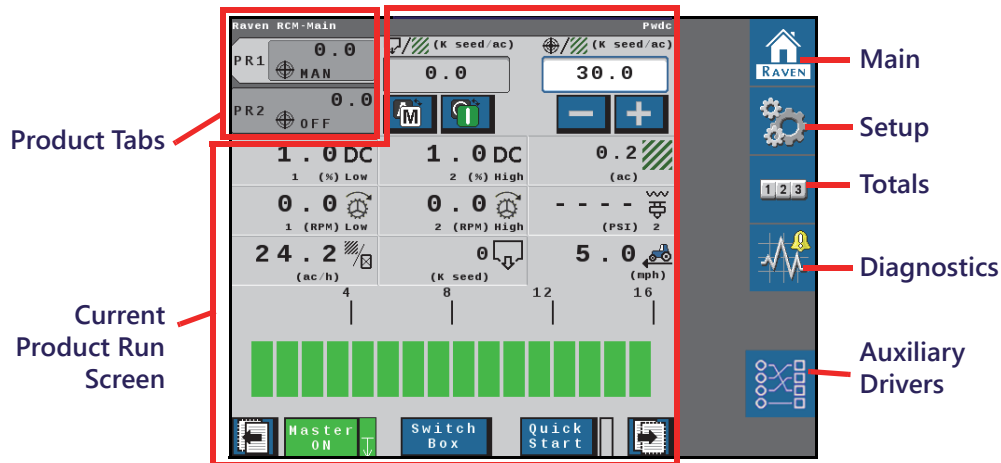
The screenshot displays a software interface titled "Setup Alarms". Below the title is a section for "Product 1 Planter". Within this section, there is a label "Off Rate Alarm (% off target rate)" followed by a text input field containing the value "20". To the right of the input field is a checkbox labeled "Alarm?" which is checked with a checkmark. In the top right corner of the "Product 1 Planter" section is a small blue square button with a white question mark. At the bottom of the screen, there are three navigation buttons: a back button (left arrow), a central button labeled "RAVEN", and a forward button (right arrow).

43. Select the Next button.
44. Repeat Figure 29 on page 94 through Figure 37 on page 96 for each product. Product configuration will vary depending on application type.
45. After all products are configured, a Setup Summary page will open displaying information about the configuration. If needed, select the back button to adjust the configuration. If the setup seems correct, select the Next button. The run page home screen will open. For additional information on the run page, refer to "Planter Run Page Overview" on page 107.

PLANTER RUN PAGE OVERVIEW

The image below is an example of a typical run screen.

FIGURE 38. Planter Run Screen



PRODUCT TABS

Select the product tab to view the corresponding product detail. This will open the to product run screen for that product.

CURRENT PRODUCT RUN SCREEN

The current product run screen displays information for the selected product. Each product run screen will vary based on product configuration.

Data Fields display selected settings and can be changed to the operator's preferences.

FIGURE 39. Planter Run Screen

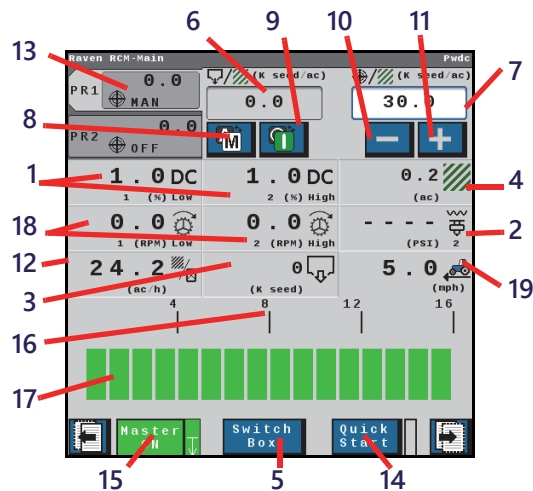
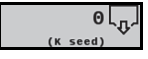


TABLE 2. Planter Run Screen Information

	Button	Description	Function/Operation
	1.	Voltage	Indicates the current duty cycle.
	2.	Injection Pressure	Indicates the injection pressure.
	3.	Seed Level	Displays the current bin level.
	4.	Acres Applied	Displays the number of acres applied since starting the job.
	5.	Section Switch Box Button	Indicates if the switch box is on or off: - Green - On - Red - Off Select the switch box button to navigate to a screen that allows the user to turn off the switch boxes for individual sections.
	6.	Actual Rate	Displays the actual application rate.
	7.	Target Rate	Displays the current target rate. The target rate can be adjusted by selecting the number cell and entering a new number.
	8.	Manual/Automatic Mode	Touch the on-screen display to toggle between manual and automatic operation modes.
	9.	Product On/Off Toggle	Select the product toggle to manually turn a product on or off.
	10.	Rate Bump Down	Select the minus button to decrease the application rate at the increment set during configuration.
	11.	Rate Bump Up	Select the plus button to increase the application rate at the increment set during configuration.
	12.	Application Rate	Displays the current application speed in acres per hour.
	13.	Product Tab	Select a tab to view information for that product.
	14.	Quick Start Button	Select the quick start button to quickly configure a product.
	15.	Master Switch Indicator	The Master Switch Indicator shows the status of the master switch. - Green - On - Red - Off - Orange - Cycle the master switch

	Button	Description	Function/Operation
	16.	Row Number	Displays the ending row number for the section.
	17.	Row Indicator	Displays the row status. - Gray - Off - Green - On
	18.	Meter Spread High and Low	Indicates the meter spread speed in RPM.
	19.	Traveling Speed	Shows the implement/machine speed.

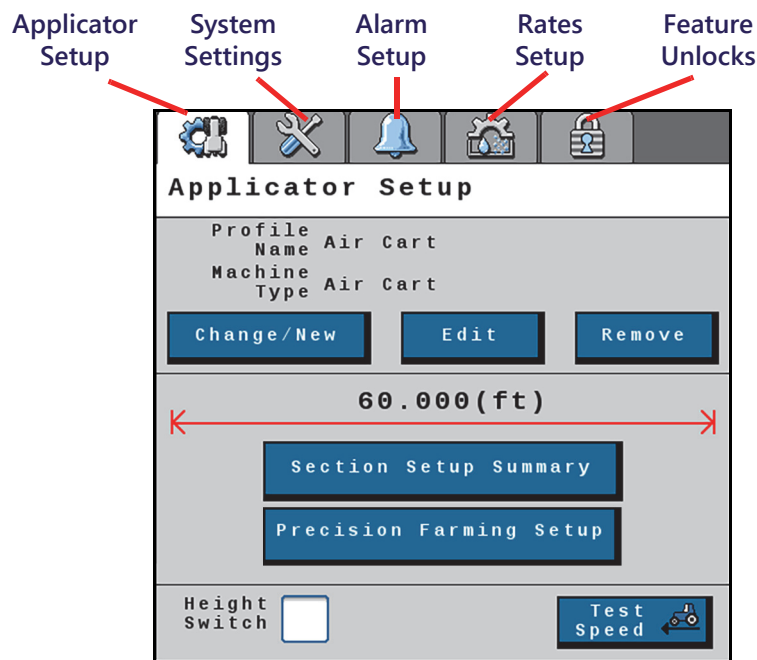
HOME

Select the Home button at any time to return to the main run screen.

TOOLS MENU

Select the Tools button to access settings and options for calibrating or tuning the application system.

FIGURE 40. Tools Menu Tabs



APPLICATOR SETUP TAB

The Applicator Setup Tab provides options to create a new, edit, or remove an applicator. This tab also provides a summary to the section configuration. For more information on the Precision Farming Setup button, refer to Chapter 10, *Precision Farming*.

SYSTEM SETTINGS

The system settings provides many buttons that allow the user to modify the current configuration. The table below describes each button in detail.

TABLE 3. System Settings

Button	Description
Control Valve Setup	The Control Valve button allows the user to adjust the following settings for each product: • Valve Response Rate • Control Deadband • Valve Delay • Valve Advance • Control Effort
Rate Sensor Setup	The Rate Sensor Setup button provides the options to adjust the following settings: • Flow meter Calibration • Flow meter Pulse/Units • Flow meter Low Limit • Tank Fill Flow meter Calibration • Tank Fill Flow meter Pulse/Units There is also the option to perform a catch test and applied product calibration.
Tank Fill Settings	This button allows the user to enter the Tank Capacity, Current Tank Level, and Low Tank Level.
Display Setup Menu	Use the Display Setup Menu to add buttons, remove buttons, or reorganize the main run screen.
Pressure Sensor Setup	This button allows the user to modify the alarm Min and Max for any products that have pressure alarms selected.
Auxiliary Functions	The Auxiliary Functions button allows the user to create new or modify existing auxiliary functions.
Scale Setup	Scale Setup allows the user to configure scale options.

ALARM SETTINGS

Select the Alarm Settings tab to modify or update alarm settings such as Off Rate Alarm and the Minimum Flow Rate. There is also an option to update the Pressure Alarm.

RATES SETUP

The Rates Setup tab allows the user to adjust the Preset Rate Values, Rate Bump, Rate Selection, and other values that were entered during the original configuration.

FEATURE UNLOCKS

If there a additional features available for the RCM, enter the provided Activation Key to access these features.

TOTALS

The totals button provides options to access a Current Totals, Device totals, and Distance totals tabs.

DIAGNOSTICS

Selecting the Diagnostics button open a window with tabs for the items listed below.

SYSTEM INFORMATION

Displays information about the RCM including the Hardware Serial Number, Hardware Revision, and Software Version Number.

TESTS

The Tests tab allows the user to select various tests from a drop down. These list of tests will vary by product configuration.

DIAGNOSTIC TROUBLE CODES

This tab lists Active and Inactive diagnostic trouble codes as well as the ability to Clear the active codes.

SYSTEM SUMMARY

Displays information configured during the setup process but does not provide the option to modify the configuration.

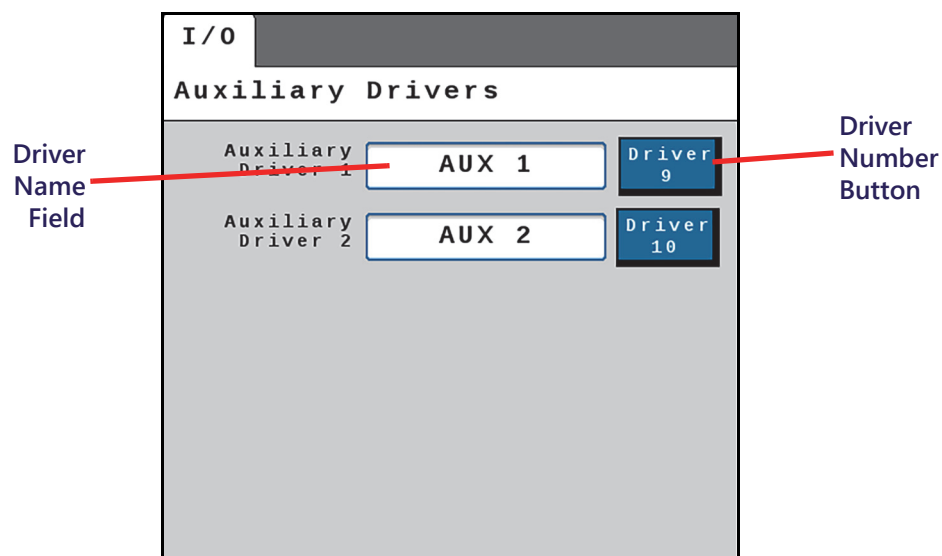
PRODUCT SUMMARY

The Product Summary provides a brief summary for all of the products such as Application Type, Control Valve type, Target Rate, and other settings. This tab does not allow the user to modify the configurations.

AUXILIARY DRIVERS

Auxiliary drivers that were created during configuration are listed in Auxiliary Drivers.

FIGURE 41. Auxiliary Drivers



To give the driver a custom name, select the Driver Name field and, using the keypad, enter the desired name. To activate the auxiliary driver, select the driver number button next to the desired driver.

CHAPTER

8

STAND ALONE SCALE OPERATION

SCALE MACHINE LIST

TABLE 1. RCM Machine List

Machine Type	Application Type	Application Mode	Application Mode Uses
• Scale	• NA	NA	NA

STAND ALONE SCALE OPERATION

1. Select Scale as the Machine Type.

FIGURE 1. Name Profile

Name Profile

Profile Name
*

Machine Type
*

Software Version Number

Hardware Serial Number

RAVEN 

2. Enter a Profile Name.
3. Select the Next button.
4. Select the check box(es) next to the desired Scale(s) you want to monitor.

FIGURE 2. Scale Setup

Scale Setup

Scale 1 ☒

Scale 2 ☒

Scale 3 ☒

Scale 4 ☐

Total Scale ☒

RAVEN

5. If desired, select the Total Scale check box to monitor the weight of all the selected scales combined.
6. Select the Next button.
7. Enter the Scale Total Calibration Number.

FIGURE 3. Scale Setup

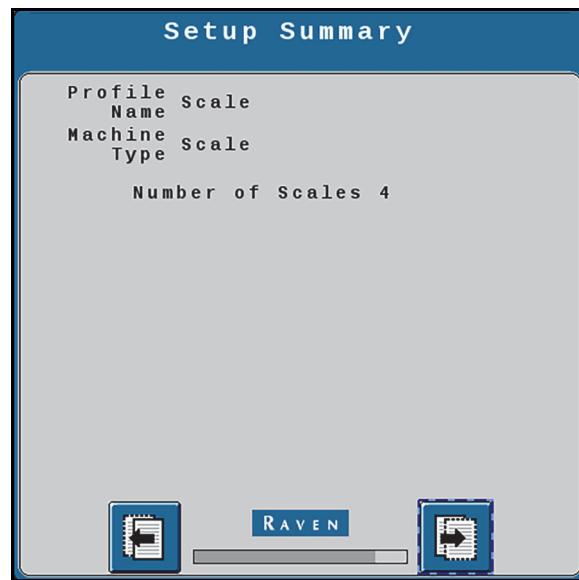
Scale Setup

Scale Total Calibration Number 45000

RAVEN

8. Select the Next button.
9. Review the scale configuration on the Setup Summary page.

FIGURE 4. Setup Summary

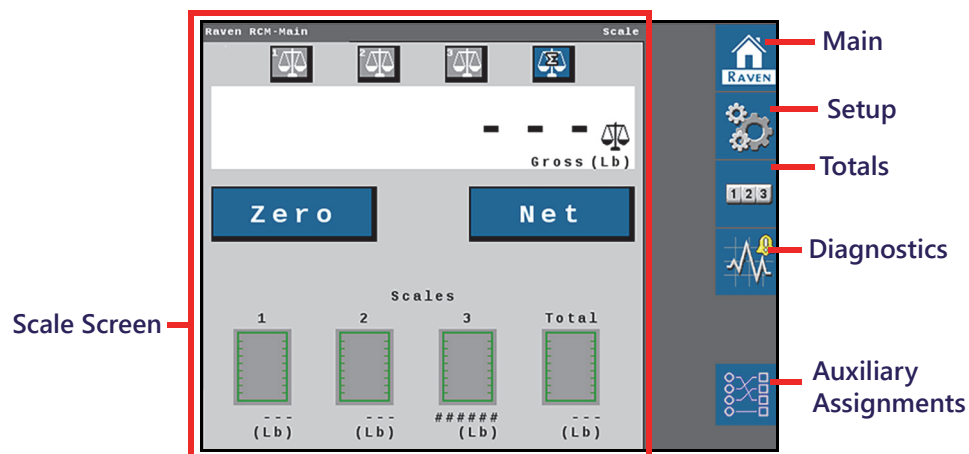


10. If any of the information is correct, select the Back button to adjust the configuration. If the configuration is correct, select the Next button.

SCALE RUN PAGE OVERVIEW

The image below is an example of a typical run screen.

FIGURE 5. RCM Main Screen



SCALE SCREEN

The scale screen displays graphic and numeric representations of the scales as well as options to zero a scale or view the current gross scale weight.

CURRENT PRODUCT RUN SCREEN

The current product run screen displays information for the selected product. Each product run screen will vary based on product configuration.

Data Fields display selected settings and can be changed to the operator's preferences.

FIGURE 6. Air Cart Run Screen

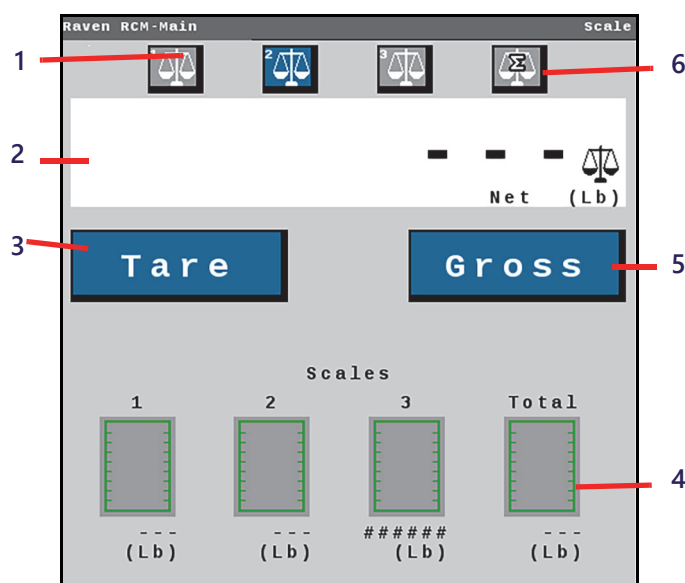
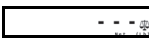


TABLE 2. Scale Run Screen Information

	Button	Description	Function/Operation
	1.	Scale Selection	Select these buttons along to the to switch between the different scales.
	2.	Weight	Displays the current weight on the selected scale.
	3.	Tare	Select the Tare button to zero out the selected scale. If the combined weight scale is selected this will display as Zero.
	4.	Scale Graphics	Shows a graphical representation of the weight of teach scale.
	5.	Gross	Displays the weight on the scale. If the combined weight scale is selected this will display as Net.
	6.	Combined Weight	Displays the combined weight of all the scales.

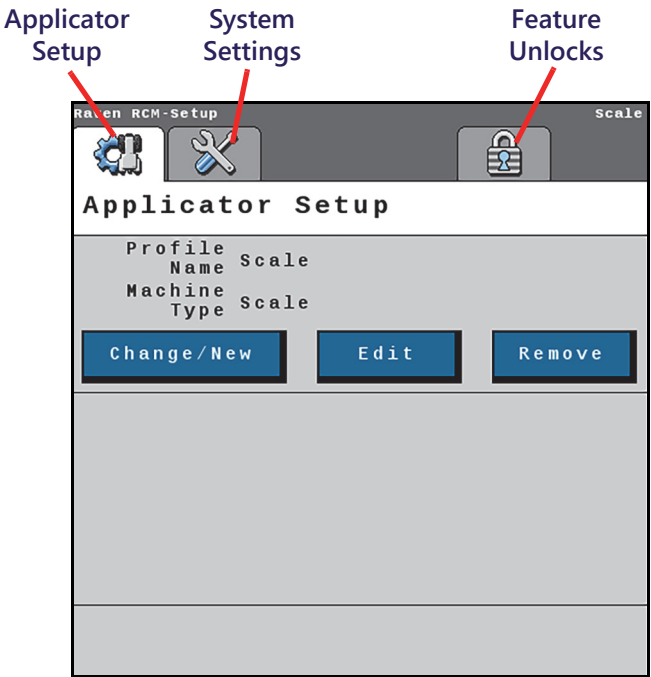
HOME

Select the Home button at any time to return to the main run screen.

TOOLS MENU

Select the Tools button to access settings and options for calibrating or tuning the application system.

FIGURE 7. Tools Menu Tabs



APPLICATOR SETUP TAB

The Applicator Setup Tab provides options to create a new, edit, or remove an applicator. This tab also provides a summary to the section configuration.

SYSTEM SETTINGS

The system settings provides many buttons that allow the user to modify the current configuration. The table below describes each button in detail.

TABLE 3. System Settings

Button	Description
Control Valve Setup	The Control Valve button allows the user to adjust the following settings for each product: • Valve Response Rate • Control Deadband • Valve Delay • Valve Advance • Control Effort
Rate Sensor Setup	The Rate Sensor Setup button provides the options to adjust the following settings: • Flow Meter Calibration • Flow Meter Pulse/Units • Flow Meter Low Limit • Tank Fill Flow Meter Calibration • Tank Fill Flow Meter Pulse/Units There is also the option to perform a catch test and applied product calibration.
Tank Fill Settings	This button allows the user to enter the Tank Capacity, Current Tank Level, and Low Tank Level.
Display Setup Menu	The Display Setup Menu allows the operator to configure the main run screen.
Pressure Sensor Setup	This button allows the user to modify the alarm Min and Max for any products that have pressure alarms selected.
Auxiliary Functions	The Auxiliary Functions button allows the user to create new or modify existing auxiliary functions.
Scale Setup	Scale Setup allows the user to configure scale options.

FEATURE UNLOCKS

If there a additional features available for the RCM, enter the provided Activation Key to access these features.

TOTALS

The totals button provides options to access a Current Totals, Device totals, and Distance totals tabs.

DIAGNOSTICS

Selecting the Diagnostics button open a window with tabs for the items listed below.

SYSTEM INFORMATION

Displays information about the RCM including the Hardware Serial Number, Hardware Revision, and Software Version Number.

TESTS

The Tests tab allows the user to select various tests from a drop down. These list of tests will vary by product configuration.

DIAGNOSTIC TROUBLE CODES

This tab lists Active and Inactive diagnostic trouble codes as well as the ability to Clear the active codes.

SYSTEM SUMMARY

Displays information configured during the setup process but does not provide the option to modify the configuration.

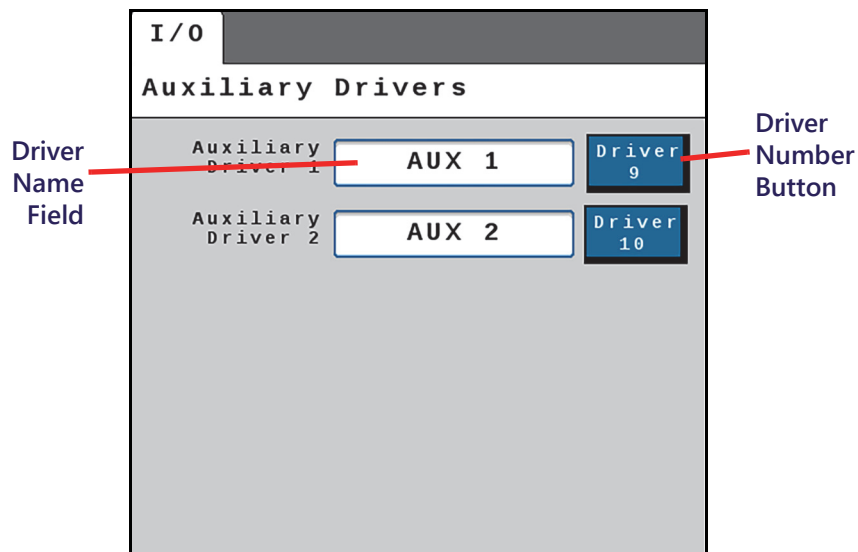
PRODUCT SUMMARY

The Product Summary provides a brief summary for all of the products such as Application Type, Control Valve type, Target Rate, and other settings. This tab does not allow the user to modify the configurations.

AUXILIARY ASSIGNMENTS

Auxiliary assignments that were created during configuration are listed in Auxiliary Assignments.

FIGURE 8. Auxiliary Assignments



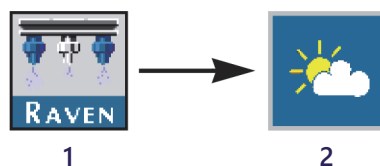
To give the driver a custom name, select the Driver Name field and, using the keypad, enter the desired name. To activate the auxiliary driver, select the driver number button next to the desired driver.

WEATHER STATION SETUP

To view weather station data:

1. Open the Universal Terminal (UT) Menu and select the Rate Control Module – Universal (RCM-U) working set icon (1).

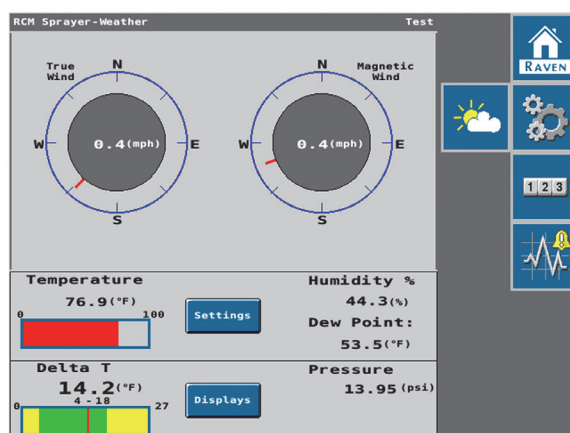
FIGURE 1. UT Navigation



2. Select the Weather Station softkey (2) along the right side of the display. The user defined weather information is displayed on the Weather Display Settings page.

NOTE: The weather station feature must be enabled during the initial RCM calibration to allow the weather station softkey to be displayed. Restart the initial RCM calibration wizard if a weather station is connected after the initial tuneset.

FIGURE 2. Weather Station Information Page

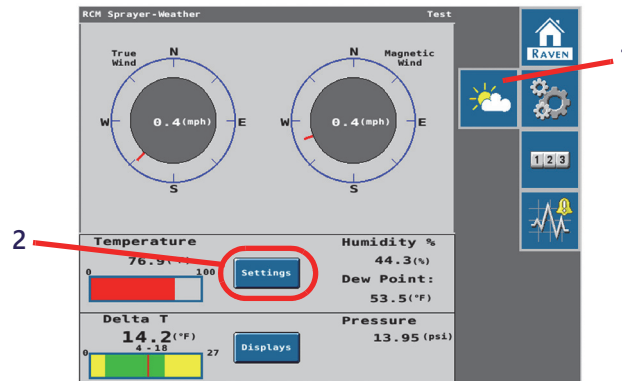


WEATHER STATION SETTINGS

To configure available settings for the weather station:

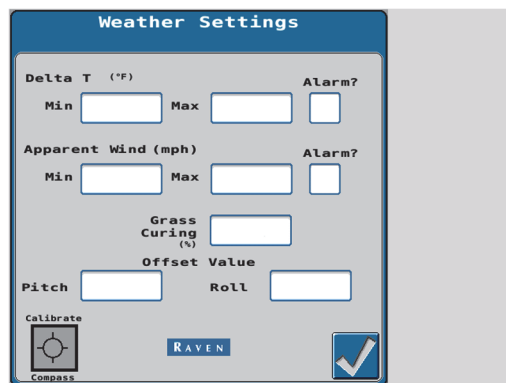
1. Select the Weather Station softkey (1) along the right side of the RCM page display.

FIGURE 3. Weather Station Information Page



2. Select the Settings (2) button on the Weather page to access the Weather Settings page.

FIGURE 4. Weather Settings Page



- Delta T (temperature) – Enter the minimum and maximum temperatures (in the displayed units) into the respective fields. These values set the temperature thresholds for the weather station alerts or alarms.
- Temperature Alarm – Enable the Alarm option to sound an audible alarm if the ambient temperature measured by the weather station exceeds the limits defined by the Delta T values.
- Apparent Wind – Enter the minimum and maximum wind speeds (in the displayed units) into the respective fields. These values set the wind speed thresholds for the weather station alerts or alarms.
- Wind Speed Alarm – Enable the Alarm option to sound an audible alarm if the wind speed measured by the weather station exceeds the limits defined by the Delta T values.
- Grass Curing % – The grass curing percentage is used to calculate the fire index if this value is displayed on the weather station page.

NOTE: The grass curing percent is not required unless the fire index display is used during field operations. For best results, adjust the curing percent as conditions change or at least a few times per season. For assistance with estimating the grass curing percent, please find a grass curing guide provided by a governing body for your location.

OFFSET VALUES

Use the following offset values to calibrate the weather station for an uneven mounting surface.

- Pitch - Use the pitch offset value to adjust the fore or aft tilt of the weather station on the mounting surface in degrees.
- Roll - Use the roll offset value to adjust for any left or right tilt of the weather station on the mounting surface in degrees.
- Calibrate Compass – Select the calibrate icon and follow the on-screen instructions to calibrate the weather station compass.

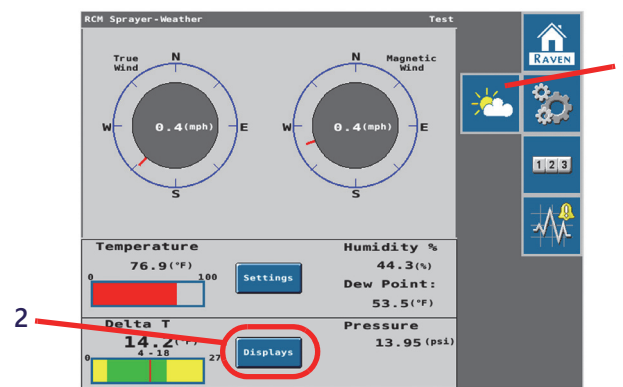
NOTE: The compass calibration requires a large area to turn the machine in a complete circle. Review the on-screen instructions before starting the compass calibration.

WEATHER STATION DISPLAYS

To configure weather settings and options:

1. Select the Weather Station softkey (1) along the right side of the RCM page display.

FIGURE 5. Weather Station Information Page



2. Select the Displays (2) button on the Weather page to access the Weather Display Settings page.

Left and Right Wind Select Options – Use the drop-down option list to select the following options for the upper left or right weather station wind information displays:

FIGURE 6. Weather Display Settings Page

- True wind
- Apparent wind
- Magnetic wind

Lower Screen View Options – Use the drop-down option list to select the following options for the displays in the bottom area of the screen.

- Temperature
- Humidity/Dew Point
- Delta T
- Pressure
- Fire Index

NOTE: A grass curing percent calibration is required to calculate the fire index value. Refer to the Weather station settings section above.

- Latitude/Longitude
- Pitch/Roll
- No Display

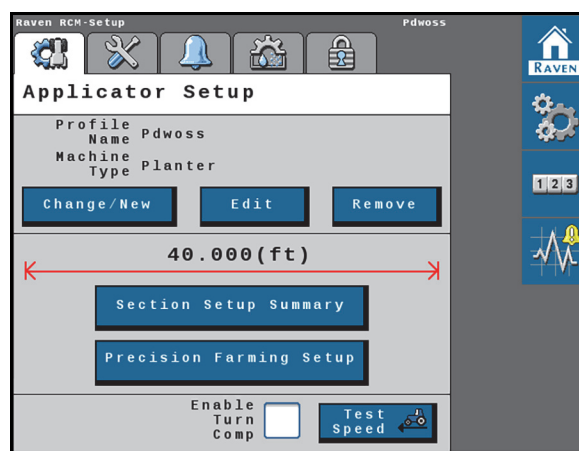
Precision farming allows the user to modify configurations that may not be available through the field computer.

IMPORTANT: Depending upon the field computer, these settings may or may not be implemented.

To adjust precision farming settings after performing a machine configuration:

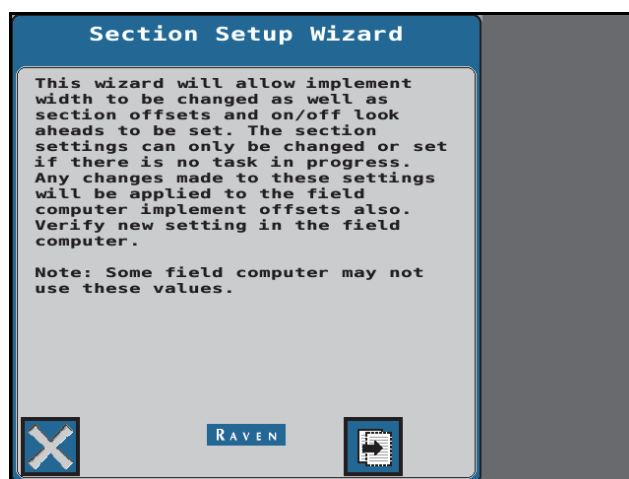
1. Select the Tools Menu button.

FIGURE 1. RCM Settings

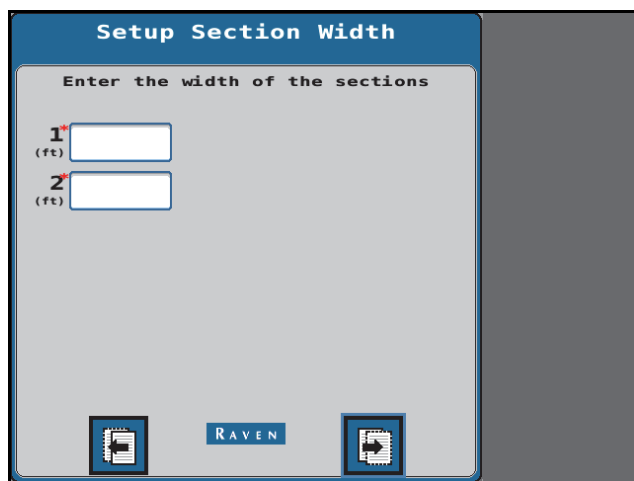


2. Select Precision Farming Setup button.
3. Review the information on the Section Setup Wizard screen then select Next.

FIGURE 2. Section Setup Wizard Page



4. Select the Next button.
5. Use the Setup Section Width page to confirm and adjust the configured widths as necessary.

FIGURE 3. Setup Section Width Page

Setup Section Width

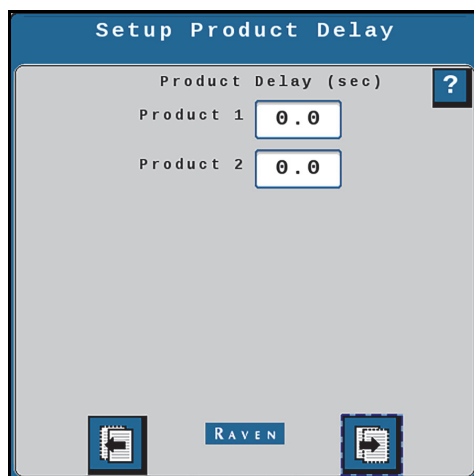
Enter the width of the sections

1 (ft)

2 (ft)

Navigation buttons: Left arrow, RAVEN, Right arrow

6. When the section widths are set up correctly, select the Next button.
7. Enter a Product Delay value for every product. Product Delay is the amount of time the product needs to adjust when changing rate zones when applying based upon a prescription map.

FIGURE 4. Setup Product Delay Page

Setup Product Delay

Product Delay (sec) ?

Product 1

Product 2

Navigation buttons: Left arrow, RAVEN, Right arrow

8. Select the Next button.
9. The Section Offsets page is displayed with various implement geometry settings.
10. Select Rear Implement if it is a rear mounted implement.

FIGURE 5. Section Offsets Page

Section Offsets

Section Group 1 ?

Rear Implement ☒

Left of Center ☐

Individual Sections Fore/Aft Offsets ☐

Left/Right Offset (in) A

Distance from pivot point to application point (in) B

Distance from connection pt to implement pivot point (in) C

RAVEN

Section Offsets

Section Group 1 ?

Rear Implement ☐

Left of Center ☐

Individual Sections Fore/Aft Offsets ☐

Left/Right Offset (in) A

Distance from pivot point to application point (in) B

Distance from connection pt to implement pivot point (in) C

RAVEN

NOTE: The example image may appear different based upon the machine type selected. Use the help icon in the upper, right corner for assistance with any of the equipment dimensions and measurements.

11. Select Left of Center of the implement is mounted left of center.
12. Select Individual Sections Fore/Aft Offsets if different sections for the same product have different fore and aft locations.
13. Enter the value for the Left/Right Offset.
14. Enter the Distance from Pivot Point to Application Point value.

NOTE: The pivot point is the point where the implement turns. Typically this is the wheels.

15. Enter the Distance from Connection point to Implement Pivot Point value.
16. Select the Next button.
17. If applicable, check Individual Section On/Off Times if different sections will need different look ahead times. For example, the center sections of an air cart will need shorter look ahead times than the outer sections.

NOTE: Not all field computers support Individual Section On/Off Times.

FIGURE 6. Section Turn On/Off Times Page

Section Turn On/Off Times

Section Group 1

ON OFF

Section Group On/Off Times (sec) 1.0 2.0

Individual Section On/Off Times

RAVEN

18. Select the Next button.

19. If Individual Section On/Off Times was selected, configure the Section Turn On/Off Times for the Section Group. If not, skip to step 20.

FIGURE 7. Section Turn On/Off Times Page

Section Turn On/Off Times

Section Group 1

ON OFF

1 (sec)	2.0	3.0
2 (sec)	1.0	2.0
3 (sec)	1.0	2.0
4 (sec)	2.0	3.0

RAVEN

20. Select the Next button.

21. If applicable, enter the offset values for individual sections. If the section is located in front of the implement pivot point, enter it as a negative value.

FIGURE 8. Individual Fore/Aft Offsets Page

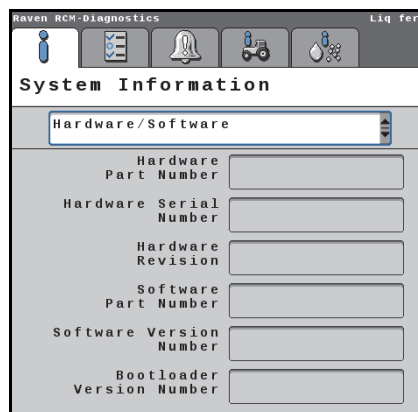
The screenshot displays the 'Individual Fore/Aft Offsets' configuration screen for 'Section Group 2'. The title bar is blue with white text. Below the title, the text 'Section Group 2' is centered, and a blue square with a white question mark is in the top right corner. The main area is light gray and contains four offset settings, each with a red asterisk and '(in)' label: offset 7 is 0, offset 8 is 0, offset 5 is 0, and offset 6 is 0. At the bottom, there are two square navigation buttons with arrows (left and right) and a blue 'RAVEN' logo in the center.

22. Select the Next button.
23. Repeat step 9 through step 22 for all section groups.
24. After configuration is complete, select the Next button and the Application Setup screen will display again.

ACCESSING SYSTEM INFORMATION

1. Select the Diagnostics button.
2. Select the System Information tab.

FIGURE 1. System Information Tab



3. Select the desired page from the drop-down.

TABLE 1. Information Options

Option	Description
Hardware/Software	Displays the manufacturer's information for the Raven Rate Control Module hardware and software.
Switchbox	Displays if an external switch box is present and the status of the switches.
Delivery System	Shows application information for the selected product.
Section Status	Shows if each section valve is currently open or closed.
System Voltages	Shows voltage and current information for the Raven Rate Control Module.
Working Parameters	Displays the implement width, current speed, and speed source.
Switches/Status	Displays the status of the Master switch.
Pressure Sensors	Displays voltage and pressure information for each pressure sensor.
Bin Level Sensors	Displays whether each bin level sensor is covered or uncovered.
RPM Sensors	Shows the signal detected by each RPM sensor.
Tank Fill Monitor	Displays the fill rate and volume detected by the tank fill monitor.
Task Totals	Shows the area covered and volume applied for the current task.
Turn Compensation	Displays inertial sensor information.

Option	Description
Speed Source	Displays available and active speed source
Funnel Actuator Positions	Displays target and actual positions.
ISOBUS Short Cut Button	Displays the ISB status.

GENERAL TROUBLESHOOTING

TABLE 2. General Troubleshooting

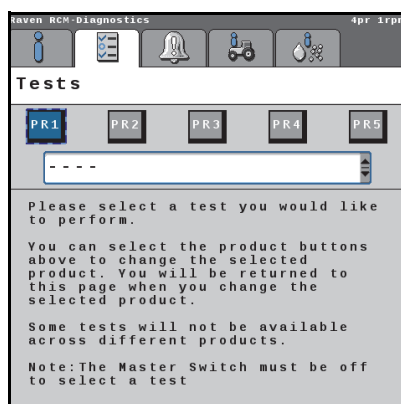
Symptom	Problem	Solution
Unexpected application rate.	Incorrect rate type selected (gal/min or gal/acre).	Select the correct rate type.
Product does not shut off.	Valve does not respond to commands.	Select the correct valve type.
2-Wire valve selection is not available.	Dual boom is selected.	Disable dual boom.
	More than seven sections are selected.	Assign fewer than eight sections.
Implement section is not turning on or off.	Incorrect section valve type selected.	Select correct section valve type.
Application is erratic.	Calibration number is not set correctly.	Enter the correct calibration number.
Trouble code is displayed for high pressure.	System pressure is too high.	Select flow return in the system setup.
Trouble code is displayed for unexpected flow.	Constant flow is disabled when using a constant flow system with boom valve closed.	Select constant flow in system setup.
Flow is not applying at desired rate.	Incorrect application rate.	Ensure 10 gal/10L unit is used.
	Minimum Flow rate feature causes over-application in areas where machine speed is low enough to activate Minimum Flow Rate.	Set minimum flow rate to zero to disable feature.
System detects implement is down for an extensive period of time.	Height switch is disabled.	If height switch indicator does not match machine operation, service height switch.
Unexpected chemical flow detected.	RCM attempts to close section valves, but detects flow on a sprayer or liquid fertilizer system.	Shut off solution pump.
Unable to setup minimum and maximum alarms.	Minimum and maximum alarms are disabled.	Ensure pressure sensor is installed and configured.
Unable to set values.	System not allowing changes values or settings.	Ensure Master Switch is off.

Symptom	Problem	Solution
Unexpected anhydrous ammonia flow detected.	RCM attempts to close On/Off valve, but still detects flow.	Select button to turn off control valve.
	RCM attempts to close all valves, but still detects flow.	Follow instructions on Warning page on display.
Pressure sensors are not configured.	Pressure sensor 2 is not an option.	Ensure both sensors are configured.
Not able to activate system.	Master Switch indicator is orange.	Cycle master switch.
Unwanted minimum flow rate activation.	Over application in low speed areas.	Set minimum flow rate to zero to disable function.

TESTS

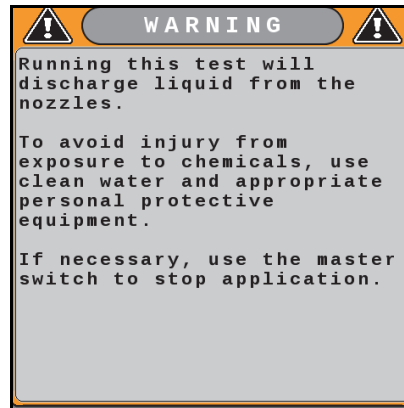
1. Navigate to the Raven Rate Control Module.
2. Select Diagnostics button.
3. Select the Tests tab.

FIGURE 2. Tests Tab



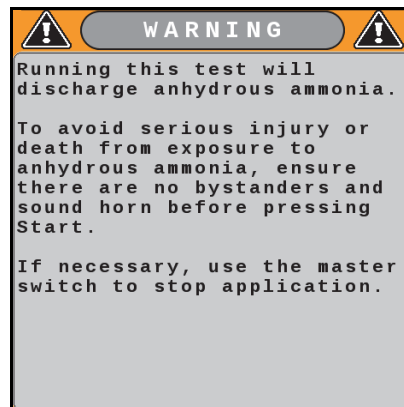
4. Select the test from the drop-down menu.
 - a. Liquid Diagnostics Test Warning displays after selecting any of the following liquid application:
 - Nozzle Flow Check
 - Rinse Cycle
 - Control/Section Test
 - Control Valve Test
 - Calibrate PWM Limits

FIGURE 3. Liquid Discharge Warning Prompt



- b. NH_3 Diagnostics Test Warning displays after selecting any of the following for NH_3 applications:
- Energize System
 - Bleed System Test

FIGURE 4. Anhydrous Ammonia Discharge Warning Prompt



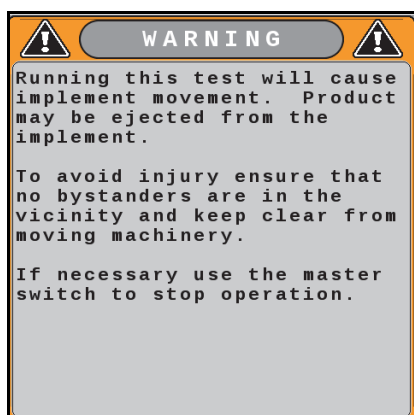
NOTE: The bleed system test will not evacuate all of the NH_3 entirely. Perform the manual bleed procedure for the system to ensure NH_3 is completely evacuated.

- c. Dry Diagnostic Test Warning displays after selecting any of the following for dry applications:
- Granular Flow Check

NOTE: If spinners of running then conveyor speed has to be limited and back covers must be removed.

- Spreader/Air Cart Check
- Control/Section Test
- Calibrate PWM Limit
- Bin/Tank Clean Out
- Actuator

FIGURE 5. Implement Movement and Product Discharge Prompt



5. Read the Discharge Warning and select Accept.

NOZZLE FLOW CHECK TEST

IMPORTANT: Always fill solution tank with clean water to perform nozzle flow check.

NOTE: Enter conditions that are comparable to normal operation. Larger dispensed volumes result in longer but more accurate calibration tests.

Perform Nozzle Flow Check to test an application rate at a desired speed without the machine moving. The following items can be determined:

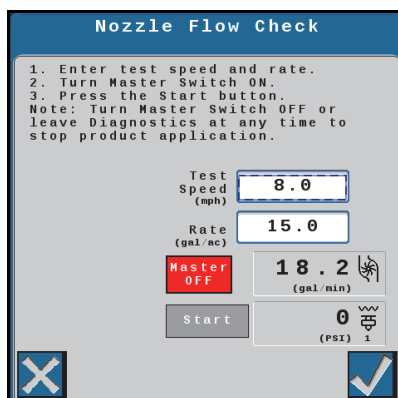
- If actual application rate meets the target application rate at a given speed.
- The actual flow rate of an implement section.
- Whether the nozzles are worn.
- Spray control valve pressure at a desired speed and application rate.

NOTE: Turn the master switch off or leave Diagnostics at any time to cancel the test.

Speed and rate can be changed while the test is running.

1. Enter a Test Speed and Rate.

FIGURE 6. Nozzle Flow Check Page



2. Turn the master switch on.
3. Select Start.

If the volume is higher than expected and pressure is lower than expected, nozzle tips could be worn.

If pressure is higher than expected for the given output, nozzle tips could be partially plugged. Pressure drops can occur between section shutoff valves and nozzle tips. This is normally only associated with high flow rates.

RINSE CYCLE TEST

IMPORTANT: Always fill the solution tank with clean water to perform the rinse cycle.

Rinse Cycle test fully opens all sections, fence row valves, and flow control valve until the flow meter detects reduced flow.

NOTE: Turn the master switch off or leave Diagnostics at any time to cancel the test.

FIGURE 7. Rinse Cycle Test Page



1. Turn the master switch on.
2. Select Start.

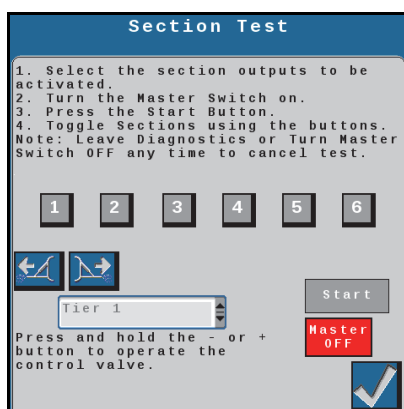
CONTROL/SECTION TEST

Selected sections open while the test is in progress. Unselected sections remain closed.

NOTE: Turn the master switch off or leave Diagnostics at any time to cancel the test.

1. Enable the desired sections.
2. Turn the master switch on.

FIGURE 8. Section Test Page



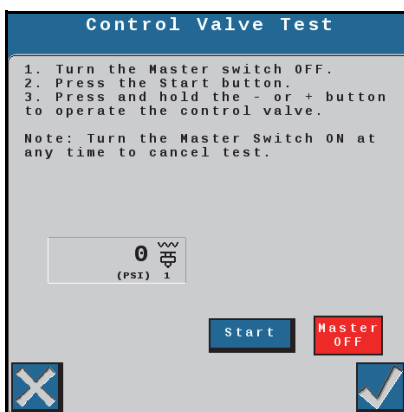
3. Select Start.
4. Toggle section on or off using the buttons.
5. Press and hold - or + to operate the control valve.

CONTROL VALVE TEST

This test operates control valve without dispensing product.

NOTE: Turn the master switch on or leave the Diagnostics at any time to leave the test.

FIGURE 9. Control Valve Test Page



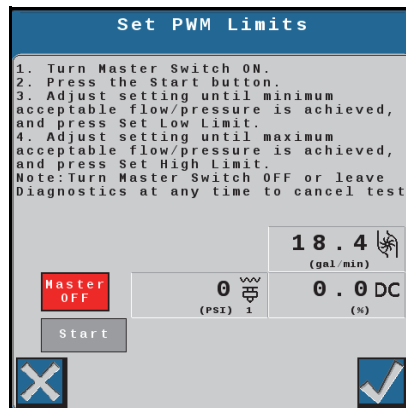
1. Select Start.
2. Press and hold - or + to operate the control valve.

CALIBRATE PWM LIMITS TEST

NOTE: Turn master switch off or leave Diagnostics at any time to cancel the test.

1. Turn the master switch on.

FIGURE 10. Set PWM Limits Test Page



2. Select the Start button.
3. Press and hold - or + buttons until the minimum acceptable flow/pressure is achieved.
4. Select Set Low Limit.
5. Press and hold the - or + buttons until the maximum acceptable flow/pressure is achieved.
6. Select Set High Limit.

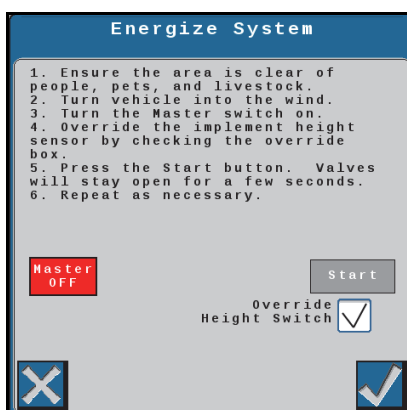
ENERGIZE SYSTEM TEST

NOTE: Turn the master switch off or leave diagnostics page to immediately force the valves to return to the closed position and stop flow.

Use the Energize System procedure to test for flow at openers, purge air and vapor from the NH₃ delivery system, and fill cooler and hoses with liquid anhydrous. Select Start to fully open the control valve and section valves for a few seconds and then automatically close the valves.

1. Ensure the area is clear of people, pets, and livestock.
2. Position the machine into the wind.
3. Turn the master switch on.

FIGURE 11. Energize System Test



4. Select the Override Height Switch checkbox.
5. Select Start. The valves will stay open for a few seconds.
6. Repeat the procedure if needed.

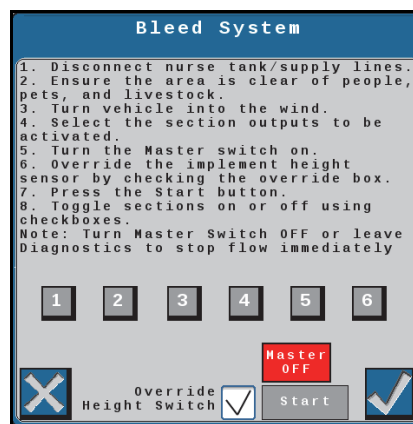
BLEED SYSTEM TEST

NOTE: Turn the master switch off or leave diagnostics page to immediately force the valves to return to the closed position and stop flow.

The Bleed System Test allows the operator to bleed trapped anhydrous ammonia from high-pressure lines between section valves and control valves while remaining seated in the cab.

1. Bleed and disconnect the nurse tank and supply lines.
2. Ensure that the area is clear of people, pets, and livestock.
3. Position the machine into the wind.
4. Enable the desired sections.

FIGURE 12. Bleed System Test Page



5. Select the Override Height Switch checkbox.
6. Select Start.
7. Toggle the sections as needed.

NOTE: Turn the master switch on or leave the Diagnostics at any time to leave the test.

SPREADER/AIR CART CHECK

NOTE: Turn the master switch off or leave Diagnostics at any time to cancel test.

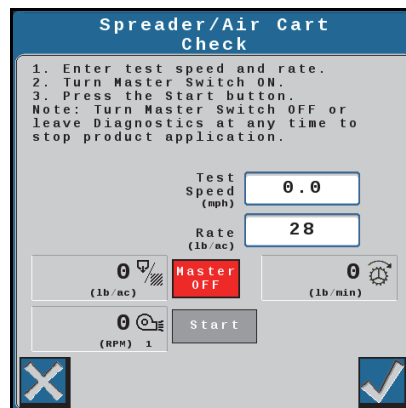
1. If the system is configured with an RPM assignment, the RPM assignment will be disabled for this test. If desired, select the Enable RPM Products check box.

FIGURE 13. Spreader/Air Cart Check Enable RPM Page



2. Enter the Test Speed and Rate.

FIGURE 14. Spreader/Air Cart Check Page



3. Turn the master switch on.
4. Select Start.

BIN/TANK CLEAN OUT

NOTE: Turn the master switch off or leave Diagnostics at any time to cancel the test.

1. Select Product bins or tanks to be cleaned out.

FIGURE 15. Bin/Tank Clean Out Page

Bin/Tank Clean Out

1. Select bins/tanks to be cleaned out.
2. Turn Master Switch ON.
3. Press Start button.
4. Toggle tanks on or off using the checkboxes.
Note: Turn Master Switch OFF at any time to cancel

Product 1 ☐ Product 2 ☐
Product 3 ☐ Product 4 ☐

Start Master OFF

2. Turn the master switch on.
3. Select Start.

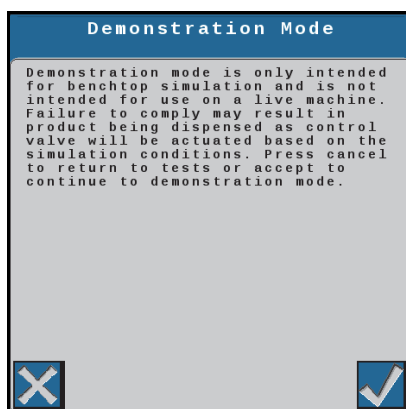
NOTE: Conveyor speed must be limited and back covers removed.

DEMONSTRATION MODE

Demonstration Mode provides a bench top simulation only. It is not intended for use on actual equipment.

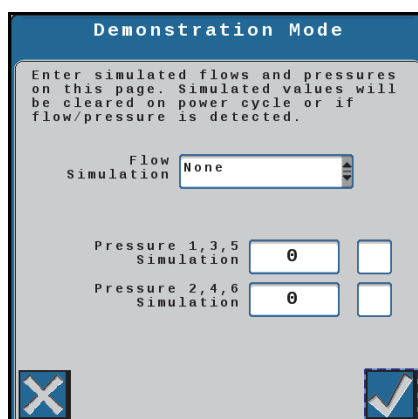
1. Select Demonstration Mode from the Tests tab. A warning prompt will appear.
2. Read the warning and either select Cancel or Accept.

FIGURE 16. Demonstration Mode Prompt



3. After the Demonstration Mode screen opens, select the Flow Simulation type.
 - None: No flow will be simulated.
 - Fixed Freq: If Fixed Frequency is selected a Fixed Flow box will appear. Enter the desired flow value in the box.
 - Rate Tracking: The system will adjust flow so it matches the flow required to achieve the target application rate entered on the main screen.

FIGURE 17. Demo Mode Settings Page



4. Enter a simulated pressure value for pressure sensors 1, 3, and 5. Enable the checkbox.
5. Enter a simulated pressure value for pressure sensors 2, 4 and 6. Enable the checkbox.

DIAGNOSTIC LOOP BACK TEST

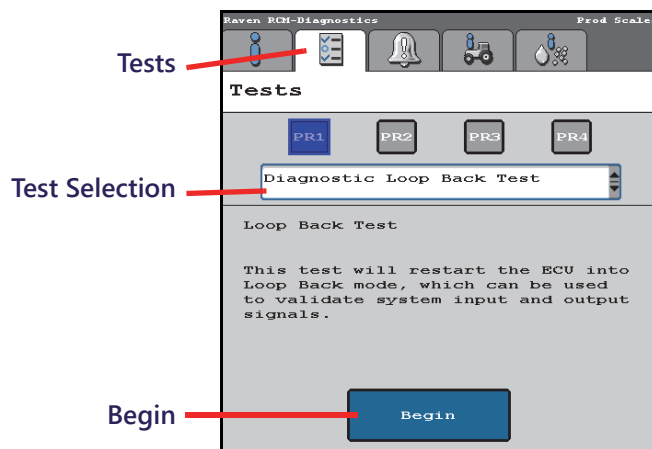
Loop back tests provide a way to self-test the Raven Rate Control Module. There are two loop back tests available.

- ECU Test: The ECU Test performs a test of the Raven Rate Control Module.
- 47 Pin: The 47 Pin test performs a test of the Raven Rate Control Module and the cabling and pins of the product cable. This test requires a 47 pin loop back tester.

To perform a Diagnostic Loop back Test:

1. Ensure the Master Switch is off and the 47-pin plug of the product cable is disconnected.
2. Select the Tests tab.

FIGURE 18. Tests Tab Page



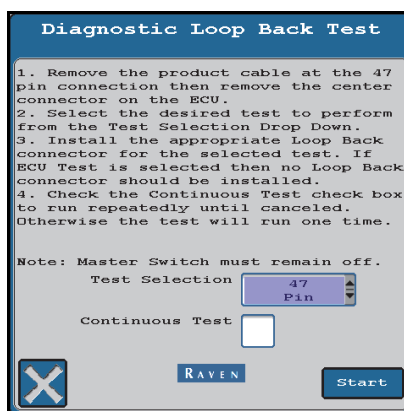
3. Select Diagnostics Loop Back Test from the test selection drop down.
4. Select Begin. A Warning window will open checking if the product cable is disconnected.

FIGURE 19. Loop Back Test Warning Prompt



5. Select the Accept button to continue or Cancel to exit the test. After selecting Accept, the Diagnostic Loop Back Test window will open.

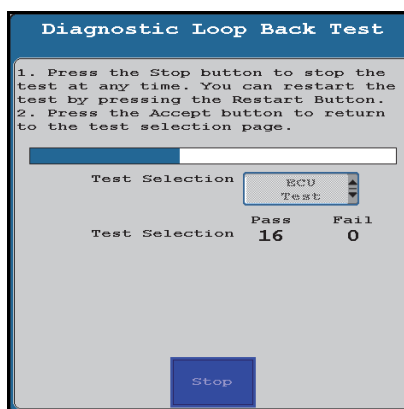
FIGURE 20. Diagnostic Loop Back Test Start Page



6. Review the information on the Diagnostic Loop Back Test.
7. Select the desired test (47 Pin or ECU Test) from the Test Selection drop down.
8. If desired, select the checkbox by Continuous Test. This checkbox will make the test run repeatedly until the operator selects the Stop button.
9. After the desired test is set, select the Start button. The Diagnostic Loop Back Test progress window will open. This window shows the test status and the number of tests that Pass or Fail. If the Continuous Test checkbox was not selected the test will run one time. If the Continuous Test checkbox was selected, the test will repeat until the operator selects the Stop button.

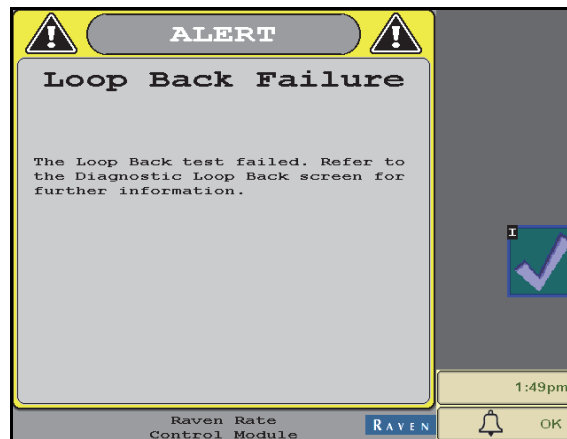
NOTE: The Start button will be grayed out if the product cable is connected or the master switch is on. Fix the issue to start the test.

FIGURE 21. Diagnostic Loop Back Test Progress Page



10. If a failure is detected a Loop Back Failure Alert window will open. After reviewing the information of the Alert, select Accept.

FIGURE 22. Loop Back Failure Prompt



11. After the loop back test is complete, select the Accept button to return to the test selection window. To exit the loop back test, select the cancel button.

FIGURE 23. Test Canceled Prompt



12. Select the Accept button to exit the test or Cancel to return to the test.
13. Select the desired object pool.

DIAGNOSTIC LEDS

There are four LEDs on the front of the ECU, labeled with the power symbol, A, B, and C. Each LED's color and blink rate indicates different information as detailed in the table below. If multiple states are true for a given LED the first active state listed in the table will be the state displayed. After addressing the displayed state (if needed), the next LED state will be indicated.

FIGURE 24. Raven Rate Control Module LEDs



TABLE 3. Diagnostic Light Emitting Diode (LED) Status

LED	Main App Controlled	Color	Blinks Per Second	Status Name	Description
Power	No	GREEN	Solid	ECU powered	Active when ECU has power

LED	Main App Controlled	Color	Blinks Per Second	Status Name	Description
A	No	OFF	Solid	Microprocessor Off	Active when the microprocessor is not powered
	No	ANY	Solid	System Fault	Active when the microprocessor has stopped functioning
	No	YELLOW	1	Boot Hold Mode	Active when the boot loader enters boot hold mode
	No	RED	5	Programming Microprocessor	Active when the microprocessor is being programmed
	Yes	RED	1	ISOBUS Offline	Active if the ISOBUS is offline
	Yes	WHITE	1	UT Offline	Active if the UT is offline
	Yes	PURPLE	1	Loop back Test Mode	Loop back test mode enabled
	Yes	GREEN	1	Systems Normal	Active when linked with UT and system is normal
B	No	RED	Solid	FPGA not running	PCB subsystem not running (FPGA)
	Yes	RED	1	ECU Power Loss	System has lost ECU power
	Yes	BLUE	1	Rate Sensor Signal Present	Signal is present on 1 or more rate sensors
	Yes	YELLOW	1	DTC Active	One or more DTCs are active
	Yes	WHITE	1	System Under Voltage	System voltage is below 11.5 volts
	Yes	PURPLE	1	System Over Voltage	System voltage is above 16 volts
	Yes	BLUE	Solid	Product Enabled	One or more product switches have been set to On
	Yes	PURPLE	Solid	RPM Signal Present	Signal is present on one or more RPM sensors
B (cont.)	Yes	GREEN	Solid	All Products Disabled	All product switches have been set to Off
	Yes	RED	Solid	Current loopback test sequence failure	One or more loop back subtests failed in this current test sequence
	Yes	YELLOW	Solid	Previous loop back test sequence failure	One or more loop back subtests failed in the previous test sequence
	Yes	GREEN	Solid	No loop back subtests have failed	No loop back subtests have failed

LED	Main App Controlled	Color	Blinks Per Second	Status Name	Description
C	No	RED	Solid	FPGA not running	PCB subsystem not running (FPGA)
	Yes	BLUE	1	Bluetooth Command	Bluetooth command has been received
	Yes	BLUE	Solid	Bluetooth Comm Active	Bluetooth communication is active
	Yes	GREEN	1	Aux CAN Active	The Auxiliary CAN channel is active
	Yes	RED	1	Aux CAN Comm Lost	Active if the Auxiliary CAN channel was active and is now offline
	Yes	GREEN	Solid	LED C Functional - No Error	LED C is functional and there are no other LED C states to report
	Yes	PURPLE	Solid	Loop back test in progress	A loop back test is in progress
	Yes	GREEN	Solid	Loop back test not in progress	A loop back test is not in progress

OUTPUTS TABLES

NOTE: Enabling optional features, such as fence row nozzles and agitators reduces the number of section controls.

TABLE 4. Single Product Outputs

Output Number	3-Wire Section Valves	2-Wire Section Valves	NH ₃ Tool	Tiered Boom Applications
1.	Section 1	Section 1 (+)	Section 1	Section 1
2.	Section 2	Section 1 (+)	Section 2	Section 2
3.	Section 3	Section 2(+)	Section 3	Section 3
4.	Section 4	Section 2 (-)	Section 4	Section 4
5.	Section 5	Section 3 (+)	Section 5	Section 5
6.	Section 6	Section 3 (-)	Section 6	Section 6
7.	Section 7	Section 4 (+)	Section 7	Section 7
8.	Section 8	Section 4 (-)	Section 8	Section 8
9.	Section 9	Section 5 (+) or agitator valve (+)	Boom pump (+)	Section 9
10.	Section 10	Section 5 (-) or agitator valve (-)	Boost pump (-)	Section 10
11.	Section 15 or agitator valve	Section 6 (+) or left fence row		Section 15 or agitator valve
12.	Section 16 or flow return (+)	Section 6 (-) or right fence row		Section 16 or flow return (+)
13.	Flow return (-) or left fence row	Section 7 (+) or flow return valve (-)	Master on-off valve	Section 17, tier 1 solenoid signal, flow return (-), or right fence row
14.	Right fence row	Section 7 (-) or flow return valve (+)		Section 18, tier 2 solenoid signal, or left fence row
15.	Control valve (+)	Control valve (+)	Control valve (+)	Control valve (+)
16.	Control valve (-)	Control valve (-)	Control valve (-)	Control valve (-)
17.	Section 11			Section 11
18.	Section 12			Section 12
19.	Section 13			Section 13
20.	Section 14			Section 14
21.				
22.				
23.				Section 19
24.			Fast control valve power	Section 20
25.	Flow return (+)	Section 8 (+) or agitator valve B (+)		Flow return (+)
26.	Flow return (-)	Section 8 (-) or agitator valve b (-)		Flow return (-)

Output Number	3-Wire Section Valves	2-Wire Section Valves	NH ₃ Tool	Tiered Boom Applications
27.			Section 9	
28.	Agitator valve		Section 10	Agitator valve
29.	Right fence row	Right fence row		Right fence row
30.	Left fence row	Left fence row		Left fence row
31.				
32.				

TABLE 5. Multiple Product Outputs

Output Number	NH ₃ Tool	Spreader	Air Cart
1.	Section 1	Section 1	Section 1
2.	Section 2	Section 2	Section 2
3.	Section 3	Section 3	Section 3
4.	Section 4	Section 4	Section 4 or input 22
5.	Section 5	Product 5 control valve (+) or spinner PWM (+)	Product 5 control valve (+), section 5 (primary), or master clutch (secondary)
6.	Section 6	Product 5 control valve (-) or spinner PWM (-)	Product 5 control valve (-) or section 6 (primary)
7.	Section 7		Input 21 or section 7 (primary)
8.	Section 8		Master clutch (primary), section 8 (primary), or impute 10
9.	Boost pump (+)	Product 4 control valve (+)	Product 4 control valve (+) or section 9 (primary)
10.	Boost pump (-)	Product 4 control valve (-)	Product 4 control valve (-) or section 10 (primary)
11.	Product 2 control valve (+)	Product 3 control valve (+)	Product 3 control valve (+) or section 15 (primary)
12.	Product 2 control valve (-)	Product 3 control valve (-)	Product 3 control valve (-) or section 16 (primary)
13.	Master on-off valve	Product 2 control valve (+)	Product 2 control valve (+)
14.		Product 2 control valve (-)	Product 2 control valve (-)
15.	NH ₃ control valve (+)	Product 1 control valve (+)	Product 1 control valve (+)
16.	NH ₃ control valve (-)	Product 1 control valve (-)	Product 1 control valve (-)
17.			Section 11
18.			Section 12
19.			Section 13
20.			Section 14
21.			

Output Number	NH ₃ Tool	Spreader	Air Cart
22.			
23.			
24.	Fast control valve power		
25.	Product 3 control valve (+)	Section 11	Next available section +6
26.	Product 3 control valve (-)	Section 12	Next available section +7
27.	Section 9	Section 5	Next available section
28.	Section 10	Section 6	Next available section +1
29.	Section 11	Section 7	Next available section +2
30.	Section 12	Section 8	Next available section +3
31.	Section 13	Section 9	Next available section +4
32.	Section 14	Section 10	Next available section +5

INPUTS TABLES

NOTE: Enabling optional features, such as fence rows nozzles and agitators, reduces number of section controls.

TABLE 6. Single Product Inputs

Input Number	Sprayer and Liquid Fertilizer Tool	NH ₃ Tool
1.	Flow meter signal	Flow meter signal
2.	Fill flow meter signal	Master valve status
3.		
4.		
5.		
6.		Valve status 4
7.		Valve status 5
8.		Valve status 3
9.		Valve power 1 sense
10.		
11.		Valve power 2 sense
12.		
13.		Valve status 1
14.	Pressure signal 1 (boom pressure)	Pressure signal 1 (NH ₃ outlet)
15.		Valve status 2
16.	Pressure signal 2 (sparge pressure)	Pressure signal 2 (NH ₃ inlet)
17.		
18.		Pressure signal 3
19.		Valve status 7
20.		Valve status 8
21.		
22.		
23.		Valve status 6
24.	Pump RPM signal	Pimp RPM signal
25.		
26.		
27.		
28.		Valve status 9
29.		Valve status 10

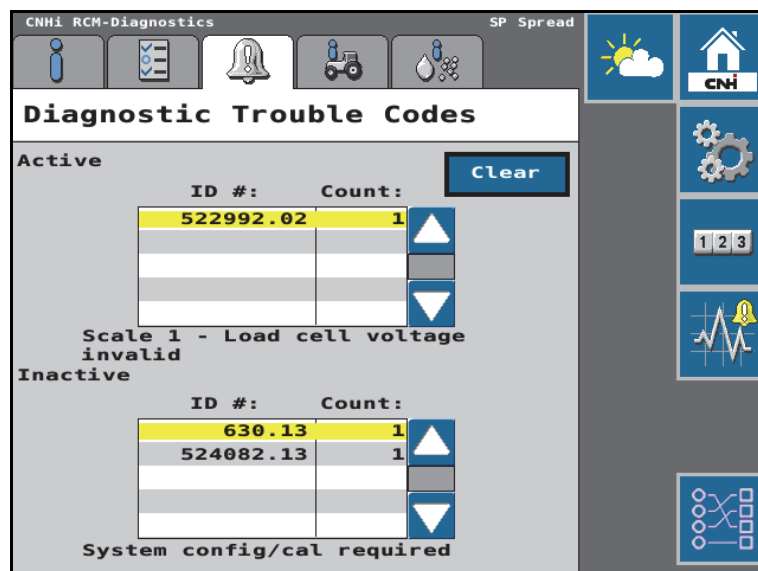
TABLE 7. Multiple Product Inputs

Input Number	NH ₃	Spreader	Air Cart and Generic
1.	Flow meter signal	Product 1 rate sensor signal	Product 1 rate sensor signal
2.	Master valve status	Product 1 rate sensor signal (right-hand dual encoder)	Product 1 shaft sensor signal
3.		Product 2 rate sensor signal	Product 2 rate sensor signal
4.		Product 2 rate sensor signal (right-hand dual encoder)	Product 3 shaft sensor signal
5.	Product 2 rate sensor signal	Product 3 rate sensor signal	Product 3 rate sensor signal
6.	Valve status 4	Product 3 rate sensor signal (right-hand dual encoder)	Product 3 shaft sensor signal
7.	Valve status 5	Product 4 rate sensor signal	Product 4 rate sensor signal
8.	Valve status 3	Product 4 rate sensor signal (right-hand dual encoder)	Product 4 shaft sensor signal
9.	Valve power 1 sense	Product 5 rate sensor signal	Product 5 rate sensor signal
10.		Product 5 rate sensor signal (right-hand dual encoder) or pressure signal 5	Product 5 shaft sensor signal or pressure signal 5
11.	Valve power 2 sense		
12.	Pressure signal 6	Pressure signal 6	Pressure signal 6
13.	Valve status 1	Product 1 bin level signal	Product 1 bin level signal
14.	Pressure signal 1 (NH ₃ outlet)	Pressure signal 1 (primary)	Pressure signal 1 (primary)
15.	Valve status 2	Product 2 bin level signal	Product 1 bin level signal
16.	Pressure signal 2 (NH ₃ inlet)	Pressure signal 2 (primary)	Pressure signal 2 (primary)
17.	Product 2 bin level signal	Product 3 bin level signal	Product 3 bin level signal
18.	Pressure signal 3	Pressure signal 3 (primary)	Pressure signal 3 (primary)
19.	Valve status 7	Product 2 bin level signal	Product 4 bin level signal
20.	Valve status 8	Pressure signal 4 (primary)	Pressure signal 4 (primary)
21.		Product 5 bin level signal	Product 5 bin level signal
22.			
23.	Valve status 6		Fan 2 PRM signal
24.	Pump, fan, or spinner RPM signal	Fan or spinner RPM signal	Fan 1 RPM signal
25.	Master switch	Master switch	Master switch
26.	Implement height switch	Implement height	
27.	Product 3 rate sensor signal	Pressure signal 4 (secondary)	Pressure signal 4 (secondary)
28.	Valve status 9	Pressure signal 3 (secondary)	Pressure signal 3 (secondary)
29.	Product 3 bin level signal or valve status 10	Pressure signal 2 (secondary)	Pressure signal 2 (secondary)
30.	Pressure signal 4	Pressure signal 1 (secondary)	Pressure signal 1 (secondary)
31.			

ACCESSING DIAGNOSTIC TROUBLE CODES

1. Select the Diagnostics button.
2. Select the Diagnostic Trouble Codes (DTC) tab.
 - Current trouble codes appear in the Active table. The DTC Identification number and occurrence count is listed.
 - Resolved trouble codes appear in the Inactive table. The DTC Identification number and occurrence count is listed.
3. Use the up and down arrows to scroll through the list of trouble codes. A description of the highlighted code is shown below each table.
4. If desired, press the Clear button to erase all the trouble codes listed in the Inactive table.

FIGURE 1. Diagnostic Trouble Codes Page



DIAGNOSTIC TROUBLE CODES (DTC)

The table below provides the DTC number, a brief alarm description, and a possible solution.

TABLE 1. DTC List

DTC	Alarm Description	Solution
0.00	Default no error state.	No Action Required.
158.03	Switched Supply Voltage High.	Check the vehicle battery to ensure power harnessing is connected to a 12 VDC battery.
158.04	Switched Supply Voltage Low.	Check the vehicle battery to ensure power harnessing is connected to a 12 VDC battery.
628.02	NVM Warning	Contact your service provider.
628.13	NVM Invalid	Contact your service provider.
628.13	NVM Error	Contact your service provider.
630.13	System configuration or calibration required.	Ensure all calibration parameters have valid data.
4305.00	Application speed exceeded.	Reduce application speed.
4305.02	Speed is below operational speed	Increase application speed.
520192.01	Low Current Power Loss	Low current (logic) supplied to the RCM. Check the vehicle battery, check fuses, and check cable connections.
520453.31	FPGA has not loaded correctly	Contact your Raven dealer or a qualified service provider.
522992.02	Scale 1 - Load cell voltage invalid	Check load cell sensor connections and cabling.
522993.02	Scale 2 - Load cell voltage invalid	Check load cell sensor connections and cabling.
522995.02	Scale 3 - Load cell voltage invalid	Check load cell sensor connections and cabling.
522996.02	Scale 4 - Load cell voltage invalid	Check load cell sensor connections and cabling.
523075.08	Implement Height Switch Malfunction	Service the Implement Height Switch.
523148.01	Valve power sense circuit 1 error	Check fuses in IBIC harness.
523149.01	Valve power sense circuit 2 error	Check fuses in IBIC harness.
523150.01	Valve power harness error	Ensure that the product harness is connected and all fuses in IBIC harness are not blown.
523196.00	Section valve master open - should be closed	Contact your service provider.
523196.01	Section valve master closed - should be open	Contact your service provider.
523200.00	Section valve 1 open - should be closed	Contact your service provider.
523200.01	Section valve 1 closed - should be open	Contact your service provider.
523201.00	Section valve 2 open - should be closed	Contact your service provider.
523201.01	Section valve 2 closed - should be open	Contact your service provider.
523202.00	Section valve 3 open - should be closed	Contact your service provider.
523202.01	Section valve 3 closed - should be open	Contact your service provider.
523203.00	Section valve 4 open - should be closed	Contact your service provider.
523203.01	Section valve 4 closed - should be open	Contact your service provider.

DTC	Alarm Description	Solution
523204.00	Section valve 5 open - should be closed	Contact your service provider.
523204.01	Section valve 5 closed - should be open	Contact your service provider.
523205.00	Section valve 6 open - should be closed	Contact your service provider.
523205.01	Section valve 6 closed - should be open	Contact your service provider.
523206.00	Section valve 7 open - should be closed	Contact your service provider.
523206.01	Section valve 7 closed - should be open	Contact your service provider.
523207.00	Section valve 8 open - should be closed	Contact your service provider.
523207.01	Section valve 8 closed - should be open	Contact your service provider.
523208.00	Section valve 9 open - should be closed	Contact your service provider.
523208.01	Section valve 9 closed - should be open	Contact your service provider.
523209.00	Section valve 10 open - should be closed	Contact your service provider.
523209.01	Section valve 10 closed - should be open	Contact your service provider.
523232.04	Pressure 1 - Sensor not detected	Check the pressure transducer connection and cabling.
523232.13	Pressure 1 - Sensor not calibrated	Calibrate the pressure sensor.
523232.16	Pressure 1 - Pressure above maximum set point	Reduce the equipment speed or adjust the maximum pressure setting.
523232.18	Pressure 1 - Pressure below minimum set point	Increase the equipment speed or adjust the minimum pressure setting.
523233.04	Pressure 2 - Sensor not detected	Check the pressure transducer connection and cabling.
523233.13	Pressure 2 - Sensor not calibrated	Calibrate the pressure sensor.
523233.16	Pressure 2 - Pressure above maximum set point	Reduce the equipment speed or adjust the maximum pressure setting.
523233.18	Pressure 2 - Pressure below minimum set point	Increase the equipment speed or adjust the minimum pressure setting.
523234.04	Pressure 3 - Sensor not detected	Check the pressure transducer connection and cabling.
523234.13	Pressure 3 - Sensor not calibrated	Calibrate the pressure sensor.
523234.16	Pressure 3 - Pressure above maximum set point	Reduce the equipment speed or adjust the maximum pressure setting.
523234.18	Pressure 3 - Pressure below minimum set point	Increase the equipment speed or adjust the minimum pressure setting.
523235.04	Pressure 4 - Sensor not detected	Check the pressure transducer connection and cabling.
523235.13	Pressure 4 - Sensor not calibrated	Calibrate the pressure sensor.
523235.16	Pressure 4 - Pressure above maximum set point	Reduce the equipment speed or adjust the maximum pressure setting.
523235.18	Pressure 4 - Pressure below minimum set point	Increase the equipment speed or adjust the minimum pressure setting.
523236.04	Pressure 5 - Sensor not detected	Check the pressure transducer connection and cabling.
523236.13	Pressure 5 - Sensor not calibrated	Calibrate the pressure sensor.

DTC	Alarm Description	Solution
523236.16	Pressure 5 - Pressure above maximum set point	Reduce the equipment speed or adjust the maximum pressure setting.
523236.18	Pressure 5 - Pressure below minimum set point	Increase the equipment speed or adjust the minimum pressure setting.
523237.04	Pressure 6 - Sensor not detected	Check the pressure transducer connection and cabling.
523237.13	Pressure 6 - Sensor not calibrated	Calibrate the pressure sensor.
523237.16	Pressure 6 - Pressure above maximum set point	Reduce the equipment speed or adjust the maximum pressure setting.
523237.18	Pressure 6 - Pressure below minimum set point	Increase the equipment speed or adjust the minimum pressure setting.
523242.01	Product Pump 1 - PWM Pump dry	Verify there is product in the tank for the pump.
523242.07	Product Pump 1 - AccuFlow HP+ boost pump fault	Contact your Raven dealer or a qualified service provider.
523242.18	Product Pump 1 - Non-PWM Pump dry	Verify there is product in the tank/bin for the pump.
523243.01	Product Pump 2 - PWM Pump dry	Verify there is product in the tank for the pump.
523243.18	Product Pump 2 - Non-PWM Pump dry	Verify there is product in the tank for the pump.
523244.01	Product Pump 3 - PWM Pump dry	Verify there is product in the tank for the pump.
523244.18	Product Pump 3 - Non-PWM Pump dry	Verify there is product in the tank for the pump.
523245.01	Product Pump 4 - PWM Pump dry	Verify there is product in the tank for the pump.
523245.18	Product Pump 4 - Non-PWM Pump dry	Verify there is product in the tank for the pump.
523246.01	Product Pump 5 - PWM Pump dry	Verify there is product in the tank for the pump.
523246.18	Product Pump 5 - Non-PWM Pump dry	Verify there is product in the tank for the pump.
523247.01	Product Pump 6 - PWM Pump dry	Verify there is product in the tank for the pump.
523247.18	Product Pump 6 - Non-PWM Pump Dry	Verify there is product in the tank for the pump.
523253.17	Product 2 Injection - Pump lost communication	Check power and ISOBUS connections to the injection pump.
523254.17	Product 3 Injection - Pump lost communication	Check power and ISOBUS connections to the injection pump.
523255.17	Product 4 Injection - Pump lost communication	Check power and ISOBUS connections to the injection pump.
523256.17	Product 5 Injection - Pump lost communication	Check power and ISOBUS connections to the injection pump.
523257.17	Product 6 Injection - Pump lost communication	Check power and ISOBUS connections to the injection pump.
523262.15	RPM 1 - Above maximum threshold	Contact your service provider.
523262.17	RPM 1 - Below minimum threshold	Contact your service provider.
523263.15	RPM 2 - Above maximum threshold	Contact your service provider.
523263.17	RPM 2 - Below minimum threshold	Contact your service provider.
523285.01	Product 1 Shaft Sensor - No rate detected.	Contact your service provider.
523286.01	Product 2 Shaft Sensor - No rate detected.	Contact your service provider.
523287.01	Product 3 Shaft Sensor - No rate detected.	Contact your service provider.

DTC	Alarm Description	Solution
523288.01	Product 4 Shaft Sensor - No rate detected.	Contact your service provider.
523289.01	Product 5 Shaft Sensor - No rate detected.	Contact your service provider.
523290.01	Product 6 Shaft Sensor - No rate detected.	Contact your service provider.
523295.01	Product 1 Dual Encoder - Feedback out of tolerance.	Contact your service provider.
523296.01	Product 2 Dual Encoder - Feedback out of tolerance.	Contact your service provider.
523297.01	Product 3 Dual Encoder - Feedback out of tolerance.	Contact your service provider.
523298.01	Product 4 Dual Encoder - Feedback out of tolerance.	Contact your service provider.
523299.01	Product 5 Dual Encoder - Feedback out of tolerance.	Contact your service provider.
523300.01	Product 6 Dual Encoder - Feedback out of tolerance.	Contact your service provider.
523305.00	Product 1 Rate - No rate expected.	Check connection to the control valve.
523305.01	Product 1 Rate - No rate detected.	Check connections to the control valve and flow sensor.
523306.00	Product 2 Rate - No rate expected.	Check connection to the control valve.
523306.01	Product 2 Rate - No rate detected.	Check connections to the control valve and flow sensor.
523307.00	Product 3 Rate - No rate expected.	Check the connection to the control valve.
523307.01	Product 3 Rate - No rate detected.	Check connections to the control valve and flow sensor.
523308.00	Product 4 Rate - No rate expected.	Check the connection to the control valve.
523308.01	Product 4 Rate - No rate detected.	Check connections to the control valve and flow sensor.
523309.00	Product 5 Rate - No rate expected.	Check connections to the control valve.
523309.01	Product 5 Rate - No rate detected.	Check the connections to the control valve and flow sensor.
523310.00	Product 6 Rate - No rate expected	Check connections to the control valve.
523310.01	Product 6 Rate - No rate detected	Check the connections to the control valve and flow sensors.
524082.13	Display is not on line	Check ISOBUS and power connections to the Raven Rate Control Module.

TABLE 2. Error Prompt Messages

NA	Incompatible HW	
NA	Loopback test failed	
NA	Loopback test canceled	
NA	Loopback test warning	
NA	Manual bin chaining ready	
NA	Object pool will go offline	
NA	Test canceled	
NA	Product # (2-6) Injection - Injection pressure below carrier pressure	
NA	Granular test warning	
NA	Liquid test warning	
NA	NH ₃ test warning	
NA	New blockage system detected	
NA	Product # (1-6) Rate - Calibration required	
NA	New switch box detected	
NA	Product # (1-6) Rate - Rate above target	
NA	New direct injection pump detected	
NA	Product # (1-6) - PWM duty maximum detected	
NA	Product # (1-6) Rate - Rate below target	
NA	Product bin/tank # (1-6) volume has fallen below the operator designated minimum level	
NA	Product # (1-6) Rate - Volume per minute below minimum	
NA	Product # (1-6) - PWM duty cycle minimum reached.	
NA	Product bin/tank # (1-6) level indicated empty bin/tank	
NA	Blockage system off line	
NA	Product # (1-6) Rate - Application attempted with no controlled RPM speed.	
NA	Product # (1-6) Rate - Application attempted with no monitored RPM speed.	
NA	NIR sensor lost communication.	
NA	NIR sensor warming up	
NA	Edge mode ON	
NA	Manual bin chaining ready	
NA	ISO Class 3 machine speed not present	
NA	ISO Class 3 pairing fault	
NA	Check tank product type	
NA	Cycle master and spinners	
NA	Aux-N input off line	

NA	New blockage detected	
NA	Hydraulic level low	
NA	Hydraulic oil temperature high	
NA	New pump detected	
NA	ISB server exceeded	
NA	ISB shutdown condition	
NA	ISB activated	
NA	YAW sensor calibration error	
NA	Weather station disconnected	
NA	Apparent wind limit exceeded	
NA	Delta T limit exceeded	
NA	Actuator failure	
NA	Granular test warning	
NA	Liquid test warning	
NA	NH3 test warning	
NA	Pin configuration fault	
NA	Communication lost with switch box	
NA	Scale # (1-4) - Unexpected weight increase	
NA	Product # (1-6) bridged	
NA	Product # (1-6) split belt encoder mismatch	
NA	Product # (1-6) rate above shutdown	
NA	Product # (1-6) rate below shutdown	

A

SECTION WIDTHS

Use the following formulas to help calculate the section widths.

Calculate the section width with the formula:

$$T \times S = SW$$

Where T = the number of Tips in each section, S = the Spacing between tips, and SW = the Section Width.

FOR EXAMPLE:

20 tips in a section with spacing of 50.8 cm [40 inches] would yield:

$$20 \times 50.8 = 2032$$

or a Section Width of 2032 cm [800 inches] (approximately 20 m [67 feet]). Enter 2032 [800] as the width for this section.

TARGET RATE CALIBRATION

The following information must be known in order to determine which spray nozzles to use with the sprayer:

- Nominal Application Pressure_____ kpa [PSI]
- Target Application Rate_____ L/ha [GPA]
- Target Speed_____ km/h [MPH]
- Nozzle Spacing_____ cm [inches]

From this information, calculate the volume per minute per nozzle as follows:

$$NVPM = \frac{\text{Rate} \times \text{Speed} \times NS}{5,940[60,000]}$$

NVPM = Nozzle Volume per Minute L/ha [gallons/acre]), Rate = target application Rate, Speed = target Speed of application, and NS = Nozzle Spacing

FOR EXAMPLE:

Application Pressure = 30 PSI, Target Application Rate = 20 GPA, Target Speed = 5.2 MPH, and Nozzle Spacing = 20 inches

$$NVPM = \frac{20 \times 5.2 \times 20}{5,940} = 0.35$$

Using the calculated nozzle volume per minute of 0.35 at an application pressure of 30, select a boom nozzle which comes closest to providing the desired output.

SETTINGS AND HELP SCREEN TERMINOLOGY

TABLE 1. Setting and Help Screen Terminology

Setting	Help Screen Terminology
Control Deadband	Allowable difference between the target and actual application rate. Rate correction is not performed as long as the application rate is within the allowable range.
Control Valve Type	Select the type of control valve used to control the product application. Valve types include: Standard, Fast, Fast Close, PWM, and PWM Close.
Display Smoothing	Enable the Display Smoothing feature to display target rate as actual rate when rate is within 10% of the target rate. Actual rate will be displayed if RCM does not reach control deadband within ten seconds.
Enable Fence Rows	Enable Fence Rows if sprayer is equipped. On-screen soft switches or physical switches can be assigned to control fence row valves. Restart the setup wizard to modify this setting.
Fill Flow Meter Cal	The fill flow meter calibration value and units may be found on the tag attached to the flow meter installed in the tank fill system. Select the appropriate units for the flow meter calibration to ensure proper calibration of the tank fill system.
Flow Meter Cal	The flow meter calibration value and units may be found on the tag attached to the flow meter installed in the application system. Select the appropriate units for the flow meter calibration to ensure proper calibration of the application system.
Implement Switch	The implement switch senses the position of the toolbar and turns off application when raised and enables application when lowered.
Low Tank Limit	Enable the Low Tank feature and enter desired volume threshold at which an alert will be displayed for low tank condition. Tank volume must be either manually set upon refilling or tank fill flow meter utilized to automatically monitor tank level.
Max Pump PWM	Enter a maximum PWM duty cycle percent to set the maximum desired output for a pulse width modulated (PWM) hydraulic control valve. This setting limits how far the PWM valve will open.
Maximum Pressure	Enter the maximum desired pressure for the system. Upon exceeding maximum pressure, an alert will be displayed, flow control will be overridden and the RCM will maintain maximum pressure.
Min Pump PWM	Enter a minimum PWM duty cycle percent to set the minimum desired output (zero point or shutoff point) for a pulse width modulated (PWM) hydraulic control valve).
Minimum Pressure	The minimum pressure feature will allow the operator to set the lowest tolerable pressure during field operations. If the application system reaches the minimum pressure, the UT will display an alert and application system will maintain the flow rate to keep the monitored pressure consistent and to maintain the spray pattern.
Number of Sections	The number of sections is the number of section valves installed on the machine.

Setting	Help Screen Terminology
Pressure Transducer Type	Select the pressure sensor range from the drop down Menu. Refer to OEM for transducer installed, or Raven part numbers.
Pressure Sensor Type	Select the pressure sensor drop down field and select the transducer to be calibrated for operation.
PWM Standby	Enter desired control valve PWM duty cycle percent when all sections are off. This is utilized when standby pressure control is not available (pressure sensor not available or direct injection is installed).
Rate Presets	Enter desired rate presets to allow the operator to quickly switch between target rates during field operation in the automatic rate control mode.
Response Rate	The response rate has a range of 1 to 100 and the setting determines how aggressively the target is controlled to. Increasing this value will cause the system to respond more quickly. Decreasing it will cause a slower response. If the system is slow to reach the target value consider increasing it.
Speed Cal	Enter the Speed Cal value of radar speed sensor (if equipped). Reference radar manufacturer's specification for recommended value and perform distance calibration to ensure accuracy.
Tank Capacity	Enter maximum capacity of the tank.
Tank Volume	Enter the current tank level.