

ROS (Raven Operating Software) ISO UT Manual

016-0171-623 Rev. B

08/17

E29197



Disclaimer

While every effort has been made to ensure the accuracy of this document, Raven Industries assumes no responsibility for omissions and errors. Nor is any liability assumed for damages resulting from the use of information contained herein.

Raven Industries shall not be responsible or liable for incidental or consequential damages or a loss of anticipated benefits or profits, work stoppage or loss, or impairment of data arising out of the use, or inability to use, this system or any of its components. Raven Industries shall not be held responsible for any modifications or repairs made outside our facilities, nor damages resulting from inadequate maintenance of this system.

As with all wireless and satellite signals, several factors may affect the availability and accuracy of wireless and satellite navigation and correction services (e.g. GPS, GNSS, SBAS, etc.). Therefore, Raven Industries cannot guarantee the accuracy, integrity, continuity, or availability of these services and cannot guarantee the ability to use Raven systems, or products used as components of systems, which rely upon the reception of these signals or availability of these services. Raven Industries accepts no responsibility for the use of any of these signals or services for other than the stated purpose.

Chapter 1	<i>Important Safety Information</i>	1
	Instructions for Wire Routing	1
	Instructions for Hose Routing	3
Chapter 2	<i>Introduction</i>	5
	What is ISOBUS?	5
	Universal Terminal	5
	Task Controller	5
	Updates	5
Chapter 3	<i>Universal Terminal (UT) Panel</i>	9
	Overview	9
	ISO Status	10
	Transfer Progress Bar	10
	Working Sets	10
	Soft Keys Area	10
	Working Set Application Display	10
	Auxiliary Control Assignments	10
	UT Alarms	11
	Additional UT Features	12
	ISOBUS Status	12
	UT Display Widgets	13
	Creating an Assignable Item	14
	Navigating the Interactive UT	14
Chapter 4	<i>Task Controller</i>	17
	Task Controller Overview	17
	Machine Configuration	17
	Adding Section Groups to Implements	17
	Readdress ISOBUS Product Configuration	19
	Task Controller Widgets	19
Chapter 5	<i>Diagnostics Trouble Codes (DTC)</i>	21
	Accessing Diagnostic Trouble Codes	21

CHAPTER

1

IMPORTANT SAFETY INFORMATION

DANGER

CHEMICAL AND AGRICULTURAL PRODUCT SAFETY

- Thoroughly bleed or rinse the nurse tank hose and all other system lines of chemical or product prior to disassembling the flow meter, fittings and hoses, especially in the case of anhydrous ammonia (NH₃) application systems.
- Follow all label instructions for proper chemical mixing, handling, and container disposal methods.

NOTICE

Read this manual and the operation and safety instructions included with the equipment and/or controller carefully before installing the ROS device.

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

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

- Be alert and aware of surroundings.
- Do not operate the ROS device while under the influence of alcohol or an illegal substance.
- Remain in the operator's position in the machine at all times when the ROS device is engaged in product control functions or while any additional automated features are operating. Disable these functions or features when exiting the operator's position.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling the ROS device or any optional features when the safe working distance has been diminished.

INSTRUCTIONS FOR WIRE ROUTING

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

Harness should not contact or be attached to:

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

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

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

Routing should not allow harnesses to:

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

Harnessing should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

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

For harness sections that move during machine operation:

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

Protect harnesses from:

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

IMPORTANT: Avoid directly spraying electrical components and connections with high pressure water. High pressure water sprays can penetrate seals and cause electrical components to corrode or otherwise become damaged. When performing maintenance:

- Inspect all electrical components and connections for damage or corrosion. Repair or replace components, connections, or cable as necessary.
- Ensure connections are clean, dry, and not damaged. Repair or replace components, connections, or cable as necessary.
- Clean components or connections using low pressure water, pressurized air, or an aerosol electrical component cleaning agent.
- Remove visible surface water from components, connections, or seals using pressurized air or an aerosol electrical component cleaning agent. allow components to dry completely before reconnecting cables.

INSTRUCTIONS FOR HOSE ROUTING

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

Hoses should not contact or be attached to:

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

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

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

Routing should not allow hoses to:

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

Hoses should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

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

For hose sections that move during machine operation:

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

Protect hoses from:

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

WHAT IS ISOBUS?

Simply put, ISOBUS is a standardized communication method that means devices from different manufacturer's can communicate with each other. This enables a ROS field computer to control and monitor equipment not manufactured by Raven.

NOTE: Compatibility with all ISOBUS compliant equipment is not guaranteed. Always check with your dealer to verify compatibility.

UNIVERSAL TERMINAL

ROS devices are capable of interfacing with many ISOBUS control systems via a universal terminal. This allows the operator to monitor and control various aspects of the vehicle or implement over an ISOBUS network via the ROS device without additional displays or control consoles in the vehicle cabin.

TASK CONTROLLER

The task controller allows the ROS device to automatically control implement sections and product application using an ISOBUS application control system. The task controller allows the ROS device to automatically control sections based upon field position and previous coverage data collected during the application.

NOTE: The automatic section control unlock is not included with the free ISOBUS capabilities. Contact a local Raven dealer for additional information or pricing.

SUPPORTED FEATURES

Raven currently supports automatic section control and Variable Rate Application (VRA) via the ISOBUS task controller. This allows the operator to easily configure product and equipment information with minimal setup.

Information such as product rates, product totals, and section status is displayed in existing widgets. Refer to the ROS Basic Operation Manual for additional information.

UPDATES

Product software and documentation updates may be made available periodically on the Raven Applied Technology web site:

<https://portal.ravenprecision.com/>

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

- ROS (Raven Operating Software) ISO UT Manual
- P/N 016-0171-623 Rev. B
- 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

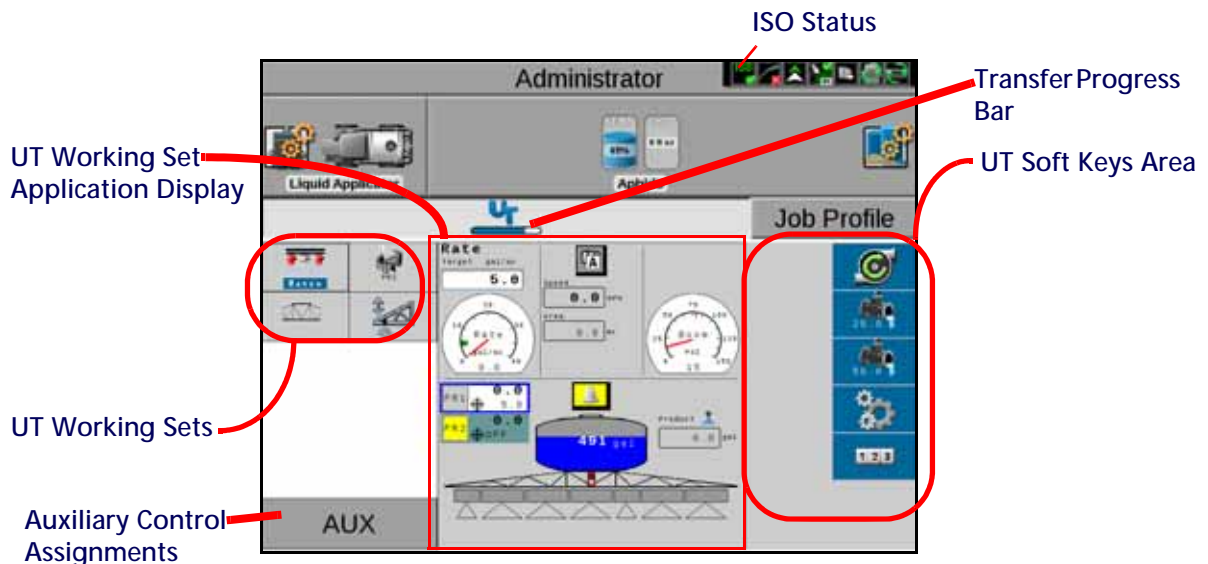
3

UNIVERSAL TERMINAL (UT) PANEL

OVERVIEW

The UT panel provides access to the ISOBUS working set displays and ECU options or features. Use this panel to access features such as the Raven ISO Product Control, Raven ISO AutoBoom, or various third party features connected to the ISOBUS network. This allows the machine operator to access various information or settings for each ECU detected on the ISOBUS network.

NOTE: The UT panel will be available in the lower, left corner of the main panel display only if an ISOBUS compatible ECU is detected by the ROS device.



The application area displays the working set information and provides the control or interface options for monitoring or configuring the available ISOBUS system components or features.

Review the installation, calibration, setup, and operation documentation provided with the ISOBUS component before operation.

ISO STATUS

The ISO Status icon at the top of the screen displays the status of ISO connections. The following table describes the color coding for the ISO Status icon and what it means.

Color/Status	Status Meaning
Green with no check mark	ISO is good but no products are on the bus.
Green ISO with check	ISO is good, there are products on the bus, and all booms have been assigned.
Yellow ISO with refresh icon	<ul style="list-style-type: none"> • There is a product on the boom that has not been assigned or there is a boom assigned but the node is not connected. • Node data is still processing.
Red ISO icon	ISO will not work because there is not a valid license.

TRANSFER PROGRESS BAR

When connected to an ECU for the first time, ROS must transfer the display information from the ECU to the ROS device. Depending on ECU capabilities, this progress could take several minutes to complete. The progress bar at the top of the UT panel indicates data transfer progress.

WORKING SETS

The working sets area of the UT panel provides quick access to all of the UT capable equipment connected on the ISOBUS network.

SOFT KEYS AREA

The soft keys area provides easy access to ECU specific features. Refer to the ECU documentation for additional information on the function of each soft key.

WORKING SET APPLICATION DISPLAY

The working set application display area of the UT allows the operator to control, configure, and monitor the equipment represented by the working set. Refer to ECU documentation for additional information.

AUXILIARY CONTROL ASSIGNMENTS

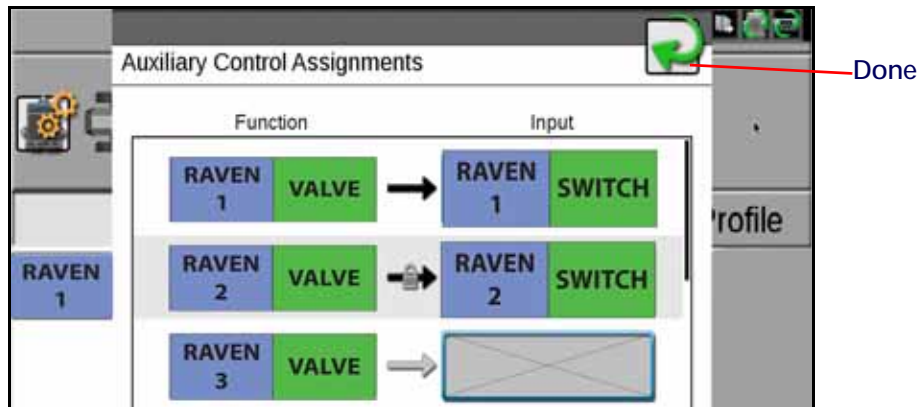
The auxiliary controls button allows the user to view and modify assignments between input devices and control functions connected to the ISOBUS network. The UT auxiliary controls interface does not directly control devices but does allow the user pair an input device (button, switch, knob) with a control function (valve, motor, etc).

NOTE: Raven currently supports ISO Standard AUX-N for ISO Auxiliary Controls.

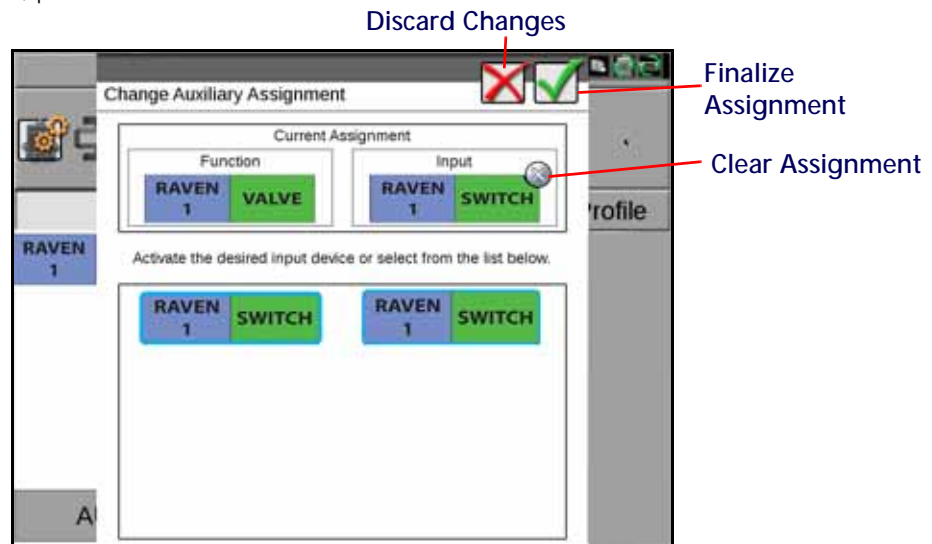
ASSIGNING AUXILIARY CONTROLS

To manually configure auxiliary controls:

1. Press the AUX button at the bottom left of the UT panel. A drop down window will open showing available control functions. The black arrows represent an active assignment. Grayed arrows indicate an unassigned function. Arrows with a padlock represent an assignment that cannot be changed.



2. To change an assignment, press on one of the blue-bordered buttons.

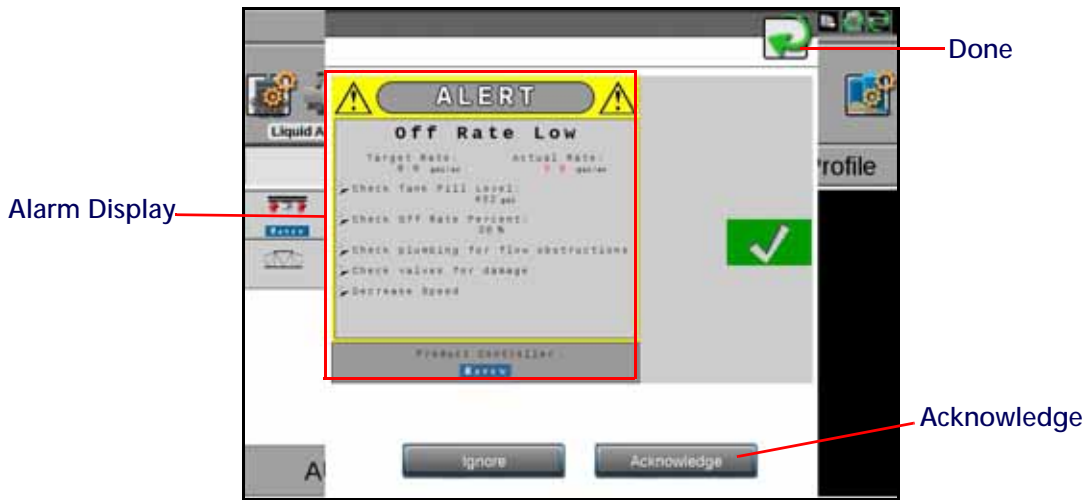


3. If desired, press the Clear Assignment (Gray X) button to remove the assignment.
4. If desired, press the Discard Changes (Red X) button to discard changes made to the assignment.
5. Press the Finalize Assignments (Green Check) to finalize the assignment.
6. When complete with all assignments, press the green Done button.

UT ALARMS

When an ECU triggers a UT alarm, an alarm dialog screen will be displayed. To acknowledge the alarm, press the alarm display area and then select Acknowledge. To close the dialog without acknowledging the alarm, press the

done button. The conditions causing a UT alarm are specific to the ECU. Refer to ECU documentation for additional information.



ADDITIONAL UT FEATURES

ISOBUS STATUS

To access the ISOBUS status widget on the ROS device:



1. Touch the Edit icon in the machine panel to view the machine devices.
2. Touch the ISOBUS status button to display information on:
 - Detailed Transfer Status
 - Request UT Identification - If there are other UT's on the ISOBUS network, this button will cause them to identify themselves with their UT Instance ID.
 - UT Instance ID - This number field allows the operator to change the UT instance ID of the ROS device. Each UT on the ISOBUS network should have it's own UT instance ID. If the ID is set to a number other than one, the Auxiliary Controls feature will not work, and some Working Sets may not be displayed on the ROS UT.
 - Clear ISOBUS Data - This will dump all stored ECU information on the Viper 4. If desired, restart the Viper 4 to reload this data. Clearing ISOBUS data will not clear the ECU settings stored on the ECU since these settings are stored on the Viper 4.

UT DISPLAY WIDGETS

ASSIGNABLE UT

The assignable item widget allows the user to create a configurable widget for any ECU that makes data points available to monitor a desired Data Type, Function or Feature, or Data Element on the desired Implement.

Blank

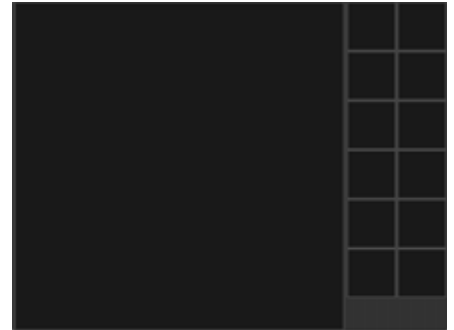


Default



INTERACTIVE UT

The Interactive UT widget allows the user to scroll through multiple devices connected to the ISOBUS.



UT WIDGET

Place the UT widget on the guidance screen to quickly access the UT and manage ISOBUS control features from the guidance screen. Touch the UT button to open the UT during an active field operation.



UT DISPLAY

Place the UT display widget on the guidance screen to display the active UT window on the guidance screen during field operations. There are two different sizes of UT display that show the same information. Select the desired UT display size.

This view allows the operator to monitor ISOBUS control features during active field operations without exiting the job. Touch the UT display to open the UT during active field operations to adjust ISOBUS features.



ISO WORKING SELECTOR

To scroll through various ISO applications, place the ISO Working Set Selector widget on the run screen. This allows the user to have a scroll through all of the items running on the ISObus system. Scroll left or right through the selector to view the available systems on the ISObus system. Press the center of the button to show all available ISO working sets. From the list of available working sets, select a working set to make it active.



CREATING AN ASSIGNABLE ITEM

To create a custom assignable interface widget:

1. Long press the assignable item widget. The Select Data Element window will open.

Blank



Default



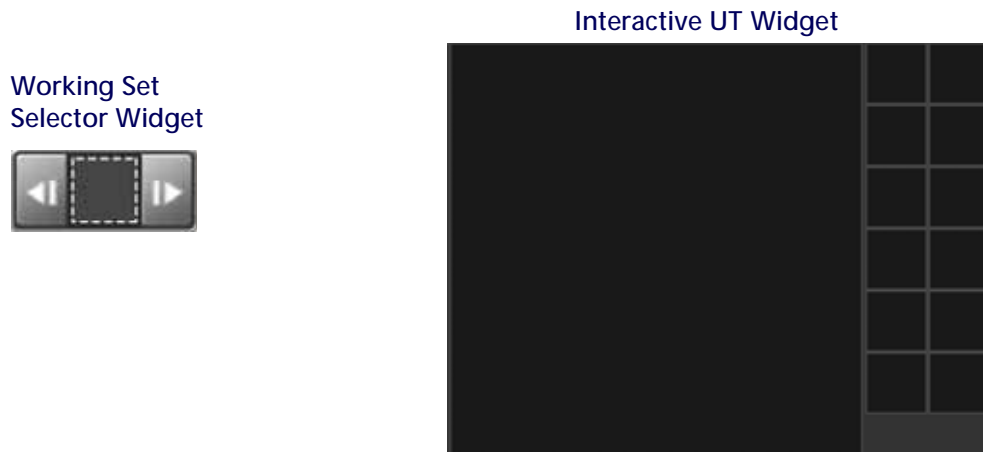
2. Select the desired Data Type from the drop-down.
3. Select the desired Implement from the drop-down. Options will vary based on machine type.
4. Select the desired Function or Feature from the drop-down. Only products configured based on ISO ECU configuration will be available from this drop-down.
5. Select the desired Data Element from the drop-down. Options will vary based on the filters applied in previous drop-down selections.
6. If desired, deselect Use Default Name and enter a custom Name for the data element selected.

NAVIGATING THE INTERACTIVE UT

Interactive UT allows the user to scroll through multiple ISOBUS components to quickly access and view items connected to the ISOBUS. To use Interactive UT:

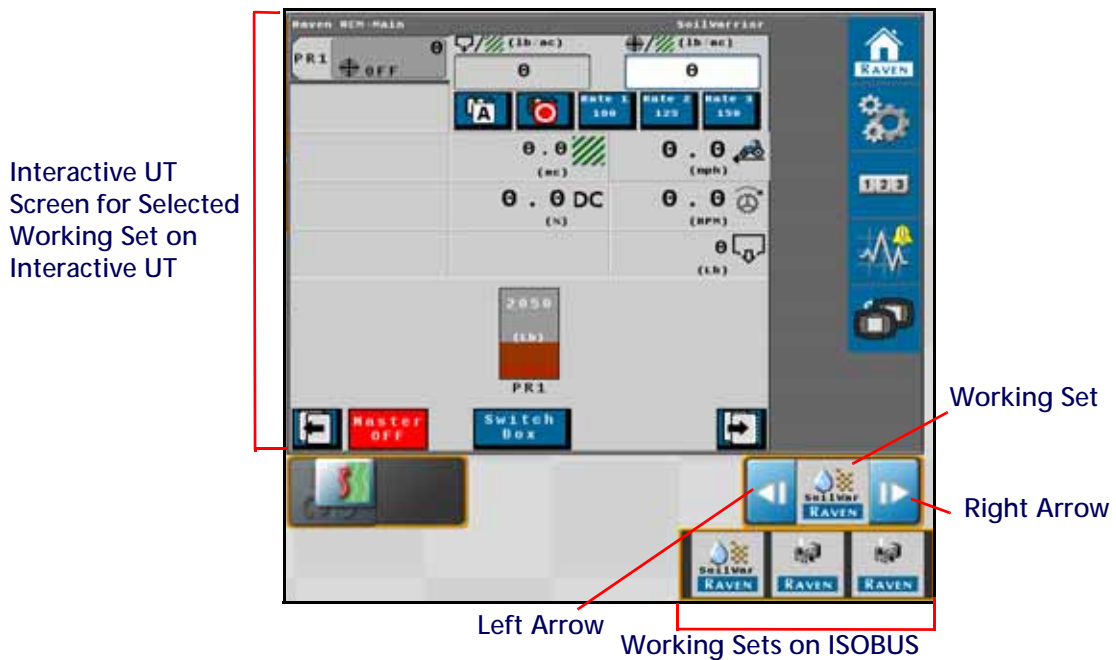
1. Place the Interactive UT or Working Set widget on the run screen. The Interactive UT will detect components connected to the ISOBUS.

FIGURE 1. Interactive UT Widgets



2. Press the currently selected UT working set on the Working Set Selector widget to view available working sets on the ISOBUS network. A list of working sets currently connected to the ISOBUS will open. If desired, select one the other available working sets connected to the ISOBUS. The Interactive UT screen will open and display the currently selected working set.

FIGURE 2. Interactive UT Overview



3. If desired, use the left and right arrows to scroll through the various working sets connected to the ISOBUS.

TASK CONTROLLER OVERVIEW

The task controller allows the user to do variable rate application and section control using ISOBUS-compatible ECUs. Equipment measurements are defined by the ECU, reducing manual configuration.

When a task controller-capable ECU is connected to the ISOBUS, the ROS device will determine the ECU capabilities. The boom information on the ECU is used to automatically create a section group in ROS, and the product control information is used to create products in ROS.

Some additional configuration (listed below) must be performed manually.

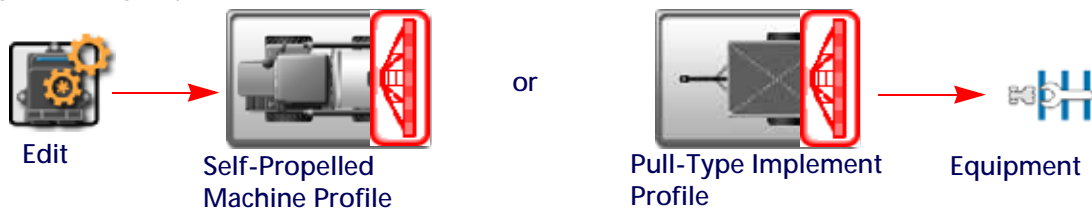
MACHINE CONFIGURATION

When a section group is created based on information from an ECU, a red icon is added to the machine implement button. This indicates that operator needs to choose the machine or implement where the section group is mounted. Additionally, the offset of the section group relative to its implement may need to be manually entered on some systems.

NOTE: Set the sections on the ECU before adding a boom group to the Viper 4.

ADDING SECTION GROUPS TO IMPLEMENTS

The equipment tab provides an overview of configured section groups and allows the operator to create or manage section groups.



1. Touch the edit icon in the machine panel to view the machine devices.

2. Touch the machine or implement button where the section group is physically located.

Equipment Tab

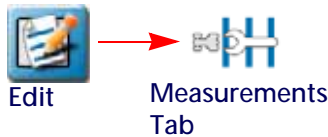


3. Touch the equipment tab to display configured section groups for the self-propelled or implement profile.
4. Touch the add button to assign the section group to the machine or implement.

ADJUSTING THE SECTION GROUP OFFSETS

For some Raven ISO systems, the section group offsets received from the ECU will be (0,0). Typically, the user must override the (0,0) setting with the actual offset measurement. Offsets are measured from the pivot point to the center of the section group.

After adding section groups to implements:



1. Select the edit button in the desired section group to edit section group information.
2. Touch the measurements tab to access the following settings for the selected section group:

EQUIPMENT OFFSETS

Use the following settings to configure the location of the section group on the machine or implement:



Left/Right Offset Direction. Touch the left/right offset direction drop down and select the overall offset for the selected section group from the center-line of the machine or implement.

Left/Right Offset Distance. Select the offset distance field and enter the distance from the center-line of the machine or implement to the center of the section group in inches [centimeters]. Measure the left/right offset distance perpendicular to the direction of travel.



Fore/Aft Offset Direction. Touch the fore/aft offset direction drop down and select the position of the section group from the machine or implement pivot point.

NOTE:The fore equipment offset may not be available when configuring some implement types.

Fore/Aft Offset Distance. Select the offset distance field and enter the distance from the pivot point to the section group in inches [centimeters]. The fore/aft offset distance must be measured parallel with the direction of travel.

Use Defaults. When the Use Defaults box is checked, the values from the ECU are used. When the box is unchecked, the values entered by the user will be used.

READDRESS ISOBUS PRODUCT CONFIGURATION

The task controller will automatically detect the product control capabilities of an ECU on the ISOBUS network. When a controllable product is detected, it is assigned to a product index. The index of each product corresponds to the order it is detected.

To configure and control products, the operator must understand which tank or bin is represented by each product index. The ISO Product Control widget allows the operator to view this information and change assignments.

Whenever a product index is changed, update the chemical/seed information. Refer to the ROS Basic Operation manual for additional information on product configuration.

To view or edit product index assignments:



1. Touch the edit icon in the machine panel to view the machine devices.
2. Touch the ISO product control button to display the available product control channels.
3. Select the desired control channel to modify.
4. Touch the up or down arrows along the right side of the display to move the selected channel up or down in the channel order.

Repeat this process for each control channel to re-address each product control channel available on the ISOBUS system.

TASK CONTROLLER WIDGETS

The Task Controller utilizes many existing widgets to display information and allow the operator to command and configure ECUs on the ISOBUS network. These include most of the "Implement Status and Control" and "Product Control" widgets.

Additionally, the "Process Data" widget provides a way to view all ECU data available through the task controller.



Process

CHAPTER

5

DIAGNOSTICS TROUBLE CODES (DTC)

ACCESSING DIAGNOSTIC TROUBLE CODES

The information in this section provides basic information on accessing Diagnostic Trouble Codes (DTC).

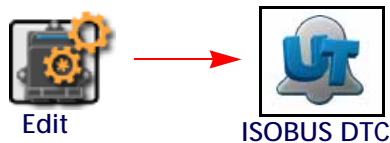
To access DTCs within a job, press the Alarm icon and then the ISO DTC button.



The ISO DTC Information page will show active and inactive alarms for a user selected ISO ECU. ISO ECU alarms are defined and set by the ECU and dependent on the ECU. When available, a brief description of the alarm will display. Refer to the ECU documentation for a full alarm definition.



A similar page is also outside of the job through the ISOBUS DTC widget.



LIMITED WARRANTY

WHAT DOES THIS WARRANTY COVER?

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

HOW LONG IS THE COVERAGE PERIOD?

Raven Applied Technology products are covered by this warranty for 12 months from the date of retail sale. In no case will the Limited Warranty period exceed 24 months from the date the product was issued by Raven Industries Applied Technology Division. This warranty coverage applies only to the original owner and is non-transferable.

HOW CAN I GET SERVICE?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including proof of purchase) must be included inside the box to be sent to Raven Industries.

WHAT WILL RAVEN INDUSTRIES DO?

Upon confirmation of the warranty claim, Raven Industries will (at our discretion) repair or replace the defective product and pay for the standard return freight, regardless of the inbound shipping method. Expedited freight is available at the customer's expense.

WHAT IS NOT COVERED BY THIS WARRANTY?

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

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

EXTENDED WARRANTY

WHAT DOES THIS WARRANTY COVER?

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

DO I NEED TO REGISTER MY PRODUCT TO QUALIFY FOR THE EXTENDED WARRANTY?

Yes. Products/systems must be registered within 30 days of retail sale to receive coverage under the Extended Warranty. If the component does not have a serial tag, the kit it came in must be registered instead.

WHERE CAN I REGISTER MY PRODUCT FOR THE EXTENDED WARRANTY?

To register, go online to www.ravenhelp.com and select Product Registration.

HOW LONG IS THE EXTENDED WARRANTY COVERAGE PERIOD?

Raven Applied Technology products that have been registered online are covered for an additional 12 months beyond the Limited Warranty for a total coverage period of 24 months from the date of retail sale. In no case will the Extended Warranty period exceed 36 months from the date the product was issued by Raven Industries Applied Technology division. This Extended Warranty coverage applies only to the original owner and is non-transferable.

HOW CAN I GET SERVICE?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including proof of purchase) must be included inside the box to be sent to Raven Industries. In addition, the words "Extended Warranty" must appear on the box and all documentation if the failure is between 12 and 24 months from the retail sale.

WHAT WILL RAVEN INDUSTRIES DO?

Upon confirmation of the product's registration for the Extended Warranty and the claim itself, Raven Industries will (at our discretion) repair or replace the defective product and pay for the standard return freight, regardless of the inbound shipping method. Expedited freight is available at the customer's expense.

WHAT IS NOT COVERED BY THE EXTENDED WARRANTY?

Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit, labor, or other damages. Cables, hoses, software enhancements, and remanufactured items are not covered by this Extended Warranty. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

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