

**R A V E N**

# Calibration & Operation Manual



**ISO AutoBoom®**  
*Software Version 6.0 & Newer*

## ***Disclaimer***

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## CHAPTER

# 1

# ***Important Safety Information***

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## **NOTICE**

Read this manual and the operation and safety instructions included with your implement and/or controller carefully before installing the AutoBoom™ system.

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

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

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



## **WARNING**

- When starting the machine for the first time after installing AutoBoom, be sure that all persons stand clear in case a hose has not been properly tightened.
- The machine must remain stationary and switched off, with the booms unfolded and supported, during installation or maintenance.

 **CAUTION**

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## **Hydraulic**

- Raven Industries recommends that appropriate protective equipment be worn at all times when working on the hydraulic system.
- Never attempt to open or work on a hydraulic system with the equipment running. Care should always be taken when opening a system that has been previously pressurized.
- When disconnecting the hydraulic hoses or purging is required, be aware that the hydraulic fluid may be extremely hot and under high pressure. Caution must be exercised.
- Any work performed on the hydraulic system must be done in accordance with the machine manufacturer's approved maintenance instructions.
- When installing AutoBoom hydraulics or performing diagnostics, maintenance, or routine service, ensure that precautions are taken to prevent any foreign material or contaminants from being introduced into the machine's hydraulic system. Objects or materials that are able to bypass the machine's hydraulic filtration system will reduce performance and possibly damage the AutoBoom hydraulic valve.

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## **Electrical**

- Always verify that the power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the equipment.
- Ensure that the power cable is the last cable to be connected.
- A minimum of 12 VDC is required for system operation with a maximum of 15 VDC.

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## CHAPTER

# 2

# Introduction

Congratulations on your purchase of the Raven ISO AutoBoom™ system! The AutoBoom system, used in conjunction with a Virtual Terminal (VT) Display, is designed to provide automated boom height adjustment for agricultural equipment. Using the machine's existing hydraulics, AutoBoom's parallel hydraulic system keeps the machine's hydraulic system open, using only the hydraulic fluid needed to balance the hydraulic cylinders to allow the booms to raise or lower effortlessly.

The instructions in this manual are designed to assist in the proper calibration and operation of the AutoBoom system when used with the VT Display.

**Important:** *Installation of the AutoBoom system must be completed before calibrating the system. If you have questions regarding the installation of the AutoBoom system, refer to the machine-specific AutoBoom Installation Manual provided with the installation kit. For questions about the field computer/controller, refer to the Installation & Operation Manual provided with the field computer/controller.*

**Note:** *The VT must be instance 0 to be compatible with Raven ISO products.*

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## Updates

Updates for equipment installation manuals and software are available on the Raven Industries Applied Technology website at:

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

Sign up for e-mail alerts, and you will automatically be notified when updates for your Raven products are available on the website!



*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*

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*-ISO AutoBoom Calibration & Operation Manual, Software Version 6.0 & Newer*

*-Manual No. 016-0130-078 Rev. A*

*-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.*

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*Thank you for your time.*

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## Pre-Installation

	<p data-bbox="764 1045 1073 1094"><b>⚠ WARNING</b></p> <p data-bbox="634 1108 1187 1306">Carefully read and follow all safety requirements and precautions contained in this manual and the machine-specific installation manual. Failure to follow safety instructions may lead to equipment damage, personal injury, or death.</p>
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Before any components of the AutoBoom system are installed, activated, or operated, and at the beginning of each season Raven Industries recommends performing the following steps to ensure the machine will function with the AutoBoom system.

1. Ensure the machine's hydraulic filters have been changed and there are no problems with any components of the machine's hydraulic system:
  - Hydraulic pump issues
  - Faulty hydraulic motors
  - Other issues that may leave fine metal deposits in the circuits
2. Operate each of the machine's boom hydraulic functions three times to ensure the machine's valve has fresh oil and any debris has been flushed through the system's hoses, valves, and filters.
  - Tilt
  - Fold
  - Center rack control
  - Tongue extension
  - Any other functions operated by the machine's hydraulic valves



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## Wiring Connections

	<p><b>⚠ CAUTION</b></p> <p>Always connect the power cable as the last step in the wiring process and verify that the power leads are connected with the correct polarity. Reversing power leads can cause severe damage to the equipment.</p>
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For wiring connections made outside the cab, apply dielectric silicone grease (P/N 222-0000-006) generously on both the male and female ends of the connectors. Application of the grease will prevent corrosion to the pins and wires.



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**CHAPTER****PowerGlide Plus****3**

The PowerGlide Plus AutoBoom system uses gauge wheels to maintain optimum boom height, while state-of-the-art hydraulics maintain constant hydraulic pressure to the tilt cylinders. PowerGlide Plus systems are typically used in pre-emergence applications.

**Note:** *Terrain conditions and the machine's hydraulic system dictate the actual speeds that can be achieved during application with an engaged AutoBoom system. Typically, rougher and varied field terrain require slower speeds while AutoBoom is enabled.*

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**PowerGlide Plus Kit Contents**

In addition to the kit components listed below, one of the following harness cables is required for installation of the ISO AutoBoom system:

<b>Machine Description</b>	<b>Part Number</b>
Pull-type sprayer without ISO product control	115-0171-974
	115-0171-988
	115-0171-989
	115-0171-975
	115-0171-990
Pull-type sprayer with Raven or John Deere product control	115-0171-931
	115-0171-932
	115-0171-933
	115-0171-960
	115-0171-961
Sprayer with John Deere product control	115-0171-991

The components in the following tables are required for installation of the ISO AutoBoom system. Locate the type of sprayer the system is being installed on for the list of components applicable to the machine. System drawings for these components are located in Chapter 6, *System Diagrams*.

**TABLE 1. Pull-Type Sprayer (P/N 117-0137-037)**

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1
Terminator - ISO	063-0172-964	1
Cable - Raven ISO to Passive Terminator	115-0171-963	1
Cable - AutoBoom Node/Valve	115-0230-085	1

**TABLE 2. AGCO Self-Propelled RoGator with GTA (P/N 117-0137-039)**

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1
Cable - Falcon II RoGator PowerGlide Plus/ UltraGlide ISO CAN Control Node	115-2001-041	1

**TABLE 3. John Deere 4630, 4730, 4830 (MY 2008+), 4920, 4930 (P/N 117-0137-038)**

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1
Cable - ISO CAN Bus Terminator Adapter	115-0230-024	1
Cable - JD SP Power Harness ISO CAN AutoBoom	115-0230-025	1
Cable - JD SP Valve Connection ISO CAN AutoBoom	115-0230-026	1

TABLE 4. John Deere 4720 and 4830 (2007) (P/N 117-0137-050)

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1
Cable - ISO CAN Bus Terminator Adapter	115-0230-024	1
Cable - JD SP Power Harness ISO CAN AutoBoom	115-0230-025	1
Cable - JD SP Valve Connection ISO CAN AutoBoom	115-0230-053	1

TABLE 5. John Deere 4700 &amp; 4710 with Green Star 2 or Newer (P/N 117-0137-052)

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1
Cable - ISO CAN Bus Terminator Adapter	115-0230-024	1
Cable - JD SP Power Harness ISO CAN AutoBoom	115-0230-025	1
Cable - JD SP Valve Connection ISO CAN AutoBoom	115-0230-044	1

## PowerGlide Plus Routine Operation

The PowerGlide Plus AutoBoom system uses gauge wheels to maintain optimum boom height, while state-of-the-art hydraulics maintain constant hydraulic pressure to the tilt cylinders. PowerGlide Plus systems are typically used in pre-emergence applications.

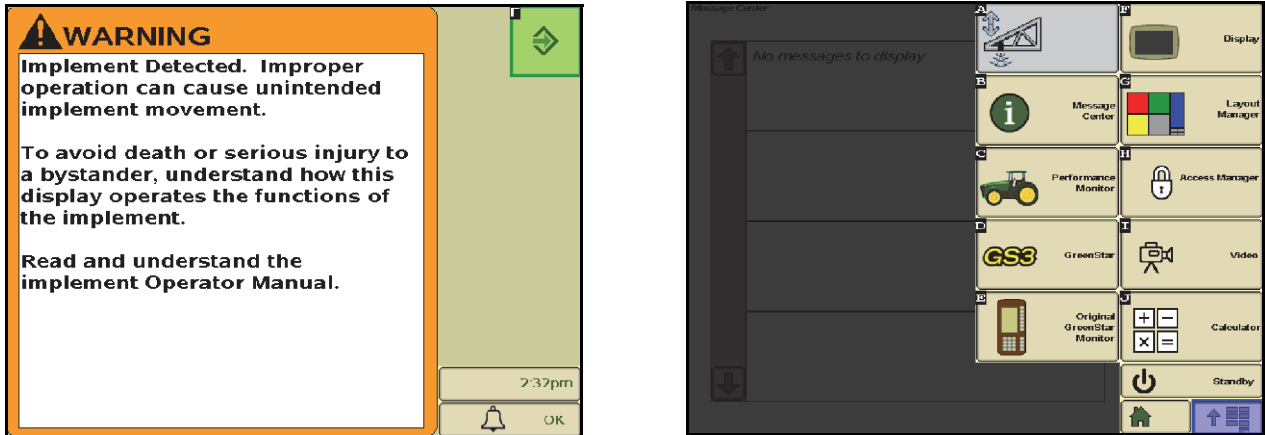
**Note:** *Terrain conditions and the machine's hydraulic system dictate the actual speeds that can be achieved during application with an engaged AutoBoom system. Typically, rougher and varied field terrain require slower speeds while AutoBoom is enabled.*

**Note:** *The VT must be instance 0 to be compatible with Raven ISO products.*

## AutoBoom Icons

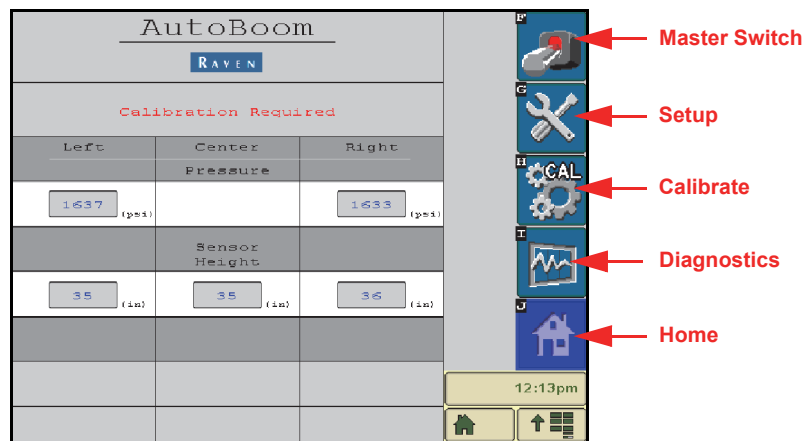
Once the AutoBoom node has been installed, the AutoBoom icons will be displayed on the Start-up screen, indicating the AutoBoom node has been detected.

FIGURE 1. Implement Detected



Refer to the icon definitions below when configuring the AutoBoom feature on the ISO terminal.

FIGURE 2. AutoBoom Home Screen

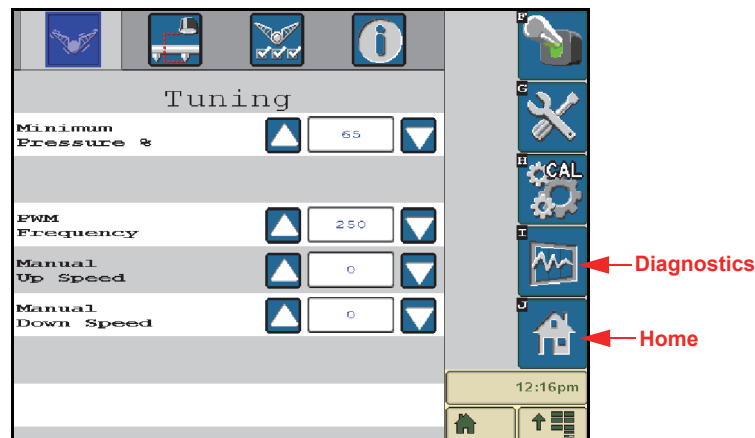


- Select the Master Switch icon to turn the AutoBoom system off and on.
- Select the Setup icon to access the setup tools.
- Select the CAL icon to access the Calibration screen.
- Select the diagnostics button to run the system diagnostic tools.
- Select the home button to return to the AutoBoom main menu.

## Setup Tools

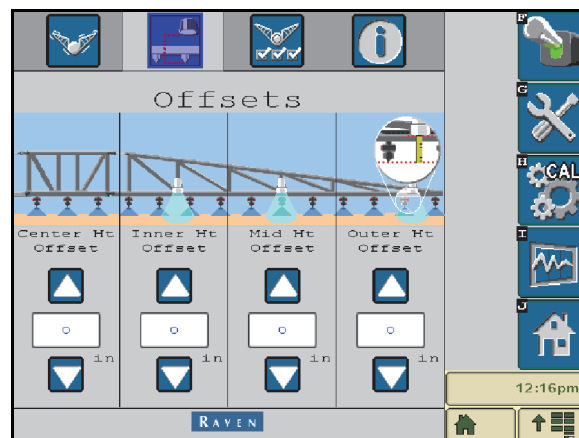
The setup tools allow fine-tuning of minimum boom pressure and sensor height offset parameters in the AutoBoom system. To access these tools, select the Setup icon. To adjust any of the ISO AutoBoom setup values, highlight the value and use the up and down arrows. To return to the AutoBoom home screen, select the Home icon.

FIGURE 3. Tuning 1 Screen



- **Min Pressure %** - Sets a low limit pressure, preventing the boom pressure from falling below a percentage of static pressure, overriding the control when necessary to maintain a low limit of pressure on each boom. Minimum Pressure % also prevents the booms from resting on the stops for travel-limited booms.
- **PWM Frequency** - Sets the frequency of the PWM signal to the proportional control valve. The default valve value of 60 Hz is recommended with AutoBoom valves with square coils and 250 Hz for valves with round coils.
- **Manual Up Speed and Manual Down Speed** - Allows the speed at which the AutoBoom hydraulic valve manually raises and lowers the booms to be adjusted on machines that do not have their own hydraulic control. **Leave the setting at the default of 0 if the machine is equipped to hydraulically control boom functions.**

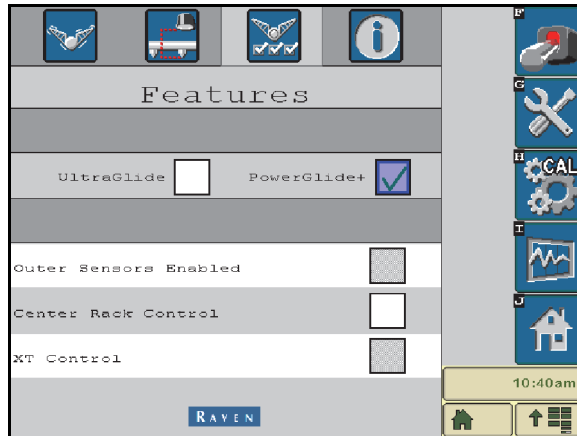
FIGURE 4. Offsets Screen



- **Height Offsets (Center, Inner, Mid, and Outer)** - Allows sensor heights to be adjusted according to the sensor mounting location. Enter a positive value if the sensors are mounted above the sprayer tips, and a negative value if the sensors are mounted below. Refer to the Ultrasonic Sensor Height Offsets section on page 45 for more information.



FIGURE 5. Features



- **Center Rack Control** - Turns the center rack control on and off. Selecting Center Rack Control ON allows center rack control to be enabled on the field computer/console or the machine’s switch. If Center Rack Control OFF is selected, center rack control cannot be used.


**Note:** Center rack control should only be turned on if the machine is equipped with a center rack sensor and the appropriate cabling that allow center rack control.

## Diagnostic Tools

Integrated diagnostic tools allow the status of all AutoBoom inputs and outputs to be viewed on the ISO terminal display. To access the diagnostic tools, select the Diagnostics icon. The following screen will appear:

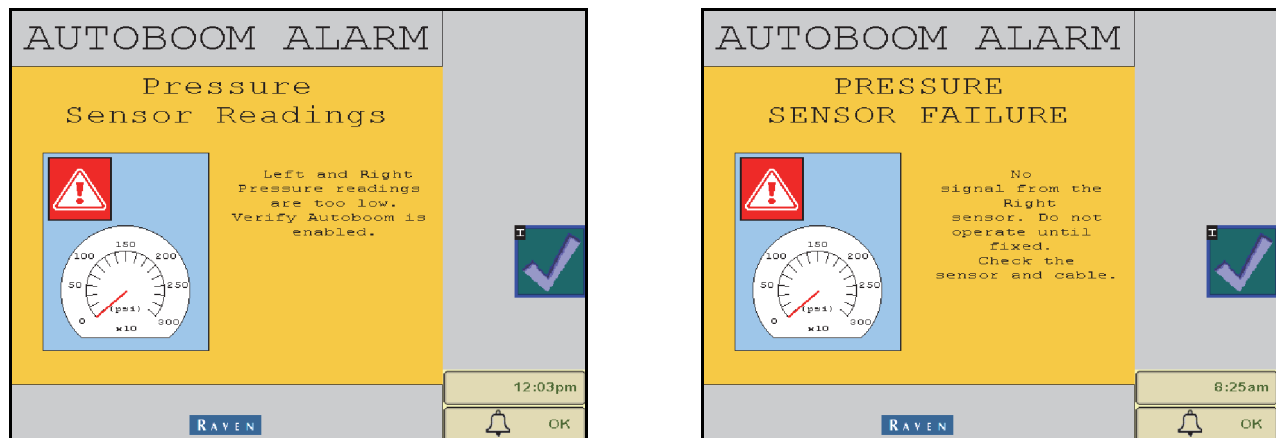
AutoBoom Diagnostics			
	Left	Center	Right
Pressure	1640		1637
Sensor Height (in)	35	35	36
Mid Ht	0		38
Inner Ht	0		7
Raise	OFF	OFF	OFF
Lower	OFF	OFF	OFF
Unfold	OFF		OFF
Blocker	OFF	LS OFF	OFF
PWR	0.00		0.00
Base PWR	71.83		68.84
State	0		0

- **Pressure, Sensor Ht, Mid Ht, and Inner Ht** - Indicate the status of the corresponding sensors.
- **Raise and Lower Buttons** - Indicate the status of the boom switches. When using the machine’s manual control functions, the corresponding boom switch will indicate On. These buttons can also be used to troubleshoot wiring or hydraulic issues by using the AutoBoom valve for raise/lower functions and by using the machine’s hydraulic valve for center rack functions (if the machine is equipped with center rack control cabling).
- **Unfold** - If the machine is equipped with a proximity sensor or AutoFold, Unfold communicates the status of the booms. OFF indicates that the booms are unfolded, and ON indicates that the booms are folded. If the machine is not equipped with a proximity sensor or AutoFold, Unfold will always indicate OFF.
- **Blocker** - Indicates the status of the double-blocker output. Blocker will indicate ON when individual booms are engaged or calibrating.

- **PWM%** - Indicates the duty cycle to the proportional valves. This value will be 0 if the individual booms are disengaged, and will vary in output up to 100 when AutoBoom is engaged and the system is operating.
- **Base PWM%** - Indicates the system's calculated static duty cycle to maintain the set height or pressure. This number will typically change slowly from 0 - 5 points during routine operation.
- **Stats** - Reflects the boom performance. This value is for Raven use only.
- **Manual Control Buttons**  - Used to actuate the corresponding boom functions. They can be used to troubleshoot wiring or hydraulic issues.

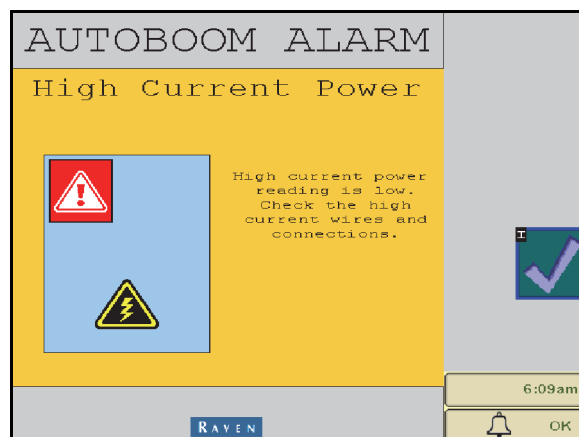
## Alarms

Alarm tones will not sound if the operator is navigating through any of the configuration menus. However, the enable/disable alarms will always sound when appropriate.



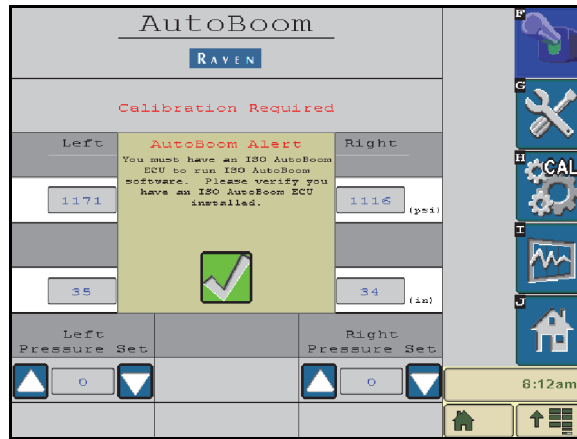
- **Low pressure alarms** - When the pressure in the left or right tilt cylinders is low, the low pressure alarm will sound. The alarm is a steady tone, and will stop immediately after pressure is restored to the system.
- **Pressure sensor failure alarms** - The pressure sensor failure alarm occurs immediately when a pressure sensor is not detected. The alarm is a steady tone, and will stop immediately after the sensor is located.

FIGURE 6. Low HC Power



- **Low HC Power** - This alarm occurs when the voltage to the node drops below 12 volts. This alarm is a steady tone, and stops immediately when proper voltage is restored to the node.

FIGURE 7. Incorrect Node Prompt

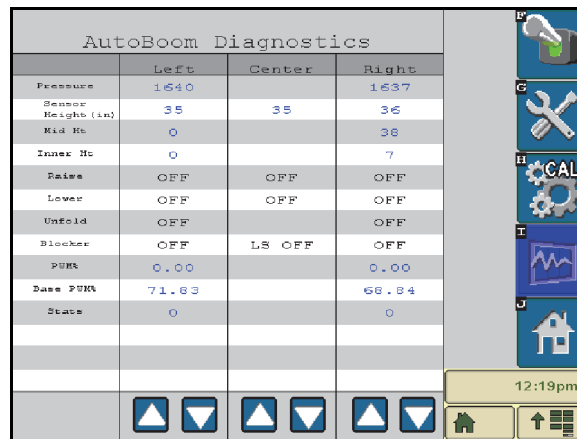


- **Incorrect Node Prompt** - This prompt appears if an incorrect ECU is connected to the system. Ensure the ISO AutoBoom ECU is installed.
- **Other tones** - When enabling the AutoBoom system in automatic mode via the machine’s boom control functions or switches, a single beep will occur. When disabling AutoBoom, a double beep will sound.

## AutoBoom Pre-Calibration Diagnostics

While every effort has been made to properly label and document connections for the hydraulic and electrical components of the AutoBoom system, boom function connections may not be identified due to changes in the make and model of the machine. This makes it especially important to trace the hoses from the connection points and verify the electrical connections are correct to ensure proper AutoBoom system operation. In order to verify connections, it is necessary to perform a pre-calibration diagnostic test.

1. Select Setup icon.
2. Select Diagnostics icon. The following screen will appear:



3. Verify that the following components on the ISO terminal screen are displayed correctly and change when raising and lowering the booms via the machine’s controls and the AutoBoom manual functions:
  - Pressures
  - Sensor heights

- Right and left raise/lower functions
- Center raise/lower functions
- Fold/unfold functions
- Manual raise and lower buttons

## Calibration

After the AutoBoom installation is complete, it is necessary to calibrate the AutoBoom system before use. AutoBoom calibration requires pressure in the machine's cylinders and enough boom travel to allow the system to find the system base duty cycles for operation. Booms must be free to travel ten inches [25 cm] up or down without reaching the tops or bottoms of the cylinder stops.

During calibration and operation, it is important to keep the machine running at a sufficient engine RPM so that the hydraulic pump is able to supply a full flow to the hydraulic system.

**Note:** *If the machine has an open center hydraulic system, or the type of hydraulic system is unknown, all calibration procedures should be performed with the machine operating at the normal operating engine RPM.*

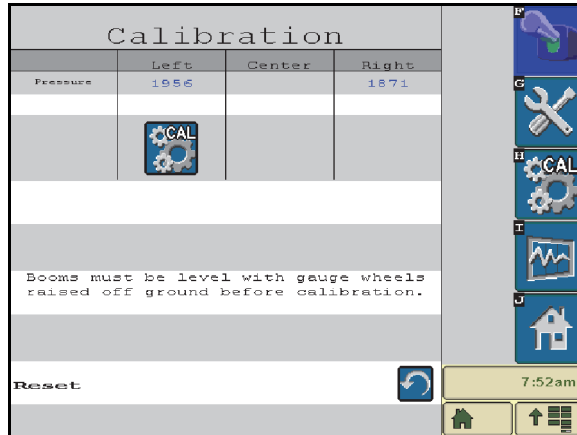
1. Touch the AutoBoom icon on the screen to display the AutoBoom main control screen.



2. Select **PowerGlide Plus** from the Features page in the Settings Menu.
3. Verify that AutoBoom is turned on.
4. Verify that the booms are unfolded, and lower the center rack so that the wheels are approximately six inches [15 cm] from the ground.

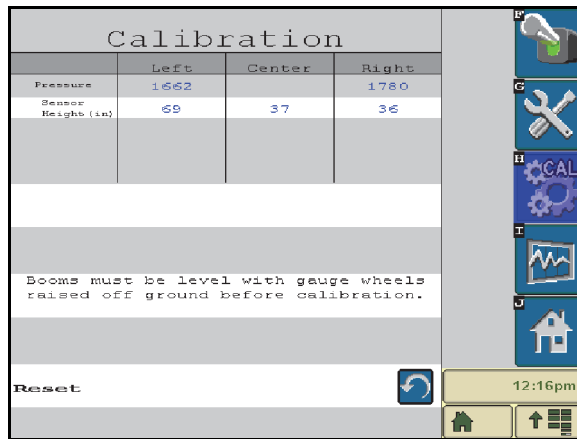
**Note:** *If the booms do not go over center or are travel-limited, raise the booms so that the tips are approximately ten inches [25 cm] above the horizontal position and lower the center section slightly below the normal spraying height. Verify the wheels are still approximately six inches [25 cm] above the ground.*

5. Select **CAL**. The following screen will appear:



6. Select the **CAL** buttons to calibrate the left and right booms.

**Note:** The calibration process may take several seconds to complete. Once the boom calibration is complete, the Cal L/R icon will disappear and the following screen will appear:



7. Select the **Home** icon to return to the AutoBoom main control screen.

## Center Rack Control Calibration (If Equipped)

There are many different valve configurations used to control the machine’s center rack functions. The AutoBoom system must “learn” which of the machine’s solenoids are used to raise and lower the booms. Complete the following steps to calibrate the center rack control feature after the individual booms have been calibrated.

1. Press and hold the center rack raise button on the machine’s control panel or joystick for six seconds so that the center rack raises.

**Note:** The center rack may reach the upper limit of travel during this time, but continue holding the button until the full six seconds has passed.

2. Press and hold the center rack lower button on the machine’s control panel or joystick for six seconds so that the center rack lowers.

**Note:** The center rack may reach the lower limit of travel during this time, but continue holding the button until the full six seconds has passed.

## Routine Operation

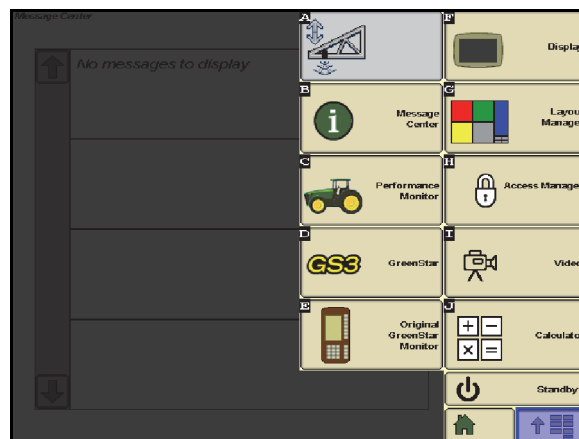
### Joystick Functions

- When AutoBoom control is on, control of each boom can be enabled or disabled via the ISO terminal or by tapping the sprayer's switch functions (if equipped).

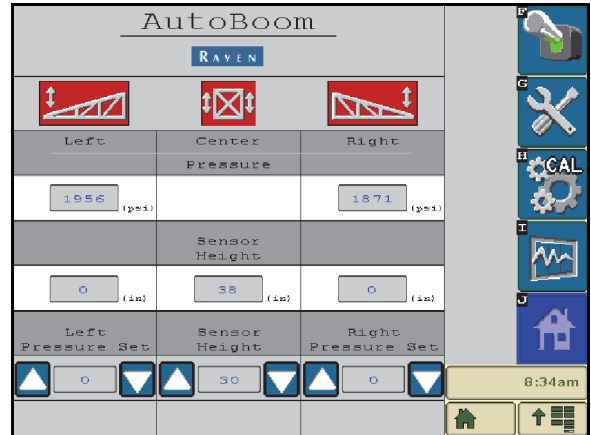
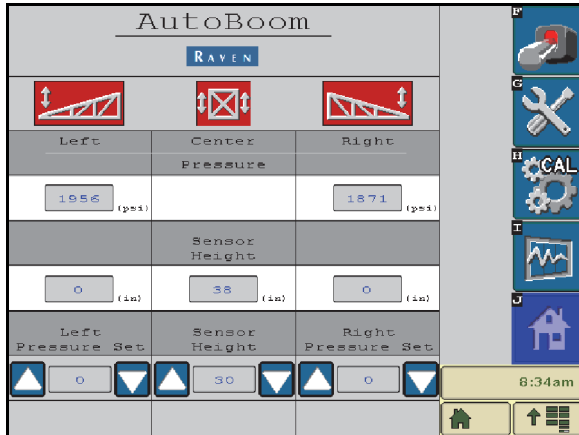
**Note:** Pressing the down function for longer than 1/2 a second will switch the function to manual control. The operator must tap the down function to enable AutoBoom.

- A single up-tap on the sprayer's switch functions disables AutoBoom on that boom.
- A single down-tap on the sprayer's switch functions enables AutoBoom on that boom.
- The fast-down feature (double-tap down) is used to quickly lower the booms when the pressure setting is set to a higher setting, which causes the booms to lower slowly. The fast-up feature (double-tap up) is used to slightly raise one boom.
  - On machines with one proportional valve (square coils on the AutoBoom valve), a double-tap up on either boom switch will raise both booms slightly. A double-tap down on either boom switch will lower both booms quickly, and AutoBoom will re-engage to the set pressure setting.
  - On machines with two proportional valves (round coils on the AutoBoom valve), a double-tap up on the right or left boom switch will raise that boom slightly. A double-tap down will lower the boom quickly and AutoBoom will re-engage to the set pressure setting.

### Enabling AutoBoom via the ISO Terminal

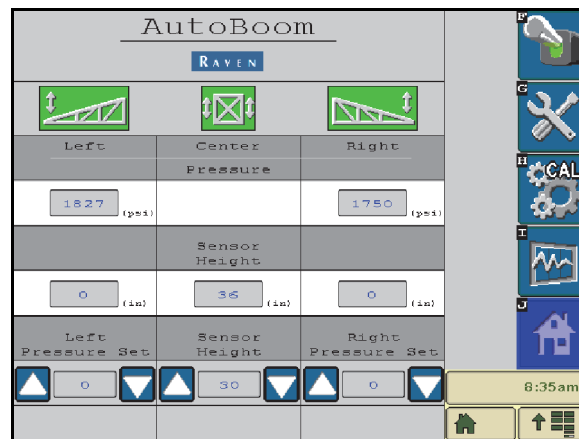


1. Touch the AutoBoom icon on the ISO terminal screen.



2. Select **AutoBoom ON** in the upper-right corner of the screen.

**Note:** The AutoBoom system is now powered on, but is not yet enabled.



3. Select the **Left**, **Right**, and **Center** icons to enable the corresponding boom sections.

**Note:** The booms can be disabled by de-selecting the Left, Right, and Center icons, selecting the toggle switch icon in the upper right corner, or by performing a machine tilt up function.

### Boom Adjustments When Approaching Headlands

When approaching the headlands to make a turn, the inside gauge wheel must be raised approximately six inches [15 cm] from the ground to prevent it from sliding sideways or backward, causing damage to the gauge wheel assembly. The fast-up feature may be used to raise the inside wheel in this situation.

### Center Rack Control (AutoBoom Enabled and Center Rack Control On) - If Equipped

**Note:** The machine may require the activation of a boom valve and/or master spray switch for the center rack control feature to engage.

**Note:** Consecutive up-taps or down-taps must be performed within 1.5 seconds of each other.

**Note:** Return to height and return to transport heights are measurements relative to the crop canopy, not necessarily ground level.



- **Center Down Switch** - A single down-tap will lower the center rack to the desired spray height, enable the center rack, and enable both booms.
- **Center Up Switch** - A single up-tap will disable the center rack and both booms. Two consecutive up-taps will raise the center rack to the desired transport height (if set). Four consecutive up-taps will raise the center rack to the maximum height, turn AutoBoom off, and preserve the new transport height as the maximum height.
  - Set a lower transport height - While the center rack is returning to transport, down- tap once on the center switch when the new transport height is reached.
  - Set the transport height to the maximum height - With the center rack positioned higher than the current transport height and with AutoBoom not currently returning to the transport height, up-tap twice on the center switch to move the center rack to the maximum height.

### Center Rack Control (AutoBoom Enabled and Center Rack Control Off) - If Equipped

**Note:** *The machine may require the activation of a boom valve and/or master spray switch for the center rack control feature to engage.*

**Note:** *Consecutive up-taps or down-taps must be performed within 1.5 seconds of each other.*

**Note:** *Return to height and return to transport heights are measurements relative to the crop canopy, not necessarily ground level.*

- **Center Down Switch** - Two consecutive down-taps will lower the center rack to the desired spray height and enable both booms.

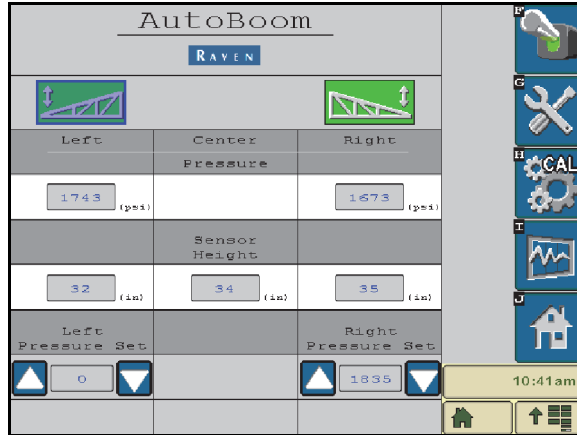
**Note:** *Center rack control will not be enabled since center rack control is off.*

- **Center Up Switch** - Two consecutive up-taps will disable both booms and raise the center rack to the desired transport height. Four consecutive up-taps will raise the center rack to the maximum height and turn AutoBoom off, preserving the new transport position as the maximum height.
  - Set a lower transport height - While the center rack is returning to transport, down-tap once on the center switch when the new transport height is reached.
  - Set the transport height to the maximum height - With the center rack positioned higher than the current transport height and with the AutoBoom not currently returning to the transport height, up-tap twice on the center switch to move the center rack to the maximum height.

## System Adjustments

During the calibration process, the AutoBoom system calculates a default Pressure Setting. Normally, the calculated value will be the level at which the machine should operate. However, at times an adjustment to the Pressure Setting may be necessary.

**Note:** *During routine operation, the gauge wheels should touch down momentarily, raise slightly, then lower back to the target height. Wheels should not continuously ride on the ground.*



1. From the AutoBoom home screen, locate the Left Press Set and Right Press Set icons.
2. Verify that AutoBoom is turned on, then select **Enable Left** or **Enable Right**, or tap the left and right boom down buttons on the joystick.
3. Exit the cab and physically lift the end of each boom up, watching the responsiveness of the booms.

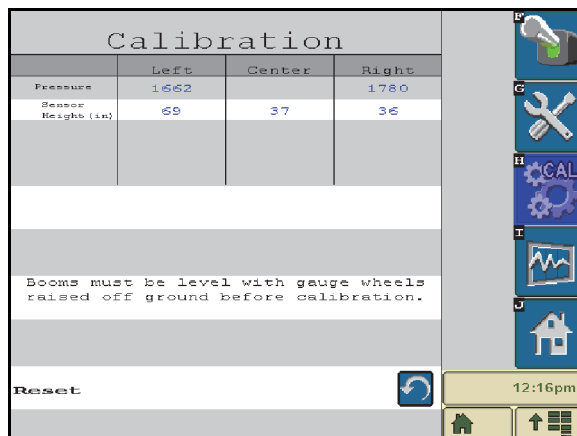
**Note:** The force required by the operator to lift the boom should never exceed 200 lbs [900 N].

4. Adjust the Pressure Setting of each boom as needed to optimize performance by highlighting the pressure set icon and using the + and - icons to adjust the setting.
  - Increasing the Pressure Setting makes the boom lighter and reduces down speed.
  - Decreasing the Pressure Setting makes the boom heavier and increases the down speed.
5. Select **Disable Left** or **Disable Right**, or tap the left and right boom up buttons on the joystick.
6. Select **OK**.

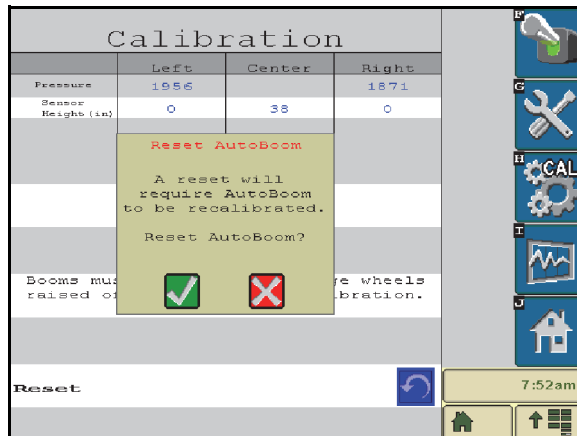
## Resetting Defaults

Although it is not normally necessary, there may be circumstances under which it may be necessary to reset the system defaults. Resetting the defaults erases all AutoBoom system settings and adjustments that have been performed. System calibration will be required after the defaults have been reset.

1. Select the CAL icon on the AutoBoom home screen. The following screen will appear:



2. Select the Reset icon. The following screen will appear:





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## CHAPTER

# 4

## UltraGlide

The UltraGlide AutoBoom system uses ultrasonic sensors to measure the boom's height above ground, and state-of-the-art hydraulics to maintain constant hydraulic pressure to the tilt cylinders. The UltraGlide AutoBoom system is ideal for use in pre-emergence and post-emergence applications.

**Note:** *Terrain conditions and the machine's hydraulic system dictate the actual speeds that can be achieved during application with an engaged AutoBoom system. Typically, rougher and varied field terrain require slower speeds while AutoBoom is engaged.*

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### UltraGlide Kit Contents

In addition to the kit components listed below, one of the following harness cables is required for installation of the ISO AutoBoom system:

Machine Description	Part Number
Pull-type sprayer without ISO product control	115-0171-974
	115-0171-988
	115-0171-989
	115-0171-975
	115-0171-990
Pull-type sprayer with Raven or John Deere product control	115-0171-931
	115-0171-932
	115-0171-933
	115-0171-960
	115-0171-961
Sprayer with John Deere product control	115-0171-991

The components in the following tables are required for installation of the ISO AutoBoom system. Locate the type of sprayer the system is being installed on for the list of components applicable to the machine.

**TABLE 1. Pull-Type Sprayer (P/N 117-0137-041)**

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1
Terminator - ISO	063-0172-964	1
Cable - 70' Ultrasonic Sensor Extension	115-0171-527	2
Cable - Raven ISO to Passive Terminator	115-0171-963	1
Cable - AutoBoom Node/Valve	115-0230-085	1

**TABLE 2. John Deere 4700/4710 with GS2 or Newer (P/N 117-0137-053)**

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1
Cable - 60' Ultrasonic Sensor Extension	115-0230-051	2
Cable - ISO Can Bus Terminator Adapter	115-0230-024	1
Cable - JD SP Power Harness ISO AutoBoom	115-0230-025	1
Cable - JD SP Valve Connection ISO AutoBoom	115-0230-053	1

**TABLE 3. AGCO Self-Propelled with GTA (P/N 117-0137-043)**

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1

**TABLE 3. AGCO Self-Propelled with GTA (P/N 117-0137-043)**

Item Description	Part Number	Qty.
Cable - 70' Ultrasonic Sensor Extension	115-0171-527	2
Cable - Falcon II Rogator PowerGlide Plus/ UltraGlide ISO CAN Control Node	115-2001-041	1

**TABLE 4. John Deere 4720 and 4830 (2007) (P/N 117-0137-051)**

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1
Cable - 40' Ultrasonic Sensor Extension	115-0171-602	2
Cable - ISO Can Bus Terminator Adapter	115-0203-024	1
Cable - JD SP Power Harness ISO CAN AutoBoom	115-0230-025	1
Cable - JD SP Valve Connection ISO CAN AutoBoom	115-0230-044	1

**TABLE 5. John Deere 4630, 4730, 4830 (Model Year 2008+), 4920 & 4930 (P/N 117-0137-042)**

Item Description	Part Number	Qty.
Manual - ISO AutoBoom Calibration & Operation	016-0130-078	1
Node - ISO AutoBoom CAN Control	063-0130-016	1
Cable - 70' Ultrasonic Sensor Extension	115-0171-527	2
Cable - ISO Can Bus Terminator Adapter	115-0203-024	1
Cable - JD SP Power Harness ISO CAN AutoBoom	115-0230-025	1
Cable - JD SP Valve Connection ISO CAN AutoBoom	115-0230-026	1



# UltraGlide Routine Operation

The UltraGlide AutoBoom system uses ultrasonic sensors to measure the boom’s height above ground, and state-of-the-art hydraulics to maintain constant hydraulic pressure to the tilt cylinders. The UltraGlide AutoBoom system is ideal for use in pre-emergence and post-emergence applications.

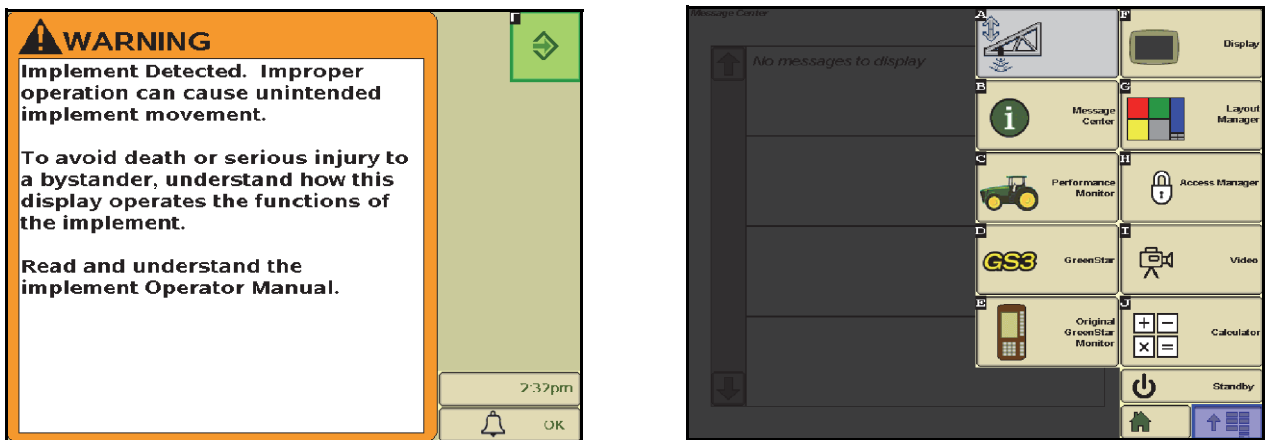
**Note:** *Terrain conditions and the machine’s hydraulic system dictate the actual speeds that can be achieved during application with an engaged AutoBoom system. Typically, rougher and varied field terrain require slower speeds while AutoBoom is enabled.*

**Note:** *The VT must be instance 0 to be compatible with Raven ISO products.*

## AutoBoom Icons

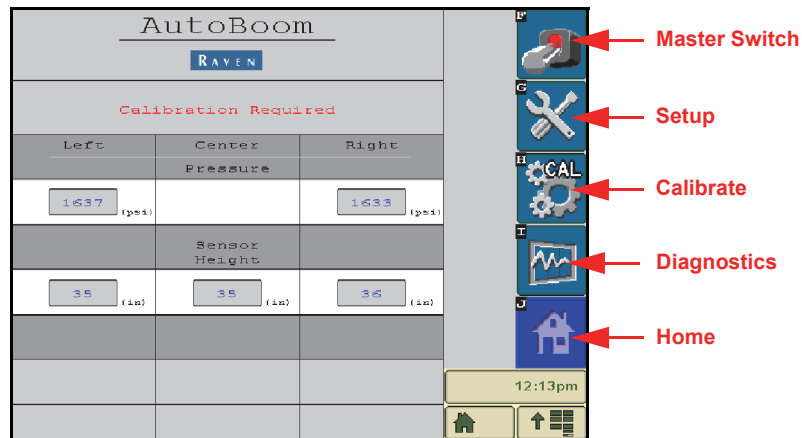
Once the AutoBoom node has been installed, the AutoBoom icons will be displayed on the Start-up screen, indicating the AutoBoom node has been detected.

FIGURE 1. Implement Detected



Refer to the icon definitions below when configuring the AutoBoom feature on the ISO terminal.

FIGURE 2. AutoBoom Home Screen

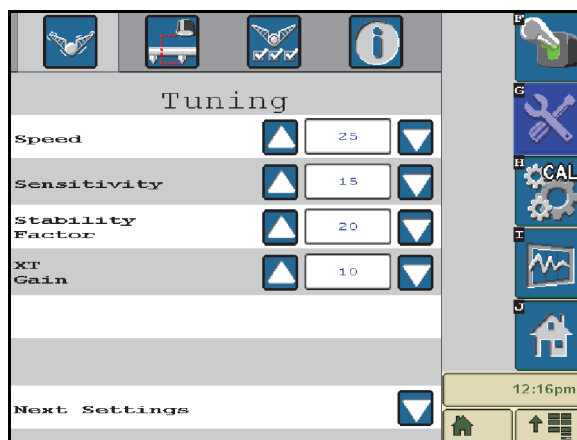


- Select the Master Switch icon to turn the AutoBoom system off and on.
- Select the Setup icon to access the setup tools.
- Select the CAL icon to access the Calibration screen.
- Select the diagnostics button to run the system diagnostic tools.
- Select the home button to return to the AutoBoom main menu.

## Setup Tools

The setup tools allow fine-tuning of stability control, minimum boom pressure, and sensor height offset parameters in the AutoBoom system. To access these tools, select the Setup icon. To adjust any of the ISO AutoBoom setup values, highlight the value and use the up and down arrows. To return to the AutoBoom home screen, select the Home icon.

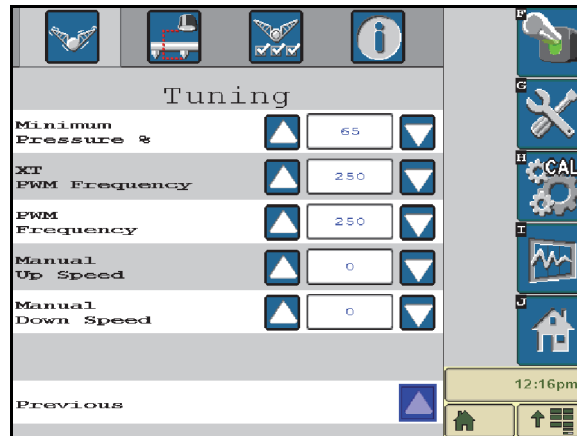
FIGURE 3. Tuning 1 Screen



- **Speed** - Controls how fast the boom will move away from an obstacle, and how much the boom over-shoots the target height. The Speed setting should be set so that the boom motion is smooth and the machine does not oscillate. Adjust the Speed setting as needed so that boom raise rates match hand movement rates, but so that the booms don't overreact and become unstable.
- **Sensitivity** - Allows the operator to adjust the sensitivity level of the sensors. If the Sensitivity setting is too high, the boom will appear unstable and jittery, reacting to slight changes in the target height or grass movement.
- **Stability Factor** - Allows fine-tuning of the rigidity of the machine's center rack. The default value of 20 is recommended for machines with a rigid center rack. A value of 5 - 14 is recommended for machines with center racks that float freely. Adjust this value as needed to prevent boom oscillation.
  - Stability settings of 0 disable the stability control completely, making the left and right booms completely independent of each other. When above target, the control of both booms is accelerated to increase the down speed. This setting is useful for machines that have a rigid center rack.
  - Stability settings of 1 - 99 will adjust the stability of the center section. Lower numbers cause the opposing boom that is not being controlled to counteract the movement of the controlled boom by raising to balance or stabilize the center section and to prevent undesired rotation or movement. While lower numbers allow the booms to react at the same rate and time, low settings may prevent the booms from lowering. Higher stability settings allow the booms to react independently from each other, but may cause the center section to oscillate, diminishing performance.

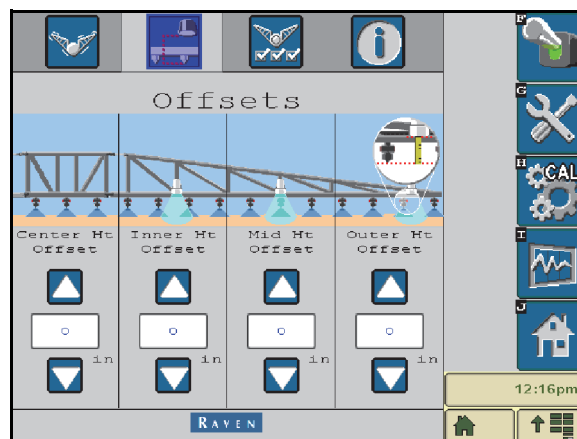
- **XT Gain** (if equipped with XT Control feature enabled) - Allows fine-tuning of the allowable rotation of the center section suspension. The default value is 10. A higher number will apply more pressure to the XT control cylinders when the chassis is maneuvering over challenging terrain.

FIGURE 4. Tuning 2 Screen



- **Min Pressure %** - Sets a low limit pressure, preventing the boom pressure from falling below a percentage of static pressure, overriding the control when necessary to maintain a low limit of pressure on each boom. Minimum Pressure % also prevents the booms from resting on the stops for travel-limited booms.
- **XT PWM Freq** - Sets the frequency of the PWM signal to the XT proportional control valve. The default value is 250 Hz.
- **PWM Frequency** - Sets the frequency of the PWM signal to the proportional control valve. The default valve value of 60 Hz is recommended with AutoBoom valves with square coils and 250 Hz for valves with round coils.
- **Manual Dn Speed and Manual Up Speed** - Allows the speed at which the AutoBoom hydraulic valve manually raises and lowers the booms to be adjusted on machines that do not have their own hydraulic control. **Leave the setting at the default of 0 if the machine is equipped to hydraulically control boom functions.**

FIGURE 5. Offsets Screen



- **Height Offsets (Center, Inner, Mid, and Outer)** - Allows sensor heights to be adjusted according to the sensor mounting location. Enter a positive value if the sensors are mounted above the sprayer tips, and a negative value if the sensors are mounted below. Refer to the Sensor Height Offsets section on page 45 for more information.

FIGURE 6. Features



- **Outer Sensors** - Allows the operator to disable outer boom sensors if the machine is equipped with optional inside boom sensors. This feature is useful when the outer boom tips are folded in, and only the inside boom sensors are needed for control.

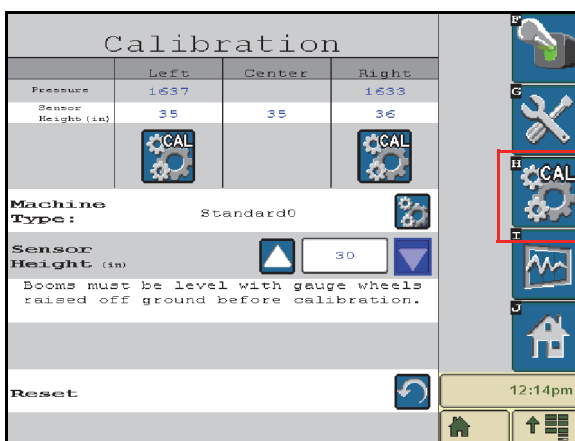
**Note:** The system may need to be re-calibrated if the outer sensors option is disabled, then re-enabled.

- **Center Rack Control** - Turns the center rack control on and off. Selecting Center Rack Control ON allows center rack control to be enabled on the field computer/console or the machine's switch. If Center Rack Control OFF is selected, center rack control cannot be used.

**Note:** Center rack control should only be turned on if the machine is equipped with a center rack sensor and the appropriate cabling that allow center rack control.

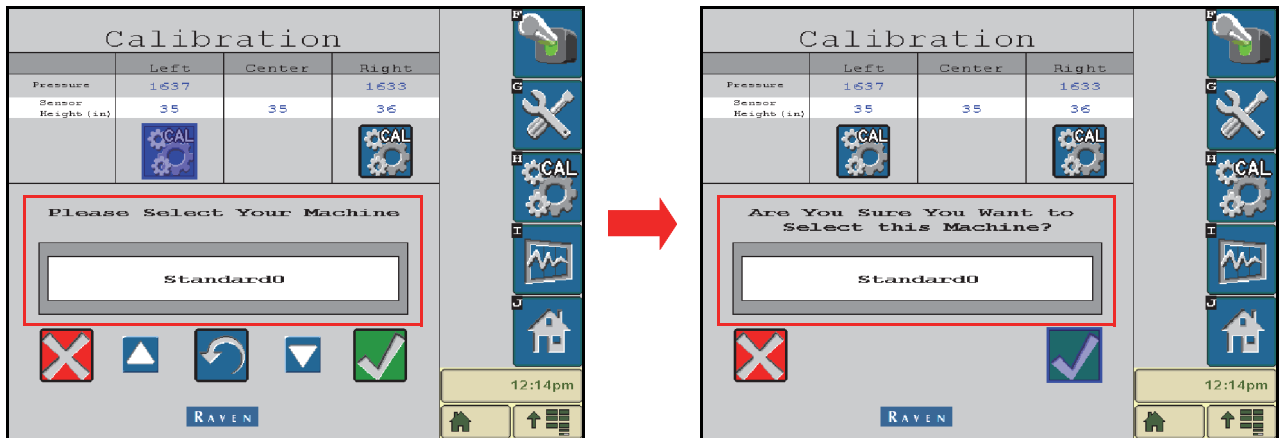
- **XT control** - Turns the XT feature on and off.

FIGURE 7. Calibration Screen



- **Machine Selection Database** - The machine type can be chosen by selecting the **CAL** button on the right side of the screen. The machine selection database contains a list of machines that, when selected, automatically populates the ideal settings for that specific machine.

FIGURE 8. Machine Selection Screen



If the specific machine is not listed, choose the profile that best fits the machine:


- Standard0 - Generic profile suitable for most machines.
- Standard100 - Generic profile for machines with heavy booms that require more pressure to lift the booms quickly. Select this profile if the static pressure required to hold the booms level is 1800 psi [12,411 kPa] or greater.
- Standard200 - Generic profile for machines with lighter booms that require less pressure to lower the booms at a faster rate. Select this profile if the static pressure required to hold the booms level is 900 psi [6205 kPa] or lower.

## Diagnostic Tools

Integrated diagnostic tools allow the status of all AutoBoom inputs and outputs to be viewed on the ISO terminal display. To access the diagnostic tools, select the Diagnostics icon. The following screen will appear:

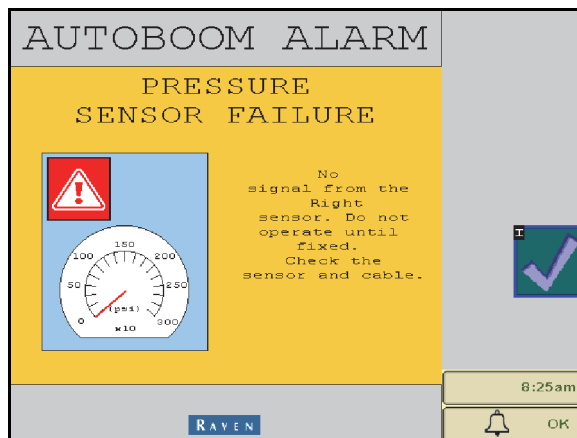
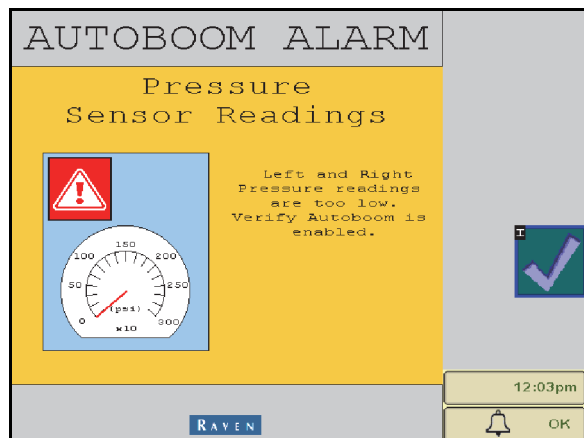
AutoBoom Diagnostics			
	Left	Center	Right
Pressure	1805		1681
Sensor Height (in)	35	33	39
Mid Ht	0		0
Inner Ht	30		39
Raise	OFF	OFF	OFF
Lower	OFF	OFF	OFF
Unfold	OFF		OFF
Blocker	ON	LS OFF	ON
PWR	45.36		41.54
Base PWR	44.28		42.19
Stats	0		0
RT PWR	28.00		52.72
Roll Rate		0.6	
Degree		- 7.7	

- **Pressure, Sensor Ht, Mid Ht, and Inner Ht** - Indicate the status of the corresponding sensors.
- **Raise and Lower Buttons** - Indicate the status of the boom switches. When using the machine's manual control functions, the corresponding boom switch will indicate On. These buttons can also be used to troubleshoot wiring or hydraulic issues by using the AutoBoom valve for raise/lower functions and by using the machine's hydraulic valve for center rack functions (if the machine is equipped with center rack control cabling).

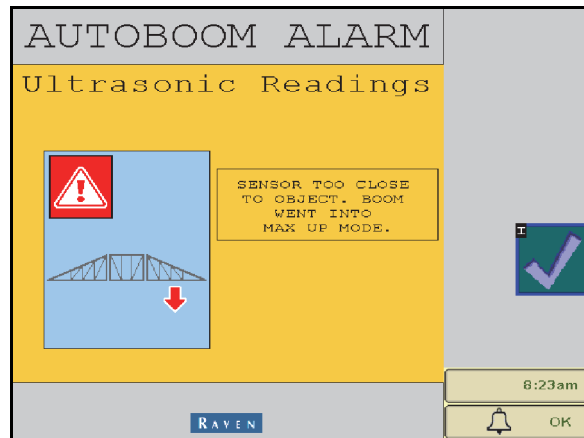
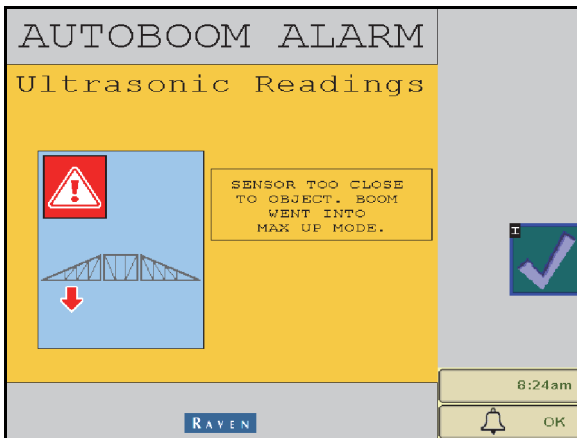
- **Unfold** - If the machine is equipped with a proximity sensor or AutoFold, Unfold communicates the status of the booms. OFF indicates that the booms are unfolded, and ON indicates that the booms are folded. If the machine is not equipped with a proximity sensor or AutoFold, Unfold will always indicate OFF.
- **Blocker** - Indicates the status of the double-blocker output. Blocker will indicate ON when individual booms are engaged or calibrating.
- **PWM%** - Indicates the duty cycle to the proportional valves. This value will be 0 if the individual booms are disengaged, and will vary in output up to 100 when AutoBoom is engaged and the system is operating.
- **Base PWM%** - Indicates the system's calculated static duty cycle to maintain the set height or pressure. This number will typically change slowly from 0 - 5 points during routine operation.
- **Stats** - Reflects the boom performance. This value is for Raven use only.
- **XT PWM%** - Indicates the duty cycle of the XT control proportional valves. This value will be 0 if the XT control is not enabled, and can vary in output up to 100 when XT control is engaged and operating. A minimum value will be maintained when the XT control system is enabled, and move slightly when the boom is re-centering.
- **Roll Rate** - Indicates the measured chassis roll rate. This value will change when the machine's chassis is rolling left or right. The roll rate is measured in degrees per second.
- **Deg** - Allows the operator to see the degrees of rotation while operating the manual XT control.
- **Manual Control Buttons**  - Used to actuate the corresponding boom functions. They can be used to troubleshoot wiring or hydraulic issues.

## Alarms

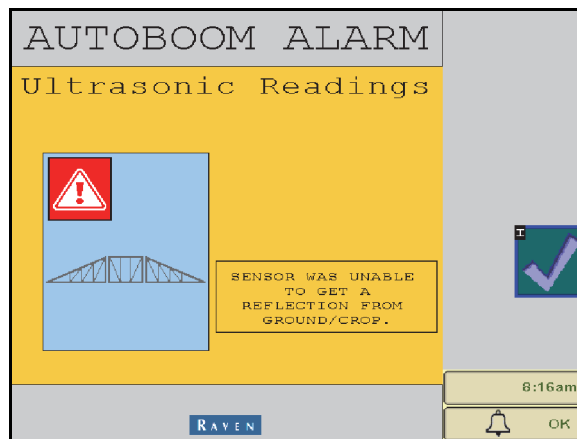
Alarm tones will not sound if the operator is navigating through any of the configuration menus. However, the enable/disable alarms will always sound when appropriate.



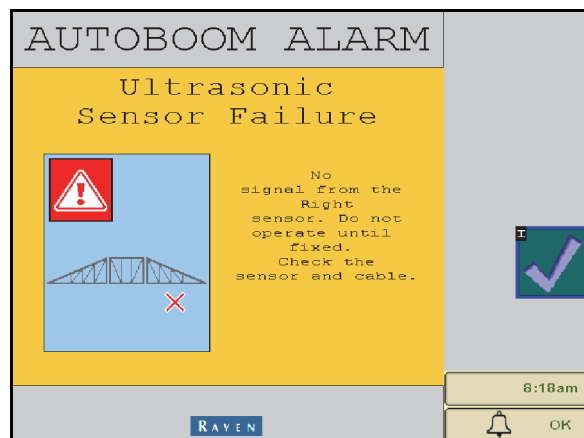
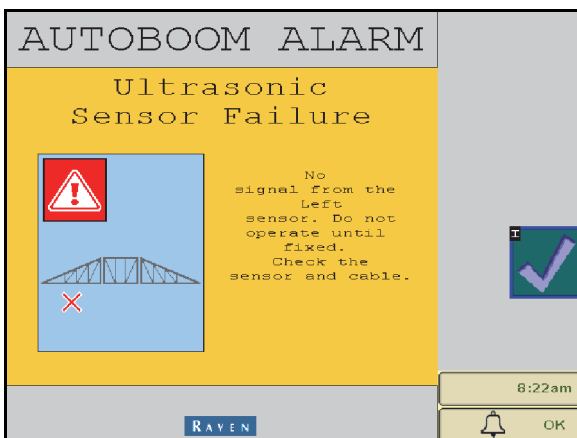
- **Low pressure alarms** - When the pressure in the left or right tilt cylinders is low, the low pressure alarm will sound. The alarm is a steady tone, and will stop immediately after pressure is restored to the system.
- **Pressure sensor failure alarms** - The pressure sensor failure alarm occurs immediately when a pressure sensor is not detected. The alarm is a steady tone, and will stop immediately after the sensor is located.



- **Ultrasonic sensor - too low alarm** - This alarm occurs if the ultrasonic sensor is closer than five inches [13 cm] to the ground for 1/2 a second.

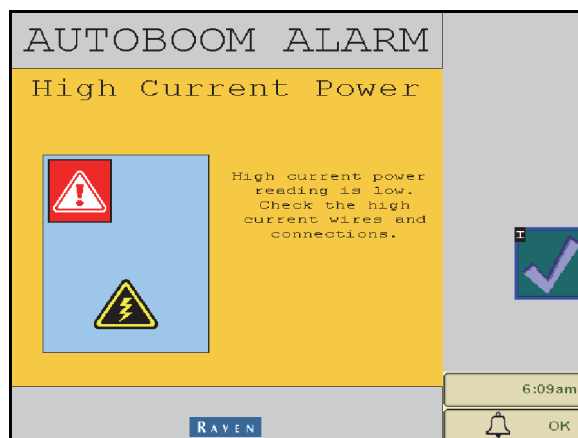


- **Ultrasonic sensor - too high alarm** - This alarm occurs when the ultrasonic sensor is higher than 65 inches [165 cm] from the ground for five seconds.



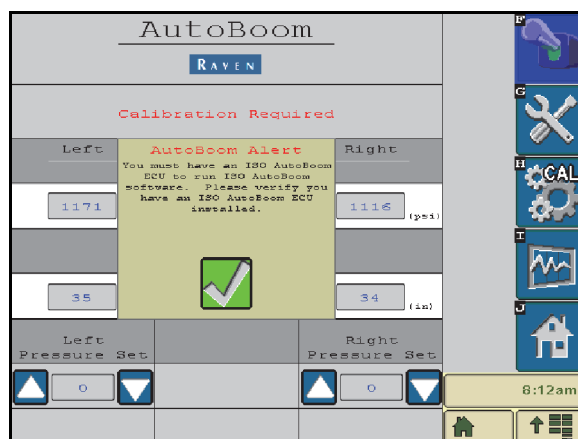
- **Ultrasonic sensor - failure alarm** - This alarm occurs immediately when an ultrasonic sensor is not detected. The alarm is a steady tone, and will stop immediately after the sensor is located.

FIGURE 9. Low HC Power



- **Low HC Power** - This alarm occurs when the voltage to the node drops below 12 volts. This alarm is a steady tone, and stops immediately when proper voltage is restored to the node.

FIGURE 10. Incorrect Node Prompt



- **Incorrect Node Prompt** - This prompt appears if an incorrect ECU is connected to the system. Ensure the ISO AutoBoom ECU is installed.
- **Other tones** - When enabling the AutoBoom system in automatic mode via the machine's boom control functions or switches, a single beep will occur. When disabling AutoBoom, a double beep will sound.

## AutoBoom Pre-Calibration Diagnostics

While every effort has been made to properly label and document connections for the hydraulic and electrical components of the AutoBoom system, boom function connections may not be identified due to changes in the make and model of the machine. This makes it especially important to trace the hoses from the connection points and verify the electrical connections are correct to ensure proper AutoBoom system operation. In order to verify connections, it is necessary to perform a pre-calibration diagnostic test.

1. Select Setup icon.
2. Select Diagnostics icon. The following screen will appear:



AutoBoom Diagnostics			
	Left	Center	Right
Pressure	1805		1681
Sensor Height (in)	35	33	39
Mid Hc	0		0
Inner Hc	30		39
Raise	OFF	OFF	OFF
Lower	OFF	OFF	OFF
Unfold	OFF		OFF
Blocker	ON	LS OFF	ON
PUM	45.36		41.54
Base PUM	44.28		42.19
Stare	0		0
XT PUM	25.00		52.72
Roll Rate		0.6	
Degree		- 7.7	

12:19pm

- Verify that the following components on the ISO terminal screen are displayed correctly and change when raising and lowering the booms via the machine's controls and the AutoBoom manual functions:
  - Pressures
  - Sensor heights
  - Right and left raise/lower functions
  - Center raise/lower functions
  - Fold/unfold functions
  - Manual raise and lower buttons

## Calibration

After the AutoBoom installation is complete, it is necessary to calibrate the AutoBoom system before use. AutoBoom calibration requires pressure in the machine's cylinders and enough boom travel to allow the system to find the system base duty cycles for operation. Booms must be free to travel ten inches [25 cm] up or down without reaching the tops or bottoms of the cylinder stops.

During calibration and operation, it is important to keep the machine running at a sufficient engine RPM so that the hydraulic pump is able to supply a full flow to the hydraulic system.

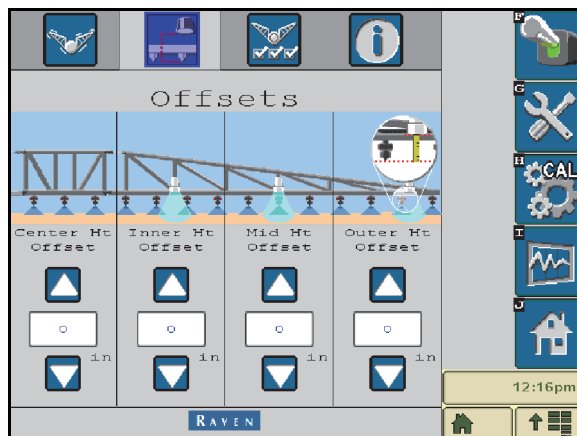
**Note:** *If the machine has an open center hydraulic system, or the type of hydraulic system is unknown, all calibration procedures should be performed with the machine operating at the normal operating engine RPM.*

**Important:** *Be sure that the area is clear of people and obstructions before beginning the calibration process.*

- Move the machine to a flat area.
- Verify that AutoBoom is turned on.

- Verify that the booms are unfolded, and lower the center rack.

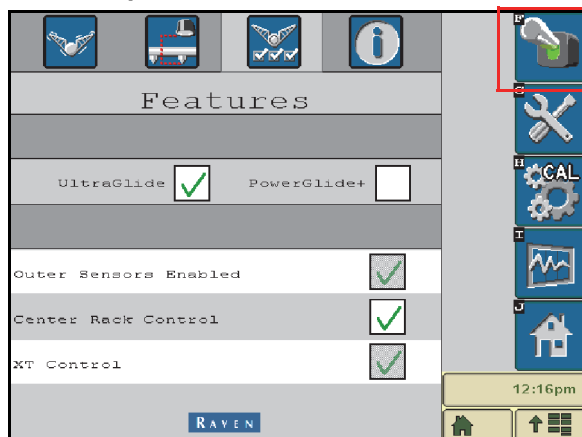
**Note:** If the booms do not go over center or are travel limited, raise the booms so that the boom tips are approximately ten inches [25 cm] above the horizontal position and lower the center section to approximately 20 inches [50 cm].



- Using a tape measure, measure the distance from the bottom of the sensor to the spray nozzle tip.
- Access the AutoBoom Setup screen.
- Adjust the vertical sensor height offset settings in the ISO terminal to sensor position as measured in step 4.
  - Positive offsets indicate the sensor surface is located above the nearest spray tips.
  - Negative offsets indicate the sensor surface is located below the nearest spray tips.
  - Inner, outer, and center offsets are not required to be the same across the width of the machine, but they must be correctly measured relative to the spray tips.
- Raise the boom tips to approximately the target height.

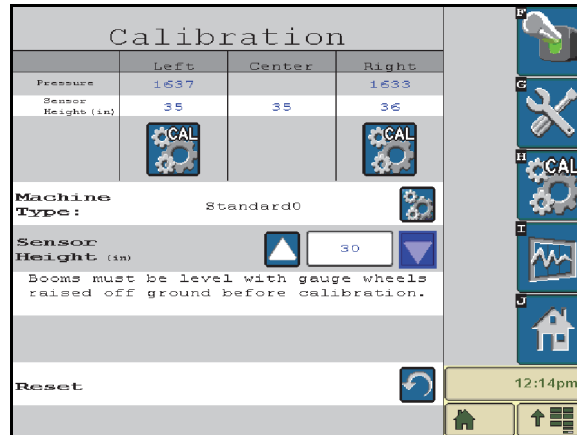
**Note:** The default target height is 30 inches [76 cm]. Verify that the booms are not fully raised to the boom stops. If gauge wheels are installed, the setting must be adjusted to 40 - 45 inches [100-115 cm] to prevent the wheels from touching the ground during the system calibration.

- Select the **Features** page in the **Setup** menu..



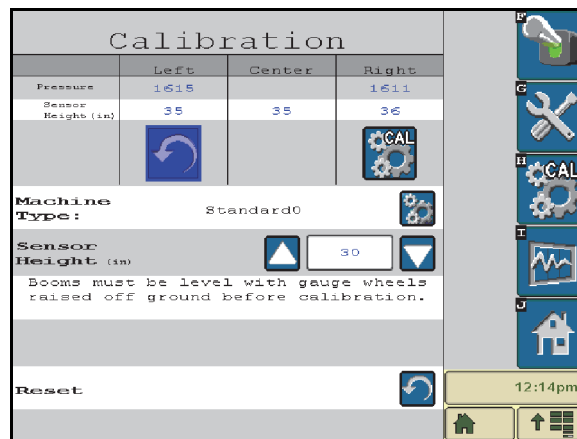
- Select **UltraGlide** from the Mode section and turn AutoBoom on in the upper-right corner.

10. Select **CAL**. The following screen will appear:

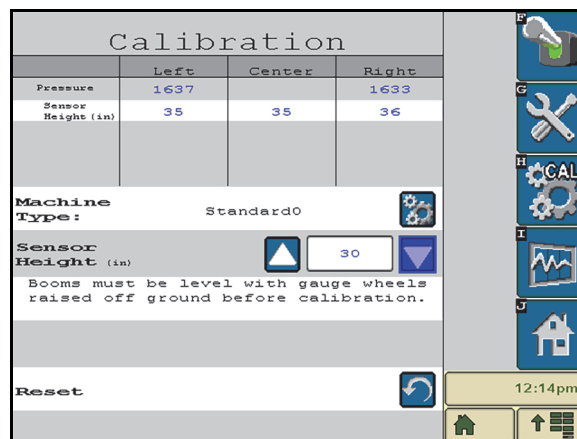


11. Select the left boom calibration icon to begin the calibration of the left boom.

**Note:** The left boom will raise and then lower. This is a normal part of the calibration process. During the calibration process, the following screen will be displayed:

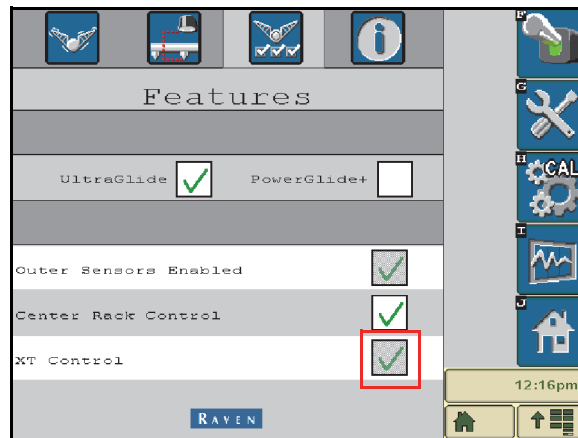


12. Repeat steps 9 - 10 above to calibrate the right boom. Once the right boom calibration process is complete, the following screen will appear:

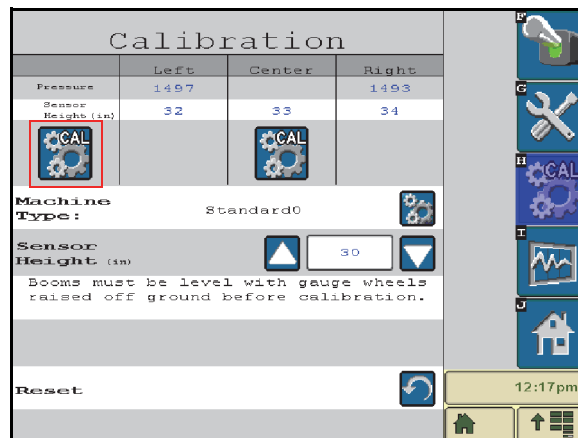


13. Select the **Home** icon.

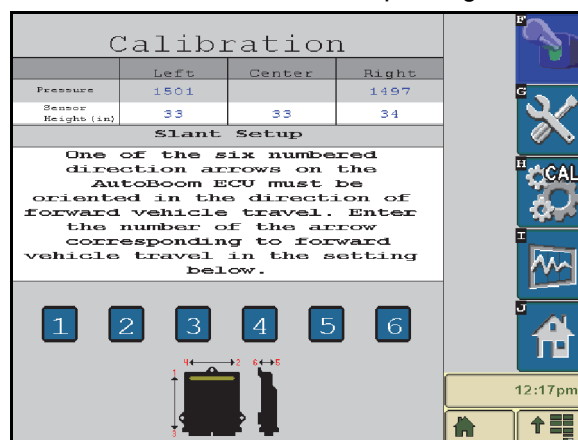
## XT Control Calibration



1. Verify the **XT Control** feature is turned on in the Features screen in the Setup menu.
2. Select the CAL icon on the Home screen.



3. Select the CAL icon on the far-left side of the screen.
4. Enter the number of the direction arrow on the node that is pointing forward.



**Note:** The boom tips may raise automatically to allow for full rotation of the center section. Pressure in one XT cylinder will increase until the center section begins to rotate slightly. The center section

will then rotate fully clockwise then counterclockwise to calibrate the center rotation sensor position.

**Note:** The center rotation sensor may be re-centered by recalibrating the XT control or by manual adjustment of the centering bolt while the center section is confirmed to be in the center position.

## Center Rack Control Calibration

There are many different valve configurations used to control the machine's center rack functions. The AutoBoom system must "learn" which of the machine's solenoids are used to raise and lower the booms. Complete the following steps to calibrate the center rack control feature after the individual booms have been calibrated.

1. Press and hold the center rack raise button on the machine's control panel or joystick for six seconds so that the center rack raises.

**Note:** The center rack may reach the upper limit of travel during this time, but continue holding the button until the full six seconds has passed.

2. Press and hold the center rack lower button on the machine's control panel or joystick for six seconds so that the center rack lowers.

**Note:** The center rack may reach the lower limit of travel during this time, but continue holding the button until the full six seconds has passed.

## Routine Operation

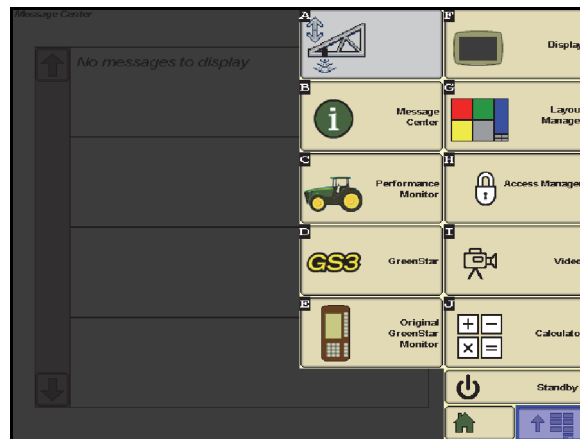
### Joystick Functions

- When AutoBoom control is on, control of each boom can be enabled or disabled via the ISO terminal or by tapping the sprayer's switch functions (if equipped).

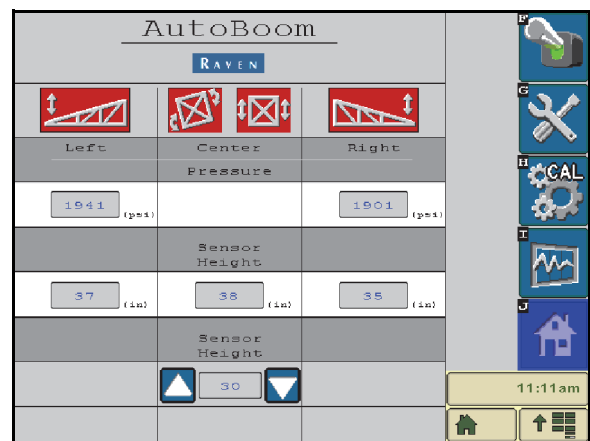
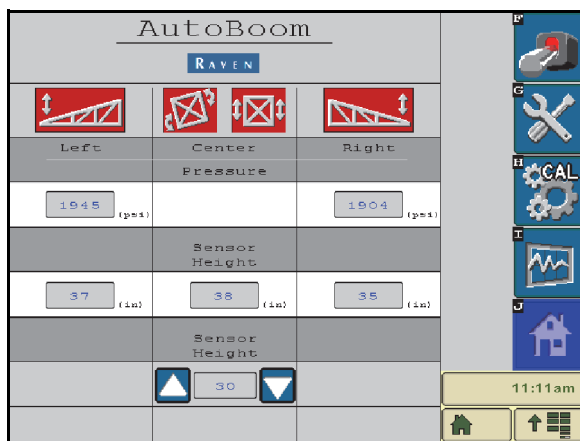
**Note:** Pressing the down function for longer than 1/2 a second will switch the function to manual control. The operator must tap the down function to enable AutoBoom.

- A single up-tap on the sprayer's switch functions disables AutoBoom on that boom.
- A single down-tap on the sprayer's switch functions enables AutoBoom on that boom.

## Enabling AutoBoom via the VT Display

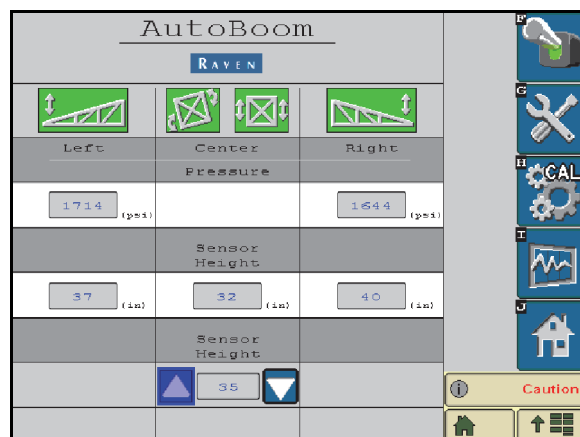


1. Touch **AutoBoom** icon on the VT display screen.



2. Select **On** in the upper-right corner of the screen.

**Note:** The AutoBoom system is now powered on, but is not yet enabled.



3. Select the **Left** and **Right** icons to enable the booms.

**Note:** *The booms can be disabled by deselecting the Left and Right icons, selecting the toggle switch icon in the upper right corner, or by performing a machine tilt up function.*

### Boom Adjustments When Approaching Headlands (If Equipped with Gauge Wheels)

When approaching the headlands to make a turn, the inner gauge wheel must be raised approximately six inches [15 cm] from the ground to prevent it from sliding sideways or backward, causing damage to the inner gauge wheel assembly.

### Center Rack Control (AutoBoom Enabled and Center Rack Control On)

**Note:** *The machine may require the activation of a boom valve and/or master spray switch for the center rack control feature to engage.*

**Note:** *Consecutive up-taps or down-taps must be performed within 1.5 seconds of each other.*

**Note:** *Return to height and return to transport heights are measurements relative to the crop canopy, not necessarily ground level.*

- **Center Down Switch** - A single down-tap will lower the center rack to the desired spray height, enable the center rack, and enable both booms.
- **Center Up Switch** - A single up-tap will disable the center rack and both booms. Two consecutive up-taps will raise the center rack to the desired transport height. Four consecutive up-taps will raise the center rack to the maximum height, turn AutoBoom off, and preserve the new transport height as the maximum height.
  - Set a lower transport height - While the center rack is returning to transport, down-tap once on the center switch when the new transport height is reached.
  - Set the transport height to the maximum height - With the center rack positioned higher than the current transport height and with AutoBoom not currently returning to the transport height, up-tap twice on the center switch to move the center rack to the maximum height.

### Center Rack Control (AutoBoom Enabled and Center Rack Control Off)

**Note:** *The machine may require the activation of a boom valve and/or master spray switch for the center rack control feature to engage.*

**Note:** *Consecutive up-taps or down-taps must be performed within 1.5 seconds of each other.*

**Note:** *Return to height and return to transport heights are measurements relative to the crop canopy, not necessarily ground level.*

- **Center Down Switch** - Two consecutive down-taps will lower the center rack to the desired spray height and enable both booms.

**Note:** *Center rack control will not be enabled since center rack control is off.*

- **Center Up Switch** - Two consecutive up-taps will disable both booms and raise the center rack to the desired transport height. Four consecutive up-taps will raise the center rack to the maximum height and turn AutoBoom off, preserving the new transport position as the maximum height.
  - Set a lower transport height - While the center rack is returning to transport, down-tap once on the center switch when the new transport height is reached.

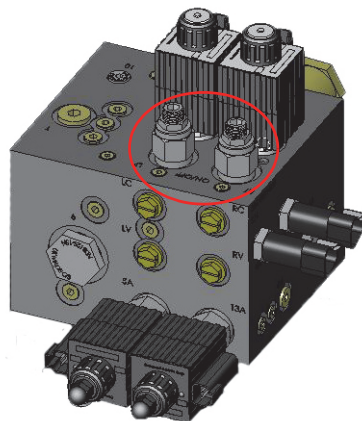
- Set the transport height to the maximum height - With the center rack positioned higher than the current transport height and with the AutoBoom not currently returning to the transport height, up-tap twice on the center switch to move the center rack to the maximum height.

### Operating the UltraGlide AutoBoom System in PowerGlide Plus Mode (Square Coils on the AutoBoom Valve)

The UltraGlide AutoBoom system is also capable of operating in the PowerGlide Plus mode. In addition to the AutoBoom valve modification listed below, a gauge wheel kit is required for the system to operate in the PowerGlide Plus mode. For available kits and ordering information, contact your local Raven dealer

Complete the following steps to convert the UltraGlide AutoBoom valve to the PowerGlide Plus Mode.

FIGURE 11. Needle Valves on the UltraGlide AutoBoom Valve



1. Locate the needle valves in Ports RT and LF on the AutoBoom valve.
2. Loosen the jam nuts on the needle valves.
3. Use an Allen wrench to turn the set screws counter-clockwise until they won't move any further.
4. Tighten the jam nuts.

**Note:** When converting the AutoBoom system back to UltraGlide, the needle valves must be screwed all the way back in (clockwise).

FIGURE 12. ISO Terminal Programmed to Run in PowerGlide Plus Mode





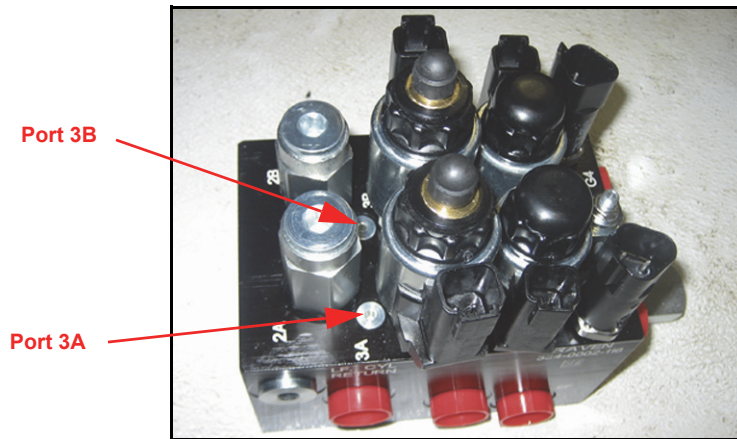
5. Select PowerGlide + mode in the Features page of the Setup menu.

**Note:** When converting the AutoBoom system back to UltraGlide, the ISO terminal display must show the UltraGlide mode selected.

### Operating the UltraGlide AutoBoom System in PowerGlide Plus Mode (Round Coils on the AutoBoom Valve)

Before operating the system in the PowerGlide Plus mode, it is necessary to remove orifice fittings from the valve in the AutoBoom system. Failure to remove these fittings from the valve will restrict the down speed of the booms when the system is enabled.

FIGURE 13. Port 3A and 3B Location



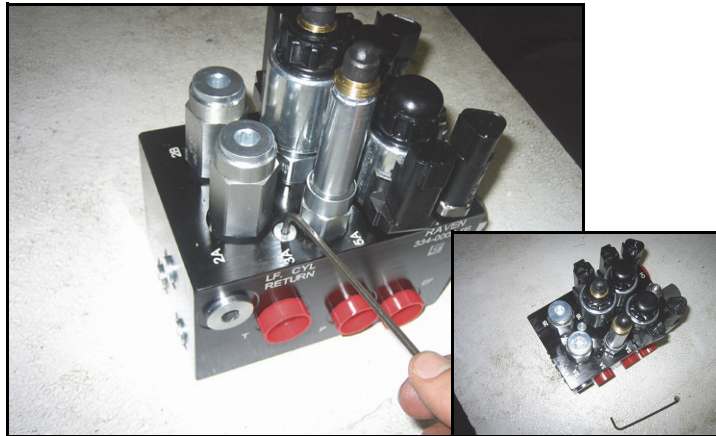
1. Locate Ports 3A and 3B on the AutoBoom valve.

FIGURE 14. Coil Removed from the AutoBoom Valve



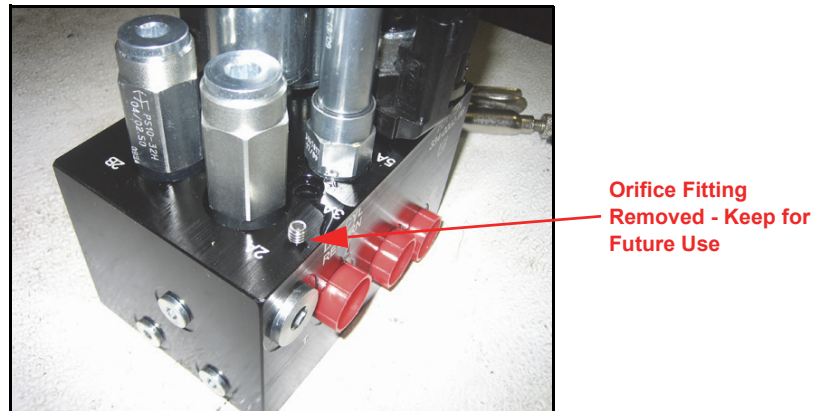
2. Remove the coils from the solenoids near Ports 3A and 3B to gain easy access to those ports.

FIGURE 15. Port Plugs Removed from the AutoBoom Valve



3. Use an Allen wrench to remove the plugs from Ports 3A and 3B.

FIGURE 16. Orifice Fitting Removed from the AutoBoom Valve



4. Remove the orifice fittings from Ports 3A and 3B.

**Important:** Tip the AutoBoom valve on its side and use the Allen wrench to remove the orifice from the cavity, taking care not to let the fitting fall into the valve.

FIGURE 17. Port Plug Reinstalled on the AutoBoom Valve



5. Use the Allen wrench to reinstall the port plugs on Ports 3A and 3B of the AutoBoom valve.

FIGURE 18. Coil Reinstalled on the AutoBoom Valve



6. Reinstall the coils on the solenoids of the AutoBoom valve.

**Note:** When converting the AutoBoom system back to UltraGlide, the orifice fittings must be reinstalled.

FIGURE 19. ISO Terminal Programmed to Run in PowerGlide Plus Mode

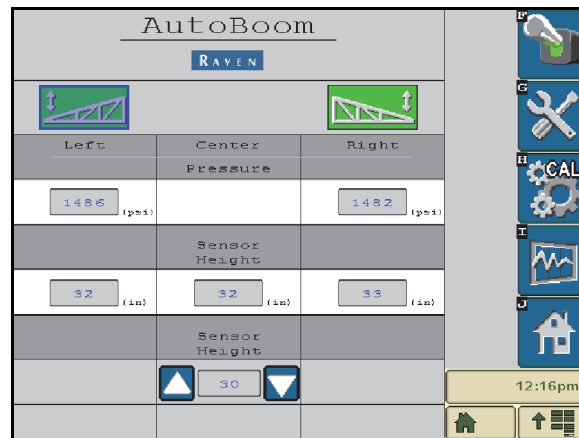


7. Select PowerGlide + mode in the Features page of the Setup menu.

**Note:** When converting the AutoBoom system back to UltraGlide, the VT display must show the UltraGlide mode selected.

## System Adjustments

**Note:** *AutoBoom must be enabled after both booms have been calibrated in order to make system adjustments.*

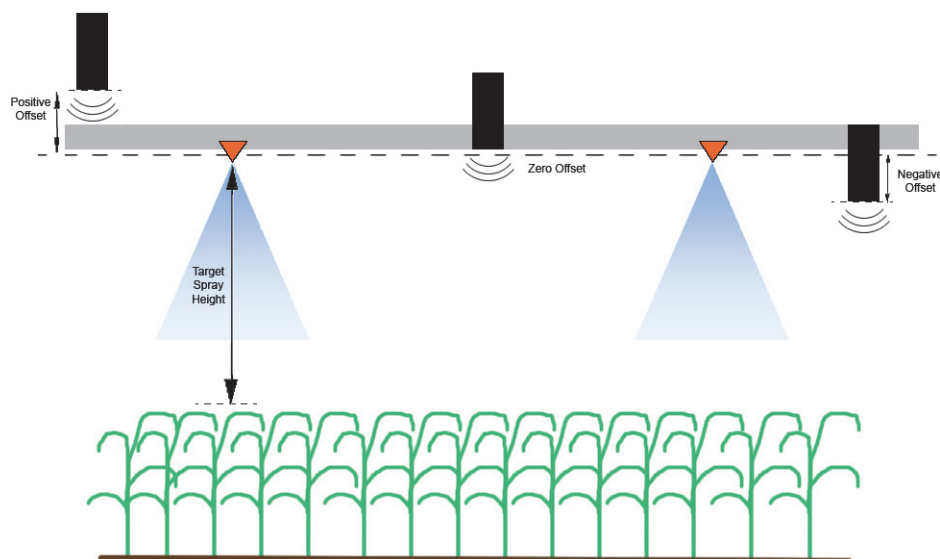


### Ultrasonic Sensor Height Offsets

Ultrasonic sensor height offset adjustments are used to compensate for the difference between the height of the sensor surface and the height of the spray tip. The offset height is calculated by measuring the distance from the bottom of the sensor to the height of the crop, measuring the distance between the spray tip to the height of the crop, and then subtracting the spray tip distance from the sensor distance. Refer to the diagram below to determine whether the offset value should be positive or negative.

**Note:** *The maximum offset height value is 30 inches [76 cm].*

**Note:** *Ultrasonic sensors will react to the first object that reflects an echo, whether it is the ground or the crop. For row-crop situations, it may be beneficial to adjust the sensor positions to directly over a row, or add additional boom sensors.*



- Touch up arrow in the Sensor Height section to increase the value representing the distance between the sensor and the ground.
- Touch down arrow in the Sensor Height section to decrease the value representing the distance between the sensor and the ground.

**Note:** *On machines with travel-limited booms, center sensor height offsets may need to be entered as less than the measured value from the sensor to the ground to ensure the boom cylinders have sufficient pressure during operation.*

### Sensitivity

1. Place one hand at ground level below one boom sensor and raise it slowly (about one foot [30 cm] per second) to within 12 inches [30 cm] of the sensor surface.

**Note:** *The boom should react immediately and raise at approximately the same speed as your hand.*

2. Adjust the Sensitivity setting as needed to make the boom more or less reactive to hand motions.

**Note:** *The default setting is 15. If the Sensitivity is too high, the boom will appear unstable and jittery, reacting to slight changes in target height or crop movement. The typical Sensitivity setting that works best for most machines is 13 - 17. During routine operation, AutoBoom should be unresponsive to changes in height of 2" - 3" [5-8 cm], but should react quickly to changes of 5" [12 cm] or more.*

*For row-crop situations, or when crop conditions are sparse and not fully covering the ground, it may be beneficial to decrease the sensitivity so the boom is less reactive to sudden changes in crop height, and less likely to cause sudden movements that diminish performance.*

### Speed

The Speed setting controls how fast the boom will move away from an obstacle, and how much the boom overshoots the target height. The Speed setting should be set so that the boom motion is smooth and the machine does not oscillate. Adjust the Speed setting as needed so that boom raise rates match hand movement rates, but so that the booms don't overreact and become unstable.

1. Place one hand at ground level below one boom sensor and raise it quickly (about 2 feet [60 cm] per second) to within 12 inches [30 cm] of the sensor surface.

**Note:** *The boom should react immediately and adjust at a raise speed matching the hand movement, overshooting the new target height by one foot [30 cm] or less.*

2. Adjust the Speed setting as needed.

**Note:** *The default setting is 25. The Speed setting should be set so that the boom motion is smooth and the machine does not oscillate. The typical Speed setting that works best for most machines is 22 - 27, but can be much higher depending on the static pressures of the boom, boom geometry, and the Sensitivity settings.*

### Stability

1. Place one hand at ground level below one boom sensor and raise it quickly (about two feet [60 cm] per second) to within 12 inches [30 cm] of the sensor surface, while observing the movement of the opposite boom.

**Note:** *The opposite boom should raise slightly (usually no more than six inches [15 cm]) simultaneously.*



- Adjust the Stability setting to minimize movement of the opposite boom.

**Note:** Lower the Stability value to make the opposite boom more rigid, but keep the number high enough to allow for natural movement of the boom without affecting the chassis roll.

### Min Press %

**Note:** On machines with travel-limited booms, operate the AutoBoom system with center rack control enabled, or with the center sensor at or slightly below the target height to prevent the booms from continuously entering the Min Press % mode. This mode is for boom emergency protection only, and AutoBoom system should not be run in this mode during routine operation.

- Raise the center rack section to the target height, so that the booms and center rack are horizontal.
- Enable the AutoBoom system.
- Locate the Min Press % setting in the AutoBoom control menus.

**Note:** The default setting is 65.

- Increase the Min Press % value to approximately 80.
- Place one hand at ground level below one boom sensor and raise it slowly (about one foot [30 cm] per second) to within 12 inches [30 cm] of the sensor surface, or until the boom travels up approximately three feet [1 m] higher than the original target.
- Pull hand away, and verify that the booms lower slowly after a slight delay.

**Note:** If the booms do not lower, decrease the Min Press % setting value by one and repeat the steps above. Continue performing the Min Press % test until the booms begin to lower.

### XT Gain

Allows fine-tuning of the allowable rotation of the center section suspension. Higher XT Gain values cause the XT control to react more aggressively when chassis roll is sensed by the node and can cause the boom to be excessively rigid, possibly causing damage to the center rack. Lower XT Gain values cause the XT control to be less aggressive and can cause the system to be unresponsive, not controlling the suspension based on the chassis roll.

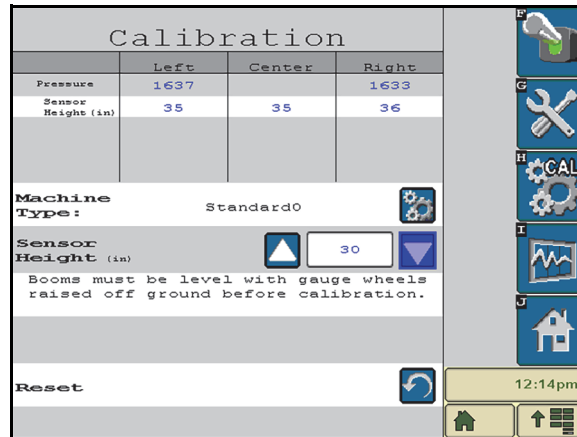
- Take the machine to the field and observe the rotation of the center section suspension with the AutoBoom system on and left, right, and XT control enabled.
- Adjust the XT Gain setting to cause the XT control to be more or less reactive.

**Note:** The default setting is 10.

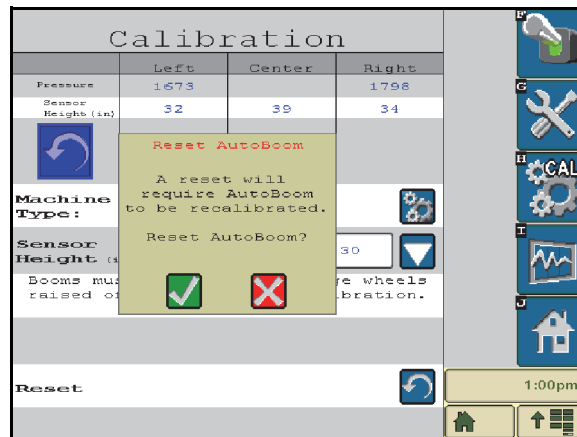
## Resetting Defaults

Although it is not normally necessary, there may be circumstances under which it may be necessary to reset the system defaults. Resetting the defaults erases all AutoBoom system settings and adjustments that have been performed. System calibration will be required after the defaults have been reset.

- Touch **CAL** on the ISO terminal screen. The following screen will be displayed:



2. Select the reset icon. The following screen will appear:

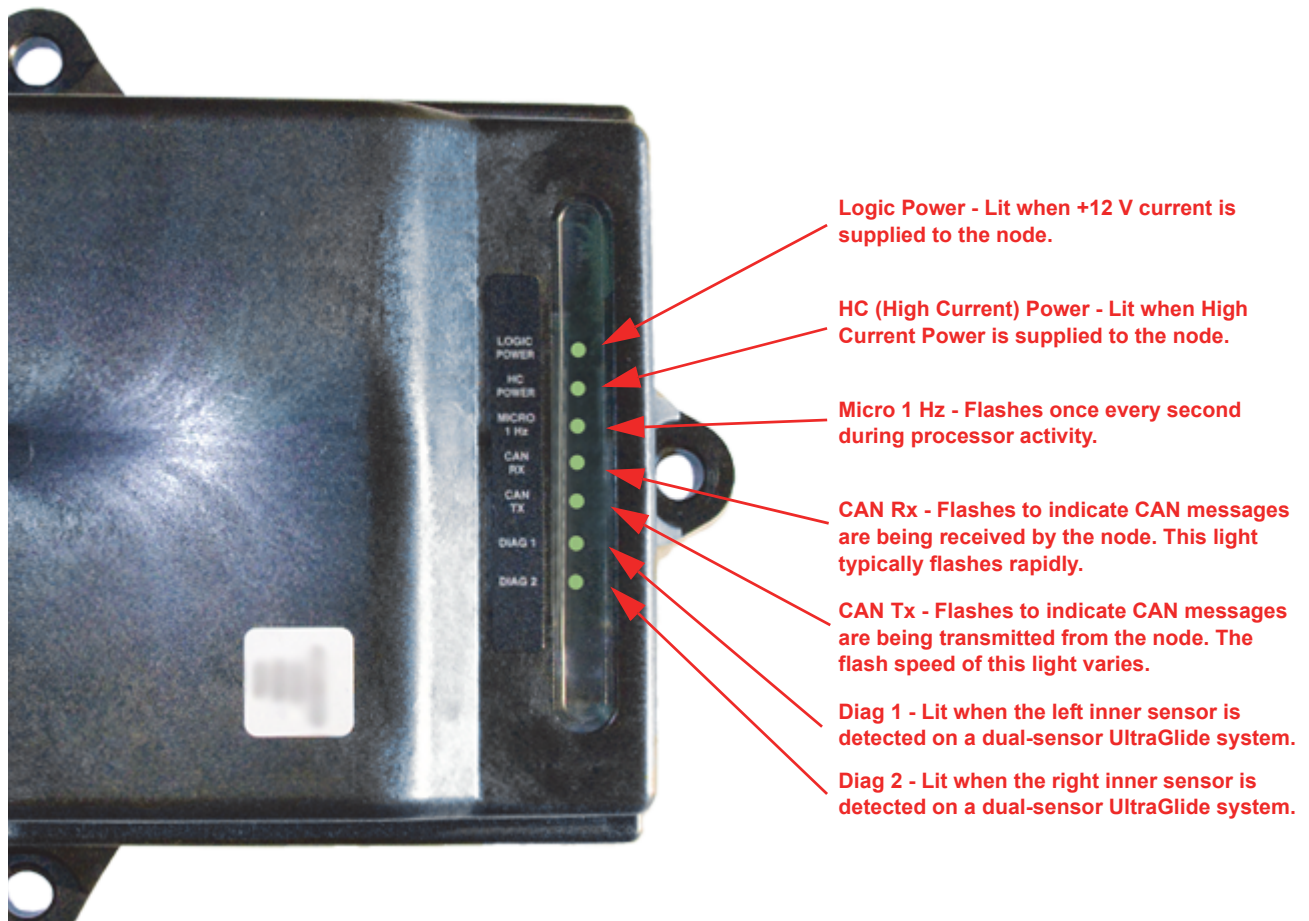


**Node**

The AutoBoom CAN control node features several green light-emitting diodes (LEDs) which may be used to diagnose issues within the AutoBoom system.

**Note:** *If the LEDs are not displayed as outlined in the figure below or are all on continuously, check the CAN connections and the control cable connections on the node. If the issue persists, contact your local Raven dealer for additional technical support.*

FIGURE 1. AutoBoom CAN Control Node LEDs





## AutoBoom Pre-Calibration Diagnostics

Problem	Possible Cause	Corrective Action
AutoBoom icon does not appear on the VT display.	The AutoBoom node is not being detected.	Check the electrical connections to the node including the power and CAN communication circuits.
	Power circuits are not properly connected.	<ul style="list-style-type: none"> <li>• Check power circuits.</li> <li>• Verify high current, logic, and CAN power systems are connected to the battery and switched properly.</li> </ul>
	Malfunctioning/improperly connected CAN system.	<ul style="list-style-type: none"> <li>• Verify the CAN system is installed correctly.</li> <li>• Verify terminators, cables, and connections are functioning.</li> </ul>
Pressures/heights are not being displayed in the correct units of measure.	System startup performed incorrectly.	Turn the power to the CAN system off, then on.
	Units of measure programmed incorrectly.	Reprogram the VT display to display the correct units of measure.
Pressures for the left and right boom are not displayed on the correct side.	The left and right pressure transducer connections are reversed.	Reverse the left and right transducer connections.
	The left and right hose connections are reversed.	Reverse the left and right cylinder connections on the AutoBoom valve.
Ultrasonic sensor heights are displaying incorrect locations.	The left and right ultrasonic sensor connections are reversed.	Reverse the left and right outer sensor connections on the AutoBoom harness cable.
	The outer sensors are connected to the inner sensor connectors.	Disconnect the sensors from the AutoBoom harness cable and connect the outer sensor connectors to the sensors.
Left, right and center raise/lower functions are not sensed correctly when the machine's functions are used.	The boom sense cables/connections are connected to the incorrect machine coils.	Check the connections to the machine's coils and trace the wiring to ensure the connections are made to the correct coils.
Center section will not raise/lower manually with the machine's functions.	The center rack boom sense cables are not connected to the correct center sense/control function.	Check the connections to the machine's coils and trace the wiring to ensure the connections are made to the correct coils.

## AutoBoom Calibration

Problem	Possible Cause	Corrective Action
Booms do not move during calibration.	The proportional/blocker connections are reversed or improperly connected.	Check the connections on the AutoBoom valve to ensure the harness cable connections are connected to the correct ports.
	The hydraulic connections are improperly connected.	Check the hydraulic connections.
	Booms are resting on their stops or the cylinders are fully extended.	Raise the booms and lower the center rack to ensure pressure is sufficient in the booms for calibration.
	The pressure transducer or connection is faulty.	Check the transducer connections to the AutoBoom harness cable.
	There is insufficient high current power.	Check the power and ground connections at the battery and AutoBoom node.
The booms fully raise during calibration and do not lower.	The inner and outer sensor connections are reversed.	Check the inner and outer sensor connections and reverse them if necessary.
	The ultrasonic sensors are giving poor readings.	<ul style="list-style-type: none"> <li>• Check the cabling to the sensors.</li> <li>• Verify the sensor surface is clean.</li> <li>• Verify no obstructions or boom components are interfering with sensor readings.</li> </ul>
	The hydraulic connections are improperly connected.	<ul style="list-style-type: none"> <li>• Check the hydraulic connections.</li> <li>• Reverse the direction of the hydraulic lever on pull-type sprayers.</li> </ul>
	The electrical connections to the AutoBoom valve are reversed.	Check the connections to the proportional and blocker valves and reverse if necessary.
	The Speed setting is too high.	Decrease the Speed setting.
	The Sensitivity setting is too high.	Decrease the Sensitivity setting.
	The hydraulic flow is too high (pull-type sprayers only).	Decrease the hydraulic flow on the AutoBoom circuit remote. The flow should be 3 - 5 gpm [11-19 lpm] or 20 - 30%.



Problem	Possible Cause	Corrective Action
The booms fall to the ground during calibration	The proportional valve connections are reversed on the AutoBoom valve.	Check the connections on the AutoBoom valve to ensure the harness cable connections are connected to the correct ports.
	The hydraulic connections are improperly connected.	<ul style="list-style-type: none"> <li>• Check the hydraulic connections.</li> <li>• Reverse the direction of the hydraulic lever on pull-type sprayers.</li> </ul>
	Malfunctioning proportional valve.	Turn the set screws in on the proportional valve to verify the booms raise during calibration. <ul style="list-style-type: none"> <li>• If the booms raise, troubleshoot the electrical system and/or AutoBoom node.</li> <li>• If the booms do not raise, troubleshoot the hydraulic system and/or AutoBoom node.</li> </ul>
	The hydraulics are not activated (pull-type sprayers only).	<ul style="list-style-type: none"> <li>• Verify the hydraulics are activated.</li> <li>• Ensure hydraulic flow going to the AutoBoom valve.</li> </ul>
Booms over-react or oscillate during calibration.	There are objects beneath the sensors causing faulty readings.	Attempt to calibrate the system over open ground or consistent crop canopy.
	The inner and outer sensor connections are reversed.	Check the inner and outer sensor connections and reverse if necessary.
	Faulty ultrasonic sensor readings.	Check the sensors and cabling and replace if necessary.
	The Speed setting is set too high.	Decrease the Speed setting.
	The Sensitivity setting is too high.	Decrease the Sensitivity setting.
	The hydraulic flow is too high (pull-type sprayers only).	Decrease the hydraulic flow to the AutoBoom circuit remote.

## AutoBoom Operation

Problem	Possible Causes	Corrective Action
The booms will not enable with the down-tap of the machine's functions.	The boom sense adapter cables are damaged or not connected.	<ul style="list-style-type: none"> <li>• Check the cabling.</li> <li>• Use the Diagnostics menu to determine the proper wiring setup.</li> </ul>
	There is inadequate voltage to the system.	Use a multi-meter to verify +12V is provided to the machine's coils when the function is activated.
	The AutoBoom system is not calibrated.	Calibrate the AutoBoom system.
	The AutoBoom harness cable is damaged.	Inspect the cable for damage and repair or replace as needed.
	The AutoBoom node is faulty.	Replace the AutoBoom node.

Problem	Possible Causes	Corrective Action
The pressure alarm is always on.	The pressure alarm setting in the PowerGlide Plus mode is set too low.	Increase the pressure alarm setting.
	The pressure and tank hoses are reversed.	Check the hoses and reverse if necessary.
	The pressure transducer is faulty.	<ul style="list-style-type: none"> <li>• Inspect the transducer and verify the pressure reading on the Diagnostic screen.</li> <li>• Replace the pressure transducer if necessary.</li> </ul>
	The pressure transducers are not connected to the AutoBoom harness cable.	Connect the pressure transducers to the AutoBoom harness cable.
	The AutoBoom harness cable is damaged.	Inspect the cable for damage and repair or replace as needed.
	Booms are resting on their stops or the cylinders are fully extended.	Raise the booms, lower the center section, and re-engage AutoBoom.
Objects under one boom makes the opposite side react.	The left and right sensor connections are reversed.	Check the left and right sensor connections and reverse them if necessary.
	The proportional valve connections are reversed or one side is not connected.	Check the connections on the AutoBoom valve to ensure the harness cable connections are connected to the correct ports.
	The Stability setting is too low.	Increase the Stability setting incrementally until the opposite side barely raises.
	The proportional valve is faulty.	<ul style="list-style-type: none"> <li>• Inspect the proportional valve.</li> <li>• Clean and/or replace if necessary.</li> </ul>
The booms oscillate or overreact when the machine is stationary.	The Sensitivity setting is too high.	Decrease the Sensitivity setting by one increment until the boom oscillation stops.
	The wind is affecting the sensor readings.	Decrease the Sensitivity setting by one increment until the boom oscillation stops.
	The Speed setting is too high.	Decrease the Speed setting by one increment until the boom oscillation stops.
	The center section is unstable.	Decrease the Stability setting to balance the movement of the booms on both sides of the center section.
	Sporadic ultrasonic sensor readings.	Inspect the sensor cabling for damage and repair or replace as needed.



Problem	Possible Causes	Corrective Action
The booms raise but will not lower or lower too slowly during operation.	The incorrect PWM frequency was entered.	Verify the PWM frequency setting in the Raven console/field computer. (60 Hz for square coil valves, 250 Hz for round coil valves).
	The Speed setting is too low	Increase the Speed setting.
	The Minimum Pressure % setting is too high.	Decrease the minimum pressure % setting by one increment until the booms lower at the desired rate.
	The set pressure is too high (PowerGlide Plus only).	Decrease the set pressure by 10 until the booms lower at the desired rate.
	The inner and outer sensor connections are reversed.	Check the inner and outer sensor connections and reverse them if necessary.
	Faulty ultrasonic sensor readings.	Check the sensors and cabling and replace if necessary.
	The orifices or circuit restrictions are restricting the return flow from the tilt cylinders.	Inspect the AutoBoom hydraulics and remove orifices or restrictions in the circuit if necessary.
The booms are slow to raise or are unresponsive to height changes.	The Speed setting is too low.	Increase the Speed setting.
	The Sensitivity setting is too low.	Increase the Sensitivity setting.
	Excessive ground speed.	Decrease the ground speed.
	The incorrect sensor height offsets were entered.	Verify the proper height offset and adjust the settings as needed. Refer to the appropriate chapter in this manual for the Raven controller/field computer being used to determine the height offset settings calculation.
	The orifices or circuit restrictions are restricting the return flow from the tilt cylinders.	Inspect the AutoBoom hydraulics and remove orifices or restrictions in the circuit if necessary.
Booms raise but will not lower when starting the machine or engaging the hydraulics (pull-type sprayers) with AutoBoom engaged.	The PWM base is too high.	Engage the AutoBoom hydraulics and allow the PWM base to decrease and the booms to lower automatically.
	The system is out of calibration.	Re-calibrate the AutoBoom system.
Unable to switch from PowerGlide Plus mode to UltraGlide.	The ultrasonic sensors are not detected.	<ul style="list-style-type: none"> <li>• Connect ultrasonic sensors</li> <li>• Check cabling to sensors and node and repair or replace if necessary.</li> </ul>
	The ultrasonic sensors are connected to inner sensor connectors on a non-dual sensor system.	Connect ultrasonic sensors to the outer sensor connectors.
	The UltraGlide node is not connected to the CAN bus.	Verify the node is connected to the CAN bus.

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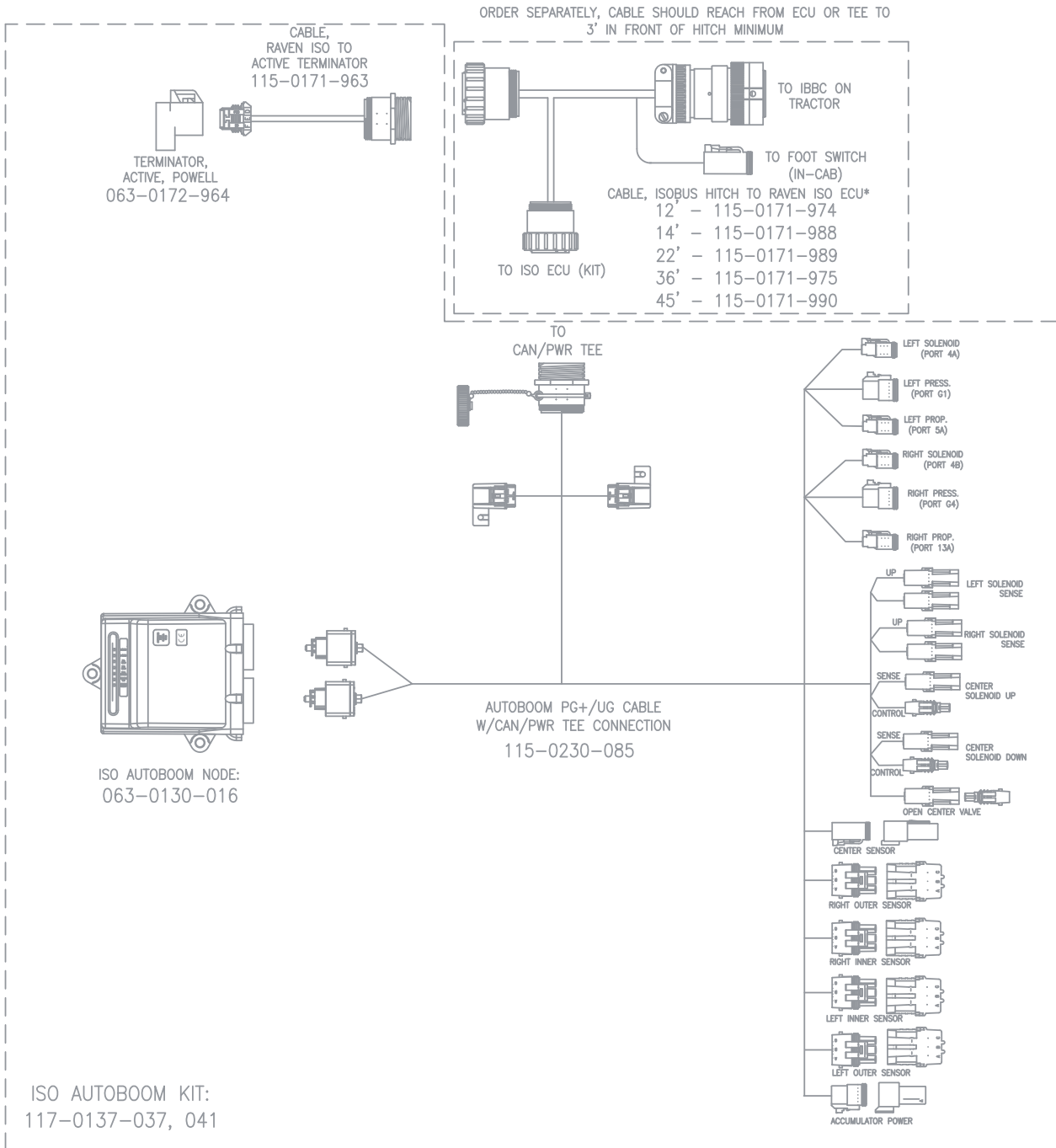
**CHAPTER**

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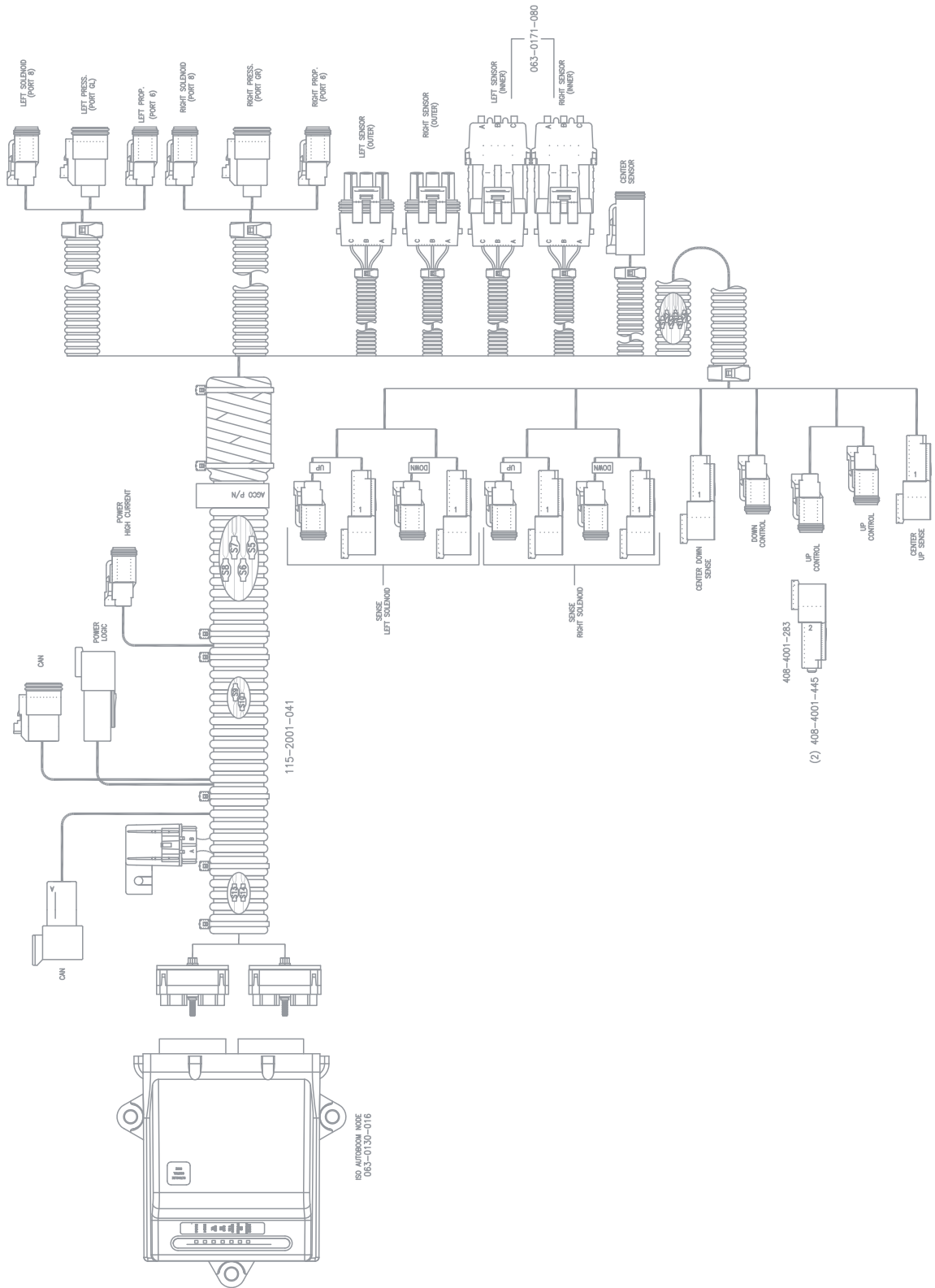
# ***System Diagrams***

This section contains system diagrams for machine-specific ISO AutoBoom machine configurations. Identify the appropriate schematic for the type of machine on which the ISO AutoBoom system is being installed.

## ISO AUTOBOOM WITHOUT ISO PRODUCT CONTROL

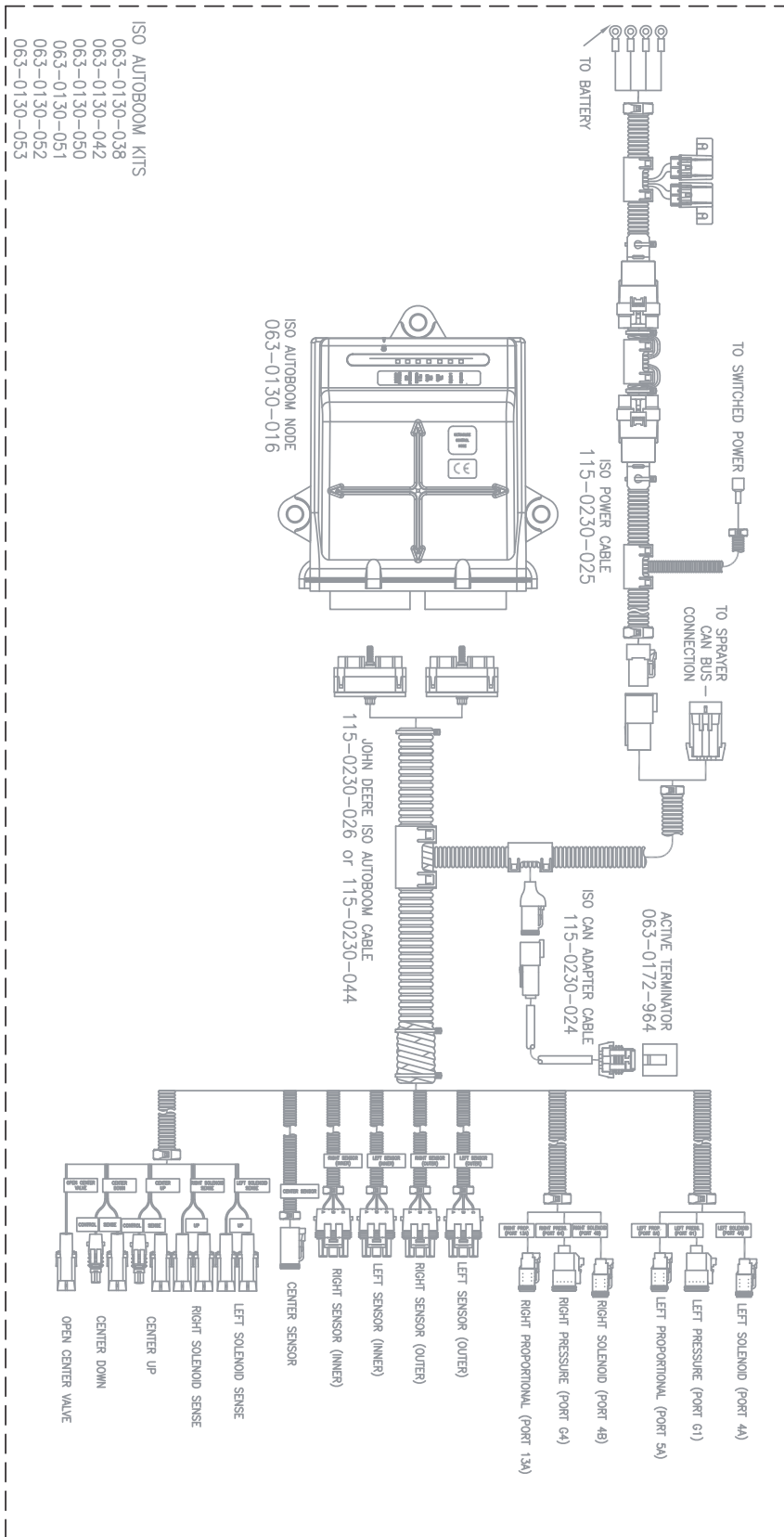


ISO AUTOBOOM FOR AGCO ROGATOR

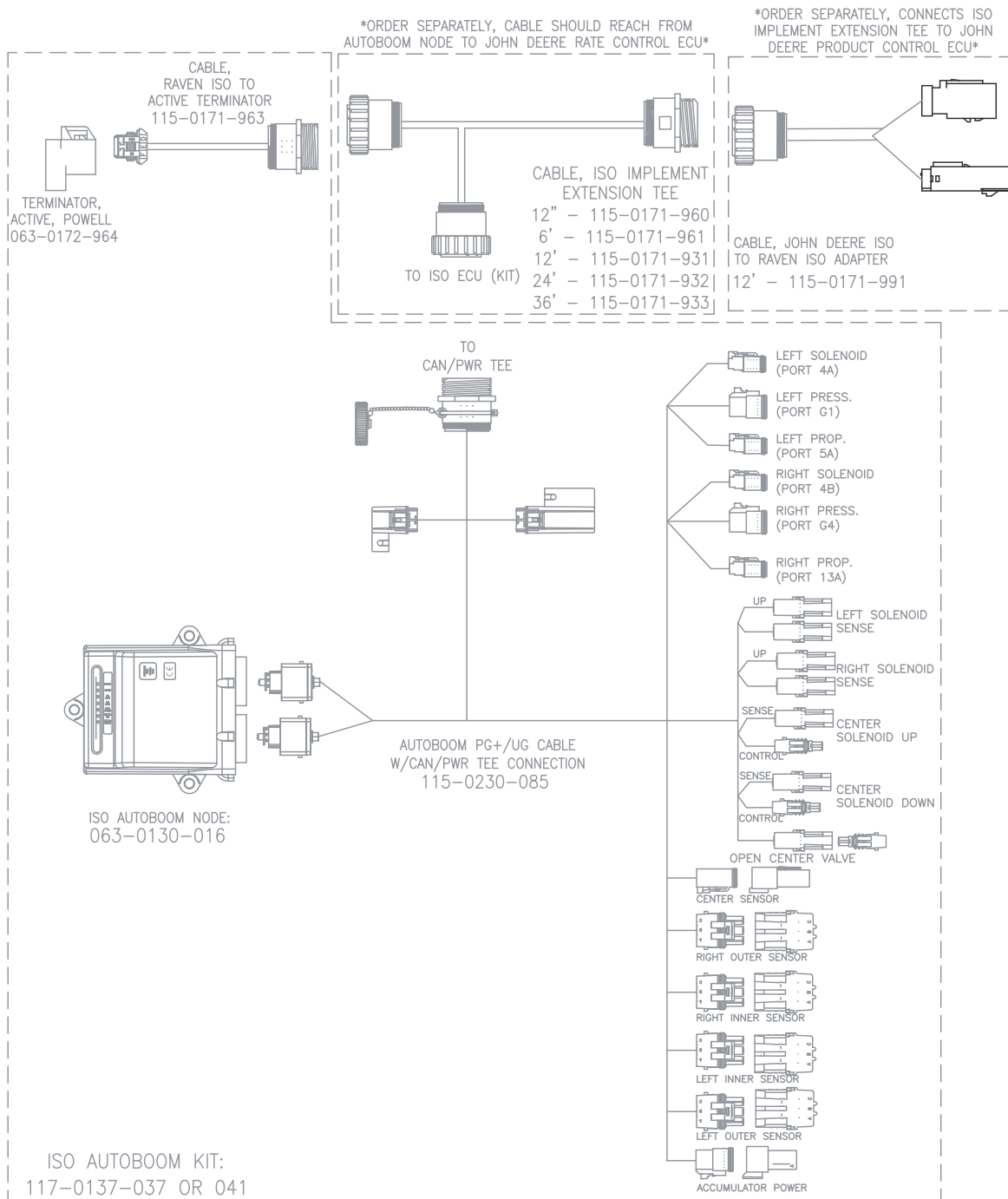




ISO AUTOBOOM FOR JOHN DEERE SELF PROPELLED SPRAYERS



## RAVEN ISO AUTOBOOM WITH JOHN DEERE PRODUCT CONTROL





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# RAVEN

## Limited Warranty

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

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service 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](http://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.**



# RAVEN

ISO AutoBoom®, Software Version 6.0 & Newer  
Calibration & Operation Manual  
(P/N 016-0130-078 Rev A 10/14 E23873)



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