Fast AutoYaw Calibration and Operation Manual

016-0130-101 Rev. B *10/2018* *E29491*

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 IMPORTANT SAFETY INFORMATION

NOTICE

Read this manual and all operation and safety instructions included with the implement and/or controller carefully before installing using the FAST AutoYaw.

- Follow all safety information presented in this manual.
- If you require assistance with any portion of the operation or service or your 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. To obtain replacement for missing or damaged safety labels, contact a local dealer.

When operating the machine after installing the FAST AutoYaw system, observe the following safety measures:

- Be alert and aware of surroundings.
- Be alert and aware of any overhead power lines or trees.
- Remain in complete control of the machine at all times.
- Do not operate the AutoYaw or any other agricultural equipment while under the influence of alcohol or an illegal substance.
- Only operate the AutoYaw system on private property without public access. Do not operate the AutoYaw system on any public thoroughfare or main road.
- Maintain a safe and operating distance. Bystanders must be well outside of the machine path while operating AutoYaw. The operator is responsible for discontinuing operation when the safe working distance has diminished.
- Ensure AutoYaw is disabled prior to starting any maintenance work on AutoYaw or the machine.
- When starting the machine for the for the first time after installing AutoYaw, be sure that all persons stand clear in case a hose has not been tightened properly.
- The machine must remain stationary and switched off, with the booms unfolded and supported during installation and maintenance.

HYDRAULIC SAFETY

- Wear appropriate protective equipment at all times when working on the hydraulic system.
- Never attempt to open or work on a hydraulic system with the equipment running. Always take care when working on a system that was previously pressurized.
- Exercise caution when disconnecting the hydraulic hoses or purging is required since hydraulic fluid may be extremely hot and under high pressure.

- Any work performed on the hydraulic system must be done in accordance with the machine manufacturer's approved maintenance instructions.
- When installing, performing diagnostics, performing maintenance, or service take precautions to prevent foreign material or contaminates from being introduced into the hydraulic system. Objects or materials that are able to pass by the machine's hydraulic filtration system will reduce performance and possibly damage the AutoBoom hydraulic valve.

ELECTRICAL SAFETY

- Always verify that the power leads are connected to the correct polarity as marked. Reversing the power leads count cause severe damage to the equipment.
- Ensure that the power cable is the last cable connected.

CHAPTER 2 AUTOYAW SYSTEM OVERVIEW

SYSTEM OVERVIEW

Thank you for purchasing a FAST sprayer with the AutoYaw featured. The AutoYaw system monitors the position of each inner boom via the rotary sensors and allows accurate control of the boom center position during spraying operations. With the system engaged the booms are allowed to move or relieve hydraulically during deceleration or acceleration of the boom. To control the booms automatically, simply turn the master switch on and engage AutoYaw. Manual operation of the machine boom functions remains fully intact which allows the operator to manually rack or unfold the booms.

AUTOYAW SYSTEM

The AutoYaw system consists of:

- One ISObus virtual terminal (VT).
- Rotary potentiometer sensors located at each pivot point on the inner boom of the machine.
- A FAST ISO AutoYaw node.
- FAST AutoYaw switch box.

VIRTUAL TERMINAL DISPLAY

On an ISO terminal, select the edit soft button then the AutoYaw module  . This will display the AutoYaw Main Run screen. This screen displays the necessary soft buttons needed to calibrate and adjust the AutoYaw system. The table on page 4 describes the function of the virtual terminal (VT) soft buttons.

SWITCH BOX

The switch box has buttons and switches that allow the user to perform many of the same tasks as the VT. The only functions the user can not perform on the switch box is calibration and accepting the Operator Liability Warning. When the switch box is powered on and the AutoYaw is calibrated and the operator accepts the liability warning, the manual control screen will gray out. All manual fold switches on the switch box are three position momentary with the middle position as a neutral position unless otherwise noted.

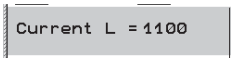
FIGURE 1. Switch Box

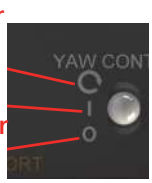
FUNCTIONAL OVERVIEW

The table below describes a desired action and what the buttons and/or switches to perform that function look like on the switch box and on the VT display.

TABLE 1. Switch Box and VT Buttons

Name	Function	Switch Box	VT Display
Yaw Control	Allows the Yaw Control to be turned off, set to auto, or master switch off.		
AutoYaw Module	This icon brings the user to the AutoYaw Yaw Control screen. Navigate to the AutoYaw module by selecting the edit button on the machine panel.	NA	
Boom Diagnostics	The boom diagnostics screen displays error counts for the left and right booms. Errors can include a sensor failure or no movement.	NA	

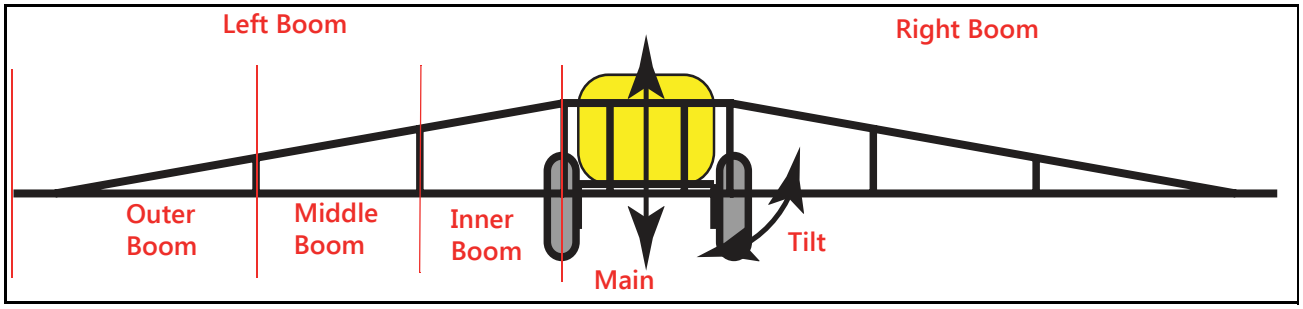
Name	Function	Switch Box	VT Display
Calibrate	Selecting calibrate allows the user to manually move the booms to the desired folded and unfolded positions and record those values. These values will become the set positions when the booms are folded for transit of unfolded for application.	NA	
Clear Calibration	Resets inner left boom and inner right boom center positions to the default settings.	NA	
Position Status	Displays the current position of the inner boom on the calibration screen.	NA	
Home	Returns the user to the AutoYaw manual control tab.	NA	
Inner Fold	Controls the folding and unfolding of the inner boom section.		
Left Tilt	Changes the boom angle relative to the ground.		
Machine Selection	This drop down allows the user to select the appropriate piece of equipment the AutoYaw is monitoring.	NA	
Main Lift	This switch raises or lowers the overall height of the sprayer.		

Name	Function	Switch Box	VT Display
Manual Control	Provides manual control of the AutoYaw system.	All of the fold switches on the switch box are manual control.	
Master	This three position switch can be set to auto, off, or master.		
Mid Fold	Controls the folding or unfolding of the middle boom section.		
Outer Fold	Controls the folding or unfolding of the outer boom section.		
Right Tilt	Changes the boom angle relative to the ground.		
Sensitivity	Controls the gain for correcting the boom position back to zero angle or calibrated position when under auto control. This setting can be adjusted from 0 - 20.	NA	

BOOM IDENTIFICATION

Figure 2, "Sprayer from Back," shows a sprayer from the back with the booms labeled and also the lift and tilt motions identified. Keep these terms in mind while reading this manual.

FIGURE 2. Sprayer from Back



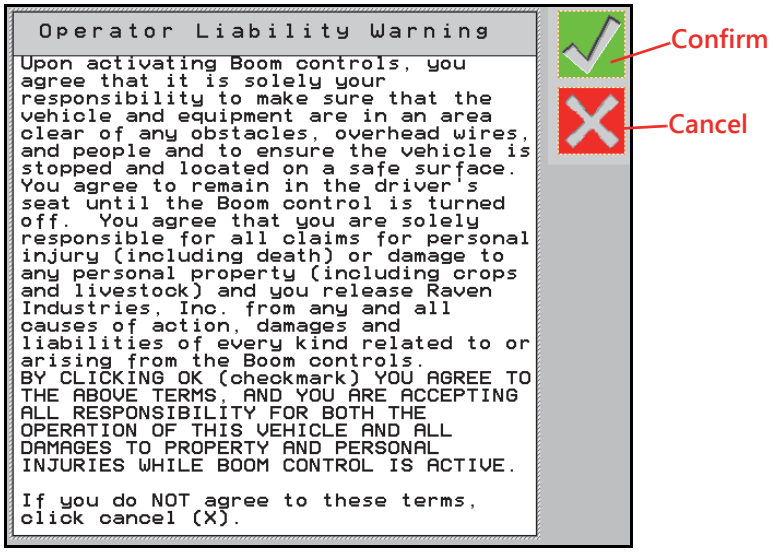
CHAPTER 3 AUTOYAW SET UP AND CALIBRATION

OPERATOR LIABILITY WARNING

The AutoYaw requires calibration and acceptance of the Operator Liability Warning before operation. To access the Operator Liability Warning:

1. In the machine panel, select the edit soft button.
2. Locate the select the AutoYaw module  . The Operator Liability Warning will open.
3. Select confirm  to proceed with calibration and operation of the AutoYaw.

FIGURE 1. Operator Liability Warning.



MACHINE SELECTION

Before starting the calibration process, it is important to select the piece of equipment the AutoYaw is monitoring. Under the Machine Selection drop-down, the following options are available:

TABLE 1. Machine Selection Options (Fast 120’/132’)

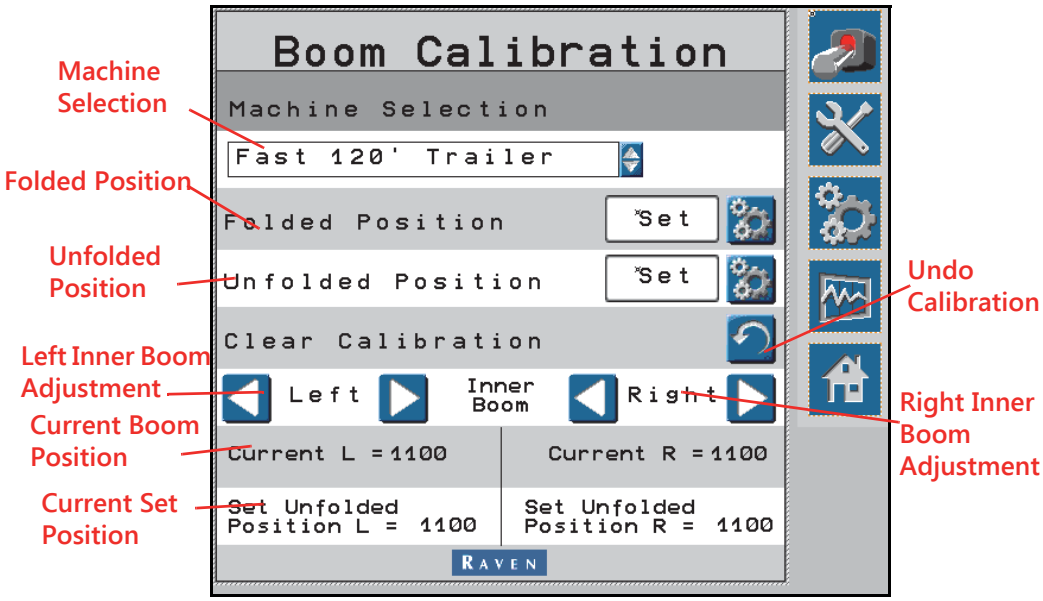
Fast 120’ Trailer
Fast 120’ 3 Pt
Fast 132’ Trailer
Fast 132’ 3 Pt

NOTE: Changing machine selection will reset folded and unfolded positions to the default settings so the machine will require calibration before the AutoYaw can be engaged.

BOOM POSITION CALIBRATION

1. Select AutoYaw setup  .
2. Verify that the machine selection drop down is showing the correct machine.

FIGURE 2. Boom Calibration Screen



FOLDED POSITION CALIBRATION

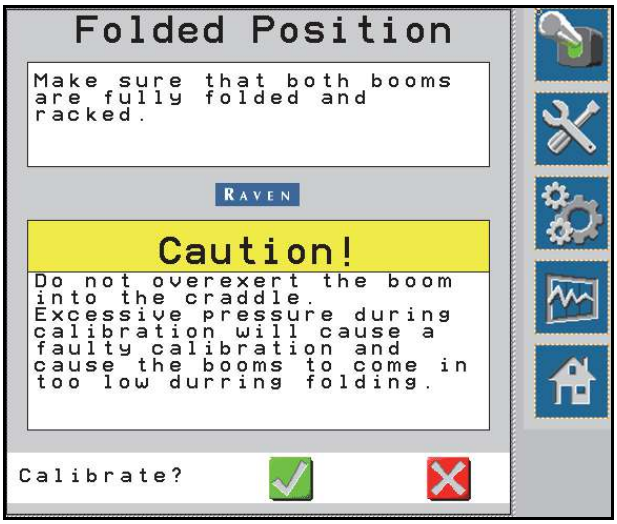
1. Use the left  and right  inner boom arrows to adjust the left and right booms to the desired folded position.

2. Verify the current boom position reading is correct.

NOTE: Review the FAST implement manual for instructions on how to manually maneuver the booms if a can switch is not used.

3. In the folded position cell, select calibrate  . A folded position window will open with the following prompt:

FIGURE 3. Folded Position Prompt

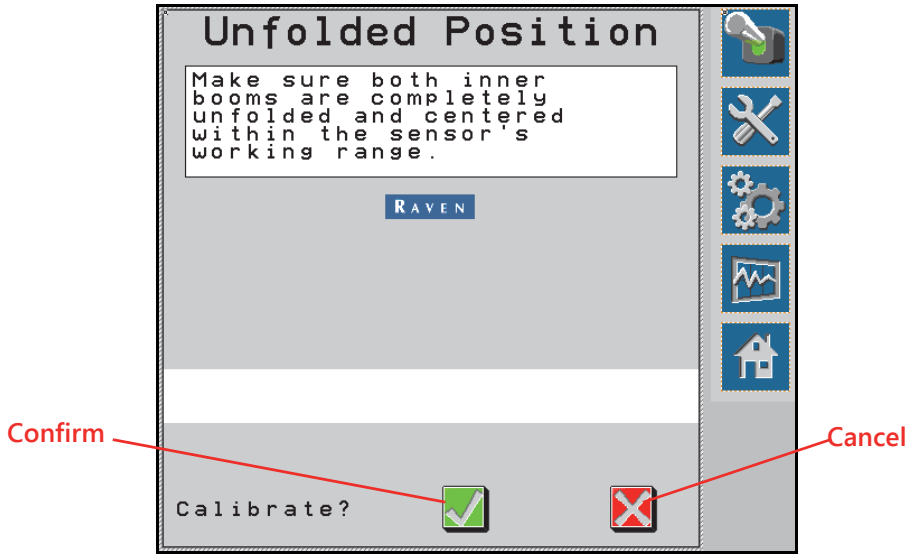


4. Select the confirm  to set the calibration or cancel  to cancel calibration. After selecting the confirm the folded position status will change from set to in. Calibration is complete and the status will change from set to in.

UNFOLDED POSITION CALIBRATION

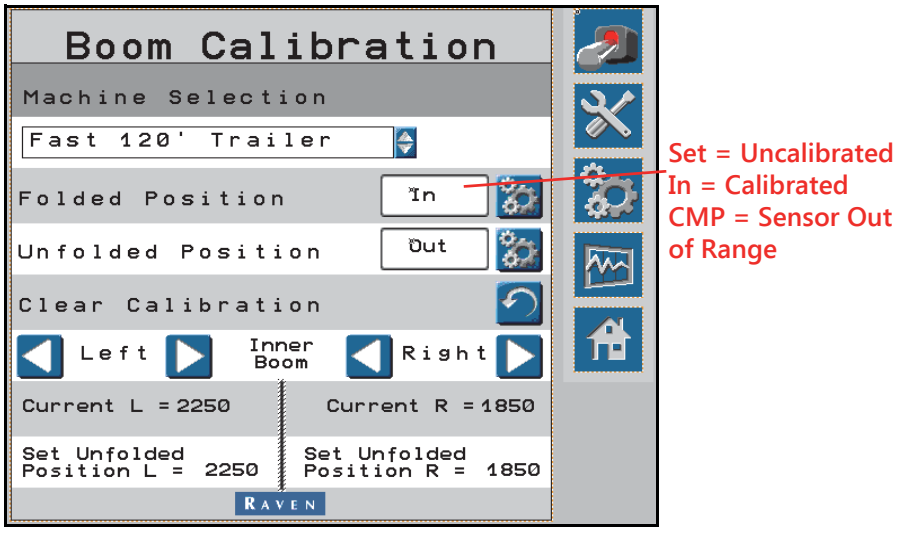
1. Use the left and right inner boom arrows to adjust the booms to the desired spraying position.
2. Verify the center point location is correct.
3. In the unfolded position cell, select calibrate  . A unfolded position window will open with the following prompt.

FIGURE 4. Unfolded Position Prompt.



4. Select the confirm to set the calibration or cancel to cancel calibration. After selecting the confirm the unfolded position status will change from set to out. Calibration is complete and the status will change from set to in.

FIGURE 5. Boom Calibration Screen After Calibration



RESETTING AUTOYAW DEFAULT CALIBRATION

To restore the default calibration settings for the folded and unfolded position:

1. On boom calibration screen, select undo calibration . The clear calibration prompt will open.

NOTE: The folded calibration position is used to slow boom speed when nearing the racked position.

2. Select confirm  to restore default calibration or cancel  to keep the programmed calibration points.

NOTE: The default settings for the unfolded position will show Set Unfolded Pos L at 2100 and Set Unfolded Pos R at 2075.

AUTOYAW CALIBRATION

NOTE: The folded calibration position is used to slow boom speed when nearing the racked position.

CHAPTER 4 AUTOYAW OPERATION

USING THE AUTOYAW SYSTEM

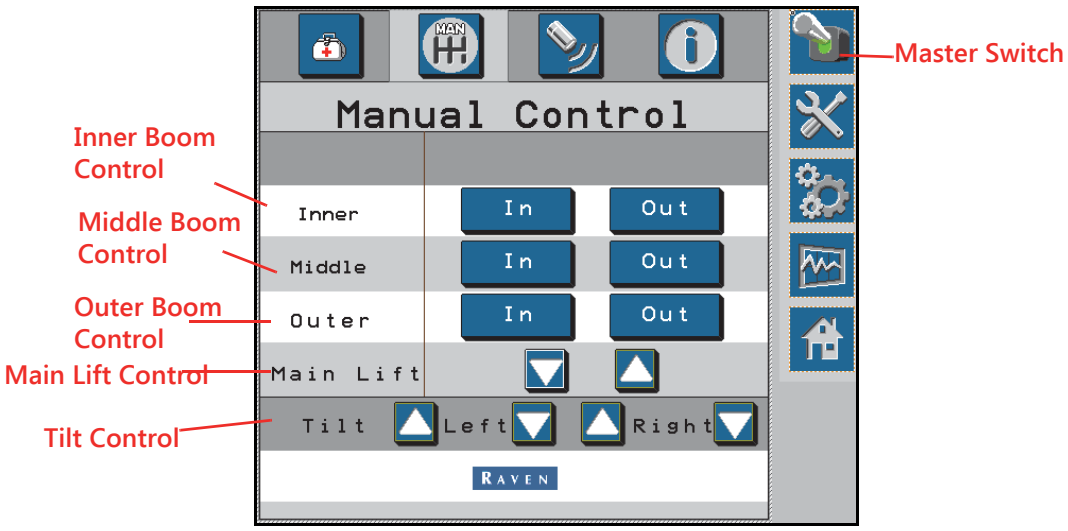
SAFETY

Please review and follow the safety precautions outlined in the Important Safety Information section before operating the AutoYaw system.

MANUAL BOOM OPERATION

1. Navigate to the manual operation by selecting Yaw Control  then Manual Control  tab.

FIGURE 1. Manual Control Tab



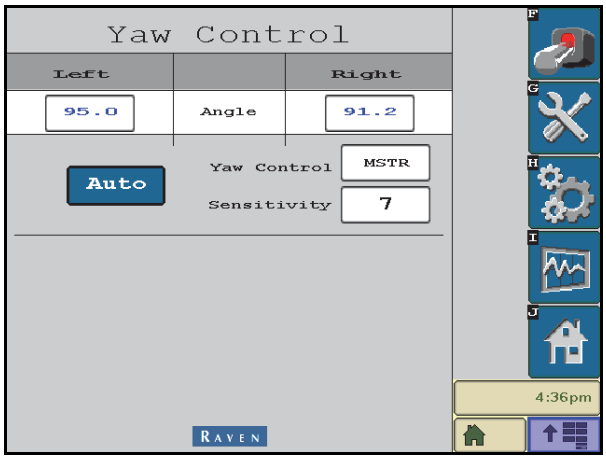
2. Turn the master switch  on. This will enable the system to apply high current to the hydraulic system.
3. Starting with the inner boom, unfold the booms and all wing sections to the spraying position.

AUTOYAW OPERATION

1. Turn the master switch  on. This will enable the system to apply high current to the hydraulic system.
2. Starting with the inner boom, unfold the booms and all wing sections to the spraying position.

3. On the Main Run screen, press the auto button. This will engage the AutoYaw. The AutoYaw will monitor and automatically control the inner boom wings, typically within +/- 2 degrees. To engage the AutoYaw system, the inner booms must be within 45 degrees of the unfolded, calibration position. When the AutoYaw detects either boom has exceeded the overload angle, typically 11 degrees, the dampers will engage and reduce the hydraulic force.

FIGURE 2. Main Run Screen



CHAPTER 5 AUTOYAW TROUBLESHOOTING

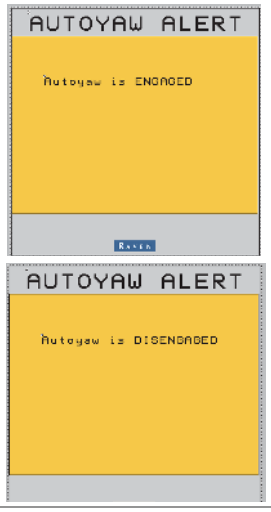
AUTOYAW DIAGNOSTICS AND TROUBLESHOOTING

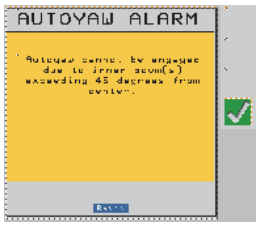
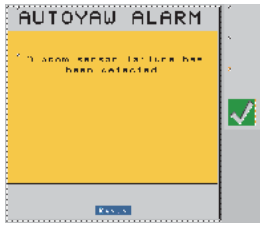
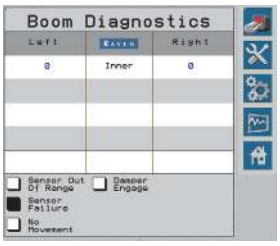
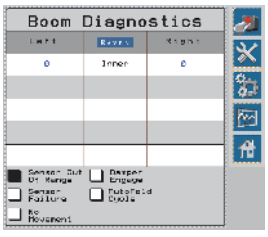
This chapter covers some of the common errors and issues encountered with the AutoYaw system. Before contacting a local FAST dealer for support, read and follow the appropriate procedure in the table below to eliminate these issues.

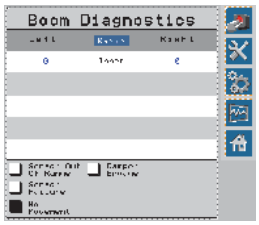
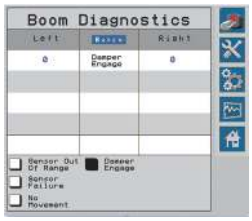
ERROR DIAGNOSTICS

It is important to understand the AutoYaw alerts before operating the AutoYaw. The table below shows the alert, diagnostics screen (if applicable) and provides steps to correct and clear the alert.

TABLE 1. Error Diagnostics Information

Alert	Diagnostics Screen	Issue/Resolution
	NA	The AutoYaw must be engaged in order to protect the boom structure and inner control. This notification provides the status of the AutoYaw when the status changes.
	NA	AutoYaw will not engage unless the master switch is turned on. Turn the master switch on either on the switch box or on the machine panel. Select ✓ to clear the alarm and turn the master switch on to resolve the issue.

Alert	Diagnostics Screen	Issue/Resolution
	NA	The booms must be calibrated to set the folded and unfolded positions for the AutoYaw to engage. After calibrating the folded and unfolded positions the AutoYaw can be engaged. Select  to clear the alarm after resolving the issue.
	NA	The AutoYaw system will disengage if either of the inner booms exceed 45 degrees. To engage the AutoYaw, move the boom to less that 45 degrees from the unfolded position. Select  to clear the alarm after resolving the issue.
	NA	The AutoYaw system will not allow the AutoYaw to engage if either inner boom is greater than 45 degrees from the unfolded position. To engage the AutoYaw, move the inner booms so both are less than 45 degrees from the unfolded position. Select  to clear the alarm after resolving the issue.
		This alarm appears when a sensor reads below the minimum expected sensor value. Select  to clear the alarm after resolving the issue.
		This alarm appears when AutoYaw system identifies a sensor is reading above the maximum expected sensor value. Select  to clear the alarm after resolving the issue.

Alert	Diagnostics Screen	Issue/Resolution
		This error occurs when a command is given to either inner boom and the sensor does not detect a change after three seconds. Select  to clear the alarm after resolving the issue. Go to the diagnostics page view to determine which side experienced the error.
		This alarm indicates that excessive movement has occurred and the damper control will engage to attempt to slow the boom. Select  to clear the alarm after resolving the issue.

TROUBLESHOOTING

TABLE 2. Troubleshooting Steps

Issue	Resolution
Boom(s) do not reach the unfolded position when AutoYaw is engaged.	1. Verify the tractor hydraulics are engaged. 2. Verify the unfolded position is calibrated to the desired position. 3. Verify the machine configuration in the boom calibration is set appropriately for the sprayer. 4. In manual mode, unfold the boom(s) to the desired spraying position. 5. Reset the unfolded calibration position on the VT display device. 6. Verify that the sensitivity setting on the main run screen is adequate to drive the booms back to the unfolded position. Adjust the sensitivity settings until the proper boom movement is observed for both sided. The sensitivity can be adjusted from 0 - 20.

Issue	Resolution
AutoYaw will not calibrate at the unfolded position.	1. Verify the booms are fully unfolded to the desired spraying position. 2. The AutoYaw controller must observe a sensor count limit between the folded, unfolded, and full rearward position to operate properly. the sensor count at the unfolded, spraying position should be near 2100 for each boom. The folded and furtherest rearward positions should not exceed the sensor count limits which can be verified in the boom calibration screen. 3. Verify the unfolded position should read 0.0 degrees, the folded position is 90 degrees, and the furtherest rearward position should read near -15 degrees on the main run screen. If they do not match, use the manual control screen buttons to adjust the positions. 4. If the sensors encounter a limit on either the folded or furtherest reward position, adjust the sensor so it works correctly within the booms physical working range. 5. Recalibrate the booms and reset the sensor counts for the folded and unfolded positions.
AutoYaw will not calibrate at the folded position.	1. Verify the booms are fully folded to the desired rack position. 2. The AutoYaw controller must observe a sensor count limit between the folded, unfolded, and full reward position to operate properly. The folded and furthest rearward positions should not exceed the sensor count limits which can be verified in the boom calibration screen. 3. Verify the folded position reads 90 degrees +/- 5 degrees, the unfolded position is 0 degrees, and the furthest rearward position should read near -15 degrees. If they do not read correctly, use manual controls to adjust to the booms to the correct position. 4. If the sensors encounter a limit on either the folded or furthest rearward position, adjust he sensor so it works correctly within the booms working range. 5. Recalibrate the booms and reset the sensor counts for the folded and unfolded positions.
Sensor count or angle does not change even though the boom is moving.	1. If all sensors indicate failure, check pin A to pin C on the three pin weather pack connector to each sensor to verify +12 V power. If an individual sensor indicates failure, check for +12 V power on the corresponding sensor connector. 2. Manually operate the corresponding section and check to see if the signal returns to normal working range when the failure is cleared. If the failure is cleared, loosen the corresponding sensor (potentiometer) bolts to adjust the sensor that, at the sensor limits, the sensor does not exceed the normal working range of 0.5 V to 4.5 V. 3. Check for continuity on the signal line (pin B of the sensor connector to the corresponding pin on the control node).

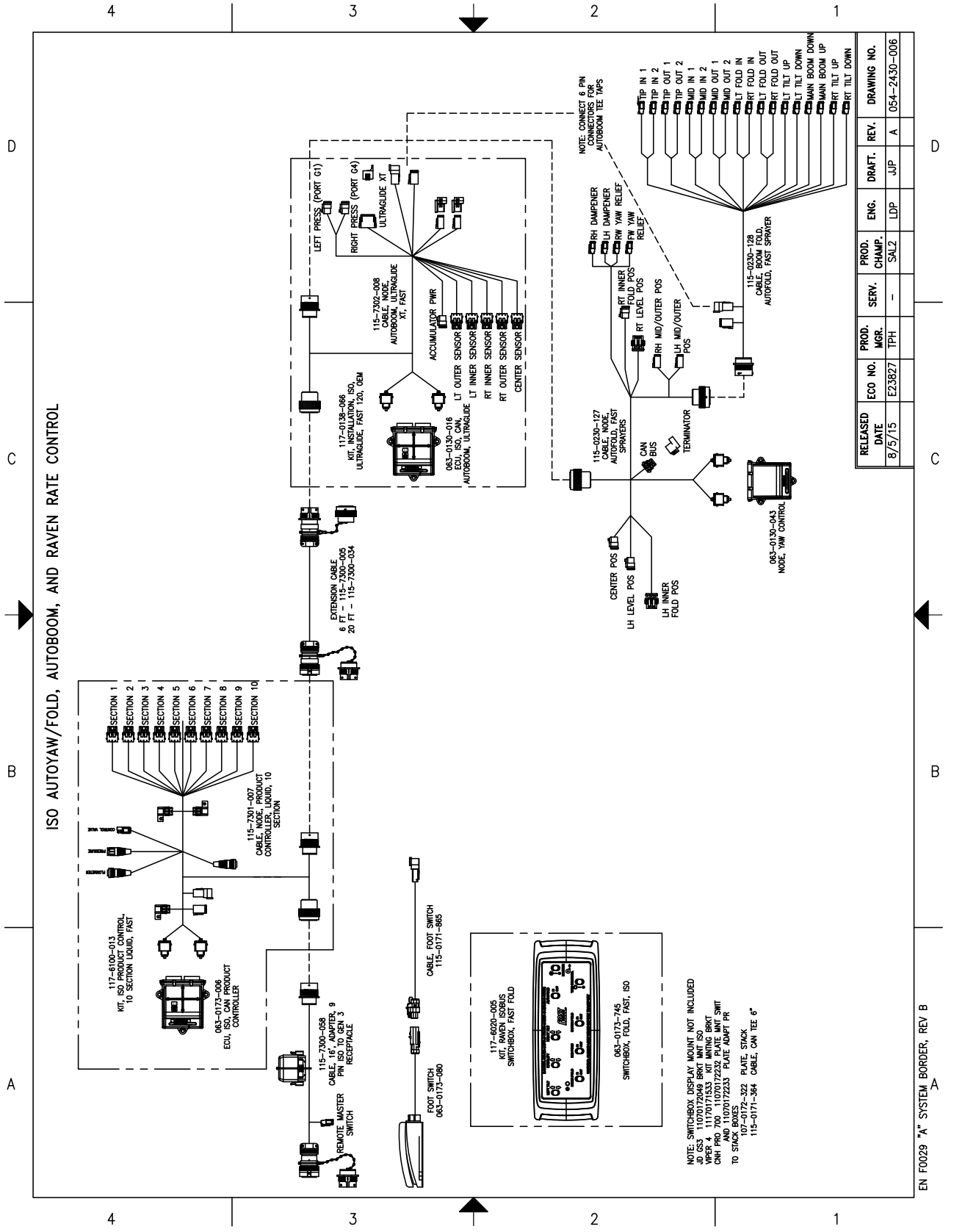
Issue	Resolution
AutoYaw will not engage in auto mode	1. Verify the master switch is on. 2. Verify the left and right boom angles read less than 45 degrees on the main run screen because auto mode will not engage is the left or right boom exceeds this angle. 3. If the 45 degree threshold was exceeded for either inner boom, manually move the booms to less than 45 degrees of the unfolded, calibrated position. 4. Verify the hydraulic lever is engaged and in the correct position. 5. Verify the electrical connections are secure and there is power to the ECU. 6. Select Auto on the main run screen.
AutoYaw will not engage in manual mode	1. Verify the master switch is on. 2. Verify the hydraulic lever is engaged and in the correct position. 3. Verify the electrical connections are secure and there is power to the ECU. 4. Select the manual button for the desired boom and operate the boom manually.
Boom(s) reach the unfolded position too quickly or too much force is applied to the booms when the AutoYaw is engaged.	1. In manual mode, unfold the boom(s) to the desired spraying position. 2. Reset the unfolded calibration position on the VT display device. 3. Verify that the sensitivity setting on the main run screen is adequate to drive the booms back to the unfolded position. Adjust the sensitivity settings until the proper boom movement is observed for both sided. The sensitivity can be adjusted from 0 - 20.

APPENDIX

SYSTEM DRAWING

A

SYSTEM DRAWING


ISO AUTOYAW/FOLD, AUTOBOOM, AND RAVEN RATE CONTROL
EN F0029 "A" SYSTEM BORDER, REV B
NOTE: CONNECT 6 PIN CONNECTORS FOR AUTOBOOM TEE TAPS
TIP IN 1
TIP IN 2
TIP OUT 1
TIP OUT 2
MID IN 1
MID IN 2
MID OUT 1
MID OUT 2
LT FOLD IN
RT FOLD IN
LT FOLD OUT
RT FOLD OUT
LT TILT UP
LT TILT DOWN
MAIN BOOM DOWN
MAIN BOOM UP
RT TILT UP
RT TILT DOWN
115-0230-128 CABLE, BOOM FOLD, AUTOFOLD, FAST SPRAYER
RH DAMPENER
LH DAMPENER
RW YAW RELIEF
FW YAW RELIEF
RT INNER FOLD POS
RT LEVEL POS
RH MID/OUTER POS
LH MID/OUTER POS
115-0230-127 CABLE, NODE, AUTOFOLD, FAST SPRAYERS
CAN BUS
TERMINATOR
063-0130-043 NODE, YAW CONTROL
CENTER POS
LH LEVEL POS
LH INNER FOLD POS
LEFT PRESS (PORT G1)
RIGHT PRESS (PORT G4)
ULTRAGLIDE XT
115-7302-008 CABLE, NODE, AUTOBOOM, ULTRAGLIDE XT, FAST
ACCUMULATOR PWR
LT OUTER SENSOR
LT INNER SENSOR
RT INNER SENSOR
RT OUTER SENSOR
CENTER SENSOR
117-0138-066 KIT, INSTALLATION, ISO, ULTRAGLIDE, FAST 120, OEM
063-0130-016 ECU, ISO, CAN, AUTOBOOM, ULTRAGLIDE
EXTENSION CABLE 6 FT – 115-7300-005 20 FT – 115-7300-034
SECTION 1
SECTION 2
SECTION 3
SECTION 4
SECTION 5
SECTION 6
SECTION 7
SECTION 8
SECTION 9
SECTION 10
115-7301-007 CABLE, NODE, PRODUCT CONTROLLER, LIQUID, 10 SECTION
117-6100-013 KIT, ISO PRODUCT CONTROL, 10 SECTION LIQUID, FAST
063-0173-006 ECU, ISO, CAN PRODUCT CONTROLLER
115-7300-058 CABLE, 16', ADAPTER, 9 PIN ISO TO GEN 3 RECEPTACLE
REMOTE MASTER SWITCH
CABLE, FOOT SWITCH 115-0171-865
FOOT SWITCH 063-0173-080
117-6020-005 KIT, RAVEN SCRIBUS SWITCHBOX, FAST FOLD
063-0173-745 SWITCHBOX, FOLD, FAST, ISO
NOTE: SWITCHBOX DISPLAY MOUNT NOT INCLUDED
AUTOSTEP 4 11070172043 BRKT MNT ISO
VIPER 4 11070172153 KIT MNTG BRKT
CNH PRO 700 11070172232 PLATE MNT SWIT
AND 11070172233 PLATE ADAPT PR
TO STACK BOXES
107-0172-322 PLATE, STACK
115-0171-364 CABLE, CAN TEE 6"
RELEASED DATE 8/5/15
ECO NO. E23827
PROD. MGR. TPH
SERV. –
PROD. CHAMP. SAL2
ENG. LDP
DRAFT. JJP
REV. A
DRAWING NO. 054-2430-006

We Solve Great Challenges.

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.

We Solve Great Challenges.

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.

RAVEN