AutoBoom™

2025

RAVEN

General Business

AutoBoom System

AUTOMATIC HEIGHT CONTROL SYSTEM

- The AutoBoom system maintains optimal spray height with either cushioned gauge wheels or ultrasonic sensors.
- The system uses the ground or canopy height information and adjusts the booms to stay within its intended height position.
- As a result, the boom stays closer to the target height with less variability, maximizing boom life and minimizing crop damage.

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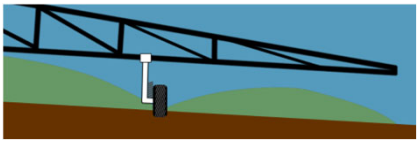
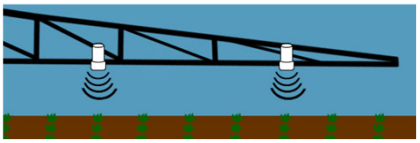
General Business

AutoBoom System

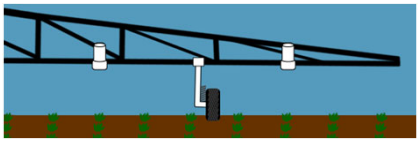
HYDRAULIC CONTROL OPTIONS



PowerGlide Plus



UltraGlide



Combination

RAVEN

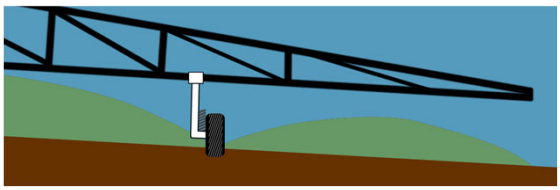
AutoBoom comes in two options: PowerGlide Plus which uses cushioned gauge wheels to feel for the ground; and UltraGlide which uses ultrasonic sensors to see either the ground or the crop canopy. You can also operate the AutoBoom system with a combination of both control options; whereby either the cushioned gauge wheels or the ultrasonic sensors are the primary control component. Must order either the gauge wheels or ultrasonic sensors and cabling separately.

All three variations can be used on both pull-behind or self-propelled sprayers.

General Business

PowerGlide Plus

CUSHIONED GAUGE WHEELS



- Adjust the length of the wheel axle for height tolerance, typically 6” above the ground.
- Set the pressure for how sensitive you want the gauge wheels to maintain the spray height while operating in the field.
- The gauge wheels are not designed to hold the weight of the boom or ride along the ground.
- Great system for pre-emergent applications.

RAVEN

PowerGlide Plus is a pressure-based system.

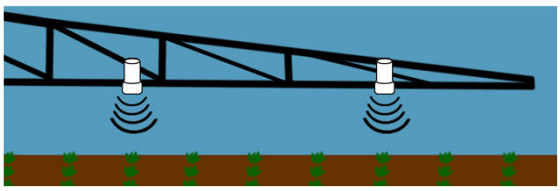
Adjust the length of the wheel axle for height tolerance, typically up to 6 inches above the ground. Set the pressure for how sensitive you want the gauge wheels to be if they touch the ground to maintain the spray height while operating in the field.

The important thing to remember is that the gauge wheels are not designed to hold the weight of the boom or ride along the ground. These wheels are, instead, intended to “feel” for the ground to maintain the correct height. For this reason, PowerGlide Plus is a great system for pre-emergent applications

General Business

UltraGlide

ULTRASONIC SENSORS



- Set the height you want to maintain while operating in the field.
- Height can be from the ground or top of the canopy.
- Sensor location should be mounted between or over the rows accordingly.
- Great system for pre-emergent & post-emergent applications.

RAVEN

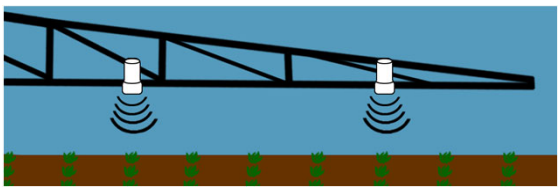
With UltraGlide, you just set the boom height you want to maintain while operating in the field. The height setting can be from the ground or top of the crop canopy; but you must choose one or the other.

If using the system in row crops, the ultrasonic sensor should be mounted between or over the rows according to your decision. UltraGlide is a great system for pre-emergent & post-emergent applications.

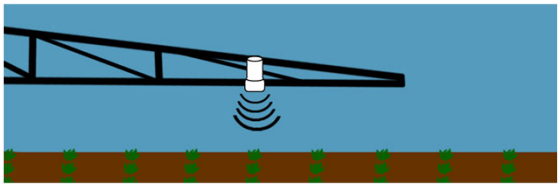
General Business

UltraGlide

ULTRASONIC SENSORS



- Typical installation for 120 ‘ or wider booms would include 5 sensors - (2) on each side and (1) on the center rack



- Narrower booms would include 3 sensors - (1) on each side and (1) on the center rack

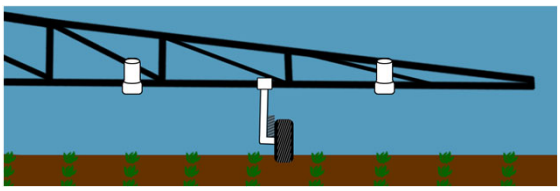
RAVEN

A typical installation for 120 foot or wider booms would include 5 sensors. 2 on each side and 1 on the center rack. Narrower booms would typically have 3 sensors. 1 sensor on each side and 1 on the center rack.

General Business

Combination

ULTRAGLIDE IN POWERGLIDE PLUS MODE



- Put the system to PowerGlide Plus mode and set the boom pressure as before.
- The ultrasonic sensors on the boom are not used but the middle sensor is active if wanting Center Rack Control.
- Center Rack Control will raise/lower the center rack based on the middle height reading.
- The orifices in the AutoBoom valve block will need to be removed.

RAVEN

The UltraGlide system can be set to PowerGlide Plus mode. You will still set the boom pressure as before. The ultrasonic sensors on the boom are not being used for height control but the center sensor is still active and can be used for center rack control.

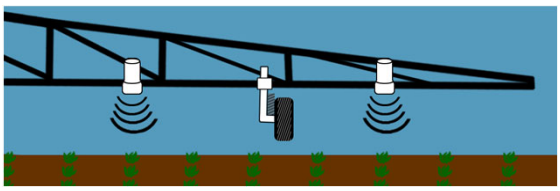
Center rack control when enabled will raise or lower the center rack automatically based on the center sensor height reading.

There are orifices in the AutoBoom hydraulic valve block that will need to be removed when operating in PowerGlide Plus mode. Do not lose them as they will need to be replaced if switching back to UltraGlide mode. These orifices will be explained later in the AutoBoom valve block discussion.

General Business

Combination

ULTRAGLIDE WITH GAUGE WHEELS



- Keep the system in UltraGlide mode.
- Install the gauge wheels so that they are high enough to provide a backup system without interfering with the sensors or damaging the crop.
- You will need to replace the orifices in the AutoBoom valve block if you removed them previously while operating in PowerGlide Plus mode.

RAVEN

You can also operate the UltraGlide system with the gauge wheels installed. Just make sure they are set high enough to provide a backup system without interfering with the sensors or damaging the crop.

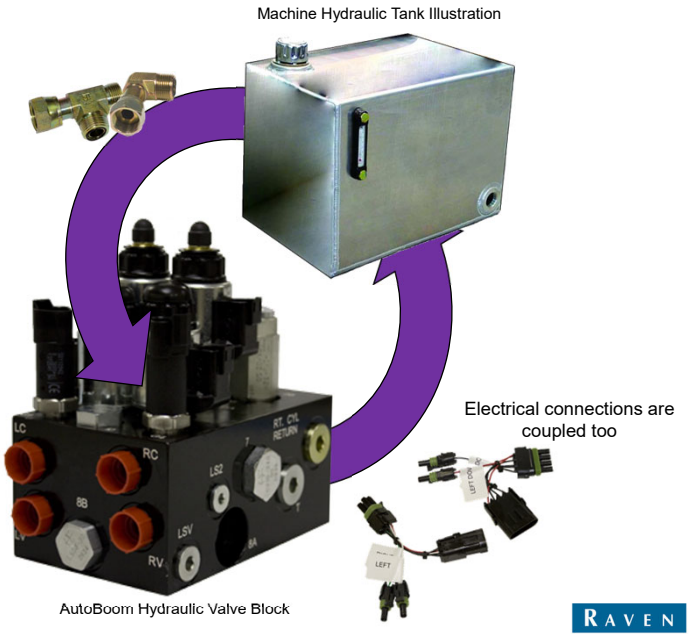
You will need to replace the orifices in the AutoBoom hydraulic valve block if they were removed previously while operating in PowerGlide Plus mode.

General Business

System Overview

HYDRAULICLY SPEAKING

- The AutoBoom system is coupled with the machine's tank, pressure, and boom hoses.
- This allows the AutoBoom system to have full control of the machine's boom functions.



AutoBoom is not intended to be a closed hydraulic system. With pull-behind sprayers, it is recommended to install the AutoBoom system as open center to prevent high operating pressures and excessive hydraulic heat buildup.

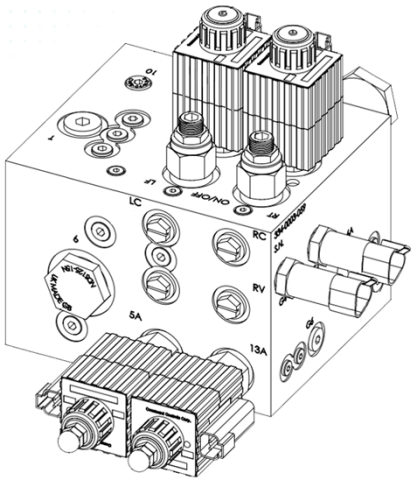
All AutoBoom systems will require a separate hydraulic valve block to be installed. This valve block will couple with the machine's tank, pressure and boom hoses with tee connectors. This design allows the AutoBoom system to have full control of the machine's boom functions. Simply stated, the AutoBoom system has access to the hydraulic capacity it needs for boom functions and the ability to relieve any excess hydraulic flow it does not need.

The AutoBoom system is also coupled with the electrical connections on the machine hydraulic valve block. An important note to remember is that center rack function and automatic control is not plumbed through the AutoBoom valve block. Instead, the system will directly activate the center rack up and down solenoids on the machine valve block.

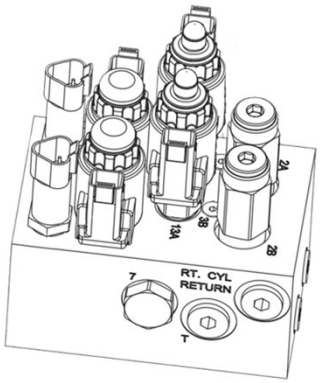
General Business

Components

HYDRAULIC VALVE BLOCK



Legacy Hydraulic Valve Block



Current Hydraulic Valve Block

RAVEN

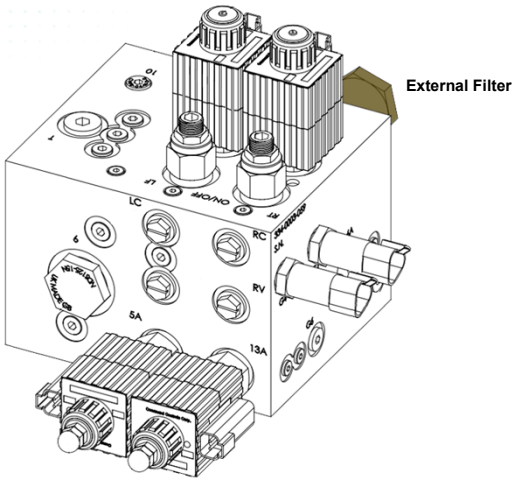
Both the PowerGlide Plus and UltraGlide systems will have their own hydraulic valve block. The left valve block is from the legacy systems and the right valve block is the current version for both systems. Even though the current version is smaller, it has the same hydraulic capacity of the larger legacy valve block.

With some factory-fit machines, the AutoBoom valve block has been modified to mount directly to the machine valve block as with some Agco Rogator sprayer models. With other machines, like Equipment Technologies Apache sprayers, the AutoBoom valve block components have been integrated into the machine valve block.

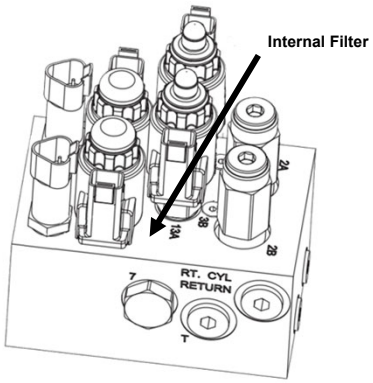
General Business

Hydraulic Valve Block

DESIGN CHANGES



Legacy Hydraulic Valve Block



Current Hydraulic Valve Block

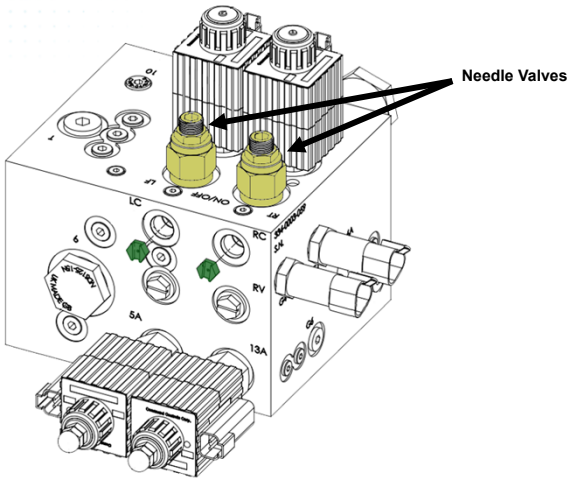
RAVEN

There are a couple of design changes between the legacy and current valve blocks. The first change is that the legacy valve block has an external filter that can be serviced easily. The current valve block has an internal filter that is not serviceable. Even though both valve blocks have their own filters, it is important to maintain the machine's hydraulic filters as the primary filtering system. This practice is especially critical for the current valve block.

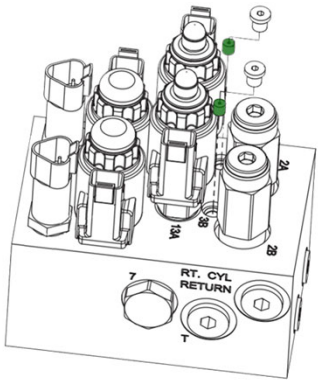
General Business

Hydraulic Valve Block

DESIGN CHANGES



Legacy Hydraulic Valve Block



Current Hydraulic Valve Block

RAVEN

The other design change is with the orifices. Remember the orifices must be removed for the PowerGlide Plus system or when running UltraGlide in PowerGlide Plus mode. The orifices are needed for the UltraGlide system to help cushion the hydraulic response when lowering the booms. With the legacy valve block, you only need to turn out the needle valves which basically bypasses the orifices when in or switching to PowerGlide Plus.

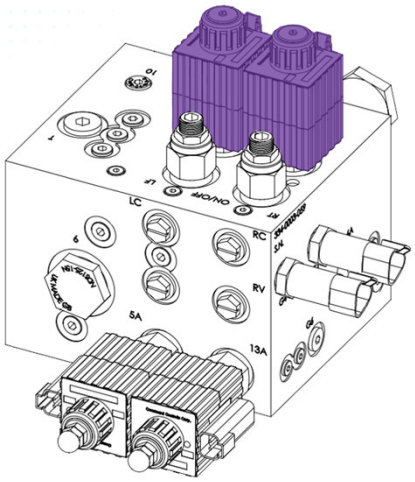
You would then turn the needle valves all the way in to restrict the hydraulic flow with the orifices when running the UltraGlide system. The needle valves make it easier to switch between the two modes as you do not need to remove the orifices.

With the current valve block, you will need to physically remove the orifices as there are no needle valves in this design. Thus, you would need to replace them when running the UltraGlide system again.

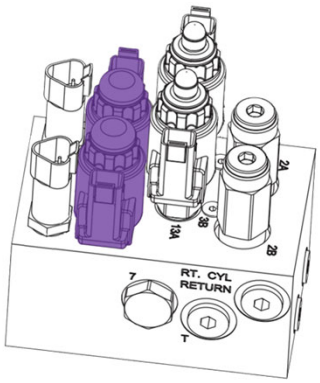
General Business

Components

BLOCKER CARTRIDGE VALVES



Legacy Hydraulic Valve Block



Current Hydraulic Valve Block

RAVEN

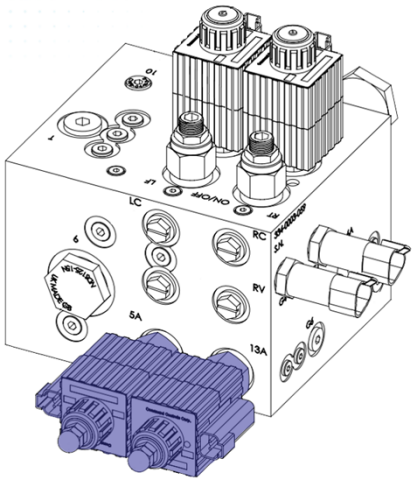
Since AutoBoom is coupled into the pressure and tank hoses, it must have a way to control the machine hydraulic fluid.

When AutoBoom is active, the Blocker Valves open to allow the free flow of the machine's hydraulic fluid through the AutoBoom valve block. There is now a complete hydraulic pathway from the machine pump back to the hydraulic tank which allows the AutoBoom system to have full control of the boom functions.

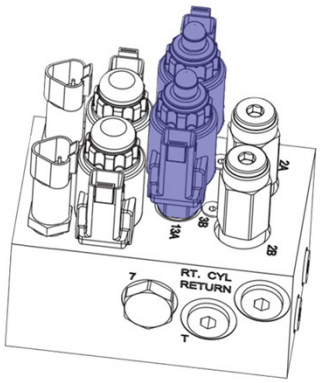
General Business

Components

PROPORTIONAL CARTRIDGE VALVES



Legacy Hydraulic Valve Block

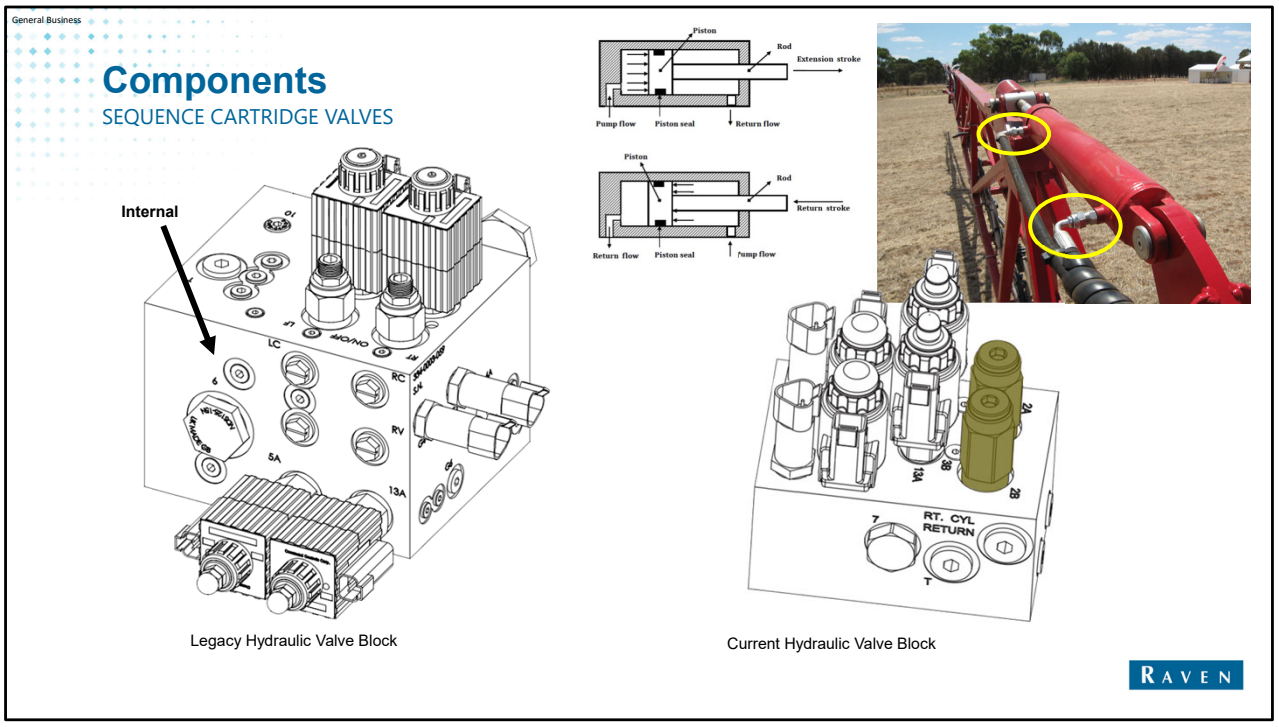


Current Hydraulic Valve Block

RAVEN

Since the Blocker Valves enable an open hydraulic pathway, the booms would crash to the ground since nothing is preventing the flow of hydraulic fluid back to tank.

The Proportional Valves restrict the flow of hydraulic fluid back to tank to prevent the booms from crashing. In fact, they restrict the flow just enough so that the booms remain level or at the set boom height. While out in the field, AutoBoom will restrict this flow to lift the booms and then restrict less to bring the booms back to level or to the programmed height.



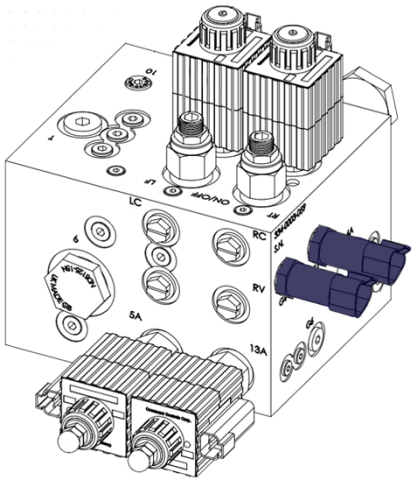
The Sequence Valves allow the AutoBoom system to work better with machines that have double-acting boom cylinders. One key feature of the AutoBoom system is that the left and right booms can be controlled independently. This attribute can be important when an operator wants to manually control one side of the boom, along fence lines, for example, and let the AutoBoom system control the opposite side.

The Sequence Valves provide the ability to raise and lower the boom when that side is being manually controlled. The legacy valve block has this feature built in and is not a replaceable component. The upper middle illustration shows how hydraulic fluid is needed on the extension and return stroke of the boom cylinder. The upper right image is of a double-acting boom cylinder on a sprayer.

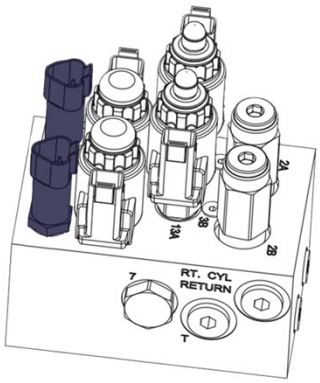
General Business

Components

PRESSURE TRANSDUCERS



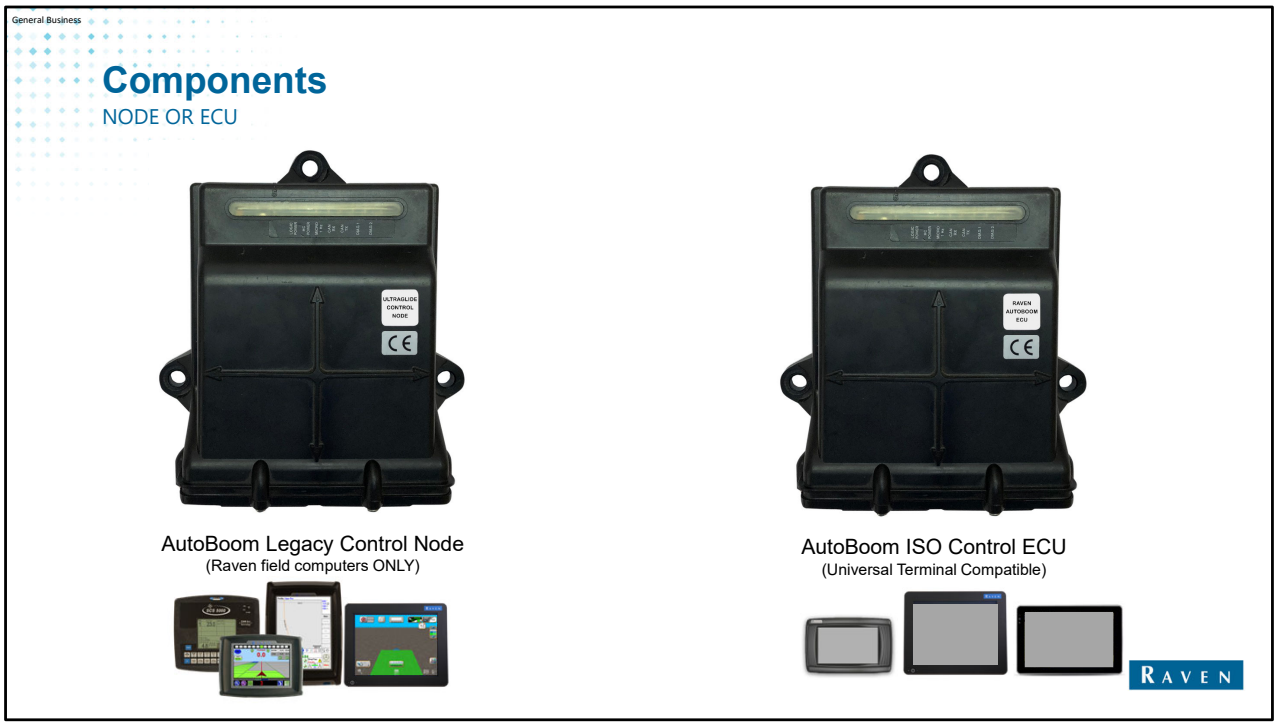
Legacy Hydraulic Valve Block



Current Hydraulic Valve Block

RAVEN

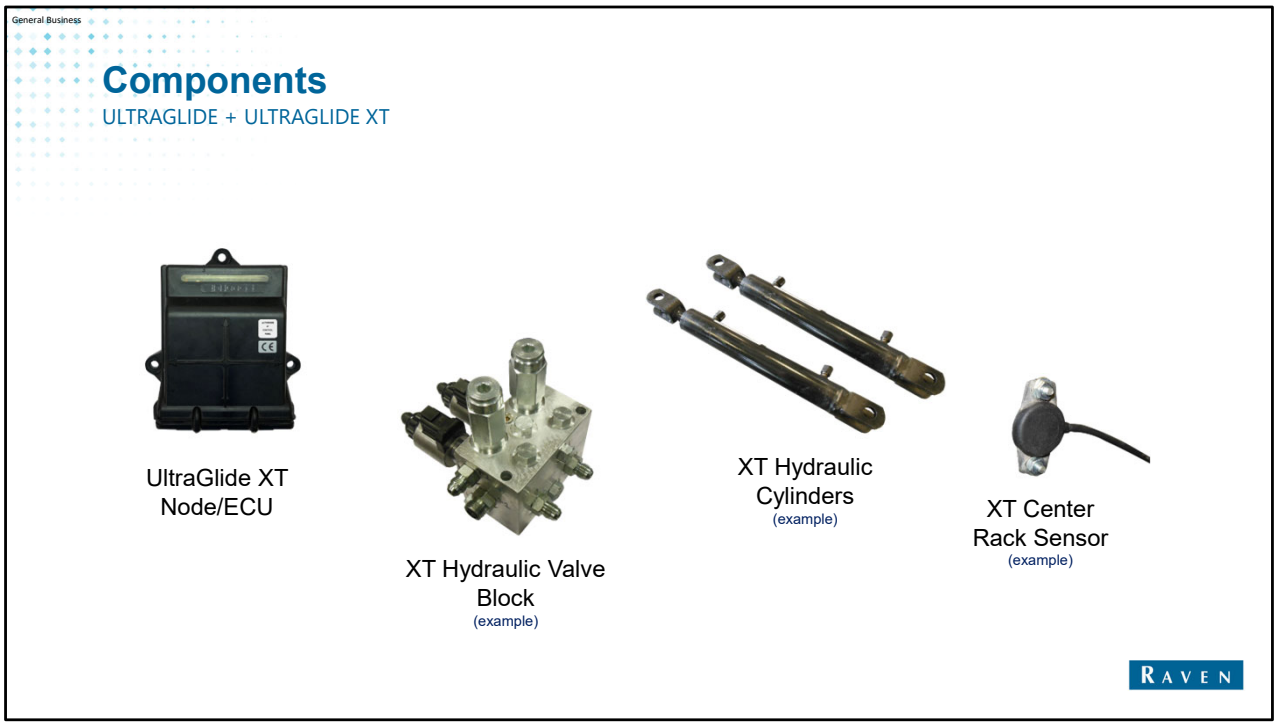
Both hydraulic valve blocks have Pressure Transducers. Since the PowerGlide Plus system is pressure-based, the Pressure Transducers are essential for boom control. Unlike the PowerGlide Plus system, the UltraGlide system only monitors boom pressure and does not use the system pressure to make height control decisions.



The AutoBoom system comes in two versions, either Raven proprietary CAN bus or universal ISO CAN bus (International Organization for Standardization) which makes it an ideal height control system for most sprayers The terms Node and ECU (Electronic Control Unit) are used interchangeably in some context. Both terms identify a device, microcontroller, that performs specific functions and communicates with other Nodes/ECUs on the CAN bus network.

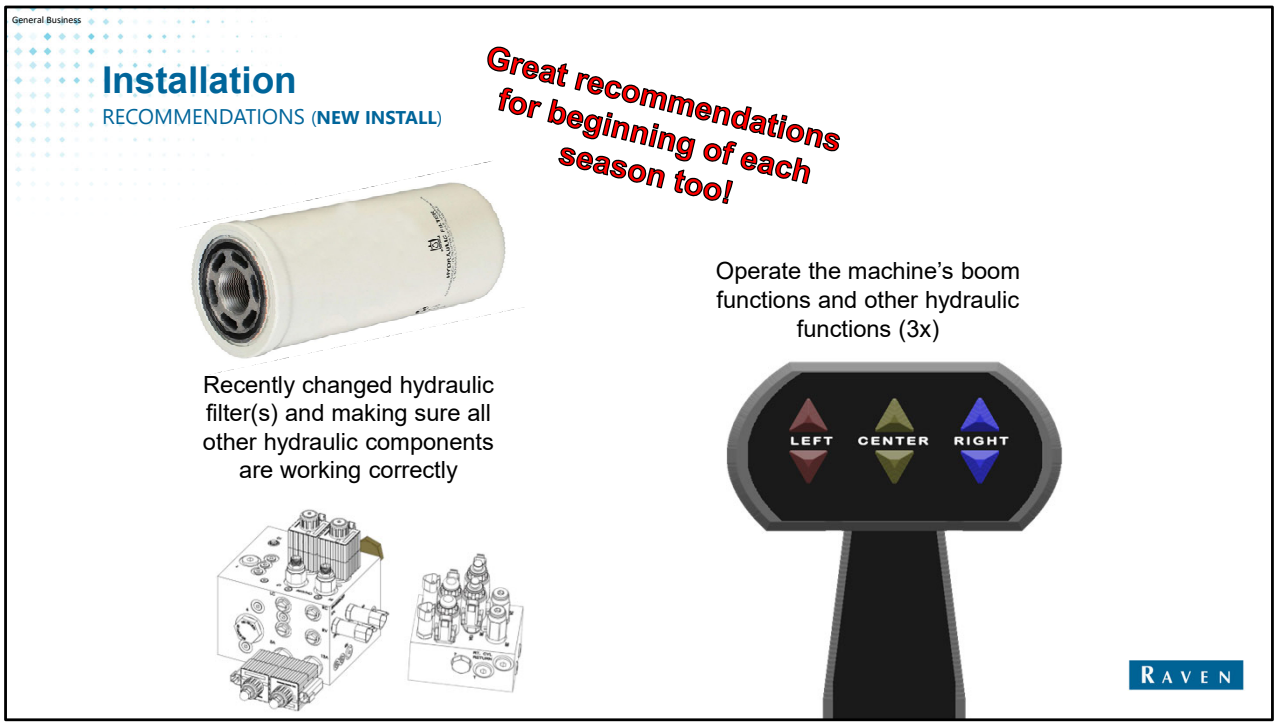
The Raven legacy system requires a Raven legacy or current field computer, or a Raven SCS Can Controller (SCS4400, SCS4600, SCS5000). The only exception is the Raven CRx field computers which are only compatible with the ISO system.

The ISO system is also compatible with most universal terminals in the market. The main takeaway is that the functionality between the two versions is identical.



For extreme field conditions, an additional hydraulic system can be installed with the UltraGlide system. The UltraGlide XT system includes its own Raven proprietary node or ISO ECU, its own hydraulic valve block that is coupled with the AutoBoom valve block, separate hydraulic cylinders that replace the springs or dampeners on the machine center rack, and a center rack sensor.

The gyros in the XT node or ECU measure machine roll and compares that reading to the center rack position provided by the XT Center Rack Sensor to help stabilize any excessive center rack movement. The UltraGlide XT system is a great addition to the UltraGlide system on many pull-behind sprayers or self-propelled sprayers that have excessive movement in their center racks.



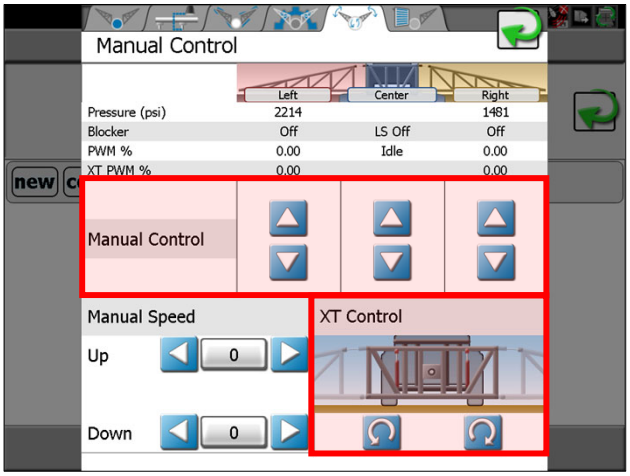
In most cases, you will no longer be installing an AutoBoom system for the first time. It is still recommended that the hydraulic filters be changed on a regular basis and that all other hydraulic components are working correctly as well. Remember that the current AutoBoom valve block has an internal filter that is not serviceable.

It is also a good idea to service the legacy valve block filter regularly. It is always a good idea to operate the machine's boom functions manually to make sure everything is working correctly before operating the AutoBoom system for the first time or at the start of a new season.

General Business

Manual Control

AFTER INSTALL OR NORMAL MACHINE CHECK



RAVEN

Once the machine boom functions have been validated with the machine's boom switches, it is good practice to manually control the boom functions from within the AutoBoom control pages or through the object pool if using the ISO system. This routine check should be completed after a new install, at the beginning of each season, or any time the system is not operating correctly. If UltraGlide XT is installed, it will have its own manual control section.

General Business

Installation

ULTRASONIC SENSORS

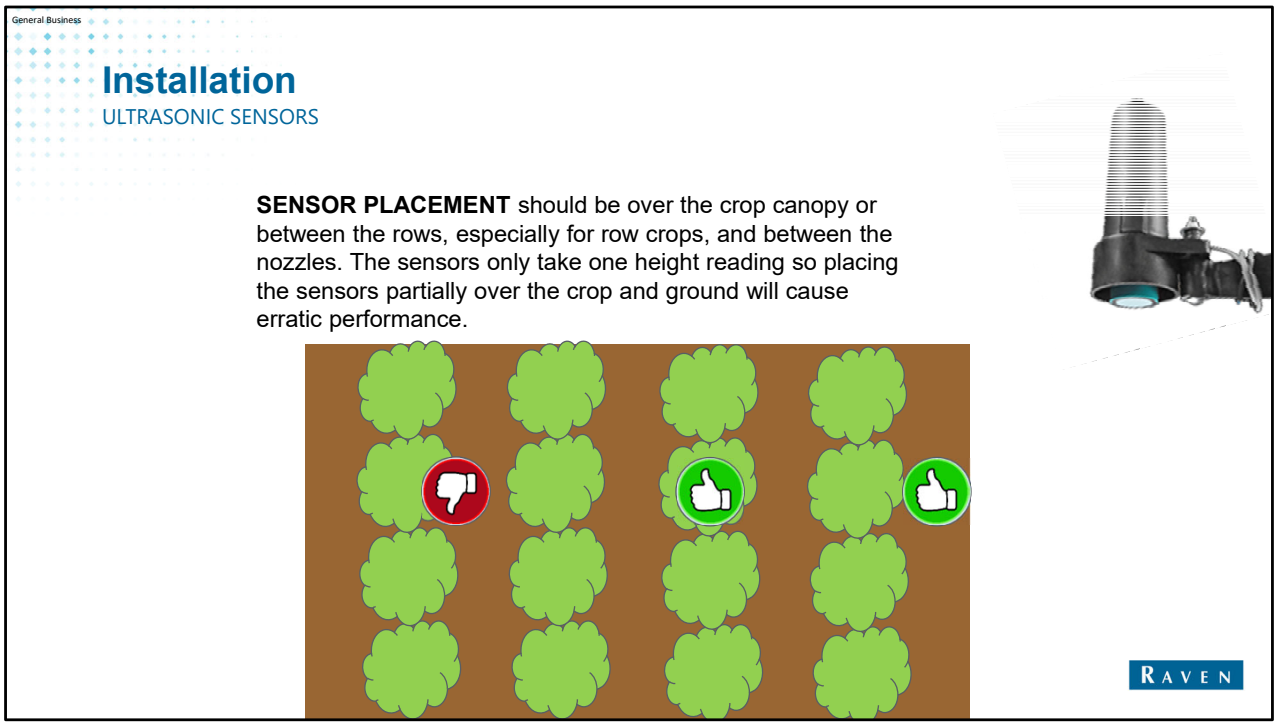
OUTSIDE SENSOR mounted as far out on the boom as possible but not on the breakaway section. Sensor cable is protected when folded in and out.

INNER SENSOR mounted mid-range of the boom but protected when boom is folded. Sensor cable protected when folded in and out.

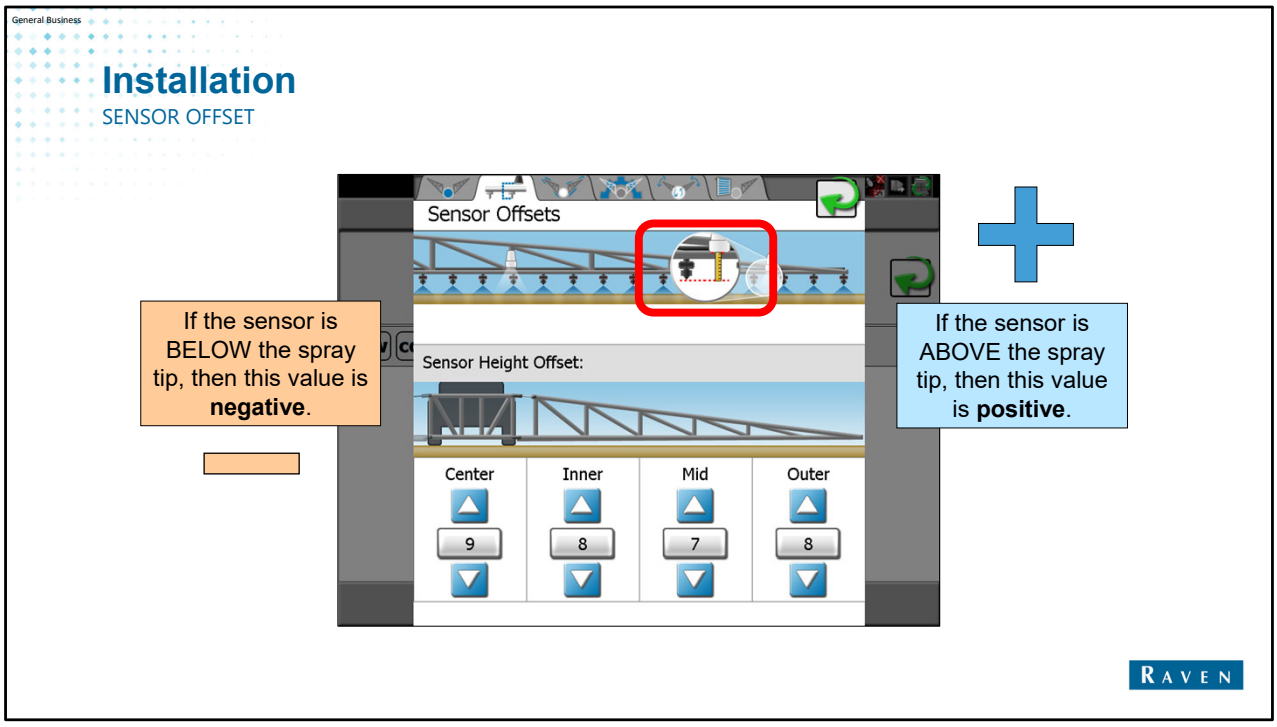
CENTER SENSOR mounted on the center rack and away from any hanging hoses, etc. especially when center rack is raised.

RAVEN

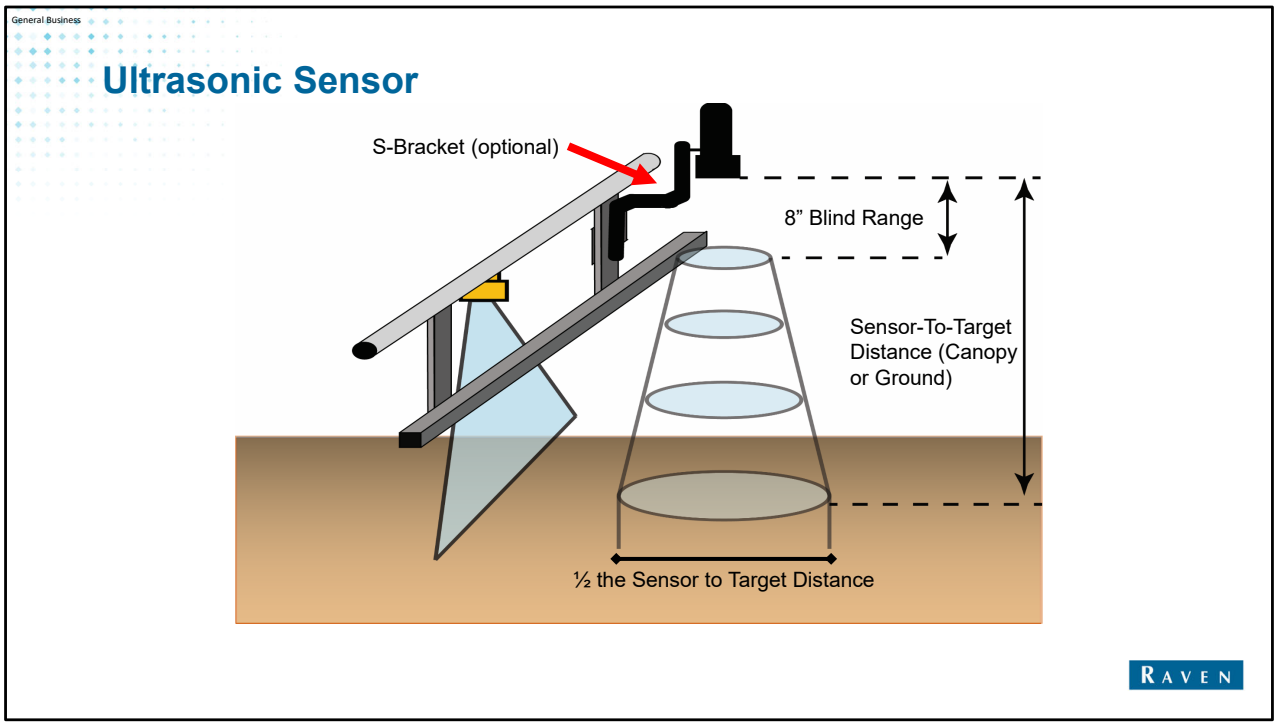
The outside sensor should be mounted as far out on the boom as possible but not on the break away section, if possible, to avoid any potential sensor damage. The inner sensor if installed should be mounted about mid-range on the boom but protected when the boom is folded in The center sensor should be mounted on the center rack and away from any hanging hoses or anything else that might cause sensor interference when the center rack is raised.



The ultrasonic sensors should be installed on the boom over the crop canopy or between the rows, especially for row crops, and between the nozzles. The sensors only take one height reading so placing the sensors partially over the crop and ground will cause erratic performance. Placement of all the sensors with respect to the height control point of reference, crop canopy or ground, must be the same.



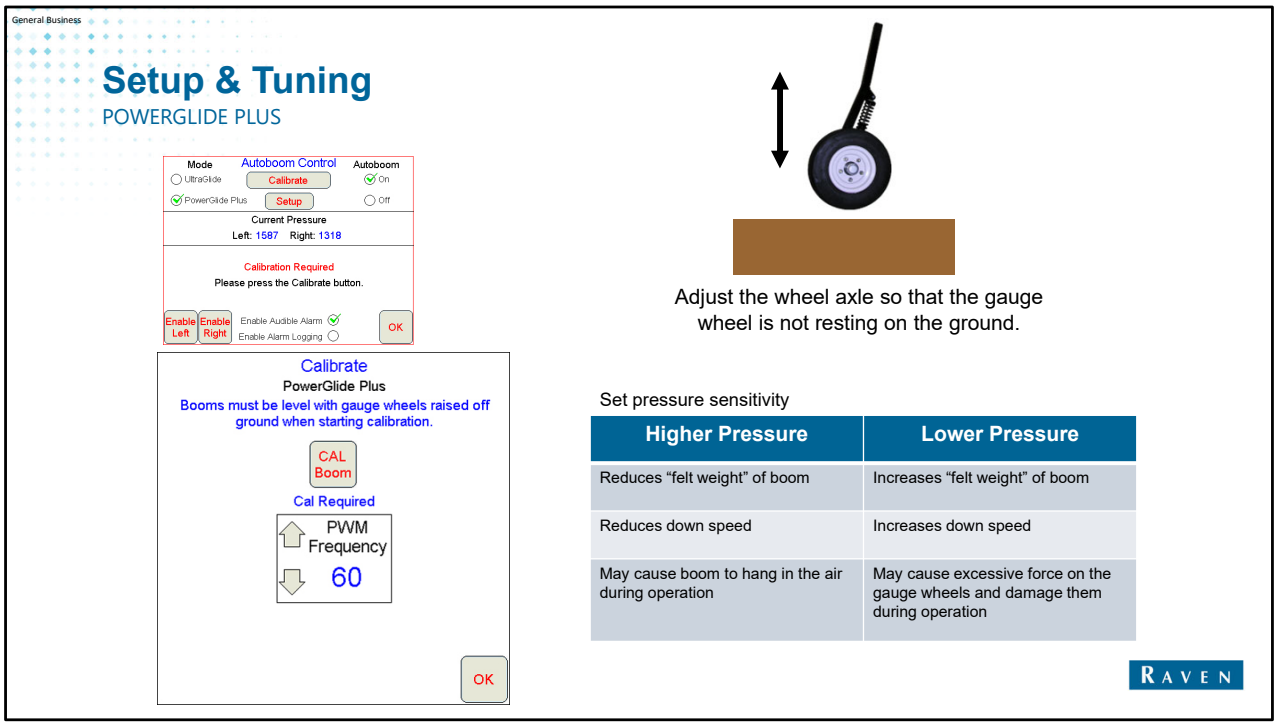
When setting up the UltraGlide system, you will need to enter the sensor offset with respect to the spray nozzles. This offset can be different between the outer, inner, and center sensors but must be the same for each on the left and right booms. It is always a good idea to check that the sensor offset has been entered correctly when troubleshooting the system.



The ultrasonic sensors on the boom should be mounted on the front and on the lower rail of the boom. They should always be mounted perpendicular to the ground and never at an angle. There is an optional S-Bracket that can be used that will allow the sensor to be mounted farther in front of the boom and a little higher to avoid any interference from spray drift. It is important to remember that the ultrasonic sensor is susceptible to spray drift, heavy dusty conditions, and standing water or snow.

The ultrasonic sensor emits a cone-shape pattern as shown in the illustration. The footprint of the cone is related to the target height entered which will result in the cone having a diameter that is half the measurement of the sensor to target distance. This measurement is important to know when deciding on the placement of the sensor along the boom to make sure the cone is completely over your control reference point of either the crop canopy or ground.

Also, because of the properties of ultrasonic wavelengths, the sensor will receive erratic readings within 8 inches of it. This sensor property is labelled the blind range in the illustration. When mounting the center sensor, it will be important to be mindful of all these properties as well if center rack control is enabled.

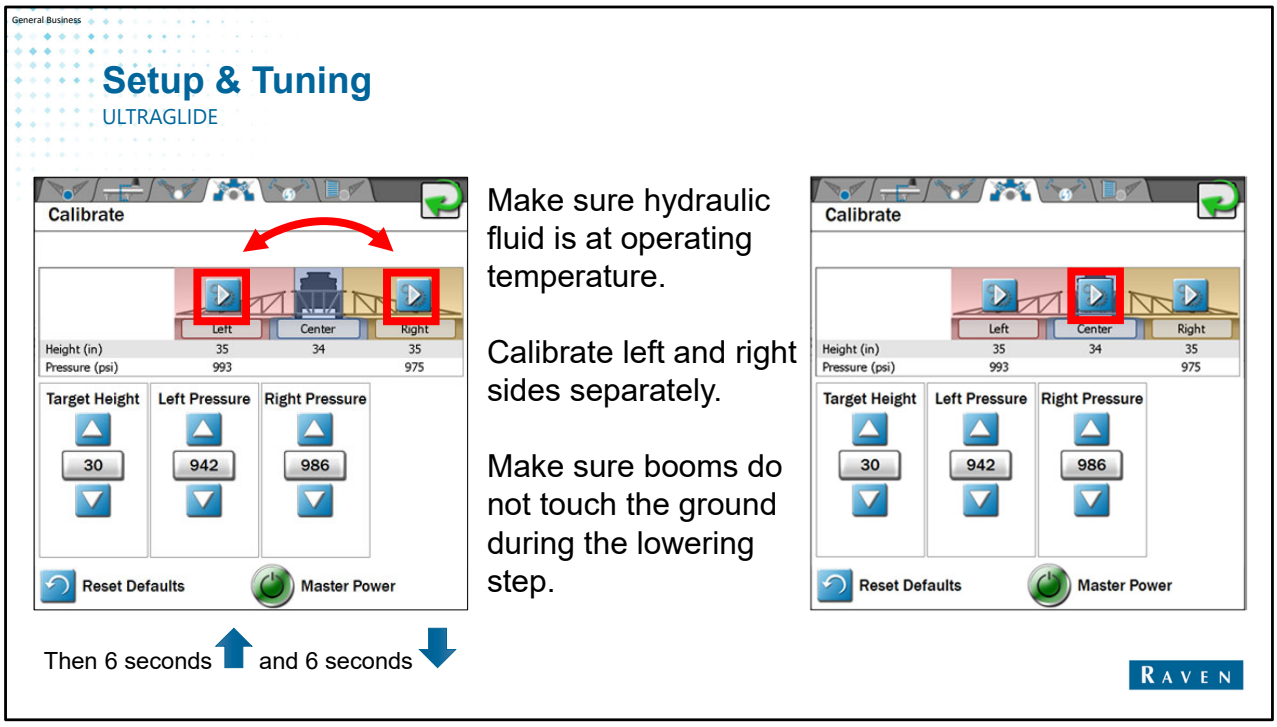


Adjust the wheel axle so that the gauge wheels are not resting on the ground. You may want to go higher than the typical recommendation of up to 6 inches just for calibration purposes. Hydraulic fluid should be at operating temperature, level the boom and calibrate the system.

During calibration, the PowerGlide Plus system will raise and lower each side of the boom. It is important that the height of each boom is high enough that the wheels do not touch the ground when each side is lowered.

Set the pressure for how sensitive you want the wheels to be when they touch the ground during operation. Setting a higher pressure will reduce the felt weight of the boom but it will reduce the down speed which may cause the boom to hang in the air when in the field. Setting a lower pressure will have the opposite effect and could cause excessive damage to the wheels in some conditions.

Remember, the wheels were neither designed to carry the full weight of the boom nor should the set pressure allow them to ride along the ground.



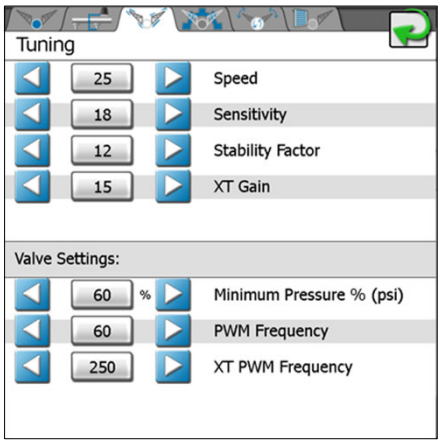
Make sure the hydraulic fluid is at operating temperature. You will calibrate each side separately. While calibrating, make sure the booms do not touch the ground during the lowering step. Once both sides have been calibrated, you should raise the center rack for 6 seconds and then lower it for 6 seconds. It is okay to reach the limit of the boom travel in either direction before 6 seconds has expired as it is the time frame that is important and not the travel distance.

If UltraGlide XT is installed, a play button will appear over the center section after the both sides have been calibrated. You will then need to calibrate the XT system separately.

General Business

Setup & Tuning

ULTRAGLIDE

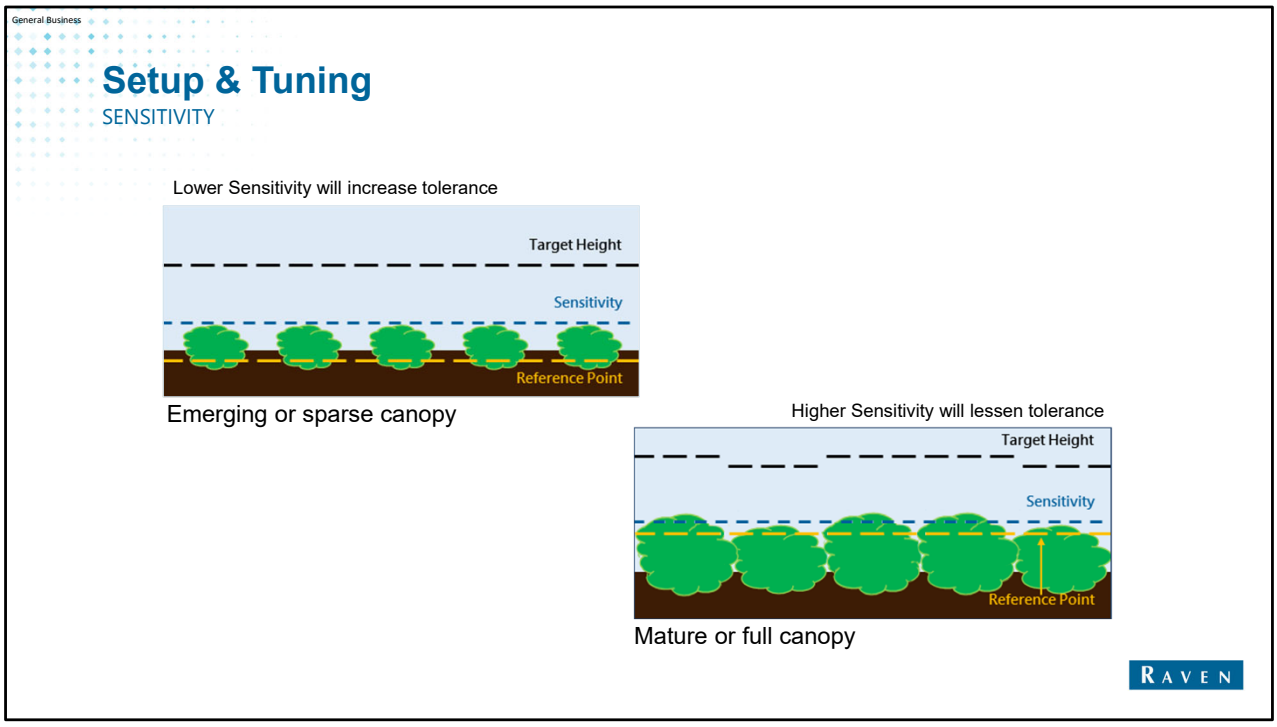


Once calibration has been completed, you should fine-tune the system starting with Sensitivity then Speed and finally Stability Factor.

MUST be in this order!

RAVEN

Once the UltraGlide system has been calibrated, you should fine-tune the system starting with Sensitivity then Speed and finally Stability Factor. You should always fine-tune and adjust these settings in this order after any calibration and even in the field when system adjustments are needed.

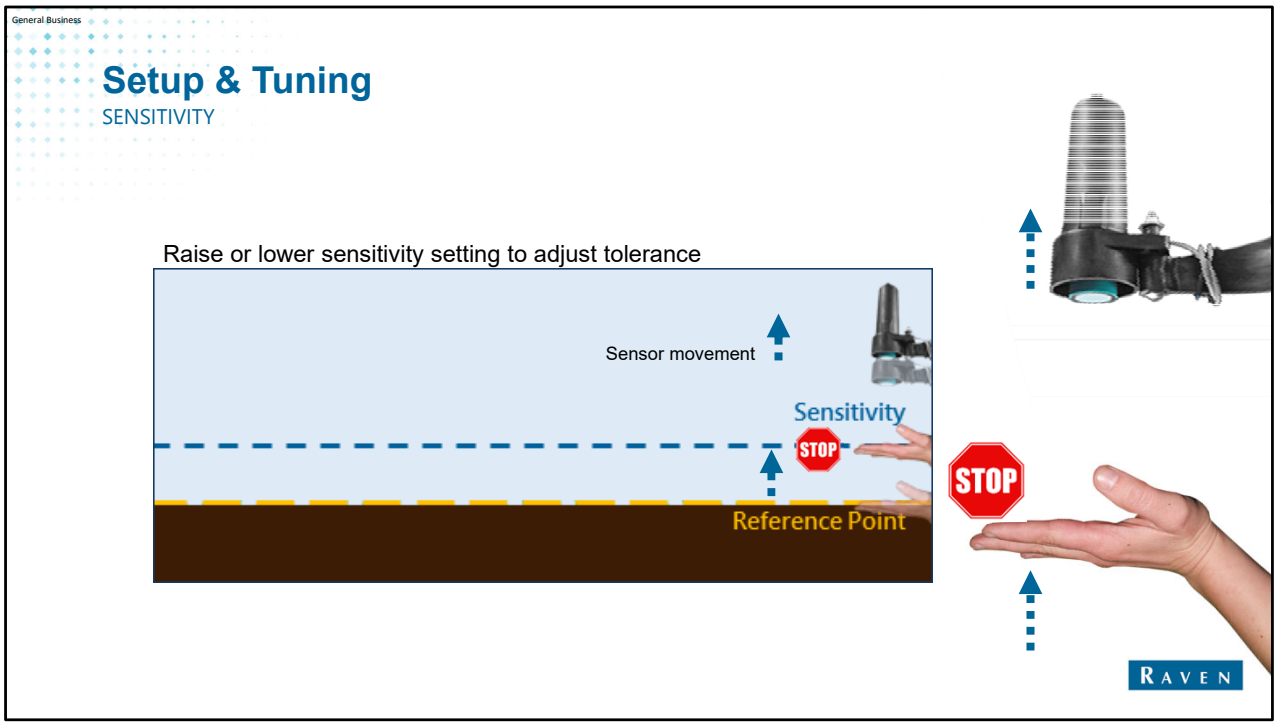


Sensitivity determines how reactive the UltraGlide system will be when there are changes in height from your reference point. Do you want the UltraGlide system to raise and lower with small changes in the height reading or ignore some height differences?

In the upper illustration, the reference point is the ground. With a lower Sensitivity setting, the UltraGlide system will ignore any height changes between the reference point and the sensitivity line. It will not raise the booms until the crop height is above the Sensitivity line. This scenario works best for emerging or sparse canopy conditions because the ground is a more consistent reference point.

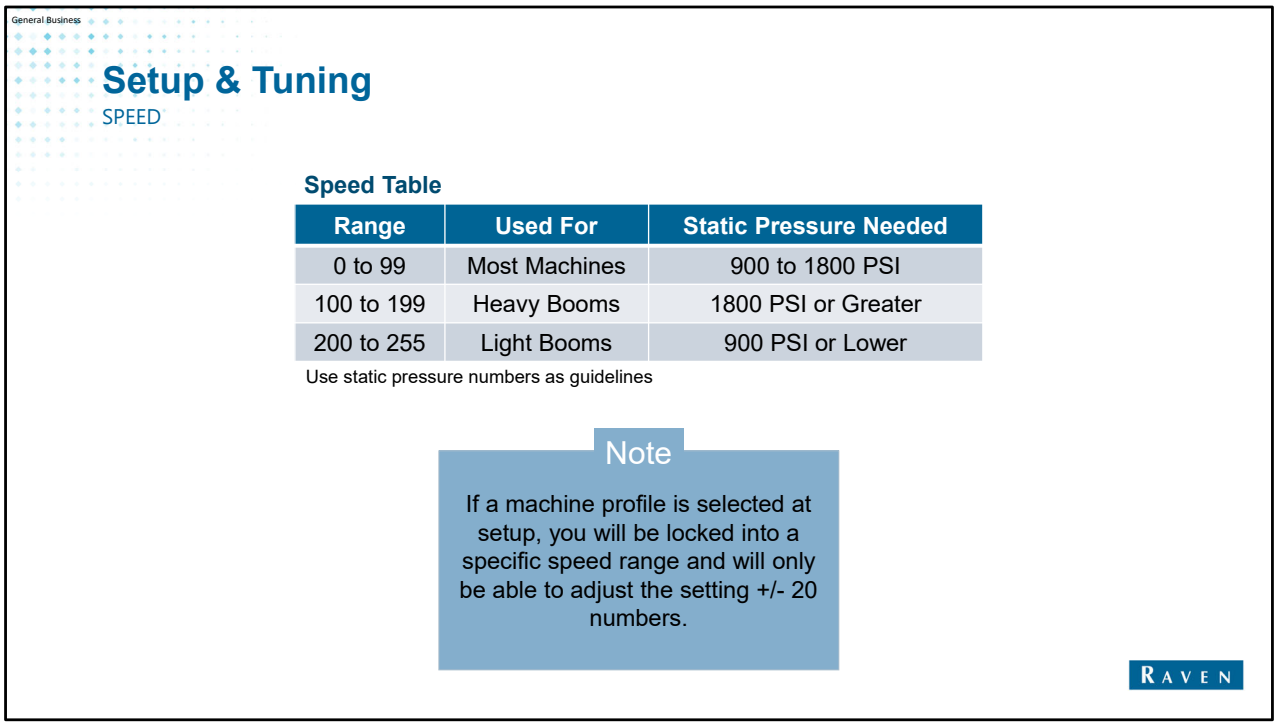
The bottom illustration, the reference point is the crop canopy. With a higher Sensitivity setting, the UltraGlide system will raise the booms with smaller changes from the reference point. In this illustration the booms would be raised for any plant canopy that is above the Sensitivity line. This scenario works best for mature and full canopy conditions.

Ideally you will need to adjust your sensitivity throughout the season as the crop matures.



Place your hand or a piece of cardboard or similar object on the ground directly below the sensor. Raise your hand or object slowly. When the sensor detects your hand or object movement and starts raising the boom, stop moving.

You have now determined your Sensitivity line and can measure from the ground to your hand or object. Increase the setting if you want teh zone smaller (more sensitive) or decrease it to make the zone larger (less sensitive).



Once Sensitivity is set, you can adjust how fast the UltraGlide system will raise the booms to any detected height changes. The Speed Setting is only for raising the booms. The time it takes to lower them is not configurable and is pre-determined by the speed range. During setup, you can select your sprayer from the machine database. This selection will place you in one of the three speed ranges.

The speed ranges are based on the static pressure it takes to keep the booms level. The heavier the booms the more effort it will take to raise them.

The speed ranges are also independent of each other and the numbering is not consecutive. Each speed range has a different effort algorithm based on the boom properties it was created for.

The caveat is that you will only be able to raise or lower the default speed number by 20 numbers in either direction.

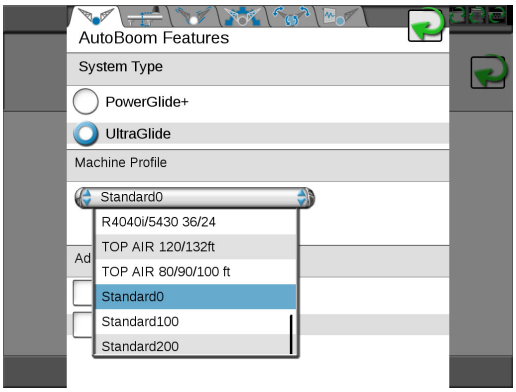
The speed ranges are based on the static pressure it takes to keep the booms level. The heavier the booms the more effort it will take to raise them. The speed ranges are independent of each other, and the numbering is not consecutive. Each speed range has a different effort algorithm based on the boom properties it was created for.

General Business

Setup & Tuning

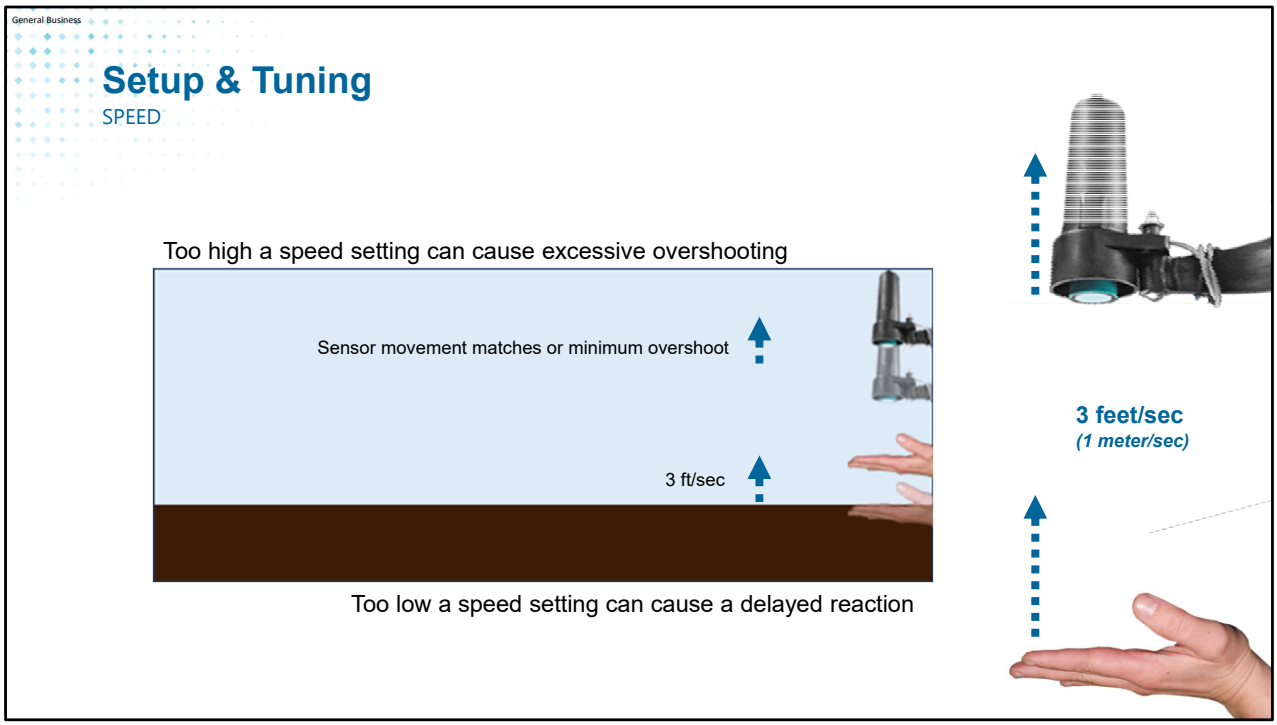
SPEED RANGES

Range	Used For	Static Pressure Needed
0 to 99	Most Machines	900 to 1800 PSI
100 to 199	Heavy Booms	1800 PSI or Greater
200 to 255	Light Booms	900 PSI or Lower



RAVEN

If additional adjustment is needed beyond this limited range, you will have to reset the system and select a speed range directly. Instead of selecting your sprayer from the machine database, select the speed range that matches the static pressure needed to keep the booms level. You will now have the full range of values in that speed range. In this example, you would have from 0 to 99 with the Standard0 Machine Profile.



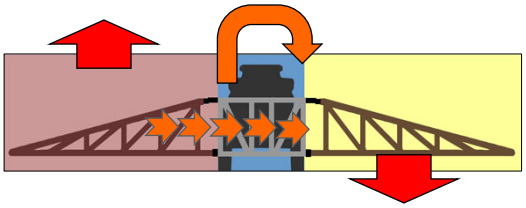
Place your hand or a piece of cardboard or similar object on the ground directly below the sensor. Raise your hand or object about 3 ft/second. When the sensor detects your hand or object, the boom will raise. Continue to raise your hand at 3 ft/second for a little longer and then stop. The boom movement should match the speed you are raising your hand or object and stop when you stop moving. Any additional movement or overshooting of up to 6 inches is acceptable in most cases.

Too high of a Speed setting will cause faster movement and excessive overshooting and may cause the boom to hang in the air for extended periods of time. Too low of a Speed setting will cause a delayed reaction and the boom will raise very slowly. The Speed setting only determines the raise speed as the down speed is pre-determined based on the speed range and cannot be changed.

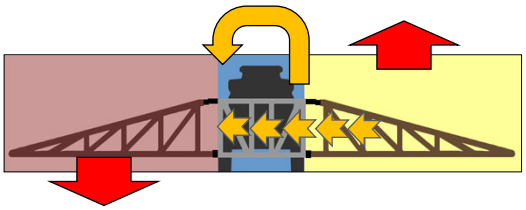
General Business

Setup & Tuning

BOOM DYNAMICS



How rigid or loose is the center rack?



RAVEN

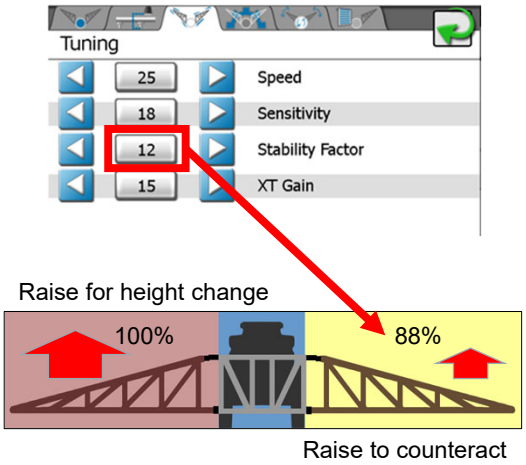
We will want to counteract the effect of raising one boom at the Speed setting with respect to the opposite side movement. Depending on how rigid or loose the machine center rack is, the force of raising one side may transfer the energy to the opposite side and cause it to drop.

We do not want the opposite side to drop as UltraGlide will need to raise it which will now cause the first side to drop. The seesaw effect has begun which is not what we wanted!

General Business

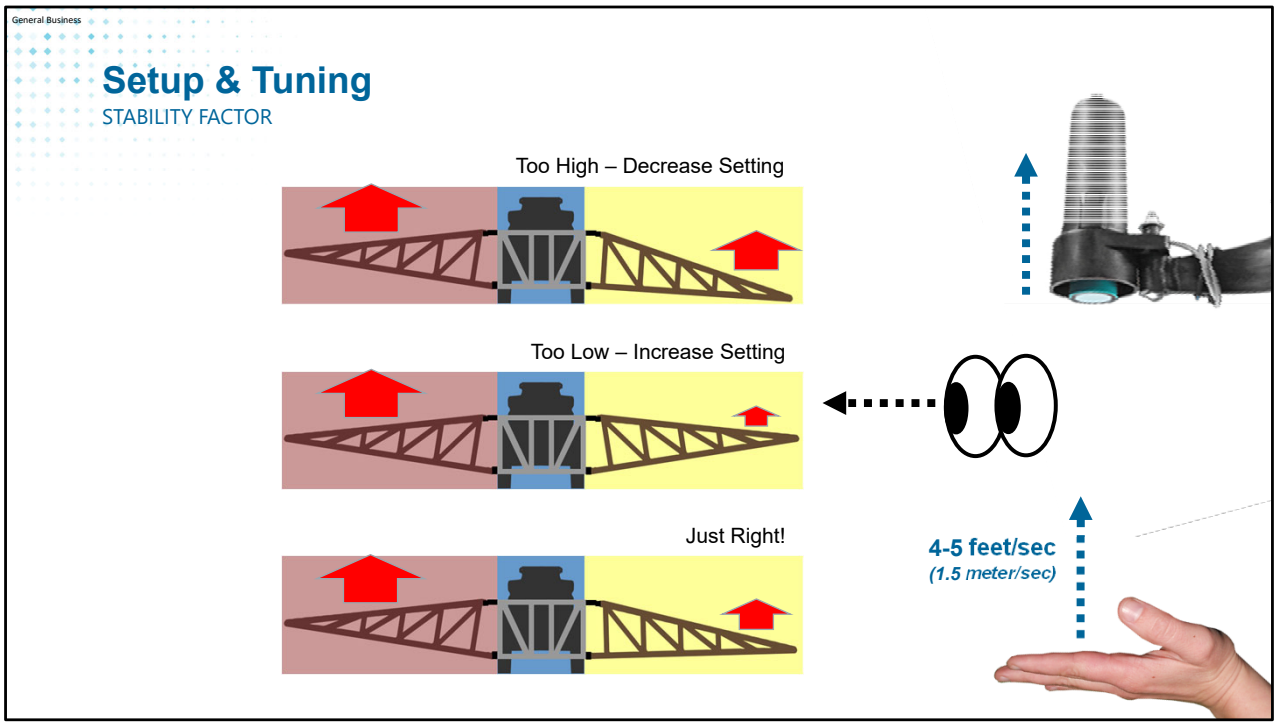
Setup & Tuning

STABILITY FACTOR



RAVEN

Stability Factor helps counteract this boom movement from one side to the other by also raising the non-controlled side at the same time as the side that needs to be raised for height control. In this example, a setting of 12 will supply 88% of the effort used to raise the controlled side to the non-controlled side. Stability Factor is set correctly whenever one of the booms is raised and the opposite side boom remains level or only goes up slightly .



Stand by the outer sensor on one side so that you can see the opposite side boom. If your view is blocked, then you will need an assistant.

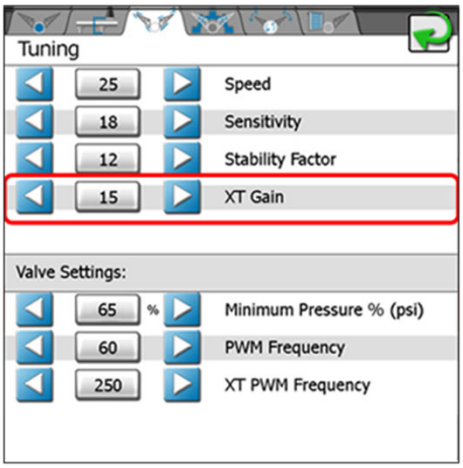
Place your hand or a piece of cardboard or similar object on the ground directly below the sensor. Raise your hand or object about 4-5 ft/ second. You want to simulate the boom needing to raise rapidly. Watch the opposite side boom to see how it reacts. Ideally, you want the opposite side to remain level, but it is acceptable for it to also raise up to an additional 6 inches. If the opposite boom drops, then you will decrease the Stability Factor number. If the opposite boom raises too much, then you will increase the value.

Always fine-tune your Sensitivity value for the operation or field conditions first. When operating in the field, you would adjust the Speed value when you want the boom reaction to be faster or slower. You do not need to change the Stability Factor just yet unless you make larger adjustments to the Speed value. Just watch the opposite side boom and make the changes accordingly. Remember, if the opposite boom drops, decrease the value and vice versa.

General Business

XT Gain

ACTIVE CONTROL



Adjust the aggressiveness of the center rack movement with respect to machine chassis roll

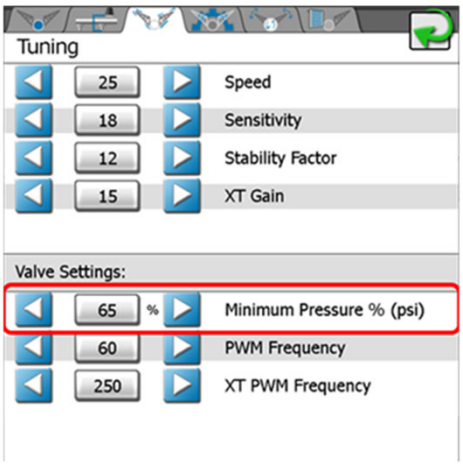
RAVEN

With extreme field conditions, Stability Factor might not be enough to counteract the boom movements. This is where UltraGlide XT would be a good solution. The XT Gain setting can be adjusted accordingly to make the center rack operate more rigid or loose. Raise the value if you would like the center rack position to be maintained more aggressively in relation to the machine chassis roll; or lower the value to lessen the effort to maintain the center rack position.

General Business

Minimum Pressure %

POWERGLIDE PLUS & ULTRAGLIDE



Adjust the aggressiveness of the center rack movement with respect to machine chassis roll

RAVEN

The Minimum Pressure % setting ensures that the boom cylinder pressure never drops below a certain percentage of the static pressure, even if the boom must be lowered more to achieve the target height. This limitation prevents booms from resting on the stops for travel-limited booms or to prevent the full extension of the boom cylinders.

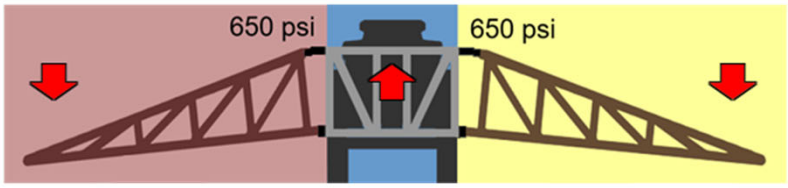
In this example, if the static pressure in the boom cylinders is 1000 psi to keep the booms level, the minimum pressure allowed would be 650 psi. Setting the Minimum Pressure % too low could cause damage to the boom but it can also result in delay in raising the boom since the too low of pressure needs to be built up before the boom will react. This delayed response can also occur whenever the center rack is higher than the side booms that have been lowered for height control or for any other reason.

Minimum pressure % is also available when running in PowerGlide Plus mode.

General Business

Minimum Pressure %

POWERGLIDE PLUS & ULTRAGLIDE



Raise center rack and enter a height setting that equals the minimum pressure % value.

Enable AutoBoom and test the boom response at this minimum pressure.

RAVEN

To test the Minimum Pressure %, raise the center rack and enter a height setting that lowers the booms and the resulting pressure equals the Minimum Pressure % value (e.g. 650 psi). Enable AutoBoom. Place your hand or a piece of cardboard or similar object on the ground directly below the sensor and raise it about 3 ft/second. You should remember when the sensor detected your hand or object from setting the Sensitivity value as the boom should start to raise at this point again without delay.

Continue to raise your hand and the boom should match your hand or object movement, just like it did when setting the Speed value. If there is a delay in response from these conditions, then your MinimumPpressure % is too low. Increase the value in small increments until you no longer notice a delay.

General Business

Button Features

UP & DOWN TAPS

Center Switch	Center Rack ON	Center Rack OFF
(1x) UP tap	Disable center rack and booms	
(2x) UP tap	Raise to transport height	Disable booms and raise to transport height
(4x) UP tap	Raise to max height and turn AutoBoom off; transport height changed to max height	Raise to max height and turn AutoBoom off; transport height changed to max height
(1x) DOWN tap	Lower center rack to spray height; enable center rack and booms	
(2x) DOWN tap		Lower center rack to spray height; enable booms

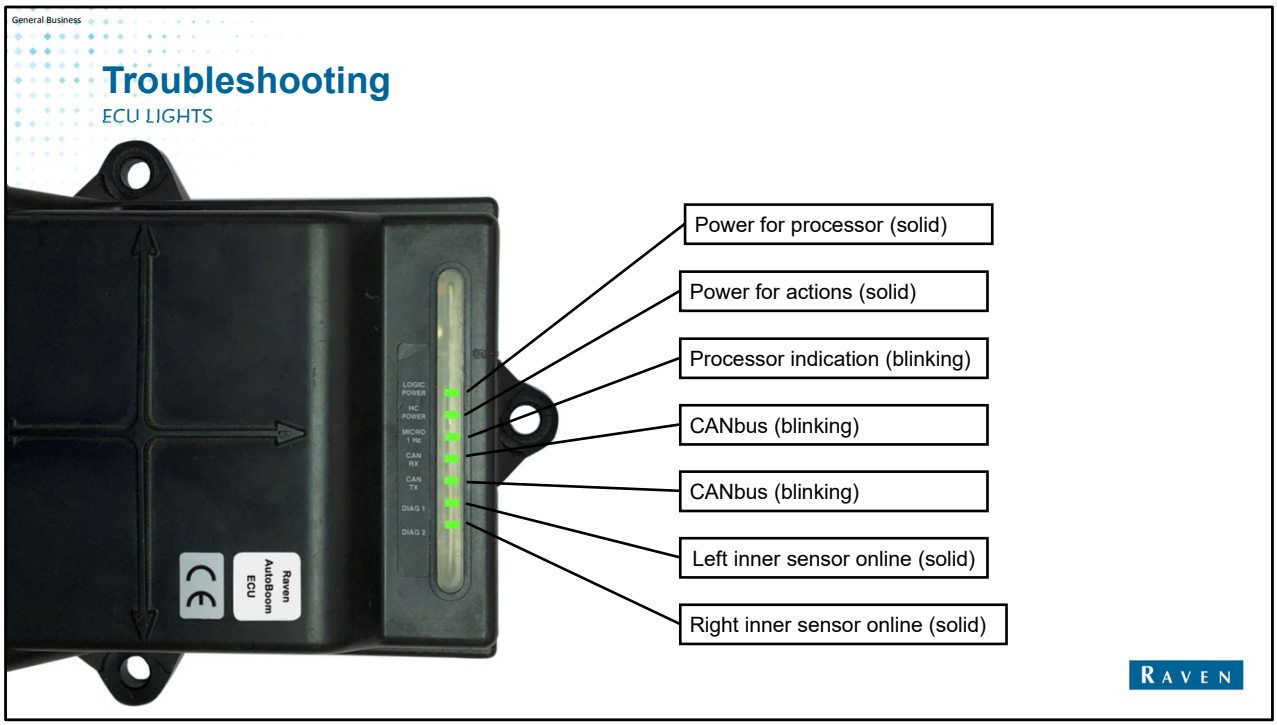
Transport Height	
Set Height	During raise sequence (to current transport height or to max height), tap (1x) DOWN
Remove Height	Must be above transport height and not in raise sequence, tap (2x) UP

Boom Switch	
(1x) UP tap	Disable that boom
(1x) Down tap	Enable that boom

RAVEN

There are some pre-programmed functions for certain up and down button presses. For the center rack switch, the button sequence depends on if center rack control has been enabled. There is also the ability to set a different max height called transport height if you do not want the center rack to go up all the way when turning or transporting the machine.

Both sides of the boom will be automatically enabled whenever the center rack is enabled by the button sequences listed prior. You can override and re-enable each side with the respective boom switch



One of the first steps in troubleshooting the AutoBoom system is to verify the lights on the ECU. The Logic Power light should be solid which indicates power is available for the ECU processor. The HC Power (High Current) light should be solid as well. This light indicates the ECU has the power needed to raise the booms.

If either light is not on, then verify the cabling and check for proper power and ground on the ECU cabling connections. Logic and HC power will have their own wires on the AutoBoom cabling. HC is typically the larger red and white wires while the Logic will have the smaller ones. Alsways visually inspect the cabling for damage when checking connections.

If the Micro 1 Hz light is not blinking 1 time per second, then the ECU processor is not functioning and should be replaced.

CAN Rx and Tx lights should be blinking at various times indicating there is CAN bus communication between the ECU and the rest of the CAN bus network. If one or both are not blinking, then check cabling connections for proper CAN bus voltages.

The Diag 1 and 2 lights are solid when the inner sensors are detected with a 5-sensor system.

Of note, the AutoBoom system will raise the booms anytime there is lost communication with the outer sensors but will still operate if one or both inner sensors fail.

General Business

Troubleshooting

ULTRASONIC SENSOR

1. You should hear a “clicking” sound from the sensor.

2. You should see yellow-green-yellow lights on sensor when it is powered. *(remove protective cap)*

3. Verify height reading is correct for each sensor.

Protective cap removed

RAVEN

One simple check for the ultrasonic sensors is to make sure you can hear a clicking sound coming from the sensor. This sound means the sensor is receiving power. If it is not clicking, you can remove the protective cap and verify the lights on top of the sensor.

The lights should be yellow, green, yellow. If there is a red light, replace the sensor. If there are no lights, then you can check for 12 volts to the sensor.

If there is an extension cable, you will also need to verify voltage at the main boom harness sensor connection. You can also remove the extension cable and connect the sensor directly to the main boom harness cabling to verify too.

Lastly, you can swap the sensor that is not working correctly with one that is to determine if there is a bad sensor.

Another check is to verify that the height reading is correct for each sensor. It will be a good idea to raise and lower the boom to make sure sensor readings change accordingly. If the sensor reading is incorrect for one, swap it with a sensor that is reading correctly.

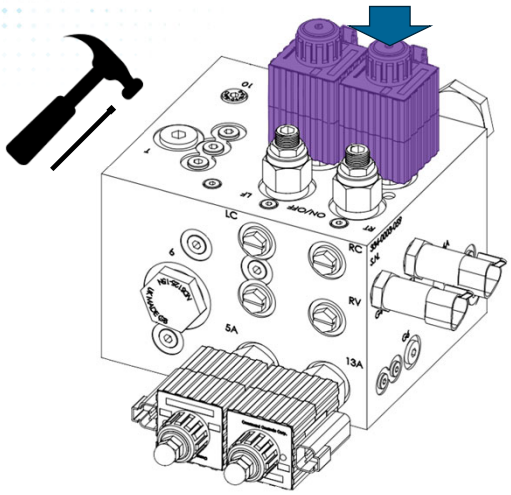
Verify the sensor offsets are correct too.

With a 3-sensor system, make sure the outer sensors are not connected to the inner sensor connections if the main boom harness cabling has both connections. Remember, the UltraGlide system will not enable if it does not detect two outside sensors.

General Business

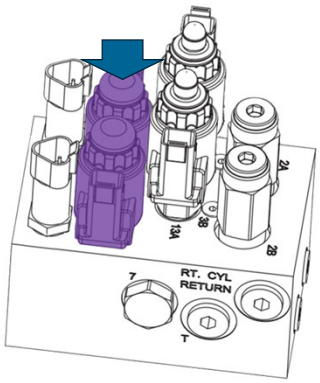
Troubleshooting

BLOCKER CARTRIDGE VALVES



Legacy Hydraulic Valve Block

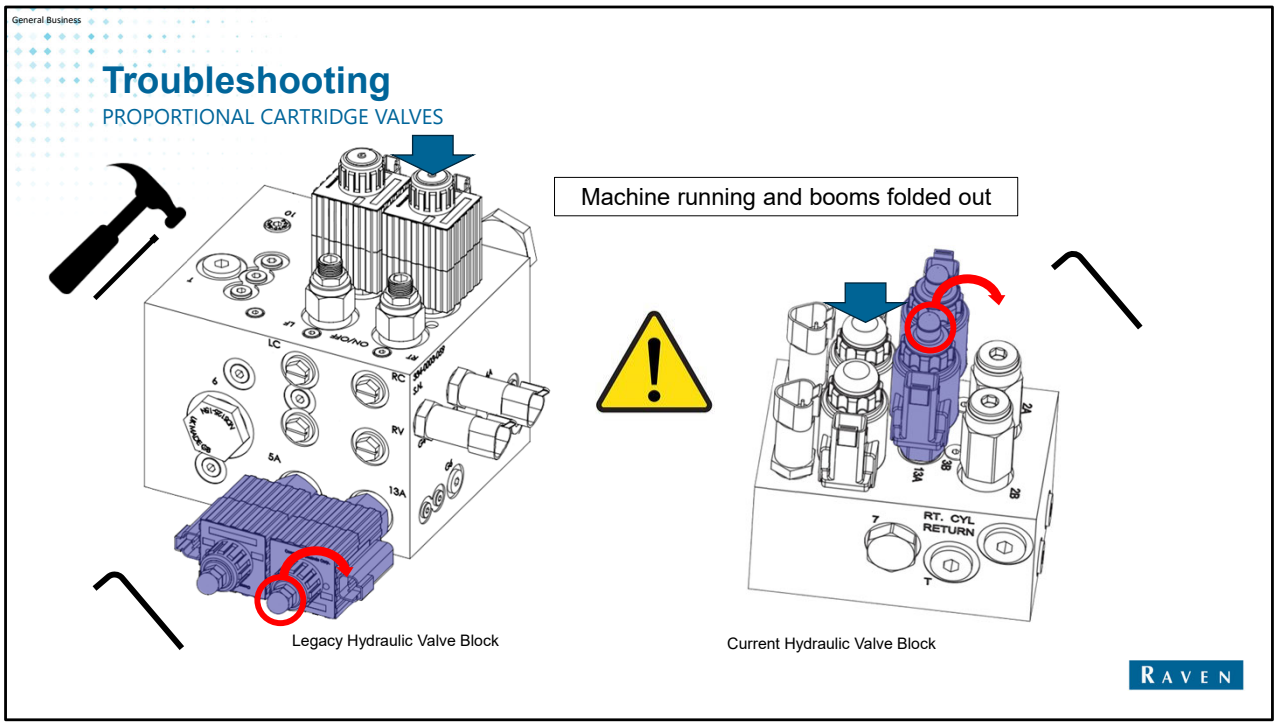
Machine running and booms folded out



Current Hydraulic Valve Block

RAVEN

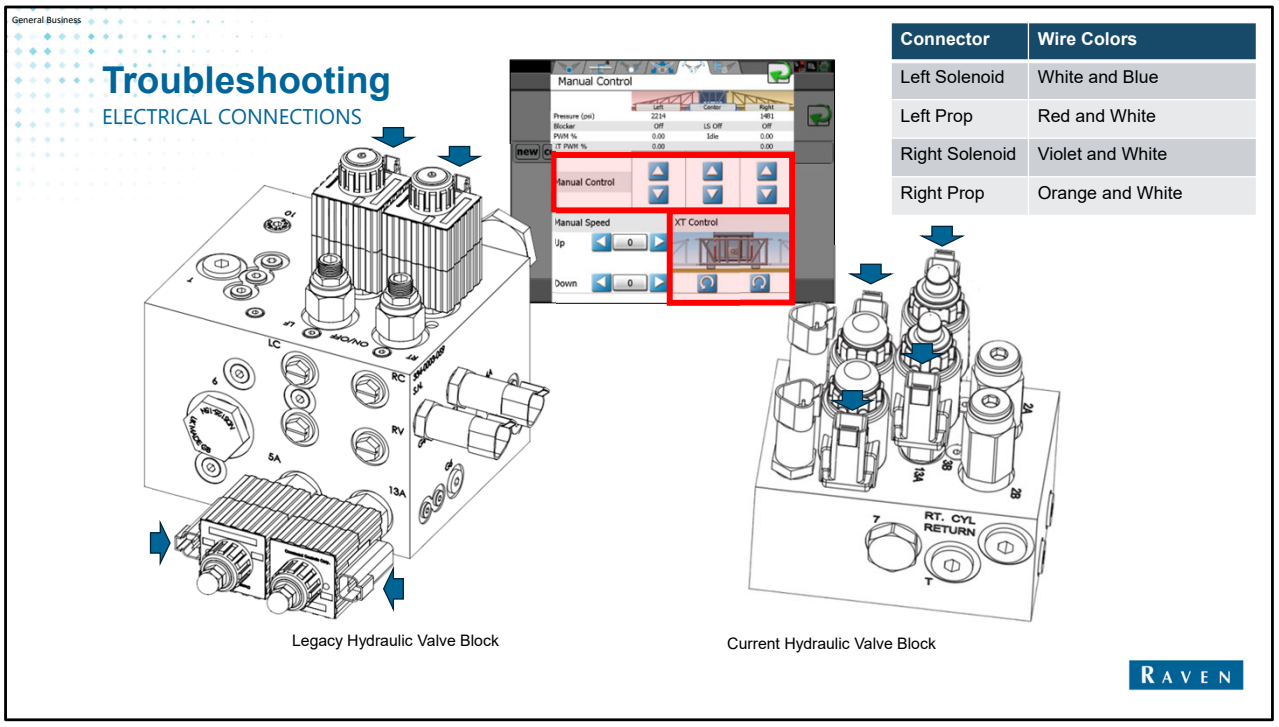
With the machine running and the booms folded out, you can check the Blocker Valves functionality by pressing on the top of the cartridges. The booms will drop quickly so it is best to have something for the booms to rest on so that they are not damaged when lowering. With the legacy valve block, you may need to use a hammer and punch to press the top of the cartridge.



You can check the Proportional Valves functionality by removing the cap from the cartridge and using an allen wrench to turn the Proportional Adjustment screw completely in. Press on (or use a hammer and punch if needed) the Blocker Valves again. This time the booms should raise to full boom height since you are completely restricting the flow of hydraulic oil back to the machine tank.

After testing, turn the Adjustment screw all the way out. The Adjustment screw is limited so you can turn it out until it no longer turns. Because the Proportional Valves are susceptible to contaminants in the hydraulic system, they do become stuck sometimes. This is one reason to service all hydraulic filters regularly! Adjusting the screw in and out may clear some blockage but the cartridges may need to be removed and cleaned periodically if the machine hydraulic filters are not serviced regularly.

Remember to relieve the hydraulic pressure within the AutoBoom valve block before servicing! Relieve pressure by bracing both sides of the boom and pressing in on the Blocker valves.



The Blocker and Proportional valves have the same 2-pin Deutsch style connector. Always make sure the different valve connectors are going to the correct component. To verify if the cabling has been labelled correctly, you can check the wire colors at each connection as seen in the Wire Color table.

You can also verify for correct voltage to each of the cartridges by manually enabling the system and commanding the booms up or down. You will need an assistant for this check. There should be 12 volts at each of the *Solenoid* connectors and variable voltage at the *Prop* connectors. Since the Proportional cartridges operate on a PWM signal (pulse width modulation), you will see the voltage rise to 12 volts the longer you command the booms up. The voltage would then lower to 0 volts as you command the booms down.

There will be 12 volts at the center rack connector since the AutoBoom system is directly coupled with the machine center rack function and does not operate through the AutoBoom hydraulic valve block.

One additional trick to help with a stuck Pproportional valve is to switch the proportional connector for the solenoid one. When AutoBoom is enabled for that side, the Proportional valve will now receive a full 12 volts right away and hopefully unstick the cartridge. Just remember to change the connections back to normal when done testing.

General Business

Troubleshooting

DIAGNOSTIC PAGE

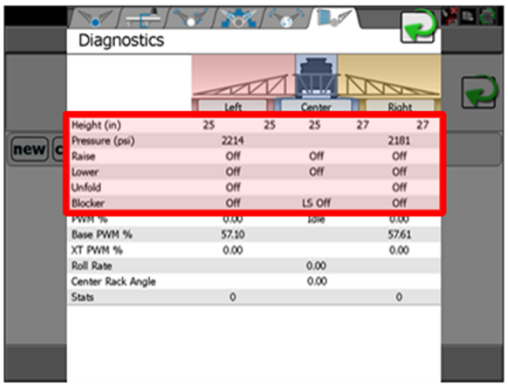
Autoboom Diagnostics

Inputs	Left	Center	Right
Raise	Off	Off	Off
Lower	Off	Off	Off
Unfold	Off		Off
PSI	1554		1605
Outer Ht.	29		29
Inner Ht.	0		0
Center Ht.	34		
Outputs	**Left**	**Center**	**Right**
Blocker	On	V1	On
PWM %	46.04	Down	39.37
Base PWM %	46.04		39.37
Node Info.	PGM: 218	VER: 6.0.0	SER: 1

Manual Boom Control

Left Boom | Center Rack | Right Boom

OK



RAVEN

The Diagnostic page has some good information on it. You can see when the command to raise or lower the boom is given and then can visually verify that the action occurred. This step can help determine if there might be an ECU issue or electrical or mechanical problems as discussed earlier.

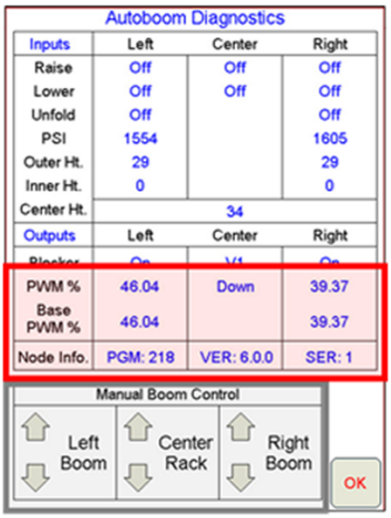
You can see the pressure in each boom cylinder and compare values. If one side is largely different from the other, this situation could indicate irregular differences between the booms like damage to some of the components, for example cylinder rods, linkage, etc. You can also see all the height measurements for the sensors on this page too.

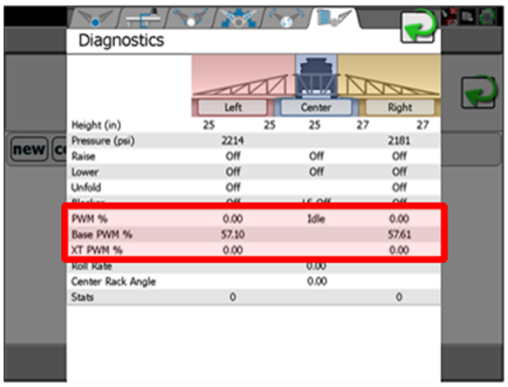
You can verify when the AutoBoom system is enabled by the blocker status which again is an ECU indication of intent.

General Business

Troubleshooting

DIAGNOSTIC PAGE





RAVEN

The *Base PWM %* is the duty cycle needed to keep the booms level. The initial value is calculated during calibration and will be adjusted as the AutoBoom system operates throughout the day. The *PWM %* is the current duty cycle for the booms. This percentage is a good indicator of the effort used to raise and lower the booms.

Base PWM % should be similar between the left and right sides. If one side's percentage is largely different from the other, this situation would indicate irregular differences between the two sides as one side is needing more effort to maintain level.
Irregular trends in either percentage should be investigated. Finally, the left image above shows where the manual control actions are on the Viper Pro field computer which were not shown earlier when discussing manual control.

General Business

Troubleshooting

FINAL CONSIDERATIONS

1. Pull-type sprayers: correct hydraulic flow (3-5 gal/min).
2. Always double check hydraulic and electrical connections.
3. Check cabling and connections for damage especially at boom fold points.
4. Verify correct voltage for all components.

RAVEN

Here are some final considerations when troubleshooting the AutoBoom height control system. For pull-type sprayers, setting the correct hydraulic flow is essential for proper operation. Common sense would always advise checking and rechecking all hydraulic and electrical connections at the AutoBoom hydraulic valve and the machine hydraulic valve. Walk along the spray booms and check for any cabling or connection damage especially around the boom fold points. Make sure there is correct voltage to the different components on the hydraulic valve and other boom and machine components.

General Business

Troubleshooting

FINAL CONSIDERATIONS

5. Verify all measurements and settings.
6. Use the Manual Control buttons within the AutoBoom page.
7. Check the Diagnostic page to verify inputs and outputs.
8. A good calibration sets the system up for success. If in doubt, recalibrate.
9. Should be able to use the most current software.

RAVEN

Always verify measurements and settings especially any settings that are pre-populated. Do not forget to use the Manual Control buttons within the AutoBoom page to validate system control. The Diagnostic page has a lot of useful information to verify inputs and outputs of the system. A good calibration will set up the height control system for success. If in doubt, recalibrate. And finally, since the AutoBoom system is an established Raven product, you should be able to use the most current software available so update if needed.