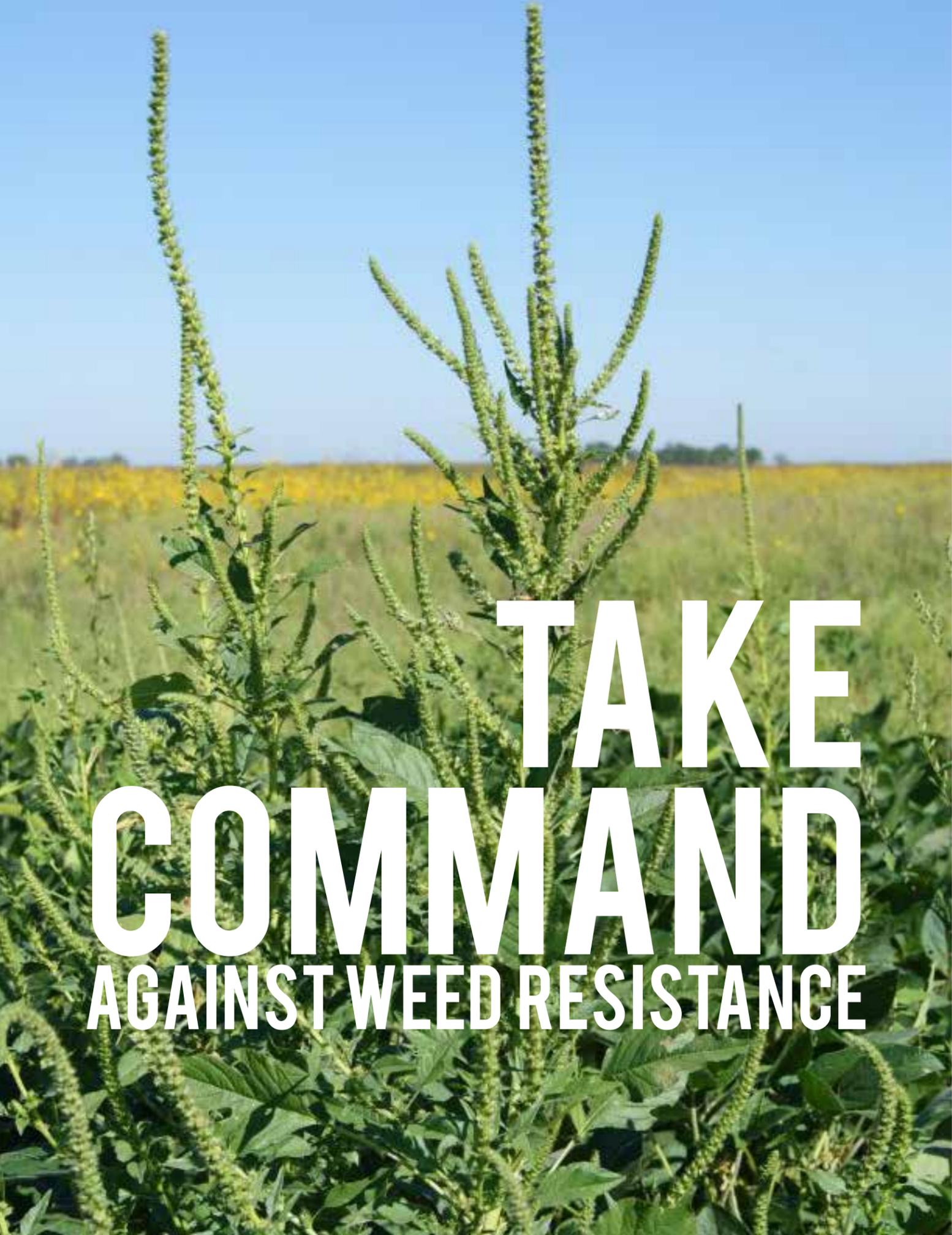


Application Controls

R A V E N



TAKE COMMAND AGAINST WEED RESISTANCE

THE PROBLEM: GLYPHOSATE RESISTANT WEEDS

CHALLENGES FACING GROWERS AND AG RETAILERS TODAY

Weed resistance is driving the need for more effective and precise application of pesticides.

Misapplication in the field can lead to field claims or the need to go back and re-apply in certain areas, impacting your profitability and customer satisfaction. Misapplication costs you time, money, and valuable resources, and can negatively affect crop yields. All of these factors contribute to input costs and the bottom line.

What do these field claims, re-applications, or lost yields cost you or your customers annually?

GLYPHOSATE RESISTANT WEEDS IN NORTH AMERICA

- Palmer Amaranth
- Spiny Amaranth
- Tall Waterhemp
- Common Ragweed
- Giant Ragweed
- Hairy Beggarticks
- Horseweed
- Junglerice
- Kochia
- Tropical Spragletop
- Italian Ryegrass
- Rigid Ryegrass
- Ragweed Parthenium
- Annual Bluegrass
- Russian-thistle
- Johnsongrass



RAGWEED



KOCHIA



TALL WATERHEMP

WHY DOES DROPLET SIZE MATTER?

TOO FINE OF A SPRAY PATTERN LEADS TO DRIFT

Fine spray droplet size, usually less than 200 microns, are the most light, remain airborne for an extended time, and are most prone to drift. The result is application to an area not intended to be treated and field claims to damaged crop.

Nitrogen burn on a soybean leaf.



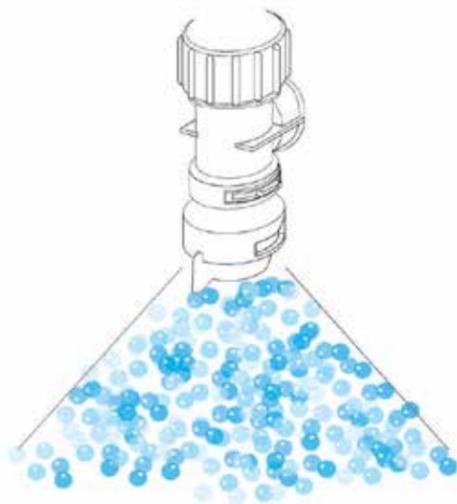
TOO COARSE OF A SPRAY PATTERN REDUCES COVERAGE

Too large of a droplet can either roll off the leaf or not have the coverage needed to take care of the pest.

If you don't accurately and efficiently control the pest, you're sacrificing the potential yield of your crops and money in your pocket.

DEPENDS ON WHAT YOU'RE SPRAYING

Some pests require fine droplets while other require coarse droplets.



ISSUES WITH CONVENTIONAL, FLOW BASED SPRAYING

Not controlling each nozzle by pressure can lead to misapplication when the machine turns.

The outer end of the boom can travel up to three times the speed of the machine or inside of the boom when turning.

The inside of the boom gets too much product and the outside of the boom doesn't get enough – both instances are problematic for your crops.

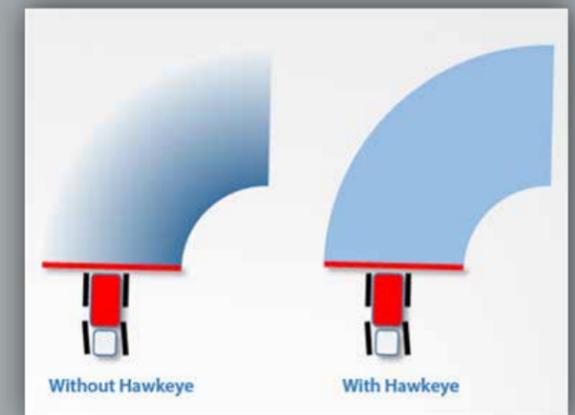


Without turn compensation, you can over or under apply across the width of the boom, affecting the yield in that area of the field. Over applying leads to chemical burned crops, while under applying leads to more pests.

Nozzles and tips are limited in range and effectiveness when used with conventional flow based product control, forcing you to:

- Limit machine speed based on nozzle selection, or
- Have a less effective application at certain speeds

Strictly flow based spraying does not take into account boom pressure, which at lower and higher speeds will impact spray pattern.



The Hawkeye® Nozzle Control System uses turn compensation to minimize over and under applications.

IMPORTANCE OF PRECISION APPLICATION

Ineffective spray application allows insects, weed pressure, or disease to damage crop yield potential.

Wrong or incorrect application rate can stress or damage crop.

Spray drift into adjacent fields results in unintended application and crop damage.

Proper application ensures chemical costs are minimized with less need for re-spraying.



THE SOLUTION: HAWKEYE® NOZZLE CONTROL SYSTEM

For over thirty years, Raven has dominated the application control market. The Hawkeye Nozzle Control System is the latest innovation in Raven technology – and the next application control system for your sprayer.

The Hawkeye Nozzle Control System is ultra-precise. This pressure based product control system allows for precise sprayer application in a variety of conditions, getting the most out of every nozzle. Each nozzle is controlled by its own individual pulsing valve giving you a consistent spray pattern as speed and conditions change.

Hawkeye has been tested for shock, vibration, impact, and weather resistance in rugged terrain and extreme temperatures. Additionally, its Viton seals on the NCV (Nozzle Control Valve) have had thousands of hours of testing to ensure system reliability. Hawkeye's durability is unparalleled.



HAWKEYE®

NOZZLE CONTROL SYSTEM

BASE PACKAGE FEATURES

- Nozzle-by-nozzle turn compensation minimizes over and under applications
- PWM (Pulse Width Modulated) valves give you:
 - Improved pressure consistency and reaction time across the boom, regardless of the flow rate or ground speed
 - Turn compensation
 - Fewer nozzle changes
- Individual valve diagnostics monitor each nozzle
- Up to 16 virtual sections providing more section control and higher ROI than traditional shut-off systems

EASE OF USE

- Fully integrated with machine application control systems
- Simple installation, setup, and calibration
- Fully integrated system means one display in the cab
- Preset pressure settings allow for quick adjustments on the fly
- Single ECU controls rate, pressure and section shutoff, providing:
 - The ability to switch between Hawkeye and conventional mode
 - Mapping and data logging of each nozzle for more accurate mapping and record-keeping

BONUS FEATURES

- Seal maintenance kit included with each system
- Two-year warranty with registration
- ISOBUS compatible

BENEFITS TO YOU INCLUDE

- Precise application rate in a variety of conditions
- Consistent coverage
- Wide speed range
- Ability to manage drift and off-target applications
- Accurate droplet size and placement
- Extended range out of each nozzle
- Blended pulse application
- Individual nozzle shut-off with Hawkeye HD
- Ability to program up to 16 virtual sections or shut-off

HAWKEYE HD

- Provides individual nozzle on/off with a simple software unlock, no change in hardware required
- Reduces costly skips or overlaps

VIRTUAL SECTION CAPABILITY

- Program additional sections for on/off control
- Available with base system—no upgrade needed
- Provides more section control and higher ROI than traditional boom valve configured systems

SIDEKICK PRO™ DIRECT INJECTION COMPATIBILITY

- Inject additional chemicals in the line as needed without worrying about tank mixing or clean-out at the end of the day
- Greater flexibility in your applications, so you can handle weed resistance and other challenges
- With Hawkeye, use up to 5 injection systems on one machine through the Viper® 4+.

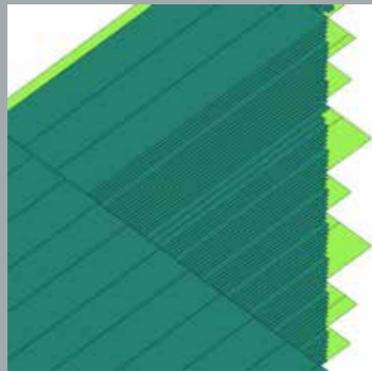
The Hawkeye System is built on the ISOBUS communication platform which allows it to work with ISO Task Controllers, including the Viper® 4+.



IMPORTANCE OF SECTION CONTROL

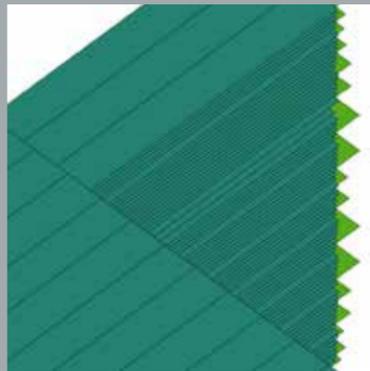
7 SECTIONS

Seven sections on a sprayer are a common base system provided on factory installation.



16 SECTIONS

The standard base Hawkeye system along with virtual section unlock provides 16 sections without additional boom valves needed.



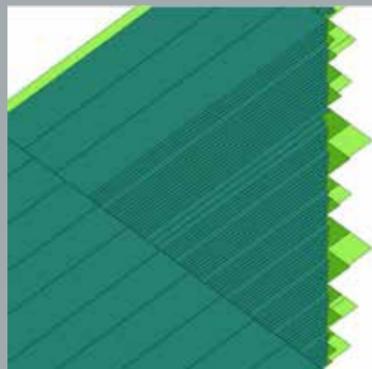
72 SECTIONS

Upgrading to Hawkeye HD provides 72 sections reducing the amount of overlap.



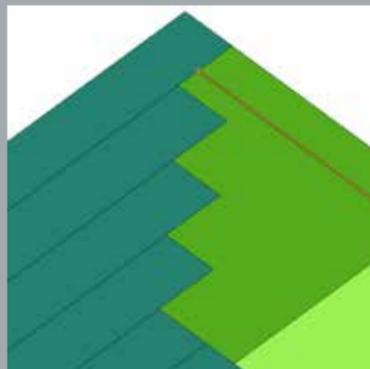
HAWKEYE HD - 72 SECTIONS

The outer edge of 7 sections to the outer edge of 72 sections is 14 feet of overlap.



7 SECTION OVERLAP

Overlap is eliminated by Hawkeye HD.



Examples shown are simulated on a 120 foot machine with 7 sections, 16 virtual sections, and 72 Hawkeye HD individual nozzle control. The field had a boundary without point rows and the sprayer exited the field at a 45 degree angle to the field boundary.

RETURN ON INVESTMENT QUESTIONS TO CONSIDER

- Q** Why is a 5% to 10% reduction of spray overlap important to you?

A It not only gives you a chemical cost savings of 5% to 10%, but also reduces damage from double application to your crops which increases your yield potential.
- Q** How much is it costing you to send a machine back to a field to fix a misapplication?

A Turn compensation dramatically reduces one of the most common causes of weed resistance and non-kill areas in a field by under applying as you maneuver through the field. This leaves you with more chemicals to manage and more trips back to the field to address previous jobs.
- Q** How much are field claims costing you each year due to sprayer drift or misapplication?

A The real time adjustments an operator makes directly affects your business. Hawkeye's ability to increase the range, control the spray pattern, and droplet size to manage drift more effectively, distributes the appropriate rate across the boom while maneuvering through the field; all which provide a better coverage and kill on your target weeds.
- Q** Why would providing a wider operating range out of your existing nozzles give you an ROI?

A Hawkeye extends the range out of your nozzle tips while keeping your droplet size and spray pattern consistent. This allows the operator to drive to the field conditions by extending the limitations set by his machine.
- Q** How can I reduce yield loss due to misapplication?

A Traditional pressure- or speed-based systems are vulnerable to inconsistent applications. Hawkeye provides a wider operating range along with consistent rates and spray patterns, which reduces negative effects on yield.



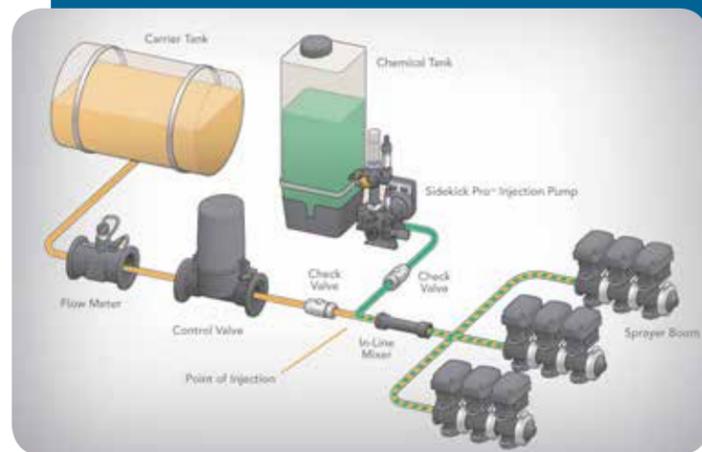
THE SOLUTION: SIDEKICK PRO™ DIRECT INJECTION SYSTEM

Raven's Sidekick Pro direct injection systems help you save time and money on applications of herbicides, insecticides, drift agents and nitrogen stabilizer. The industry leader in direct injection, Sidekick Pro features:

- Up to 5 units on one machine, allowing easy switching between fields and applications with Hawkeye Nozzle Control
- No pre-mixing, tank mixing, cross contamination or clean out reduces waste from unused product
- Powerful positive displacement pump which injects on the pressure side, closer to the boom, for faster response time
- Eliminates waste for more environmentally friendly practices
- Flexibility with multiple chemical applications
- Reduced chemical exposure means additional safety for the operator
- Adjust chemical concentration on the fly rather than spraying more or less of the entire mix
- Gives you greater flexibility in applications to tackle weed resistance and other challenges



The Sidekick Pro injects chemicals directly into the in-line mixing tube to eliminate pre-mixing and costly leftovers.



It's the direct injection system that sets a new standard for chemical applications of every type, with unprecedented precision, savings and safety. No tank mixing required —and with the industry's first remote and closed calibration and prime feature, you're ready to go in minutes. It also features:

- ISO compatible pump
- High resolution encoder that provides smoother pump control and exceptional lock on target rate technology
- Remote closed-system calibration, eliminating the need for calibration catch tests and exposure to chemicals
- Automatic priming feature and real-time diagnostics
- Compatibility with additives that reduce maintenance on your application system

RINSE ASSIST FOR DIRECT INJECTION

- Automatic rinse system that can clean the chemical out with the push of a button
- Three way valve automatically opens to a rinsing agent tank
- Valve automatically returns to chemical tank position at the end of the rinsing cycle

COMPATIBILITY

	SIDEKICK PRO	SIDEKICK PRO ISO	SIDEKICK PRO ICD
PRODUCT CONTROLLERS			
Raven Product Controller	✓		
ISO Product Controller I		✓	
ISO Product Controller II			✓
CONSOLES			
Viper® 4/Viper® 4+	✓	✓	✓
Envizio Pro™ Series	✓		
SCS 5000™	✓		
SCS 4400™	✓		
SCS 4600™	✓		
3rd Party ISO Consoles*		✓	

*Subject to 3rd party ISO console capabilities

THE SOLUTION:

RAVEN RCM™ RATE CONTROL MODULE

The Raven Rate Control Module (RCM) is your solution for every season. The RCM is an ISOBUS product controller that can control up to five products in one ECU for both liquid and dry applications.

- Liquid, NH3 and dry applications
- Easily navigate and manage multiple products, tallies, and sensor data
- Diagnostic tests and reading to easily calibrate, tune and troubleshoot system
- Compatible with ISOBUS Virtual Terminal and Task Controllers
- Multi-lingual support
- IP 67 environmental rating for the harshest of environmental conditions
- Integrated magnet mount option to easily attach and detach with any metal frame
- Dynamically configure run screen based on operator preferences to show most relevant data during operation



Pair with Viper® 4+ for ultimate user experience, and easily navigate and manage multiple products, tallies, and sensor data.

APPLICATIONS

- Pull-type sprayers, self-propelled sprayers, liquid fertilizer applicators
 - Liquid single product control
 - Up to 4 Sidekick Pro direct injection ICD pumps
 - Tank fill monitoring
- NH3 applicators
 - Raven AccuFlow™ HP+
 - Control of Sidekick Pro direct injection ICD pump
 - Up to 2 additional dry or liquid products
- Pull-type spreaders and self-propelled spreaders
 - Up to 4 products and spinner RPM control
- Air seeders, carts, and drills or generic applicator
 - Up to 5 products
- Strip-Till applicators
- Planters (liquid and granular control)



THE SOLUTION:

RS1™ GUIDANCE & STEERING

RS1 is a fully scalable GPS solution that combines autosteer, GPS, and Slingshot® into one intuitive, easy-to-use unit. Incredible accuracy at both high and low speeds with quick line acquire improves efficiency and gives you the power to cover more acres in a day.

Best-in-class diagnostics gather machine performance data while you work, alerting Raven of issues and connecting you to support as you need it. The unit is designed with a simple set up and integrated help guides, enhanced further by Slingshot - providing remote support, file transfer, OTA software updates and fleet management and logistics. Other benefits include:

- Compatible with Viper® 4+ and CR7™
- Remote performance monitoring and support through Slingshot
- Enhanced Steering Performance in a wide range of terrain
- Enhanced 3D compensation for rugged terrain
- Simplified Field Calibration Procedure
- Enhanced Diagnostics and Health Tests
- Serial GPS Output (NMEA 0183) or Radar Output
- Multi-lingual support
- Compatible with both ISO Steer Ready and Raven Aftermarket Steering Controllers



RS1 provides multiple methods of system connectivity including Cellular, Wi-Fi, or Ethernet.



slingshot.

SLINGSHOT® READY

Get unrivaled high-speed wireless connectivity, cellular-enabled technology, uninterrupted signals/data transfer, industry-leading wireless RTK corrections and vehicle tracking. And Slingshot gives you access to live remote support from Raven's team of experts.

THE SOLUTION:

AUTOBOOM®

AUTOMATIC BOOM HEIGHT CONTROL

The AutoBoom automatic boom height control system offers faster operating speeds, simple calibration and user-friendly controls. Its unique hydraulic-powered design delivers a smooth and responsive height-adjusting system. It covers more acres in less time and with less operator stress and fatigue.

- Adjusts to optimal spray height to prevent drift or inconsistent droplet size
- Pressure-based for smoother boom movements and adjustments
- Automatic calibration to get you up and running quickly
- Increased efficiency with faster spraying speeds to cover more acres in less time
- Sensors monitor boom distance from the ground for optimal height to prevent misapplication
- Keeps the center rack stable to prevent the boom from hitting the ground and damaging both the crops and the equipment



The stand alone controller allows users to add AutoBoom in the absence of a field computer.

COMPATIBLE WITH RAVEN DEVICES INCLUDING:

Envizio Pro™ Series

Viper® 4+

Cruizer II™

AutoBoom Controller

ISOBUS

IMPORTANCE OF BOOM HEIGHT CONTROL



Having the boom too high will lead to spray drift.



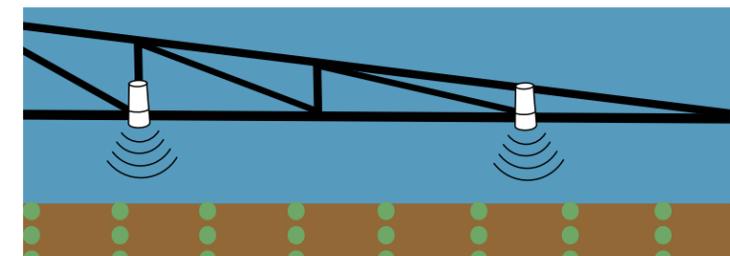
Having the boom too low can damage crops.



Damaging the boom when running into the ground is a costly fix and causes machine downtime.

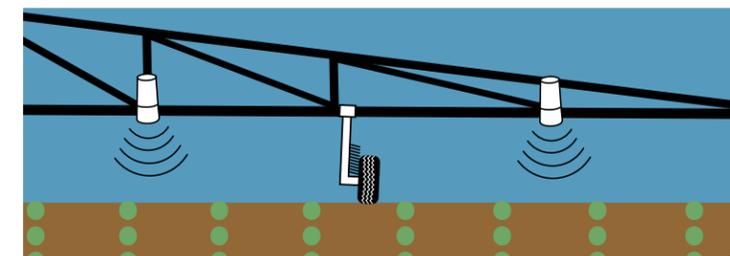
AUTOBOOM ULTRAGLIDE SYSTEM

This upgrade includes ultrasonic sensors that gauge the distance to the ground.



AUTOBOOM ULTRAGLIDE WITH POWERGLIDE PLUS

The ultimate upgrade offers the best of both systems.



AUTOBOOM XT

Provides optimal performance in extreme terrain conditions to keep the center rack stable.



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North America | Summer 2017
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