

AGCO RoGator RG900/
1100/1300 Hawkeye®
Installation Manual

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SAFETY

NOTICE

Follow the operation and safety instructions included with the implement and/or controller and read this manual carefully before installing or operating this Raven system.

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

Observe the following safety measures when operating the implement after installing this Raven system:

- Do not operate this Raven system or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Be alert and aware of surroundings and remain in the operator's seat at all times when operating this Raven system.
 - Do not operate the implement on any public road with this Raven system enabled.
 - Disable this Raven system before exiting the operator's seat.
 - Determine and remain a safe working distance from obstacles and bystanders. The operator is responsible for disabling the system when a safe working distance has diminished.
 - Disable this Raven system prior to starting any maintenance work on the implement or components of this Raven system.
- Do not attempt to modify or lengthen any of the system control cables. Extension cables are available from a local Raven dealer.



WARNING

AGRICULTURAL CHEMICAL SAFETY

Follow all federal, state, and local regulations regarding the handling, use, and disposal of agricultural chemicals, products, and containers. Triple-rinse and puncture or crush empty containers before properly disposing of them. Contact a local environmental agency or recycling center for additional information.

- Always follow safety labels and instructions provided by the chemical manufacturer or supplier.

- Always wear appropriate personal protective equipment as recommended by the chemical and/or equipment manufacturer.
- When storing unused agricultural chemicals:
 - Store agricultural chemicals in the original container and do not transfer chemicals to unmarked containers or containers used for food or drink.
 - Store chemicals in a secure, locked area away from human and livestock food.
 - Keep children away from chemical storage areas.
- Fill, flush, calibrate, and decontaminate chemical application systems in an area where runoff will not reach ponds, lakes, streams, livestock areas, gardens, or populated areas.
- Follow all label instructions for chemical mixing, handling, and disposal.
- Avoid direct contact with agricultural chemicals or inhaling chemical dust or spray particulate. Seek immediate medical attention if symptoms of illness occur during, or soon after, use of agricultural chemicals or products.
- After handling or applying agricultural chemicals:
 - Thoroughly wash hands and face after using agricultural chemicals and before eating, drinking, or using the restroom.
 - Thoroughly flush or rinse equipment used to mix, transfer, or apply chemicals with water after use or before servicing any component of the application system.



ELECTRICAL SAFETY

- Always verify that power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the Raven system or other components.
- To prevent personal injury or fire, replace defective or blown fuses with only fuses of the same type and amperage.
- Do not connect the power leads to the battery until all system components are mounted and all electrical connections are completed.
- Always start the machine before initializing this Raven system to prevent power surges or peak voltage.
- To avoid tripping and entanglement hazards, route cables and harnesses away from walkways, steps, grab bars, and other areas used by the operator or service personnel when operating or servicing the equipment.

RECOMMENDATIONS AND BEST PRACTICES

HOSE ROUTING

The word “hose” is used to describe any flexible, fluid carrying components. Use the following guidelines and recommendations when connecting and routing hoses while installing or maintaining this Raven system:

- Leave protective caps/covers over hose ends until connecting the end into the hydraulic system to help prevent contaminants from entering the system.
- Follow existing hose runs already routed on the implement as much as possible. Proper hose routing should:
 - Secure hoses and prevent hoses from hanging below the implement.
 - Provide sufficient clearance from moving components and operational zones around shafts; universal joints and suspension components; pulleys, gears, belts, and chains; moving linkages, cylinders, articulation joints, etc.
 - Protect hoses from field debris and surrounding hazards (e.g. tree limbs, fence posts, crop stubble, dirt clumps or rocks that may fall or be thrown by the implement).
 - Protect hoses from sharp bends, twisting, or flexing over short distances and normal implement operation.
 - Ensure sufficient length for free movement of the implement during normal operation and prevent pulling, pinching, catching, or rubbing, especially in articulation and pivot points. Clamp hoses securely to force controlled movement of the hose.
 - Avoid abrasive surfaces and sharp edges such as sheared or flame cut corners, fastener threads or cap screw heads, hose clamp ends, etc.
 - Avoid areas where the operator or service personnel might step or use as a grab bar.
- Do not connect, affix, or allow hoses to come into contact with components with high vibration forces, hot surfaces, or components carrying hot fluids beyond the temperature rating of hose components.
 - Hoses should be protected or shielded if routing requires the hose to be exposed to conditions beyond hose component specifications.
- Avoid routing hoses in areas where damage may occur due to build up of material (e.g. dirt, mud, snow, ice, etc.).

WIRE ROUTING

The word “harness” is used to describe any electrical cables and leads, both bundled and unbundled. Use the following guidelines and recommendations when connecting and routing harnesses while installing or maintaining this Raven system:

- Leave protective caps/covers over harness connectors until needed to avoid dirt and moisture from contaminating electrical circuits.
- Secure the harness to the frame or solid structural members at least every 12 in [30 cm].
- Follow existing harness runs already routed on the implement as much as possible. Proper harness routing should:
 - Secure harnessing and prevent the harness from hanging below the implement.
 - Provide sufficient clearance from moving components and operational zones around shafts; universal joints and suspension components; pulleys, gears, belts, and chains; moving linkages, cylinders, articulation joints, etc.
 - Protect harnessing from field debris and surrounding hazards (e.g. tree limbs, fence posts, crop stubble, dirt clumps or rocks that may fall or be thrown by the implement).

- Protect harnessing from sharp bends, twisting, or flexing over short distances and normal implement operation.
- Connectors and splices should not be located at bending points or in harness sections that move.
- Ensure sufficient length for free movement of the implement during normal operation and prevent pulling, pinching, catching, or rubbing, especially in articulation and pivot points. Clamp harnessing securely to force controlled movement of the harness.
- Avoid abrasive surfaces and sharp edges such as sheared or flame cut corners, fastener threads or cap screw heads, hose clamp ends, etc.
- Do not connect, affix, or allow harnessing to come into contact with components with high vibration forces, hot surfaces, or components carrying hot fluids beyond the temperature rating of harness components.
 - Harnessing should be protected or shielded if routing requires the hose to be exposed to conditions beyond harnessing component specifications.
- Avoid routing harnesses in areas where damage may occur due to build up of material (e.g. dirt, mud, snow, ice, etc.).
- Avoid routing harnesses in areas where the operator or service personnel might step or use as a grab bar.

IMPORTANT: Avoid applying direct spray or pressure washing of electrical components and connections. High pressure streams and sprays can penetrate seals, cause corrosion, or otherwise damage electrical components.
When performing maintenance:

- Inspect electrical components and connectors for corrosion, damaged pins or housings, etc. Repair or replace components or harnessing as necessary.
- Ensure connectors are kept clean and dry. Apply dielectric grease to the sealing surfaces of all connections exposed to moisture, dirt, debris, and other contaminants. Repair or replace harnessing as necessary.
- Clean electrical components with pressurized air, aerosol electrical cleaning agent, or low pressure rinse.
- Remove visible surface water from electrical components and connections using pressurized air or an aerosol cleaning agent. Allow components to dry thoroughly before reconnecting cables.

CHAPTER

INTRODUCTION

2

Hawkeye® nozzle control is a pressure based product control system designed for precise sprayer application in a variety of conditions. Pressure based application control provides accurate control of droplet size which reduces spray drift during field operations.

Hawkeye is compatible with the ISOBUS communication platform which allows the system to work with most ISO Virtual Terminals (VTs) and Task Controllers on the market. This manual is intended to provide installation instructions on the following equipment:

TABLE 1. AGCO RoGator Make and Model Information

Make	Model	Model Years	Boom Configuration
AGCO	RoGator 900, 1100, and 1300	2012 through 2017	120' Boom 20" and 15" Spacing
			100' Boom 20" and 15" Spacing
			90' Boom 20" and 15" Spacing

FIGURE 1. RoGator 1300B



OVERVIEW OF THE INSTALLATION PROCESS

The recommended process for installing the Hawkeye nozzle control system is as follows:

1. Check Hawkeye kit contents. See the *Kit Contents* section on page 7.
2. Replace existing strainer with an 80 mesh (or finer) strainer for use with the Hawkeye nozzle control system. See the Hawkeye Installation Preparation section on page 7.
3. Remove spray tips and flush each section individually for a minimum of 20 seconds to thoroughly flush the boom.
4. Mount Hawkeye nozzle control valves. See the Hawkeye Nozzle Control Valve Installation section on page 8.
5. Route and connect the secondary and primary boom cables. See the Boom Cable Routing and Connection section on page 10.
6. Mount the Hawkeye product controller II ECU. See the Product Controller II ECU Installation section on page 13.
7. Route and connect chassis cable. See the Chassis Cable Routing and Connection section on page 19.

REQUIRED COMPONENTS

The following components must be installed with the Hawkeye nozzle control system:

- Updated software on field computers or control monitors. Contact your local RoGator dealer for the latest version of C1000 software.
- PWM pump control valve
- Raven compatible flow meter
- Raven compatible pressure transducer
- 80 mesh (or finer) strainer

NOTE: Do not use air induction tips with the Hawkeye nozzle control system. A fan or cone style spray tip is required for the Hawkeye system to operate properly.

TOOLS AND MATERIALS NEEDED

The following tools are recommended for completing the installation:




- SAE and metric sized wrenches and tools
- 1-1/2" hole saw
- Drill bit set and drill
- Dielectric grease (supplied)
- Cable ties (supplied)

POINT OF REFERENCE

The instructions provided in this manual assume the installer is standing behind the machine, looking toward the machine cabin.

KIT CONTENTS

TABLE 2. AGCO RoGator 900, 1000, 1300 (120' Boom, 20" Spacing) Kit (P/N 117-1007-020)
 AGCO RoGator 900, 1100, 1300 (100' Boom, 20" Spacing) Kit (P/N 117-1007-021)
 AGCO RoGator 900, 1100, 1300 (90' Boom, 20" Spacing) Kit (P/N 117-1007-022)
 AGCO RoGator 900, 1100, 1300 (120' Boom, 15" Spacing) Kit (P/N 117-1007-023)
 AGCO RoGator 900, 1100, 1300 (100' Boom, 15" Spacing) Kit (P/N 117-1007-024)
 AGCO RoGator 900, 1100, 1300 (90' Boom, 15" Spacing) Kit (P/N 117-1007-025)

Picture	Item Description	Part Number	Qty.						
			117-1007-						
			020	021	022	023	024	025	
Not Pictured	Manual - Hawkeye® Calibration and Operation	016-0171-584				1			
Not Pictured	Manual - AGCO RoGator 1300 Hawkeye Installation	016-0171-588				1			
Not Pictured	Quick Start Guide - Hawkeye Start-Up	016-0171-598				1			
Not Pictured	Cable, Adapter, Viper 4 to 3-Pin ISOBUS	115-0172-247				1			
Not Pictured	Cable, RoGator ISOCan	115-0172-325				1			
	Cable - AGCO Boom Sense Retrofit	115-7303-084				1			
	Cable - AGCO Logic Power/CAN Retrofit	115-7303-085				1			
	Cable - AGCO Chassis Cable	115-7303-086				1			

Picture	Item Description	Part Number	Qty.					
			117-1007-					
			020	021	022	023	024	025
	ECU - ISO Product Controller II	063-0173-704	1					
	ECU - ISO Boom Sense/Speed	063-0173-635	1					
	Cable - Primary RG 900/1100/1300 (120', 20")	115-7303-068	2					
	Cable - Primary RG 900/1100/1300 (100', 20")	115-7303-109		2	2			
	Cable, Left Primary RG 900/1100/1300 (120', 15")	115-7303-123				1		
	Cable, Right Primary, RG 900/1100/1300 (120', 15")	115-7303-140				1		
	Cable, Left Primary RG 900/1100/1300 (90'/100', 15")	115-7303-129					1	1
	Cable, Right Primary, RG 900/1100/1300 (120', 15")	115-7303-158					1	1
	Cable - Secondary RG 900/1100/1300 (120', 20")	115-7303-069	2					
	Cable - Secondary RG 900/1100/1300 (100', 20")	115-7303-110		2				
	Cable - Secondary RG 900/1100/1300 (90', 20")	115-7303-128			2			
	Cable - Secondary, RG 900/1100/1300 (120', 15")	115-7303-124				2		
	Cable - Secondary, RG 900/1100/1300 (100', 15")	115-7303-131					2	
	Cable - Secondary, RG 900/1100/1300 (90', 15")	115-7303-130						2





Picture	Item Description	Part Number	Qty.					
			117-1007-					
			020	021	022	023	024	025
	Nozzle Body, Triple Nozzle, 1" Wet Boom, Hypro	334-0002-196	2					
	Hawkeye Nozzle Control Valve, Hypro	063-0173-673	72	60	54	95	79	71
	O-Ring, Viton, Green Coated, -115, 56 Pack	219-1005-115M	2	2	1	2	2	2

TABLE 3. Hawkeye Service Kit Components (P/N 117-1005-057)

Picture	Item Description	Part Number	Quantity
	Hawkeye Nozzle Control Valve, Hypro	063-0173-673	1
Not Pictured	Kit, Seal, Hawkeye Valve, Hypro	117-1005-051	3
Not Pictured	Hawkeye Valve Jumper	115-7303-139	2
	Hawkeye Valve Tool	321-0000-457	2
	Hawkeye Fly Nut Wrench	321-0000-459	1

UPDATES

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

www.ravenhelp.com

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To serve you best, please send an email with the following information to

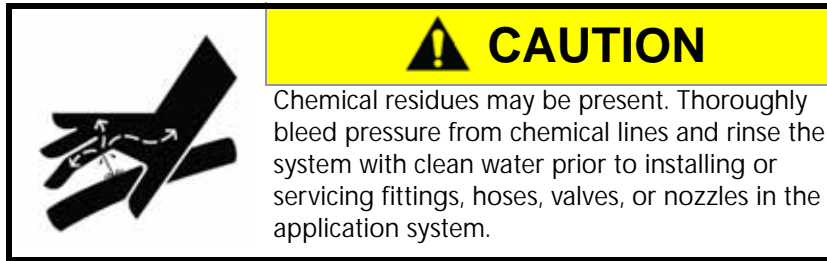
techwriting@ravenind.com

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- P/N 016-0171-588 Rev. E
- Any comments or feedback (include chapter or page numbers if applicable).
- Let us know how long have you been using this or other Raven products.

We will not share your email or any information you provide with anyone else. Your feedback is valued and extremely important to us.

Thank you for your time.

Perform the following procedure to prepare for the Hawkeye® nozzle control installation.



1. Rinse and fill the tank with clean water.
2. Move the equipment to an open area suitable for testing application system operation and rinsing the boom plumbing.
3. Unfold the boom and enable the application control system. Verify that all control hardware (e.g. control valves, section valves, etc.) and spray tips function as expected.
4. Operate the system until all chemicals are rinsed from the boom supply lines.
5. Disable the application control system and de-pressurize the boom.
6. Replace existing carrier line strainer(s) with an 80 mesh strainer. An 80 mesh (or finer) strainer is required for use with the Hawkeye nozzle control system.
7. If turret style nozzle bodies are installed on the implement, rotate the turret to an open spray position, if available. If an open spray position is not available, or for nozzle bodies without a turret, remove the spray tips from the boom and set aside for later use.
8. Enable the application control system and run clean water for at least 20 seconds to rinse any remaining debris from the boom plumbing and nozzle bodies.
9. Remove the cap and diaphragm from the nozzle bodies.

FIGURE 1. Nozzle Body Cap and Diaphragm Removed



Cap and Diaphragm
Removed

CHAPTER

4

NOZZLE CONTROL VALVE INSTALLATION

HAWKEYE NOZZLE CONTROL VALVE INSTALLATION

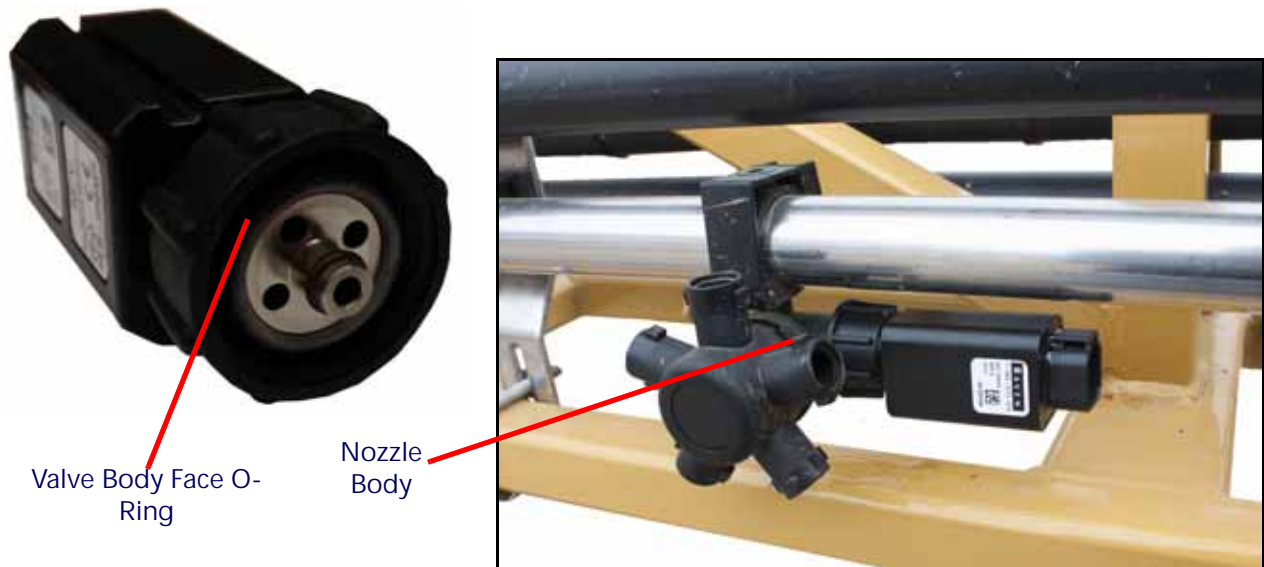
After rinsing the debris out of the plumbing, mount the Hawkeye® nozzle control valves to the existing nozzle bodies.

BEST PRACTICES AND RECOMMENDATIONS

- Do not connect battery leads until all cables are installed and connected.
- If a dual channel turret nozzle body is installed on the implement, always mount the Hawkeye nozzle control valve to the straight nozzle port to avoid excessive pressure drop across the nozzle.
- If there are obstacles that interfere with the Hawkeye valve installation it may be necessary to purchase a different brand of nozzle body with a threaded port on the opposite side.

GENERAL VALVE INSTALLATION

FIGURE 1. Valve Face O-Ring and Nozzle Control Valve



1. Place the supplied o-ring on the inside of the fly nut flush with the valve body face.

NOTE: If using TeeJet QJS (straight) nozzle bodies, use the green coated (size 115) o-ring. For AGCO Hypro nozzle bodies, use the green coated (size 115) o-ring. For TeeJet QJ (turret) nozzle bodies, use the brown/gray (size 116) o-rings.

FIGURE 2. Green Coated and Brown/Gray O-Rings



2. Thread the fly nut onto the nozzle body.
3. Orient the nozzle control valve so that the label is easily readable.
4. Hand tighten the swivel nut to secure the nozzle control valve to the nozzle body. Do not over tighten.

NOTE: Frequently check the nozzle control valve fly nuts to ensure they are secure.

VALVE MOUNTING INTERFERENCE AND OBSTRUCTIONS

In some locations on the spray boom, boom equipment or hardware may interfere with mounting the Hawkeye nozzle control valves. In these locations, there are a few options to get around the interferences:

1. Rotate the nozzle control valve so the round, low profile side of the NCV is towards the interference.

FIGURE 3. Modified Nozzle Control Valve Installation



2. Loosen the brackets and slide them down, out of the way of the NCV. Verify the brackets still adequately support the components as intended. Do not remove the brackets completely.
3. If the first two options do not solve the interference, swap the AGCO nozzle body for a triple nozzle body (provided in the kit) with the threaded connection for the Hawkeye valve facing away from the interference.

FIGURE 4. Triple Nozzle Body Installed



NOTE: Avoid removing of any existing boom hardware or support brackets where applicable during installation of the Hawkeye nozzle control valves.

BOOM CABLE ROUTING AND CONNECTION

BEST PRACTICES AND RECOMMENDATIONS

- Route the Hawkeye primary and secondary boom cables along existing cables or plumbing to avoid cable damage.
- Route cables to avoid pinch points and to avoid stretching the cable during folding and unfolding operations. Pay special attention to cable routing near folding or break-away points.
- Route cables through existing cable retention devices as appropriate.
- When securing the primary and secondary boom cables on the implement, begin at the outer boom tips. Adjust the cable position to provide sufficient slack between valve tee branches while working toward the center of the implement.
- Route the boom cables on the inside of the boom frame when available.
- Secure cables using a zip tie at each nozzle control valve tee branch, and one between each tee branch along the cable length.

SECONDARY BOOM CABLE ROUTING AND CONNECTIONS

NOTE: Please review the *Best Practices and Recommendations* section on page 15 before routing or securing the boom cables on the implement. Do not connect or secure the cable until instructed to do so in the procedure.

1. Locate the terminator on each of the secondary boom cables (refer to the *Kit Contents* section on page 7).

FIGURE 5. Secondary Cable ISOBUS Powell Terminator



NOTE: Verify the terminators are secured to the main cable trunk using a zip tie through the connector retainer clip. If terminators are not secured, wire breakage could occur.

2. Route the secondary boom cables so they are located at the outer tips of the left and right boom.
3. Starting from the mid-boom fold point, feed the terminator end of the secondary boom cable through the boom framework along existing cable or plumbing runs and through any existing cable retention devices as appropriate.

NOTE: If there is interference between the connector and boom components, remove the 90° back shell from the connector. Refer to Figure 7 on page 17.

4. If not already applied, apply a single short burst of corrosion inhibitor (Corrosion X HD (Raven P/N 222-0000-020 or available from <http://www.corrosionx.com/corrosionx-heavy-duty.html>)) into the NCV connection. Be sure the corrosion inhibitor has coated the NCV contacts and recessed portions of the connector.

NOTE: To determine if corrosion inhibitor has been applied, inspect for a thick liquid in the bottom of the connector.

5. Starting with the nozzle control valve at the outer end of the boom, begin connecting the valve tee branches to the nozzle control valves.

FIGURE 6. Securing Valve Branches



6. At each valve branch, adjust the cable as necessary to provide slack between nozzle control valve connections. The large round connector on the secondary boom cable should reach to the mid-boom fold point after all nozzle control valves are connected.

FIGURE 7. Primary and Secondary Boom Cable Connection at Mid-Boom Fold Point



- Repeat step 1 through step 5 to route and connect the secondary boom cable on the opposite boom.

NOTE: Route and connect the primary and secondary cables before securing the cable with the supplied zip ties.

PRIMARY BOOM CABLE ROUTING AND CONNECTIONS

NOTE: Review the *Best Practices and Recommendations* section on page 15 before routing or securing the boom cables on the implement. Do not connect or secure the cable until instructed to do so in the procedure.

- Locate the large, round connectors on the primary boom cables (refer to the *Kit Contents* section on page 7). Route the primary cables so the connector with female pins is located at the mid-boom fold point of the left or right boom and will connect to the secondary boom cable.

FIGURE 8. Primary Cable Ends



Male Connector
To Center Rack/Chassis Connector



Female Receptacle
To Secondary Boom Cable/Mid-Boom
Fold Point

2. Starting at the center of the implement, feed the female receptacle end of the primary boom cable through the boom framework along existing cable or plumbing runs and through any existing cable retention devices.
3. Connect the large, round connectors on the primary and secondary boom cables to each other.
4. Adjust the primary and secondary boom cables to ensure sufficient slack around the mid-boom fold point and allow each cable to reach nozzle control valves near the folding point.
5. Secure the primary and secondary connection using the supplied zip ties as necessary to protect the connector from damage during folding and unfolding operations.
6. Starting at the valve on the primary boom segment furthest from the center of the implement, connect the valve tee branches to the nozzle control valves.
7. At each valve branch, adjust the cable as necessary to provide slack between nozzle control valve connections and use the supplied zip ties to secure the cable at each valve branch. Refer to Figure 6 on page 16. The large, round connector with male pins on the primary boom cable should reach to the center of the implement after all nozzle control valves are connected.
8. Repeat this procedure to route the primary boom cable on the opposite boom.

CHAPTER

5

ISOBUS ECU MOUNTING AND CONNECTION

PRODUCT CONTROLLER II ECU INSTALLATION

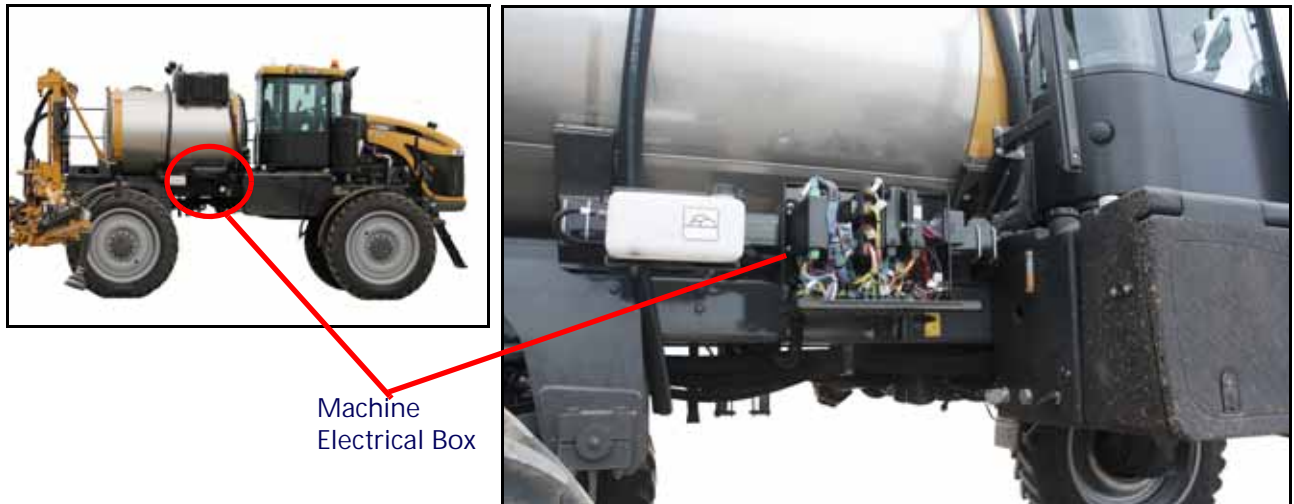
BEST PRACTICES AND RECOMMENDATIONS

- Do not connect battery leads until all cables are installed and connected.
- If a protected mounting location is not available on the equipment, mount the Hawkeye® product controller II ECU with the connectors facing down toward the ground to help keep moisture from accumulating in the ECU.

ELECTRICAL BOX PREPARATION

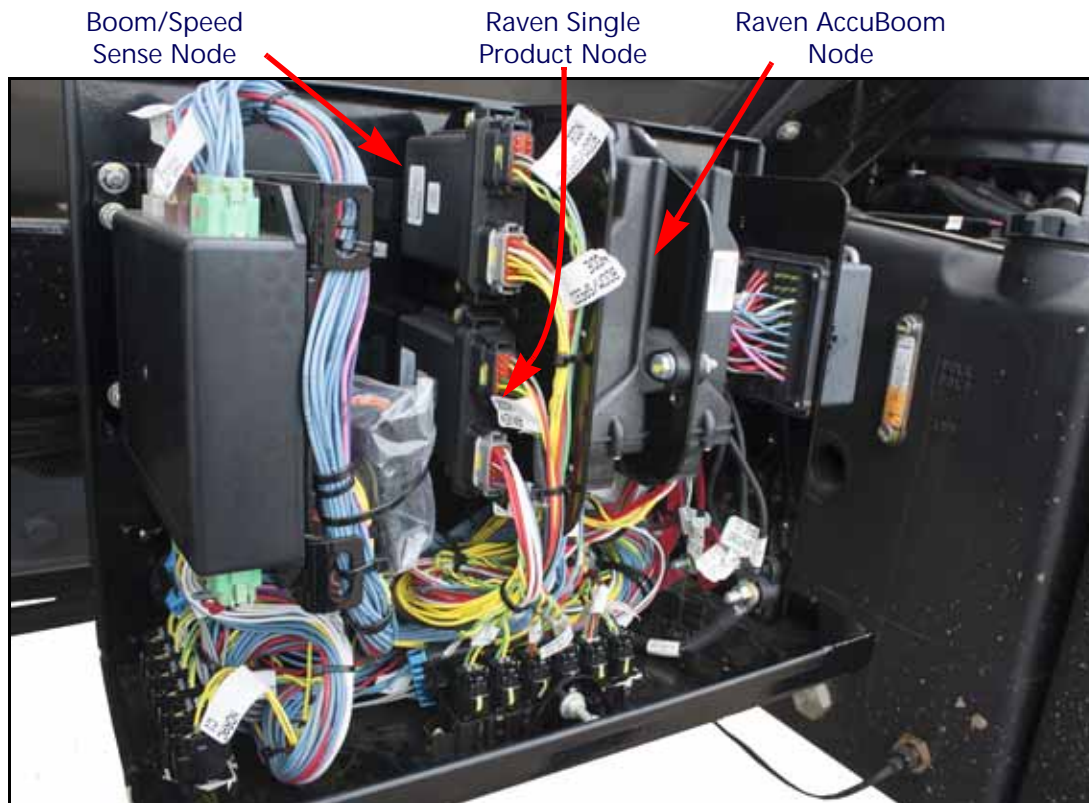
1. Locate the electrical box on the right side of the machine, between the axles and remove the cover.

FIGURE 1. RoGator 1300 Electrical Box Location



2. Locate the node mounting plate with the Raven boom/speed sense node and single product control node.

FIGURE 2. Node Mounting Plate Modifications



3. Remove the bolts securing the boom/speed node and product node to the mounting plate.

NOTE: Do not disconnect the nodes from cable connections at this time.

4. Use a socket and socket extension to loosen the bolt securing the node mounting plate and remove the plate from the electrical box.

NOTE: The mounting plate will be modified to mount the Product Controller II ECU and ISO Boom/Speed ECU in the *Mounting Plate Preparation and ECU Installation* section on page 21.

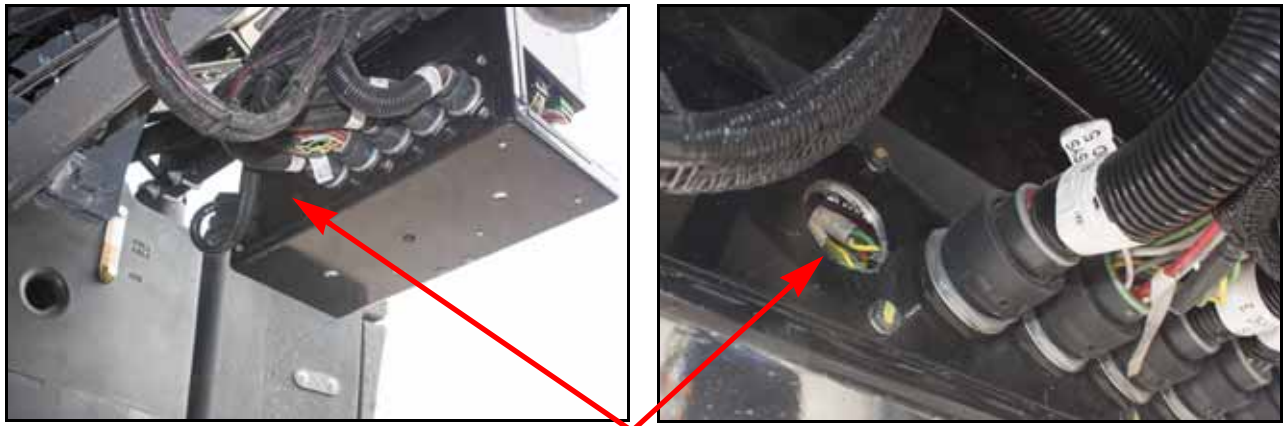
5. Remove the Raven AccuBoom node from the machine electrical box.
6. Tuck the two rectangular node plugs connected to the AccuBoom out of the way at the bottom of the electrical box. These rectangular node plugs are not needed for the Hawkeye system.

NOTE: It is recommended to cover the electrical connections so no water/dust collects within the pins.

7. Locate the two brown connections (four separate harness connectors) labeled "AccuBoom Tee" in the electrical box. These are typically located in the area below the removed mounting plate.
8. Adjust the harnesses to allow access to these connectors for use during the procedure outlined in the *Section Valve Cable Connections* section on page 27.
9. Use a 1-1/2" hole saw to drill a hole through the back of the electrical box in a location where the Hawkeye system will not interfere with the existing electrical components (refer to Figure 3 on page 21).

NOTE: Be careful not to damage any existing electrical components while drilling. This hole will be used later to connect the chassis cable to the electrical box cabling for final system connections.

FIGURE 3. Access to Electrical Box for Hawkeye Chassis Cable



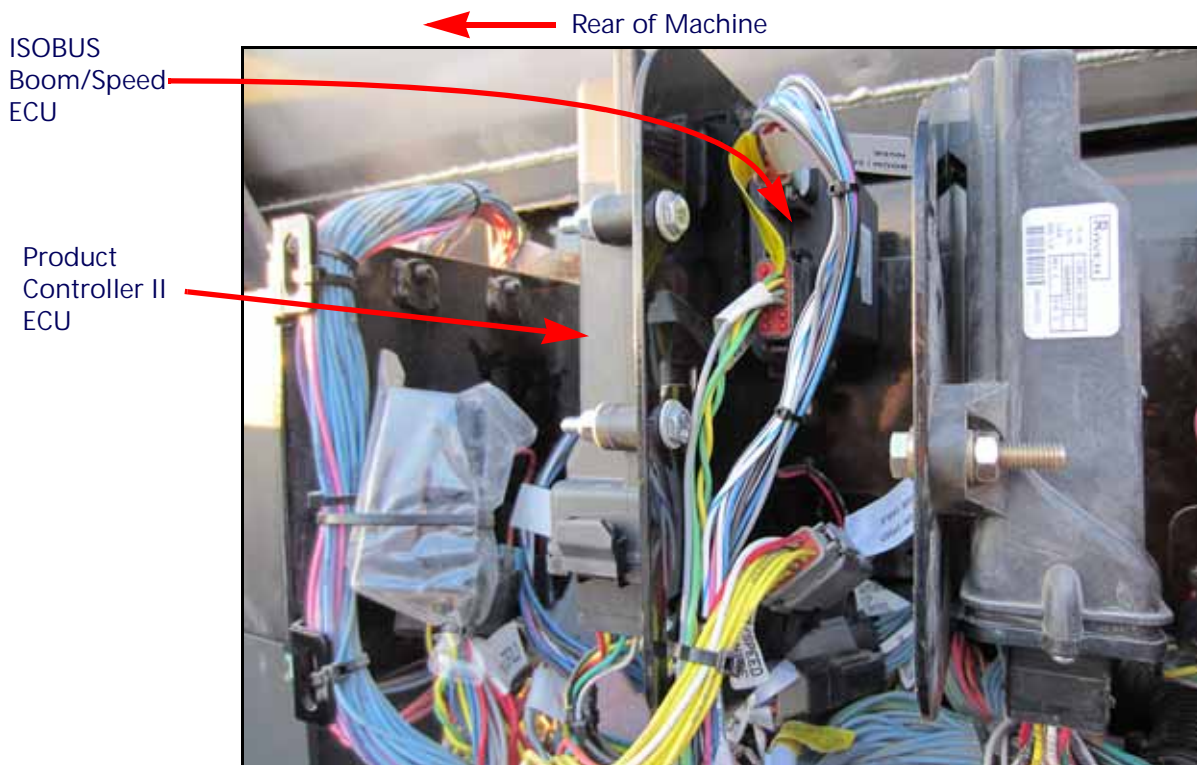
Drill 1-1/2" Hole

MOUNTING PLATE PREPARATION AND ECU INSTALLATION

1. Using the Product Controller II ECU as a template, mark the mounting plate for the new ECU mounting post pattern. It may be possible to use some existing holes in the plate.

NOTE: Mount the Product Controller II ECU to the side of the plate facing toward the rear of the machine with the cable connectors pointing toward the bottom of the electrical box. Position the ECU parallel with the top edge of the mounting plate. Keep in mind the electrical box cover when positioning and marking the plate for mounting the Product Controller II ECU.

FIGURE 4. Example of Final Product Controller II ECU Mounting



2. Use a 5/16" drill bit to make any holes in the mounting plate.

- Reuse the hardware from the boom/speed node or single product node to mount the ISO Boom/Speed Sense ECU to the side of the mounting plate facing toward the front of the machine (refer to Figure 4 on page 21).

NOTE: It may be necessary to insert the supplied 1/4" bolts and washers required for mounting the Product Controller II ECU prior to securing the ISO Boom/Speed Sense ECU.

- Use the supplied 1/4" bolts, hex nuts, and flat washers to mount the Product Controller II ECU to the mounting plate facing toward the rear of the machine.

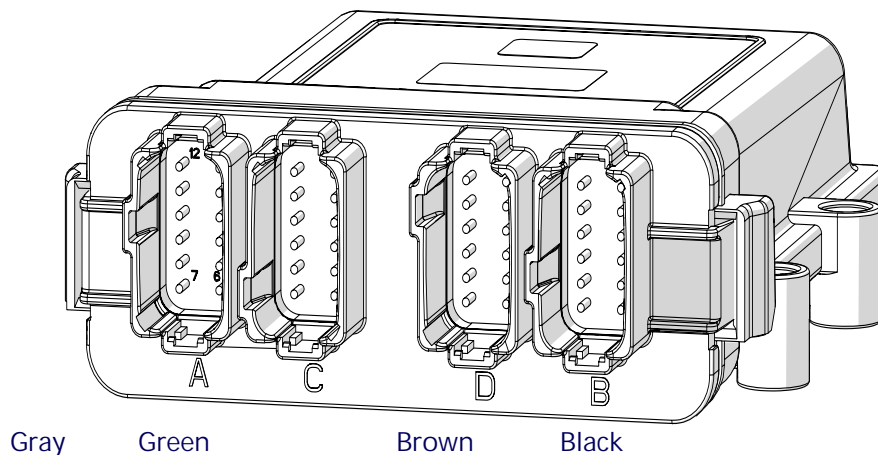
ECU ELECTRICAL CONNECTIONS

RETROFIT CABLE INSTALLATION (115-7303-085 CABLE REV A - REV C)

Check the label on the 115-7303-085 cable to determine which cable revision you have. If revision D or later skip to "Retrofit Cable Installation (115-7303-085 Cable Rev D and later and 115-0172-325 Rev B)" on page 24.

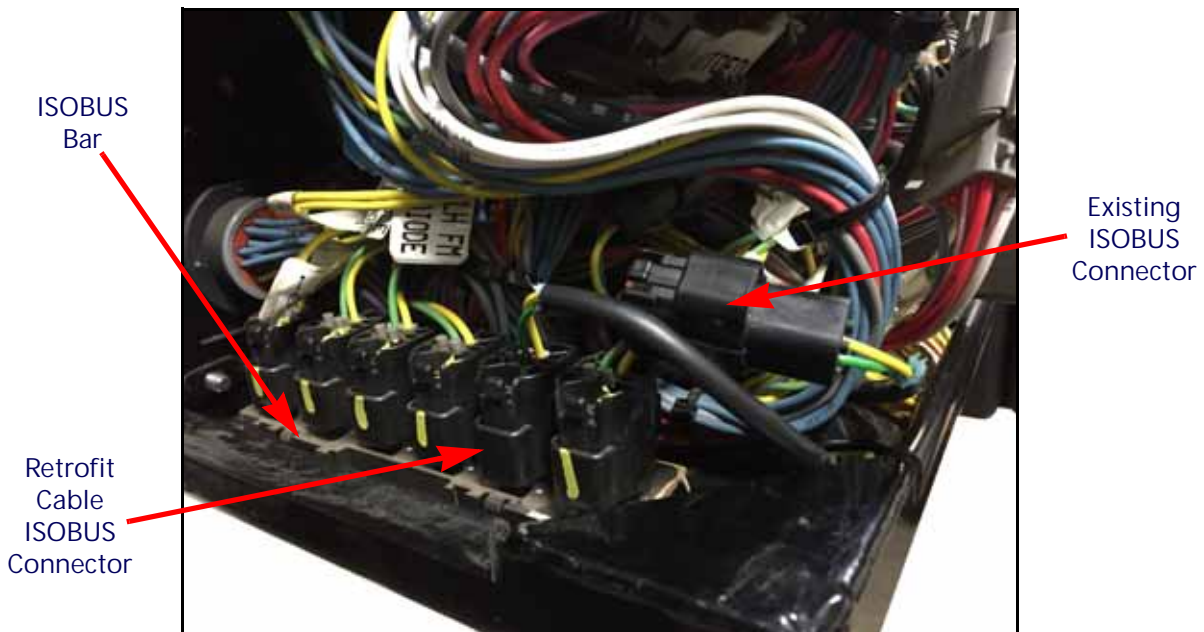
- Locate the large, round receptacle on the Hawkeye retrofit cable (P/N 115-7303-085).
- Remove the nut and washer from the receptacle.
- Feed the receptacle through the hole previously drilled through the back of the electrical box (refer to Figure 3 on page 21).
- Replace the washer and nut onto the connector from the back of the electrical box to secure the receptacle.
- Route the opposite end of the cable harness to the product controller II ECU.
- Insert the four 12-pin Deutsch plugs (gray, green, brown, and black) into the Product Controller II ECU as shown in Figure 5 on page 22. Push each connector in until both retaining clips lock into place.

FIGURE 5. Product Controller II ECU Connections



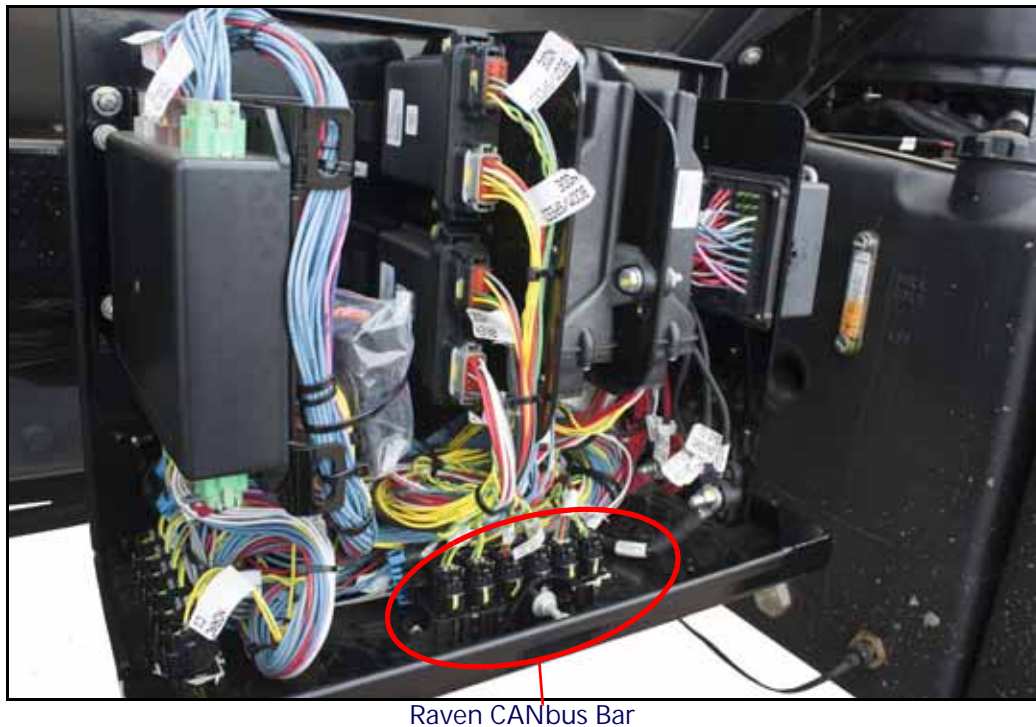
- Reinstall the node mounting plate into the electrical box and use a socket and socket extension to secure the plate in place with the existing hardware.
- Locate the branch on the retrofit cable with the three black rectangular ISOBUS connectors.
- Route these connectors to the ISOBUS bar along the side of the electrical box closest to the rear of the machine.

FIGURE 6. ISOBUS Bar Location



10. Disconnect the connector from the second port of the ISOBUS bar and insert the plug into one of the mating retrofit cable connectors.
11. Insert the ISOBUS Connector of the retrofit cable into the ISOBUS bar receptacle.
12. Locate the Raven CAN bus bar along the side of the electrical box facing the right side of the machine.

FIGURE 7. Raven CANbus Bar Location



13. Locate and disconnect the connector labeled "BIS" from the Raven CANbus bar.

14. Connect the BIS connector to one of the mating ISOBUS connectors on the Hawkeye retrofit cable (P/N 115-7303-085).

RETROFIT CABLE INSTALLATION (115-7303-085 CABLE REV D AND LATER AND 115-0172-325 REV B)

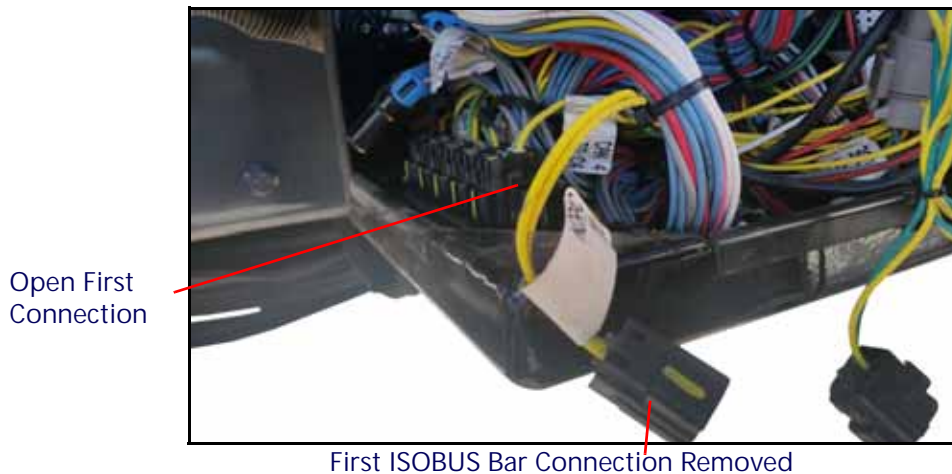
Check the label on the 115-7303-085 cable to determine which cable revision you have. If C or earlier, complete the steps in "Retrofit Cable Installation (115-7303-085 Cable Rev A - Rev C)" on page 22.

1. Locate the large, round receptacle on the Hawkeye retrofit cable (P/N 115-7303-085).
2. Remove the nut and washer from the receptacle.
3. Feed the receptacle through the hole previously drilled through the back of the electrical box (refer to Figure 3 on page 21).
4. Replace the washer and nut onto the connector from the back of the electrical box to secure the receptacle.
5. Route the opposite end of the cable harness to the product controller II ECU.
6. Insert the 12-pin Deutsch plugs (gray, green, brown, and black) into the Product Controller II ECU as shown in Figure 5 on page 22. Push each connector in until both retaining clips lock into place.
7. Reinstall the node mounting plate into the electrical box and use a socket and socket extension to secure the plate in place with the existing hardware.

ROGATOR ISOBUS TEE CABLE INSTALLATION (P/N 115-0172-325 REV B; FOR USE WITH 115-7303-085 REV D CABLES AND LATER ONLY)

1. Locate the ISOBUS Bar located inside the electrical box. The ISOBUS bar is adjacent to the edge of the box closest to the rear of the machine.

FIGURE 8. ISOBUS Bar

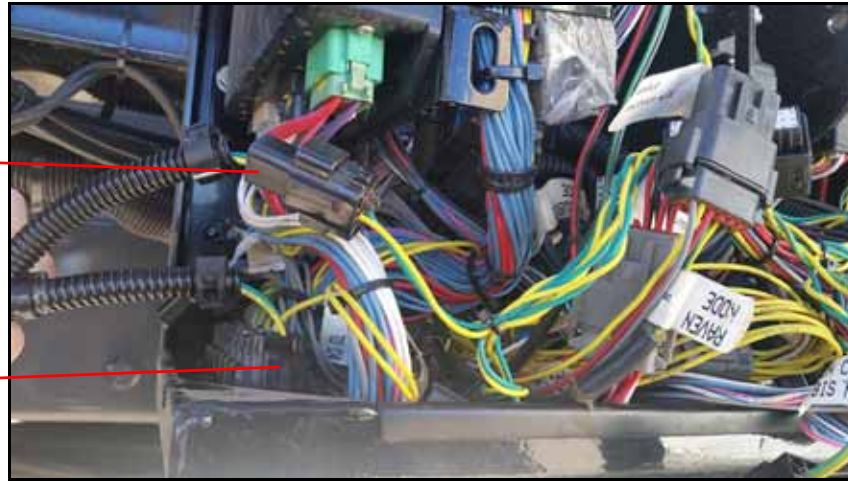


2. Disconnect the connector farthest on the right on the ISOBUS bar.
3. Locate the provided RoGator ISOBUS Tee Cable (P/N 115-0172-325 Rev B).
4. Locate and connect the mating receptacle of the RoGator ISOBUS Tee Cable to the open connector on the ISOBUS bar.
5. Locate the mating connection on P/N 115-7303-085 Rev D and plug it into the ISOBUS Tee Cable (P/N 115-0172-325 Rev B).

FIGURE 9. Hawkeye Retrofit Cable Connected to ISOBUS Tee Cable

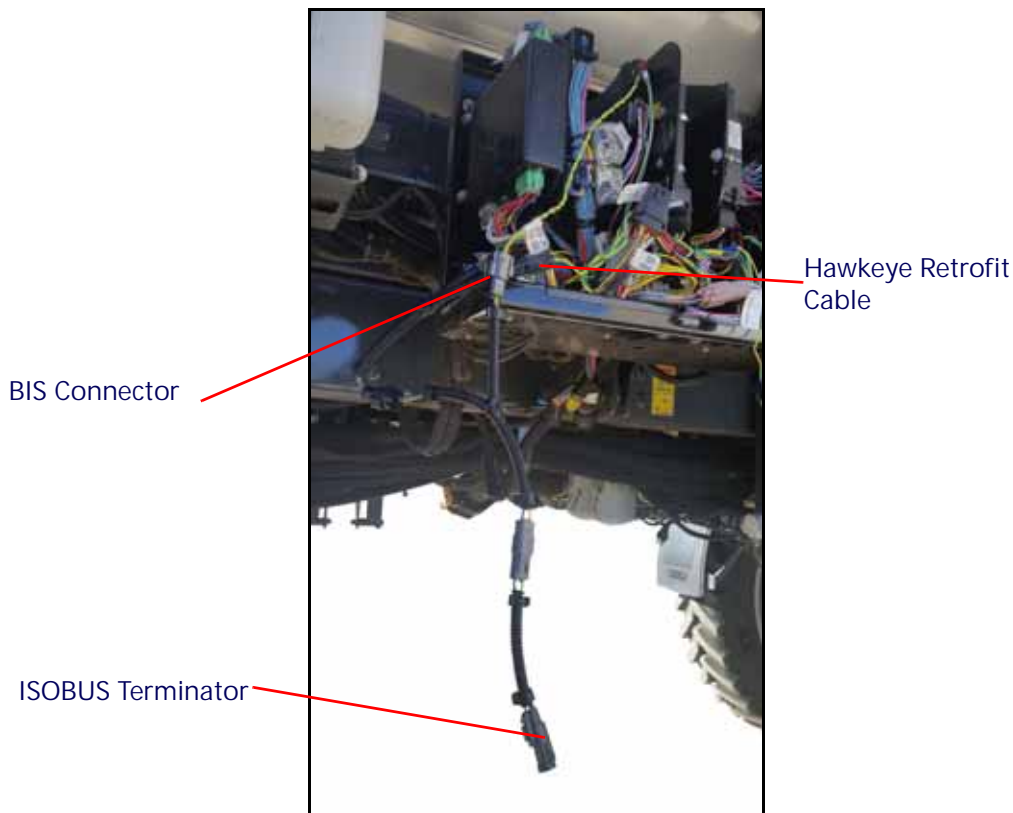
RoGator ISOBUS
Tee Cable
Connected to the
Hawkeye Retrofit
Cable

RoGator ISOBUS
Tee Cable
Connected to the
First Port of the
ISOBUS Bar



6. Locate the Raven CANbus bar along the edge of the electrical box furthest from the center of the machine. Refer to "Raven CANbus Bar Location" on page 23.
7. Locate and disconnect the connector labeled "BIS" from the Raven CANbus bar.
8. Connect the BIS connector removed in the previous step to the remaining open plug on the RoGator ISOBUS Tee Cable (P/N 115-0172-325 Rev B).

FIGURE 10. RoGator ISOBUS Tee Cable Installed



NOTE: The 3-pin cap on the end of the RoGator ISOBUS Tee Cable is an ISOBUS terminator. This must be left in place unless Sidekick Pro Injection Pump(s) are being connected to the ISOBUS. See the Appendix for connecting injection pumps to the ISOBUS with the RoGator ISOBUS Tee Cable.

SINGLE PRODUCT NODE REMOVAL

1. Locate the gray and black connectors on the existing single product node and the gray and black receptacles on the Hawkeye retrofit cable (P/N 115-7303-085).
2. Disconnect the black plug from the single product node and connect to the black receptacle on the retrofit cable.
3. Disconnect the gray plug from the single product node and connect to the gray receptacle on the retrofit cable. The single product node will not be reused with the Hawkeye system and may be set aside.

BOOM/SPEED NODE REMOVAL AND ECU CONNECTION

1. Locate the gray and black connectors on the existing boom/speed node and the gray receptacle on the boom/speed retrofit cable (P/N 115-7303-084).
2. Disconnect the gray plug from the boom/speed node and connect to the gray receptacle on the boom/speed retrofit cable.
3. Insert the remaining gray plug on the boom/speed retrofit cable into the ISO boom/speed ECU (P/N 063-0173-635).
4. Disconnect the black connector from the boom/speed node and connect to the black receptacle on the new ISO boom/speed ECU. The existing boom/speed node will not be reused with the Hawkeye system and may be set aside.

SECTION VALVE CABLE CONNECTIONS

1. Disconnect the two brown "AccuBoom Tee" connections located earlier in the installation process.
2. Locate the existing plug and receptacle labeled with an 'A1' and 'A2' or 'N1' and 'N2' at the base of the label and connect these two together.

FIGURE 11. A1 and A2 Connectors



3. Locate the existing female "AccuBoom Tee" receptacle labeled 'E1' or 'KB1' and connect to the brown receptacle labeled "From Boom Switches" on the supplied Hawkeye Retrofit Cable (P/N 115-7303-084).
4. Locate the existing male "AccuBoom Tee" plug labeled 'E2' or 'KB2' and connect to the brown receptacle labeled "boom section valves" on the Hawkeye Logic Power/CAN Retrofit cable (P/N 115-7303-085).

NOTE: The remaining 12-pin plug and receptacle lead to the AccuBoom node which is no longer used with the Hawkeye system. These connectors will not be used. Connect this plug and receptacle together to protect the pins from corrosion.

NOTE: After Hawkeye system installation is complete, if the boom switches or valves do not operate correctly, it is possible the wrong connectors were identified above. Switching connectors should correct the issue.

5. Tuck cables back into the electrical box and replace the cover.

CHAPTER

CHASSIS CABLE INSTALLATION

6

CHASSIS CABLE ROUTING AND CONNECTION

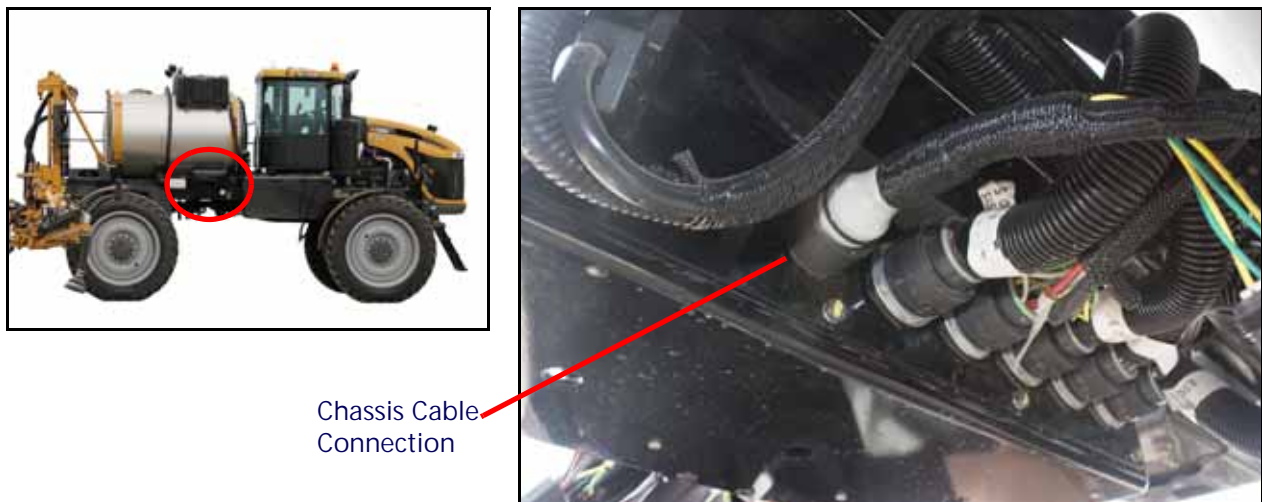
BEST PRACTICES AND RECOMMENDATIONS

- Do not connect battery leads until all cables are installed and connected.
- Route chassis cabling along existing cabling or plumbing to help avoid pinch points or stretching the cable during normal equipment operation.

ELECTRICAL BOX CONNECTION

1. Locate the single, round connector on the supplied chassis cable (P/N 115-7303-086).
2. Route this connector to the electrical box and connect to the Hawkeye retrofit cable receptacle secured previously (review the *ECU Electrical Connections* section on page 22).
3. Connect the chassis cable to the round receptacle on the Product Controller II ECU cable already installed in the electrical box.

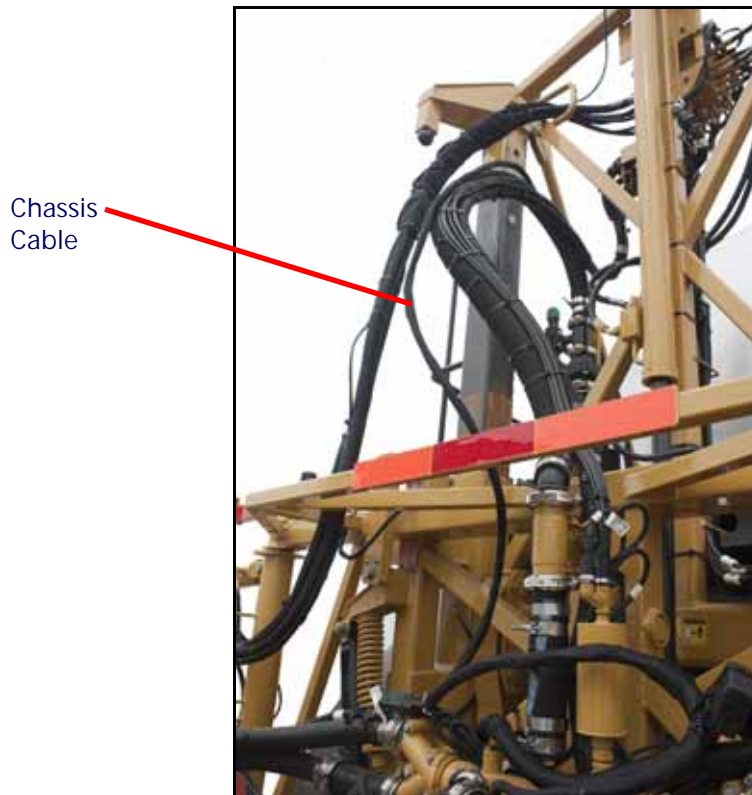
FIGURE 1. Chassis Cable Electrical Box Connection



CENTER RACK ROUTING AND BOOM CABLE CONNECTIONS

1. Route the round connectors labeled "left boom" and "right boom" toward the center rack of the machine.
2. Use the provided zip ties to secure the chassis cable to the undercarriage as necessary to avoid snagging the cable during machine operation.
3. At the rear of the applicator tank, route the chassis cable to follow the chemical supply lines underneath the rear catwalk and then up through the center rack framework. Follow the supply lines to ensure adequate slack for operating the center rack during field operations and when folding and unfolding the booms.

FIGURE 2. Chassis Cable Center Rack Routing

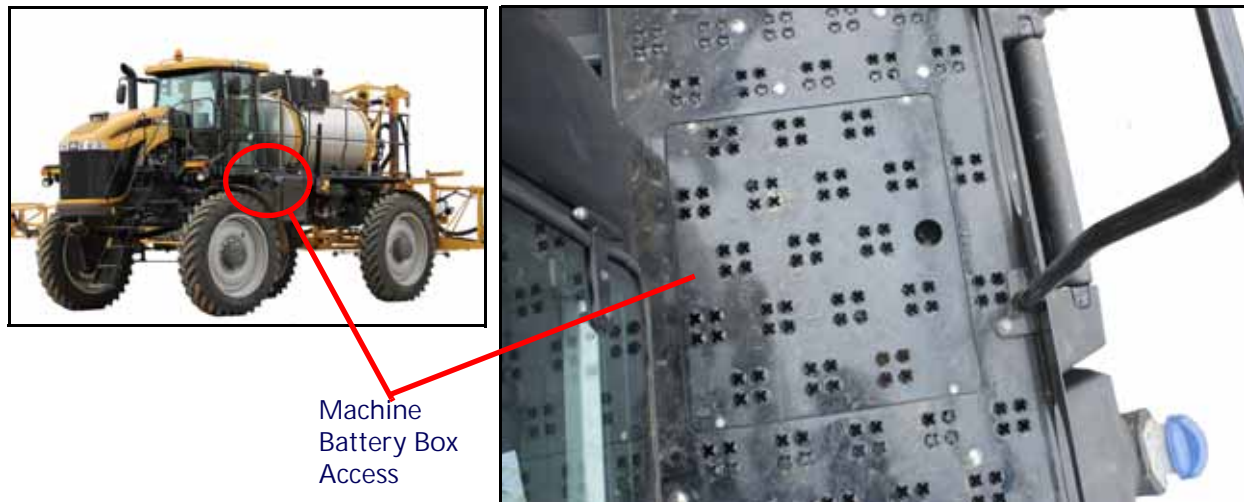


4. Use zip ties to secure the chassis cable to existing system lines to keep the cable from being damaged during normal equipment operation.
5. Connect the left and right boom cables connectors at the center rack.
6. Use supplied zip ties to secure any excess cabling on the center rack framework.

BATTERY COMPARTMENT AND CONNECTIONS

1. Disconnect the battery switch by turning the battery disconnect switch below the catwalk near the cabin door.
2. Locate the battery compartment located next to the operator cabin under the catwalk on the left side of the machine.

FIGURE 3. RoGator 1300 Battery Compartment Location



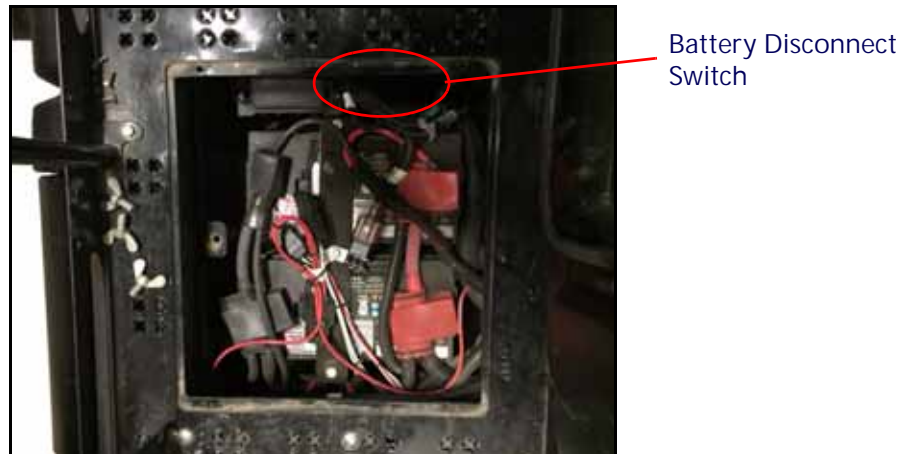
3. Remove the walkway cover and the battery compartment cover.

FIGURE 4. RoGator 1300 Battery Compartment



4. Route the battery leads on the chassis cable branch into the battery compartment.
5. Use the provided zip ties to secure the chassis cable to the undercarriage as necessary to avoid snagging the cable during machine operation.
6. Connect the red battery lead to a positive battery terminal.
7. Locate the battery disconnect switch.

FIGURE 5. Battery Disconnect Switch Location



8. Remove the nut from the top-left terminal on the battery disconnect switch.
9. Connect the negative lead from the chassis cable to the negative bolt on the battery disconnect switch and reinstall the nut.

FIGURE 6. Battery Disconnect Switch



10. When installation is complete, re-connect the battery disconnect switch before operating the equipment.

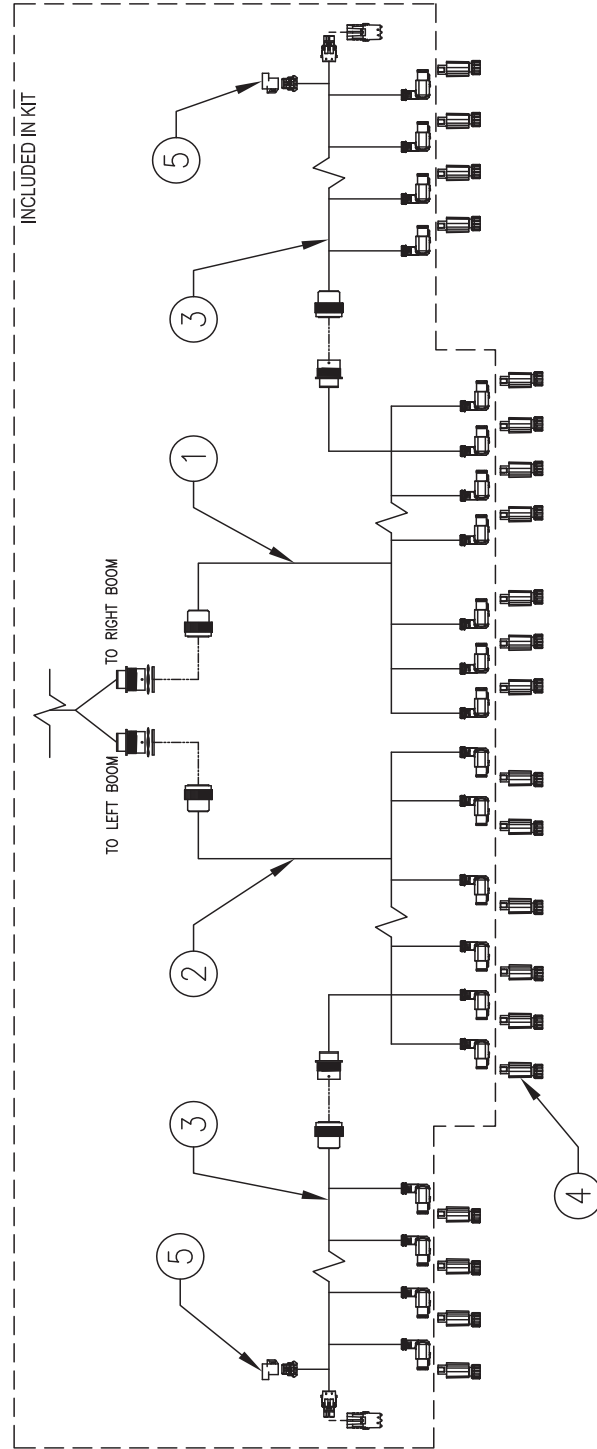
SYSTEM DIAGRAM

Diagrams start on the next page.

FIGURE 8. System Diagram (Page 2)

NOTES:
1. CABLES SHORTENED FOR GRAPHICAL PURPOSES

ITEM	DESCRIPTION	RG 900/1100/1300 120' BOOM 20" SPACING IN KIT P/N: 117-1005-020	RG 900/1100/1300 100' BOOM 20" SPACING IN KIT P/N: 117-1005-021	RG 900/1100/1300 90' BOOM 20" SPACING IN KIT P/N: 117-1005-022	RG 900/1100/1300 120' BOOM 15" SPACING IN KIT P/N: 117-1005-023	RG 900/1100/1300 100' BOOM 15" SPACING IN KIT P/N: 117-1005-024	RG 900/1100/1300 90' BOOM 15" SPACING IN KIT P/N: 117-1005-025
1	CABLE, RIGHT PRIMARY	115-7303-068	115-7303-109	115-7303-109	115-7303-140	115-7303-158	115-7303-158
2	CABLE, LEFT PRIMARY	115-7303-068	115-7303-109	115-7303-109	115-7303-123	115-7303-129	115-7303-129
3	CABLE, SECONDARY (QTY: 2)	115-7303-069	115-7303-110	115-7303-128	115-7303-124	115-7303-131	115-7303-130
4	TEE JET HAWKEYE VALVE ARAG/HYDRO HAWKEYE VALVE WILGER HAWKEYE VALVE (QTY: 72)	063-0173-672 063-0173-673 063-0173-674	063-0173-672 063-0173-673 063-0173-674	063-0173-672 063-0173-673 063-0173-674	063-0173-672 063-0173-673 063-0173-674	063-0173-672 063-0173-673 063-0173-674	063-0173-672 063-0173-673 063-0173-674 (QTY: 60)
5	CAN TERMINATOR (QTY: 2)	063-0172-964	063-0172-964	063-0172-964	063-0172-964	063-0172-964	063-0172-964



APPENDIX A

CABLE AND CONNECTOR MAINTENANCE

POWER AND ECU HARNESS MAINTENANCE

1. Disconnect the ECU harness connector and inspect for signs of moisture or corrosion.
2. If moisture or corrosion is detected, use Deoxit D5, brushes, and compressed air to clean and dry the connector.
3. When clean, apply a coating of Corrosion X HD to the connector mating surfaces and contacts.
4. Reattach the connectors.

HAWKEYE BOOM HARNESS CONNECTOR MAINTENANCE

Prior to connecting the Hawkeye boom cable to the Hawkeye Nozzle Control Valves (NCV), perform the following steps to all 6-pin NCV connectors and 19-pin circular connectors between the boom cables and ECU cable connections to ensure high quality connections:

1. Verify the NCV connectors and the accompanying boom cable connectors are free of moisture, contamination, or oxidation. Oxidation will appear as a dry, white coating on the contacts. If any connectors show signs of moisture, contamination, or oxidation, perform Step 2 - Step 6. If this is a new installation, skip to Step 7. All components listed below can be ordered in the Hawkeye NCV Connection Maintenance Kit (P/N 117-0171-692).
2. Spray the connection with a deoxidizing agent (DeoxIT D5 is recommended (P/N 222-4001-006)).



3. Clean contacts with a small wire brush (P/N 321-0000-477).



4. Spray the contacts again with the deoxidizing agent. This will rinse out debris.
5. Remove all residue of deoxidizing agent from the connection. Not removing deoxidizing agent can damage the connector seal.
6. Dry out the connection with dry, compressed air. Dust Off Electronics Duster (P/N 222-4001-007) is recommended however, if unavailable, alternate compressed air sources can be used. If using compressed air from a large volume air compressor, be sure the lines are free of moisture.



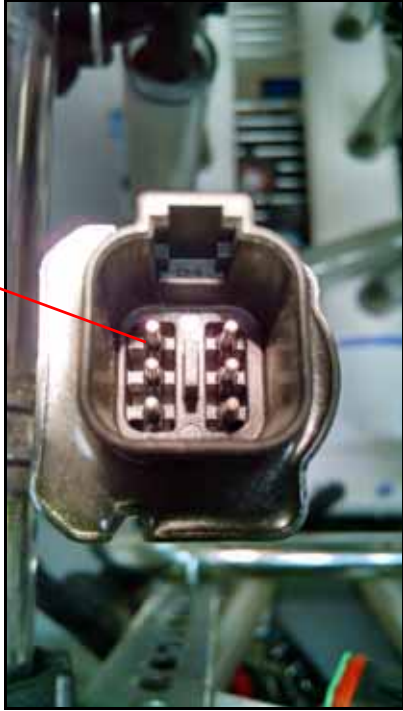
-
7. If not already applied, apply a single short burst of corrosion inhibitor (Corrosion X HD (Raven P/N 222-0000-020 or available from <http://www.corrosionx.com/corrosionx-heavy-duty.html>)) into the NCV connection. Be sure the corrosion inhibitor has coated the NCV contacts and recessed portions of the connector.

NOTE: To determine if corrosion inhibitor has been applied, inspect for a thick liquid in the bottom of the connector (as shown in the Corrosion Inhibitor Applied image below).

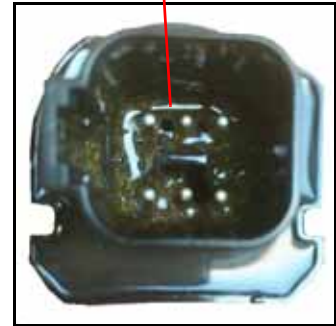
NCV Connector

Applying Corrosion Inhibitor

Spray in
Void
Between
Pins



Corrosion Inhibitor Applied



APPENDIX B

CONNECTING VIRTUAL TERMINAL TO ISOBUS

Contact a local equipment or Raven dealer for additional assistance with any adapter cables required for connecting the Hawkeye® nozzle control system to the virtual terminal (VT).

VIPER 4 ISOBUS ADAPTER CABLE

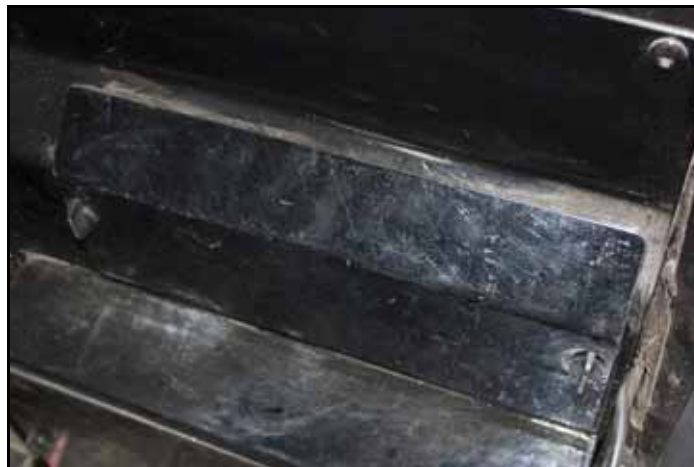
NOTE: For 2012 - 2015 machines, the ISOBUS adapter cable (P/N 115-0172-247) is required for a ROS device to interface with the Hawkeye nozzle control system. Refer to the Installation Manual provided with the ROS device for additional assistance with installing a Raven display.

2016 and newer machines with an existing Viper 4 field computer may already have the ISOBUS connected to the Viper 4.

Look for a cable connected to Port 5 on the back of the Viper 4 to verify. If present, the ISOBUS adapter cable (P/N 115-0172-247) will not be used. There will be two 2-pin Deutsch connectors on the existing console cable that need to be connected together to finish connecting the Viper 4 to the ISOBUS.

1. Locate the top panel to the right of the operator seat in the vehicle cabin.

FIGURE 1. Upper Panel Right of the Operator Seat



2. Remove the panel cover to access the ISOBUS terminator and connections.
3. Locate the connection labeled "ISO Terminator" toward the rear of the exposed panel.

FIGURE 2. Upper Panel Right of the Operator Seat



4. Disconnect the ISO terminator from the 3-pin connector.
5. Plug in the ISOBUS adapter cable to the connectors to allow the ROS device to interface with the machine ISOBUS and the Raven Hawkeye nozzle control system.
6. Plug the ISO terminator plug on to the second connector on the cable installed in Figure 5 on page 40.
7. Route the adapter cable to the back of the ROS device and connect to the receptacle labeled "5."
8. To prevent issues with the Hawkeye Icon showing up on the C1000, perform the steps in AGCO Service Bulletin Number 16-0104. This bulleting provides the steps to set the ISOBUS Terminal Generation to UT 2, turn the ISOBUS Terminal Functions On, and assign the terminal number.

APPENDIX C

CONNECTING SIDEKICK PRO ICD DIRECT INJECTION PUMPS TO ISOBUS

CONNECTING SIDEKICK PRO ICD DIRECT INJECTION PUMPS TO THE ISOBUS FOR REV C AND EARLIER 115-7303-085 CABLES

Sidekick Pro direct injection pumps installed by AGCO are Raven CAN version and are connected to the CANbus. To work with the Hawkeye® Product Control System, change the pumps to Sidekick Pro ICD pumps and connect them to the machine's ISOBUS using a Raven adapter cable (P/N 115-0172-325 Rev B). Contact a local Raven dealer to order this cable and ICD pumps if necessary.

NOTE: If adding a new injection system to the machine, also order the required AGCO cable harness from your local AGCO dealer.

1. Inspect the Sidekick Pro label to determine if it is the ICD version. The label will either read Raven Sidekick Pro™ ICD and the part number will be one of the following:
 - P/N: 1-063-0173-768 (1-40 oz/min pump)
 - P/N: 1-063-0173-769 (5-200 oz/min pump)

FIGURE 1. Raven Sidekick Pro ICD Label



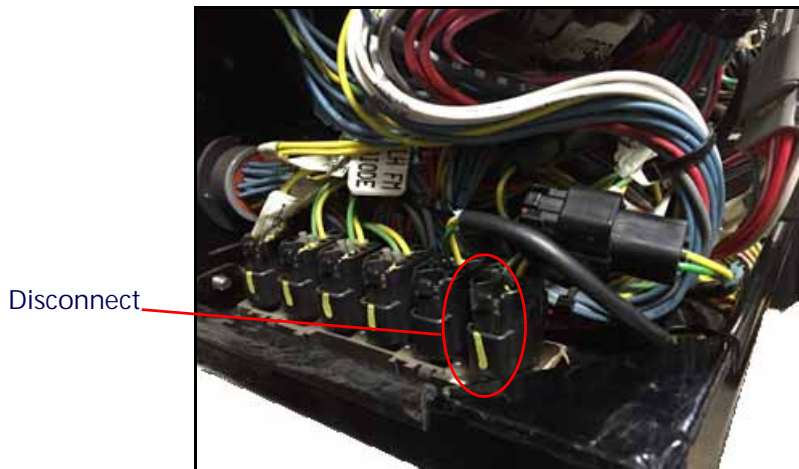
2. Remove the cover of the electrical box that contains the product control ECU's on the middle of the right frame rail.
3. Locate the RoGator ISOBUS Tee Cable (P/N 115-0172-325 Rev B). This may have been provided with your Hawkeye system kit, or it may need to be ordered.
4. Remove the 4-Pin to 3-Pin Deutsch adapter cable with ISOBUS Terminator and set aside. This will be used in a later step.
5. Follow the cable from the injection pumps down the frame rail to the round bulkhead connector on the back of the electrical box. This is typically the bulkhead connector furthest towards the front of the machine on the electrical box.
6. Locate the mating bulkhead connector on the inside of the electrical box.

7. Identify and disconnect the green/yellow twisted wires that lead to a 4-pin Deutsch connector in the electrical box.
8. Connect the 4-pin Deutsch receptacle coming from the bulkhead connector to the mating 4-pin plug on the ISOBUS adapter tee (P/N 115-0172-325 Rev B) where the adapter and terminator were removed.

NOTE: If the ISOBUS Tee Cable (P/N 115-0172-325 Rev B) was previously installed, skip step 9 through step 14.

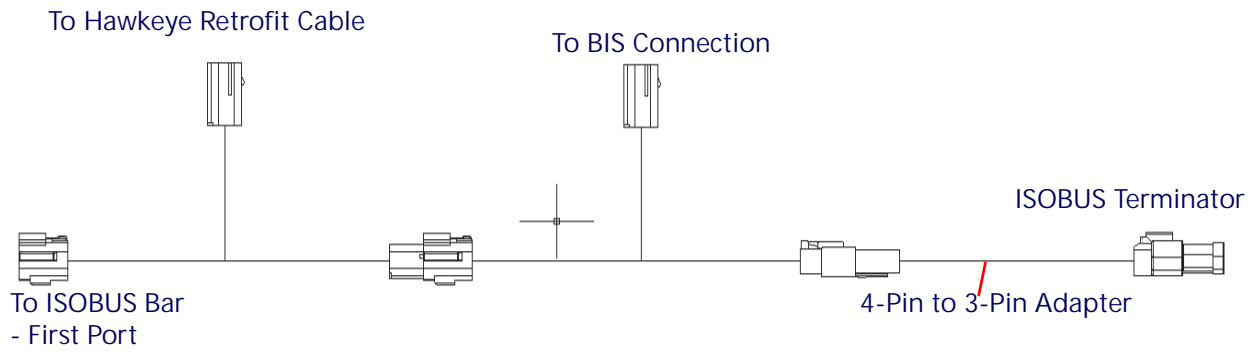
9. Remove the first connector from the front of the ISOBUS bar located in the bottom of the electrical box along the edge closest to the rear of the machine.

FIGURE 2. First ISOBUS Bar Connector.



10. Locate and disconnect the square Raven passive terminator on the cable harness near the Sidekick Pro Injection Pumps.
11. Locate the 4-Pin adapter cable and ISOBUS terminator removed from the ISOBUS Tee Cable (P/N 115-0172-325 Rev B) in a previous step.
12. Install the adapter and ISOBUS terminator onto the connection that the Raven Passive Terminator was removed from.
13. Plug the mating connector of the ISOBUS adapter tee (P/N 115-0172-325 Rev B) into the open first port of the ISOBUS bar.
14. Plug the remaining connector of the ISOBUS adapter tee into the open port of the ISOBUS bar.
15. If the Hawkeye Retrofit Cable (P/N 115-0172-325 Rev B) was not previously connected to the ISOBUS Tee Cable, connect the mating connector to the remaining open connector of the ISOBUS Tee Cable.

FIGURE 3. Adapter Cable (P/N 115-0172-325)



16. Secure any cables.
17. Replace the cover of the electrical box.

LIMITED WARRANTY

WHAT DOES THIS WARRANTY COVER?

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

HOW LONG IS THE COVERAGE PERIOD?

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

HOW CAN I GET SERVICE?

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

WHAT WILL RAVEN INDUSTRIES DO?

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

WHAT IS NOT COVERED BY THIS WARRANTY?

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

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

EXTENDED WARRANTY

WHAT DOES THIS WARRANTY COVER?

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

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

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

WHERE CAN I REGISTER MY PRODUCT FOR THE EXTENDED WARRANTY?

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

HOW LONG IS THE EXTENDED WARRANTY COVERAGE PERIOD?

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

HOW CAN I GET SERVICE?

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

WHAT WILL RAVEN INDUSTRIES DO?

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

WHAT IS NOT COVERED BY THE EXTENDED WARRANTY?

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

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