Hagie Hawkeye® Installation Manual

P/N 016-0171-635 Rev. C 05/17 E29489

We Solve Great Challenges.

LIMITED WARRANTY

WHAT DOES THIS WARRANTY COVER?

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

HOW LONG IS THE COVERAGE PERIOD?

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

HOW CAN I GET SERVICE?

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

WHAT WILL RAVEN INDUSTRIES DO?

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

WHAT IS NOT COVERED BY THIS WARRANTY?

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

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

RAVEN

CHAPTER 1 IMPORTANT SAFETY INFORMATION

NOTICE

Read this manual and all operation and safety instructions included with the implement and/or controller carefully before installing the Hawkeye system.

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

When operating the machine, observe the following safety measures:

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

⚠ DANGER

AGRICULTURAL CHEMICAL SAFETY

- Thoroughly bleed pressure from chemical lines and rinse the system with clean water prior to installing or servicing fittings, hoses, valves, or nozzles in the application system.
- 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.
- 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.
- Avoid inhaling chemical dust or spray particulate and avoid direct contact with any agricultural chemicals. Seek immediate medical attention if symptoms of illness occur during, or soon after, use of agricultural chemicals, products, or equipment.
- After handling or applying agricultural chemicals:

  - Thoroughly wash hands and face after using agricultural chemicals and before eating, drinking, or using the rest room.
  - 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.
- 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 disposing of them properly. Contact a local environmental agency or recycling center for additional information.

⚠ CAUTION

ELECTRICAL SAFETY

- Always verify that the power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the equipment.
- Disconnect the Hawkeye system ECUs and control console before jump starting the vehicle or welding on any part of the implement or machine.

INSTRUCTIONS FOR WIRE ROUTING

The word "harness" is used to mean all electrical leads and cables, bundled and unbundled. When installing harness, secure it at least every 30 cm (12in) to the frame. Follow existing harness as much as possible and use these guidelines:

Harness should not contact or be attached to:

- Lines and hoses with high vibration forces or pressure spikes
- Lines and hoses carrying hot fluids beyond harness component specifications

Avoid contact with any sharp edge or abrading surfaces such as, but not limited to:

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads
- Ends of adjustable hose clamps
- Wire exiting conduit without protection, either ends or side of conduit
- Hose and tube fittings

Routing should not allow harnesses to:

- Hang below the unit
- Have the potential to become damaged due to exposure to the exterior environment. (i.e. tree limbs, debris, attachments)
- Be placed in areas of or in contact with machine components which develop temperatures higher than the temperature rating of harness components
- Wiring should be protected or shielded if it needs to route near hot temperatures beyond harness component specifications

Harnessing should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in steering and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For harness sections that move during machine operation:

- Allow sufficient length for free movement without interference to prevent: pulling, pinching, catching or rubbing, especially in articulation and pivot points
- Clamp harnesses securely to force controlled movement to occur in the desired harness section
- Avoid sharp twisting or flexing of harnesses in short distances
- Connectors and splices should not be located in harness sections that move

Protect harnesses from:

- Foreign objects such as rocks that may fall or be thrown by the unit
- Buildup of dirt, mud, snow, ice, submersion in water and oil
- Tree limbs, brush and debris
- Damage where service personnel or operators might step or use as a grab bar
- Damage when passing through metal structures

IMPORTANT: Avoid directly spraying electrical components and connections with high pressure water. High pressure water sprays can penetrate seals and cause electrical components to corrode or otherwise become damaged. When performing maintenance:

- Inspect all electrical components and connections for damage or corrosion. Repair or replace components, connections, or cable as necessary.
- Ensure connections are clean, dry, and not damaged. Repair or replace components, connections, or cable as necessary.
- Clean components or connections using low pressure water, pressurized air, or an aerosol electrical component cleaning agent.
- Remove visible surface water from components, connections, or seals using pressurized air or an aerosol electrical component cleaning agent. allow components to dry completely before reconnecting cables.

INSTRUCTIONS FOR HOSE ROUTING

The word “hose” is used to mean all flexible fluid carrying components. Follow existing hoses as much as possible and use these guidelines:

Hoses should not contact or be attached to:

- Components with high vibration forces
- Components carrying hot fluids beyond component specifications

Avoid contact with any sharp edge or abrading surfaces such as, but not limited to:

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads
- Ends of adjustable hose clamps

Routing should not allow hoses to:

- Hang below the unit
- Have the potential to become damaged due to exposure to the exterior environment. (i.e. tree limbs, debris, attachments)
- Be placed in areas of or in contact with machine components which develop temperatures higher than the temperature rating of hose components
- Hoses should be protected or shielded if it needs to route near hot temperatures beyond hose component specifications

Hoses should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in steering and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For hose sections that move during machine operation:

- Allow sufficient length for free movement without interference to prevent: pulling, pinching, catching or rubbing, especially in articulation and pivot points
- Clamp hoses securely to force controlled movement to occur in the desired hose section
- Avoid sharp twisting or flexing of hoses in short distances

Protect hoses from:

- Foreign objects such as rocks that may fall or be thrown by the unit
- Buildup of dirt, mud, snow, ice, submersion in water and oil
- Tree limbs, brush and debris
- Damage where service personnel or operators might step or use as a grab bar
- Damage when passing through metal structures
- High pressure wash

CHAPTER 2 INTRODUCTION

The Hawkeye nozzle control system 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. Make and Model Information

Make/Model	Model Year	Boom Configuration
Hagie STS	2014-2015	90′ Boom 15″ Spacing Kit P/N 117-1007-043
	2016-2017	90′ Boom 15″ Spacing Kit P/N 117-1007-044
	2014-2015	100′ Boom 15″ Spacing Kit P/N 117-1007-045
	2016-2017	100′ Boom 15″ Spacing P/N 117-1007-046
	2014-2015	120′ Boom 15″ Spacing Kit P/N 117-1007-040
	2016-2017	120′ Boom 15″ Spacing Kit P/N 117-1007-041

REQUIRED COMPONENTS

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

- Updated software on field computers or control monitors
- PWM pump control valve

- Raven compatible flow meter
- Raven compatible pressure transducer
- 80 (or finer) mesh strainer

TOOLS AND MATERIALS NEEDED

The following tools are recommended for completing the installation:

- SAE and metric sized wrenches and tools
- 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. Hagie STS 2014-2015 (90' Boom, 15" Spacing) Kit (P/N 117-1007-043)
Hagie STS 2016-2017 (90' Boom, 15" Spacing) Kit (P/N 117-1007-044)
Hagie STS 2014-2015 (100' Boom, 15" Spacing) Kit (P/N 117-1007-045)
Hagie STS 2016-2017 (100' Boom, 15" Spacing) Kit (P/N 117-1007-046)
Hagie STS 2014-2015 (120' Boom, 15" Spacing) Kit (P/N 117-1007-040)
Hagie STS 2016-2017 (120' Boom, 15" Spacing) Kit (P/N 117-1007-041)

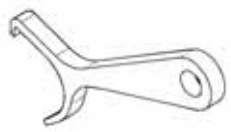
Picture	Item Description	Part Number	Qty.					
			117-1007-					
			043	044	045	046	040	041
	Hawkeye Nozzle Control Valve, Wilger	063-0173-674	73	73	81	81	97	97
Not Pictured	Kit, Hawkeye System Service, Wilger (Refer to "Hawkeye Service Kit Components (P/N 117-	117-1005-058	1					
	O-Ring, Viton, Brown/ Gray, Size -116, 56 Pack	219-1005-116M	2					

Picture	Item Description	Part Number	Qty.					
			117-1007-					
			043	044	045	046	040	041
	Product Controller II ECU	063-0173-704	1					
	ECU, ISO Interface	063-0173-717	1					
	Cable, SmarTrax Node	115-4001-229	1					
	Cable, Console, V4 ISO VT W/SmarTrax	115-7302-010	1					
	Cable, ISO Product Control II, Hagie	115-7303-167	1					
	Cable, Center Rack Harness, Hawkeye, Hagie STS 2014+	115-7303-327	1					
	Cable, ECU Extension, Port B, Hawkeye	115-7303-319	1					
	Cable, Secondary, Hagie STS, 90' Boom, 15" Spacing	115-7303-347	2					
	Cable, Secondary, Hagie STS, 100' Boom, 15" Spacing	115-7303-348			2			
	Cable, Secondary, Hagie STS, 120' Boom, 15" Spacing	115-7303-097					2	

Picture	Item Description	Part Number	Qty.					
			117-1007-					
			043	044	045	046	040	041
	Cable, Chassis, Hagie, Hawkeye, Raven CAN	115-7303-102	1					
	Cable, 28' Power, Hawkeye	115-7303-326	1					
	Cable, ISO Interface, Hawkeye, Hagie STS 2014-2015	115-7303-328	1					
	Cable, ISO Interface, Hawkeye, Hagie STS 2016-2017	115-7303-329		1		1		1
	Cable, Press Transducer Extension, Hagie STS 2014-2015	115-0171-448	1		1		1	
	Cable, Resistor, Pressure Transducer Hagie STS 2014-2015	115-7303-330	1		1		1	
	Cable, Right Primary, Hagie STS 100' and 90' Boom, 15" Spacing	115-7303-345	1					
	Cable, Left Primary, Hagie STS 100' and 90' Boom, 15" Spacing	115-7303-345	1					
	Cable, Right Primary, Hagie STS, 120' Boom, 15" Spacing	115-7303-095					1	
	Cable, Left Primary, Hagie STS, 120' Boom, 15" Spacing	115-7303-096					1	

Picture	Item Description	Part Number	Qty.					
			117-1007-					
			043	044	045	046	040	041
	Wilger Adapter C/C Male Plug	333-0002-319	75		83		99	
	Wilger, Adapter Assembly, Combo-Jet to SS	333-0002-322	150		166		198	
	Wilger, End, Nozzle Body, Blended Pulse	333-0002-325	75		83		99	
	Wilger, Nozzle Body 1" 2-Way 3/8" Modified	333-0002-332	75		83		99	

TABLE 3. Hawkeye Service Kit Components (P/N 117-1005-058)

Picture	Item Description	Part Number	Quantity
	Hawkeye Nozzle Control Valve, Wilger	063-0173-674	1
Not Pictured	Kit, Seal, Hawkeye Valve, Wilger	117-1005-052	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

At Raven Industries, we strive to make your experience with our products as rewarding as possible. One way to improve this experience is to provide us with feedback on this manual.

Your feedback will help shape the future of our product documentation and the overall service we provide. We appreciate the opportunity to see ourselves as our customers see us and are eager to gather ideas on how we have been helping or how we can do better.

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

techwriting@ravenind.com

-Hagie Hawkeye® Installation Manual
-P/N 016-0171-635 Rev. C
-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.

CHAPTER 3 INSTALLATION PREPARATION

Perform the following procedure to prepare the implement for installation of the Hawkeye nozzle control system.

⚠ CAUTION

Chemical residues may be present. Thoroughly bleed pressure from chemical lines and rinse the system with clean water prior to installing or servicing fittings, hoses, valves, or nozzles in the application system.

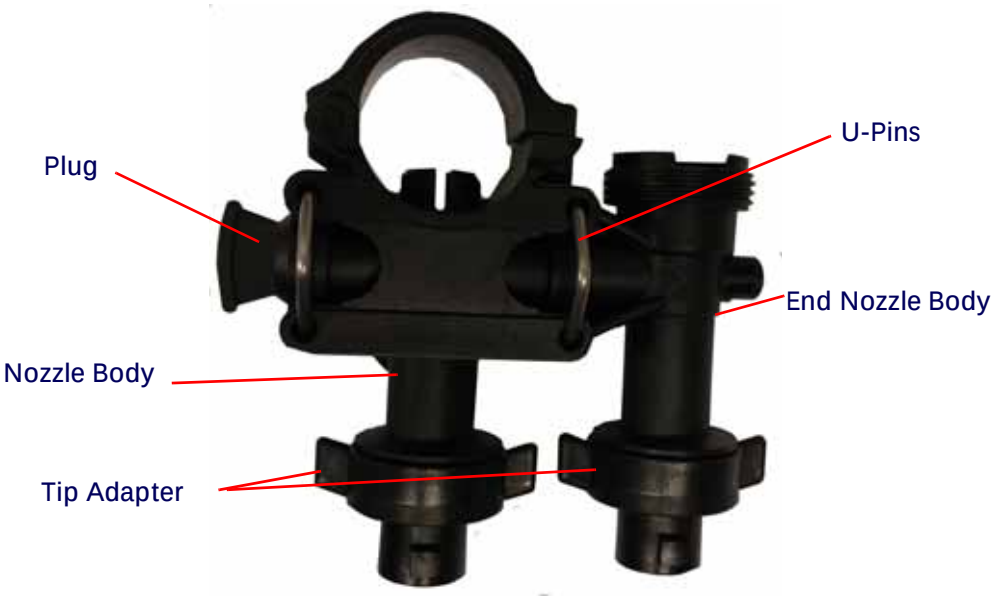
1. Rinse and fill the tank with clean water.
2. Move the equipment to an open area suitable for testing application system operation and rinsing the boom plumbing.
3. Unfold the boom and enable the application control system. Verify that all control hardware (e.g. control valves, section valves, etc.) and spray tips function as expected.
4. Operate the system until any 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. Remove the existing TeeJet nozzle bodies on the boom tube and set them aside. These will be replaced with Wilger nozzle bodies later.
8. Ensure no persons or property are near the spray boom.
9. Enable the application control system and run clean water through each boom section for at least 20 seconds to rinse any remaining debris from the boom plumbing.

CHAPTER 4 WILGER NOZZLE BODY ASSEMBLY

1. Locate the following nozzle body components provided in the kit:

Part Number	Description
333-0002-331	Wilger Nozzle Body, 1" Boom Tube
333-0002-325	Wilger End Nozzle Body
333-0002-319	Wilger Plug
333-0002-322	Wilger Tip Adapter, Combo-Jet to SS (2 per Nozzle Body Assembly)

FIGURE 1. Assembled Nozzle Body



2. Remove the stainless U-Pins from the Wilger nozzle body.
3. Install the end nozzle body onto one open end of the nozzle body.
4. Squeeze the end nozzle body and the nozzle body together to compress the O-ring while reinstalling the U-Pin to retain the end nozzle body.
5. Install the Wilger Plug onto the other end of the nozzle body, squeeze together and install the U-Pin to retain the plug.
6. Install the Wilger Tip Adapter onto each of the two outlets of the nozzle body. Rotate 1/4 turn to secure.
7. Repeat the above assembly steps for each of the provided nozzle bodies.

CHAPTER 5 NOZZLE CONTROL VALVE INSTALLATION

HAWKEYE NOZZLE CONTROL VALVE (NCV) INSTALLATION

BEST PRACTICES AND RECOMMENDATIONS

- Do not connect battery leads until all cables are installed and connected.

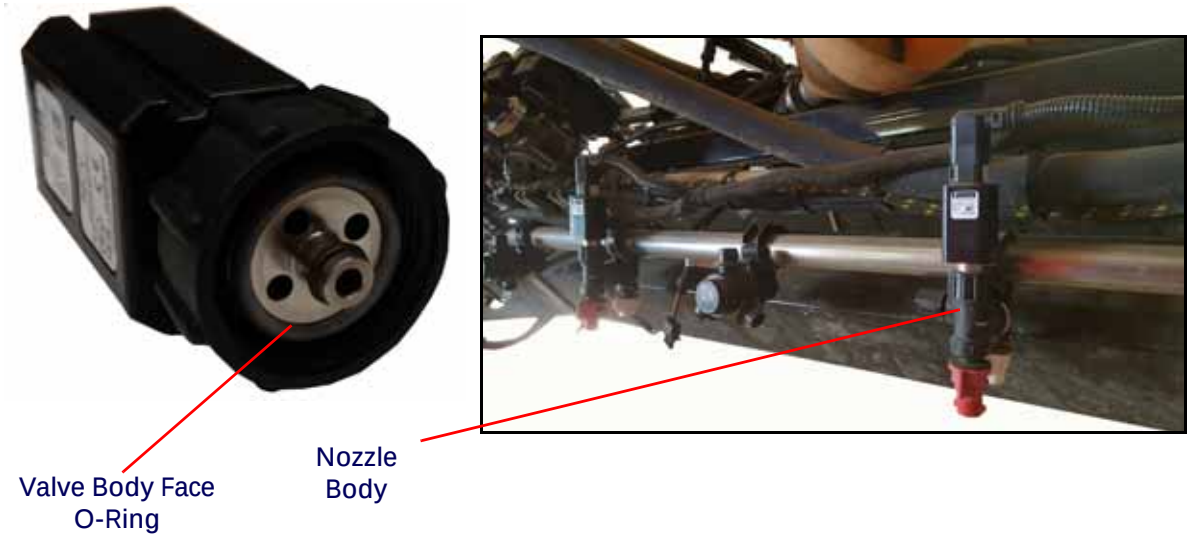
WILGER DUAL OUTLET NOZZLE BODY INSTALLATION

1. Locate the Wilger nozzle bodies that were assembled in "Wilger Nozzle Body Assembly" on page 13.
2. Begin installing the Wilger nozzle bodies onto the boom tube, verifying the spray pattern out of each of the nozzle body outlets has a clear path to spray below the boom. If there is an interference, the End Nozzle Body (P/N 333-0002-325) and the Plug (P/N 333-0002-319) may need to be switched around on the Nozzle Body in order to work around any interferences with the spray pattern.

FIGURE 1. Installed Wilger Nozzle Body

GENERAL VALVE INSTALLATION

FIGURE 2. Valve Face O-Ring and Nozzle Control Valve



1. Place a supplied o-ring on the inside of the fly nut flush with the valve body face. The o-ring should press into the outer ring of the Wilger valve body and temporarily hold in place while the NCV is installed onto the nozzle body.
2. Thread the fly nut onto the one of the threaded connections of the nozzle body.
3. Orient the nozzle control valve so that the label is easily readable while keeping the connector easily accessible.
4. Hand tighten the fly nut to secure the nozzle control valve to the nozzle body. Tighten the fly nuts until the valve no longer freely rotates and the valves do not leak under pressure. If necessary, a fly nut wrench is provided in the system service kits to tighten the fly nuts. Do not over tighten.

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

5. Repeat the previous steps to mount a nozzle control valve to each nozzle body on the spray boom.

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, it may be necessary to rotate the nozzle control valve or to relocate existing hardware to provide additional clearance.

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 help avoid damage to the cable.
- 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 work.
- 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 16 before routing or securing the boom cables on the implement. Do not to connect or secure the cables 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 6). The terminator may be braided over some boom cables to secure it in place.

FIGURE 3. Secondary Cable ISOBUS Powell Terminator

2. If the terminator is not braided over, verify the terminator is tightly secured to the main cable harness with a zip tie. If the terminator is not secured, excessive stress on the wires can cause breakage and/or intermittent nozzle CAN communication.
3. Route the secondary boom cables so the terminators are located at the outer tips of the left and right boom.
4. Starting from the mid-boom fold point, feed the terminator end of the secondary boom cable through the boom framework. Follow the existing cable or plumbing runs and through existing cable retention devices as appropriate.
5. 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 is corrosion inhibitor has been applied, inspect for a thick liquid in the bottom of the connector

6. Once the secondary boom cable is routed appropriately, begin connecting the valve tee branches to the nozzle control valves, starting with the nozzle control valve at the outer end of the boom.
7. 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 end near the fold point.
8. Repeat this procedure 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: Do not connect or secure the cable until instructed to do so in the procedure.

1. Locate the large, round connectors on the primary boom cables (refer to the Kit Contents section on page 6). Route the primary boom 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 4. 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 as appropriate.
3. Connect the large, round connector on the primary cable to the secondary cable.
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 boom cables using zip ties to protect the connector from damage during folding and unfolding operations.
6. Connect the valve branches to the nozzle control valves, starting with the valve on the primary boom segment furthest from the center of the implement.
7. At each valve branch, adjust the cable as necessary to provide slack between nozzle control valve connections and use zip ties to secure the cable at each valve branch. Refer to Figure 7 on page 17. 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 6 CAB PREPARATION AND WIRING

CONSOLE CABLE ROUTING AND CONNECTION

BEST PRACTICES AND RECOMMENDATIONS

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

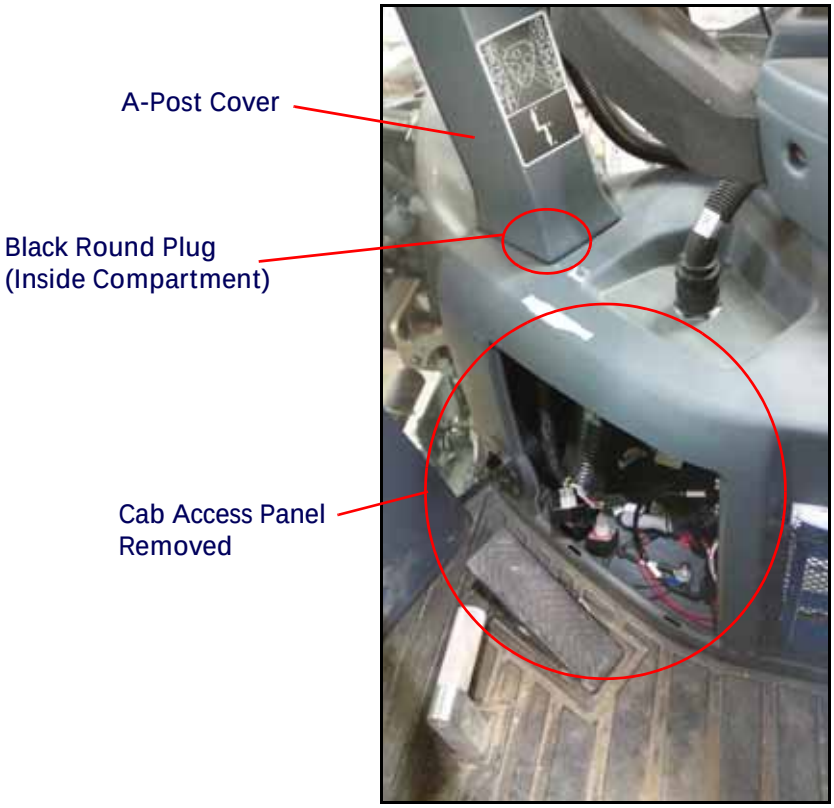
VIPER 4 AND CONSOLE CABLE CONNECTIONS

1. Start the machine and, using the hydraulic controls, completely extend the front right axle out to gain access to the exterior cab panel.
2. Remove the exterior cab panel. Refer to Figure 1, "Exterior Cab Access Panel Removed,".

FIGURE 1. Exterior Cab Access Panel Removed

3. In the cab, locate and remote the access panel in the front right corner.

FIGURE 2. Cab Access Panel Removed



4. Locate and remove the black-round Christmas tree clip (located directly below the A-Post cover in the compartment) that secures the plastic A-Post cover to the compartment.
5. Carefully remove the A-Post cover by gently pulling towards the center of the cab.

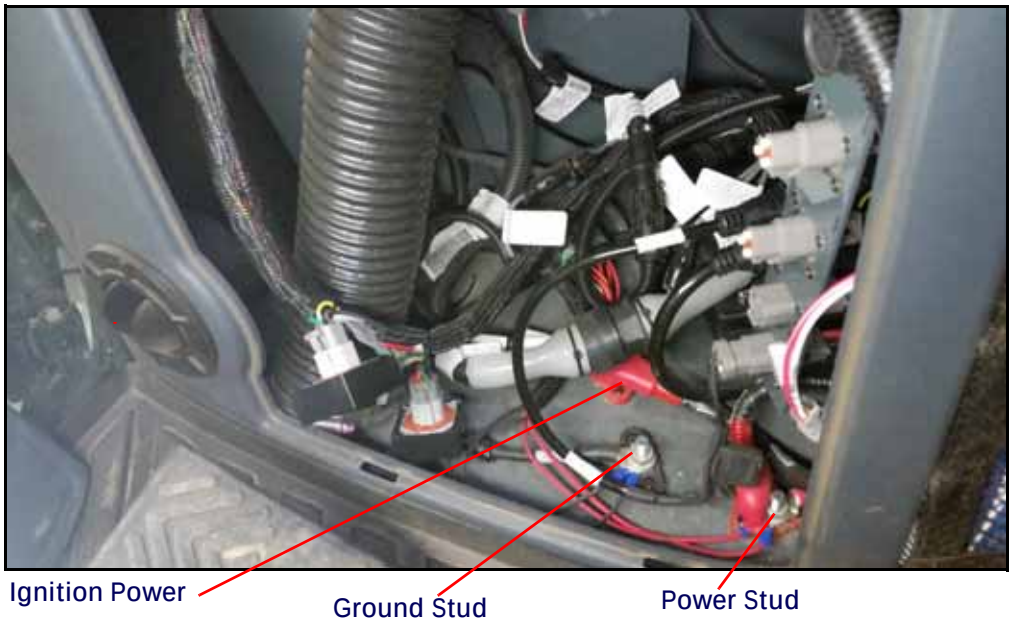
FIGURE 3. A-Post Cover Removed

6. Disconnect the existing console cables from the back of the Viper 4 and pull down through the A-post and through the electrical compartment.
7. Disconnect any connections to the existing console cable (P/N 115-0172-183).
8. Remove and set aside the existing console cable.
9. Remove the existing small gauge wire (P/N 115-0172-087) connected to all power and ground leads.
10. Locate the provided Viper 4 console cable (P/N 115-7302-010).
11. Route the three round Viper 4 connectors up the through the electrical compartment and up the A-post. It will exit the A-post near the roof.
12. Connect any serial connections (light bar, weather station, etc) used on the old console cable.
13. Gently press the A-post cover back in place.
14. Replace the clip removed in step 4.
15. Connect the three round connectors on the Viper 4 console cable to the back of the Viper 4.

FIGURE 4. Finalized Viper Connections

16. Locate the Hagie Chassis Cable (P/N 115-7303-102).
17. Connect the two ground ring terminals on the Hagie chassis cable to the ground stud located in the bottom of the electrical compartment.

FIGURE 5. Ground and Power Studs



18. Connect the two red positive ring terminals to the stud located in the bottom of the electrical compartment.
19. Locate and connect the large round connector of the Hagie chassis cable to the large round mating connector of the console cable (P/N 115-7302-010).
20. Locate and connect the ignition power ring terminal (smaller gauge wire) on the console cable (P/N 115-7302-010) to the ignition power stud in the bottom of the electrical compartment.

21. From the exterior cab access panel, remove the four screws securing the existing 12-pin Deutsch bulkhead in place. Keep hardware for use later in the procedure.

FIGURE 6. Existing Bulkhead Connection

22. Remove the bulkhead connector and cable (P/N 115-0172-087) from the machine and set it aside.
23. Locate the 12-pin bulkhead on the chassis cable (P/N 115-7303-102) that was connected to the ring terminals and console cable earlier.
24. Place the 12-pin bulkhead into the hole the existing 12-pin bulkhead was previously removed from.
25. Secure the 12-pin bulkhead using the hardware retained in step 21.

SMARTRAX NODE CABLE INSTALLATION

1. Locate the existing SmarTrax node and harness (P/N 115-4001-169) (refer to Figure 6 on page 23).
2. Disconnect the harness from the node and all other connections.
3. Connect the provided SmarTrax cable harness (P/N 115-4001-229) to the SmarTrax node, console cable, and other connections from step 2.

NORAC ADAPTER CABLE INSTALLATION (OPTIONAL)

To control the Norac boom leveling system through the Viper 4, order the Norac to Hagie ISO Adapter Cable (P/N 115-0172-382) and install by:

1. Connect the round connector on the Norac to Hagie adapter cable to the mating connector of the console cable.
2. Connect the other end of the Norac to Hagie adapter cable to the Norac control device as shown in Figure 6 on page 23.

CHAPTER 7 ISOBUS ECU MOUNTING AND CONNECTION

REMOVING EXISTING PRODUCT CONTROL ECU AND CABLE HARNESS

MODEL YEAR 2014-15 MACHINES

1. Extend the right rear axle of the machine to gain access to the Product Control ECU box.
2. Locate the Product Control ECU box just above the right rear axle.

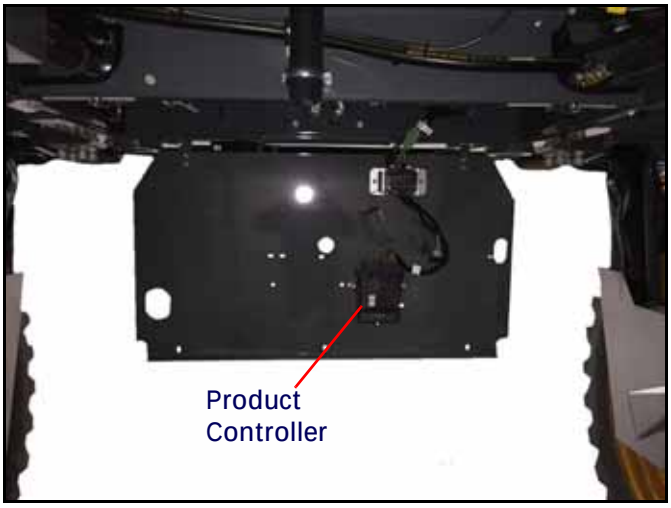
FIGURE 1. Product Control ECU Box

3. Lift the cover and pull it away from the machine to remove the cover.
4. Using a 1/4" driver, remove the two electrical connectors from the Raven Multi-Product Node.
5. Remove the Multi-Product Node from the machine and set it aside. This is not needed for the Hawkeye system.
6. Follow the product control cable harness that was disconnected from the node and disconnect all control cable harness connections from the machine.
7. Remove the harness. This is not needed for the Hawkeye system.

MODEL YEAR 2016-2017 MACHINES

1. Locate the Raven Multi-Product Node on the inside of the foremost skip plate on the underside of the machine.

FIGURE 2. Product Controller



2. Using a 1/4" driver, remove the two electrical connectors of the Product Control Harness (Raven P/N 115-7300-093) from the node.
3. Locate the green 12-pin Deustch connection of the Product Control Harness and follow it to the mating cable.
4. Disconnect all connections of the mating cable.
5. Remove the mating cable. This is not needed for the Hawkeye installation.
6. Disconnect the Product Control cable harness from all other connections.
7. Remove the Product Control Cable. This is not needed for the Hawkeye installation.
8. Remove the Multi-Product Node from the machine and set it aside. This is not needed for the Hawkeye installation.

PRODUCT CONTROLLER II 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.

MAGNET MOUNTING ASSEMBLY

1. Locate the magnets and hardware included in the kit (P/N 418-0000-013).
2. Attach the magnets to two mounting holes located diagonally from each other.

FIGURE 3. Magnet Mount Installation

ECU HARNESS INSTALLATION

1. Locate the front fill station access panel, remove the retaining clips, and allow the panel to open.
2. Lower the front fill assembly to gain access for cable routing.
3. On the front-most under-body cover panel, remove the retaining clips, and allow the panel to open.
4. Locate the ECU product control cable (P/N 115-7303-167).
5. Connect the two 12-pins connectors on the ECU product control cable into the appropriately keyed ports on the ECU.

FIGURE 4. Installed PC II Cables

6. Locate the ECU port b extension cable (P/N 115-7303-319).
7. Identify the connector labeled "TO ECU" on the ECU port b extension cable and connect it to port b on the PC II ECU.
8. Locate the plug provided with the ECU product control cable and plug it into the open port on the PC II ECU.
9. Attach to the PC II ECU to the right-hand frame rail directly behind the front axle with the connections facing towards the back of the machine. The bottom edge of the PC II ECU should be parallel with the bottom edge of the frame rail.
10. Connect the 12-pin Deutsch from the ECU product control cable (P/N 115-7303-167) to the end of the 12-pin Deustch plug feed through the opening in the previous section.
11. Route the port b extension cable over the front axle, along the right-hand frame rail, and towards the right-hand center rack linkage.

POWER CABLE INSTALLATION

CUMMINS ENGINES

1. Locate the provided 28' power cable (P/N 115-7303-326).
2. On the rear-most under-body cover panel, remove the retaining clips and allow the panel to open.
3. Locate and remove the nut on the negative ground stud on the side of the engine block, as shown in Figure 5 on page 29.

FIGURE 5. Ground Stud

4. Connect and secure the ground ring terminal to the negative ground stud.
5. Locate and remove the nut on the power stud that retains the red Jumper Bar under the black boot.

FIGURE 6. Power Stud

6. Connect and secure the power ring terminal to the power stud.
7. Route the round connector of the power harness along the left-hand frame rail and over the rear and front axles towards the right-hand center rack linkage. Ensure the harness will not get pinched when the under-body cover panels are closed.
8. Secure the harness with zip ties.
9. Close and secure the rear-most under-body cover panel.

JOHN DEERE ENGINES

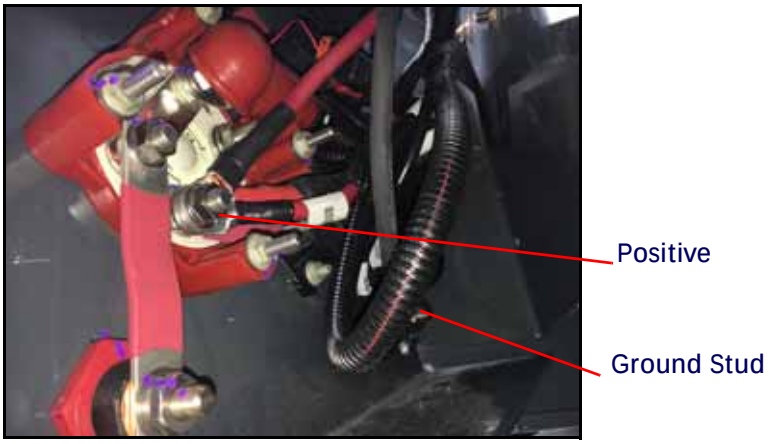
1. Locate the provided 28' power cable (P/N 115-7303-326).

2. Open the engine compartment to allow access to the battery panel located on the right-hand side of the machine.
3. Remove the three mounting bolts on the panel to allow access to power connections behind the panel.

FIGURE 7. Battery Panel Cover Removed

4. Connect and secure the power ring terminal to the positive stud located on the lower part of the battery disconnect switch.
5. Connect and secure the ground ring terminal to the negative ground stud on the back side of the panel.

FIGURE 8. John Deere Engine Power Connections



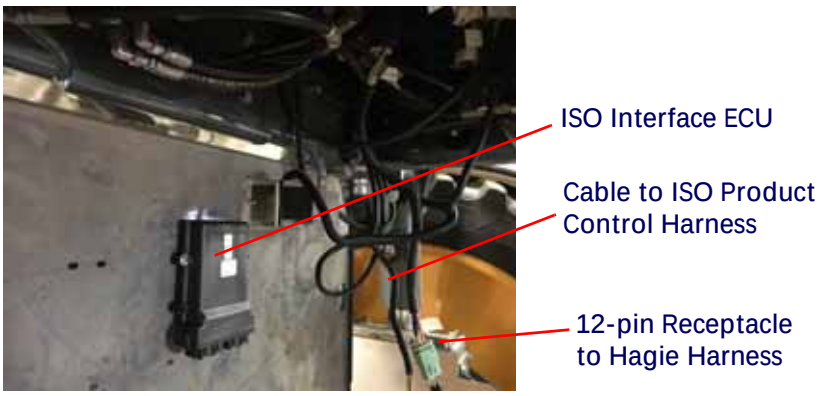
6. Route the round connector of the power harness along the right-hand frame rail over the rear and front axles towards the right-hand center rack linkage. Ensure the harness will not get pinched when the under-body cover panels are closed.
7. Secure the harness with zip ties.

ISO INTERFACE CABLE INSTALLATION

MODEL YEARS 2014-15

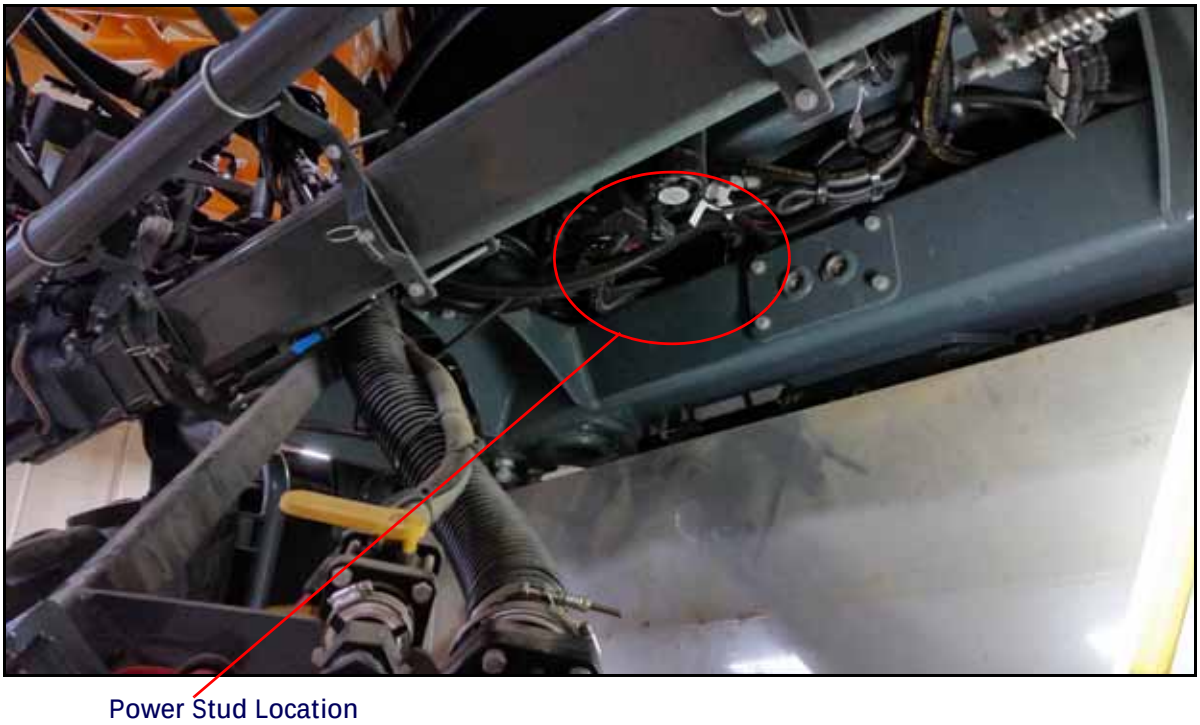
1. Locate the provided ISO interface ECU (P/N 063-0173-717).
2. Mount the ISO interface ECU to the front-most under-body cover panel using the provided hardware, ensuring the cable connections have enough length to connect the ECU.

FIGURE 9. Installed ISO Interface ECU



3. Locate the provided ISO Interface Cable (P/N 115-7303-328).
4. Connect the 12-pin Deutsch connectors to the installed ISO Interface ECU.
5. Locate the green 12-pin Deutsch connector on the ISO interface cable and connect to the mating receptacle of the ISO product control cable (P/N 115-7303-167).
6. Locate the power and ground ring terminals on the ISO interface cable and route them over the from axle towards the power and ground studs located on the floor of the cab just in front of the front axle.
7. Connect the ground ring terminal to the ground stud.

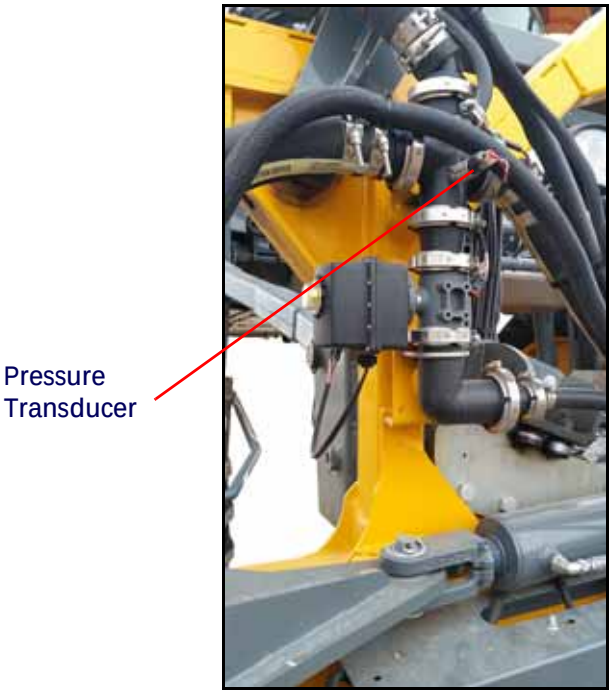
FIGURE 10. Power Stud Location



8. Connect the ignition power ring terminal to the power stud located towards the right-hand side of the machine from the constant power stud.
9. Locate the provided transducer extension cable (P/N 115-0171-448) and connect it to the 3-pin Deutsch plug labeled "PRESSURE" on the ISO interface cable.

10. Route the transducer extension cable over the front axle, along the right-hand frame rail, towards the right-hand center rack linkage.
11. Locate the pressure transducer on the front of the center rack installed in the machine plumbing manifold.
12. Disconnect the existing 3-pin Deutsch plug from the transducer and install the provided Cap with Resistors (P/N 115-7303-330) onto the cable connection. This will disable Hagie's Droplet Size Indicator feature and eliminate errors resulting from it being disconnected

FIGURE 11. Pressure Transducer Connection



NOTE: This system uses the Hagie OEM pressure transducer. This is a 0-300 psi, 1-5 Volt transducer which requires custom calibration on the Hawkeye screen once installation is complete. The value needed is 13.33 mV/psi for this transducer. See the Hawkeye Operation Manual (P/N 016-0171-584) for more information on Custom Transducer Calibration.

13. Connect the Transducer Extension Cable to the existing pressure transducer.

MODEL YEARS 2016-17

1. Locate the provided ISO interface ECU (P/N 063-0173-717).
2. Mount the ISO interface ECU to the front-most under-body cover panel using the provided hardware, ensuring the cable connections have enough length to connect the ECU.

FIGURE 12. Installed ISO Interface ECU

3. Locate the provided ISO Interface Cable (P/N 105-7303-329).
4. Connect the 12-Pin Deutsch connectors the installed ISO Interface ECU.
5. Locate the 12-pin Deutsch plug on the ISO interface cable and connect to the mating receptacle of the ISO product control cable (P/N 115-7303-167).
6. Connect the 12-pin Deutsch receptacle to the Hagie harness cable.
7. Locate the power and ground ring terminals on the ISO interface cable and route them over the from axle towards the power and ground studs located on the floor of the cab just in front of the front axle.
8. Connect the ground ring terminal to the ground stud.

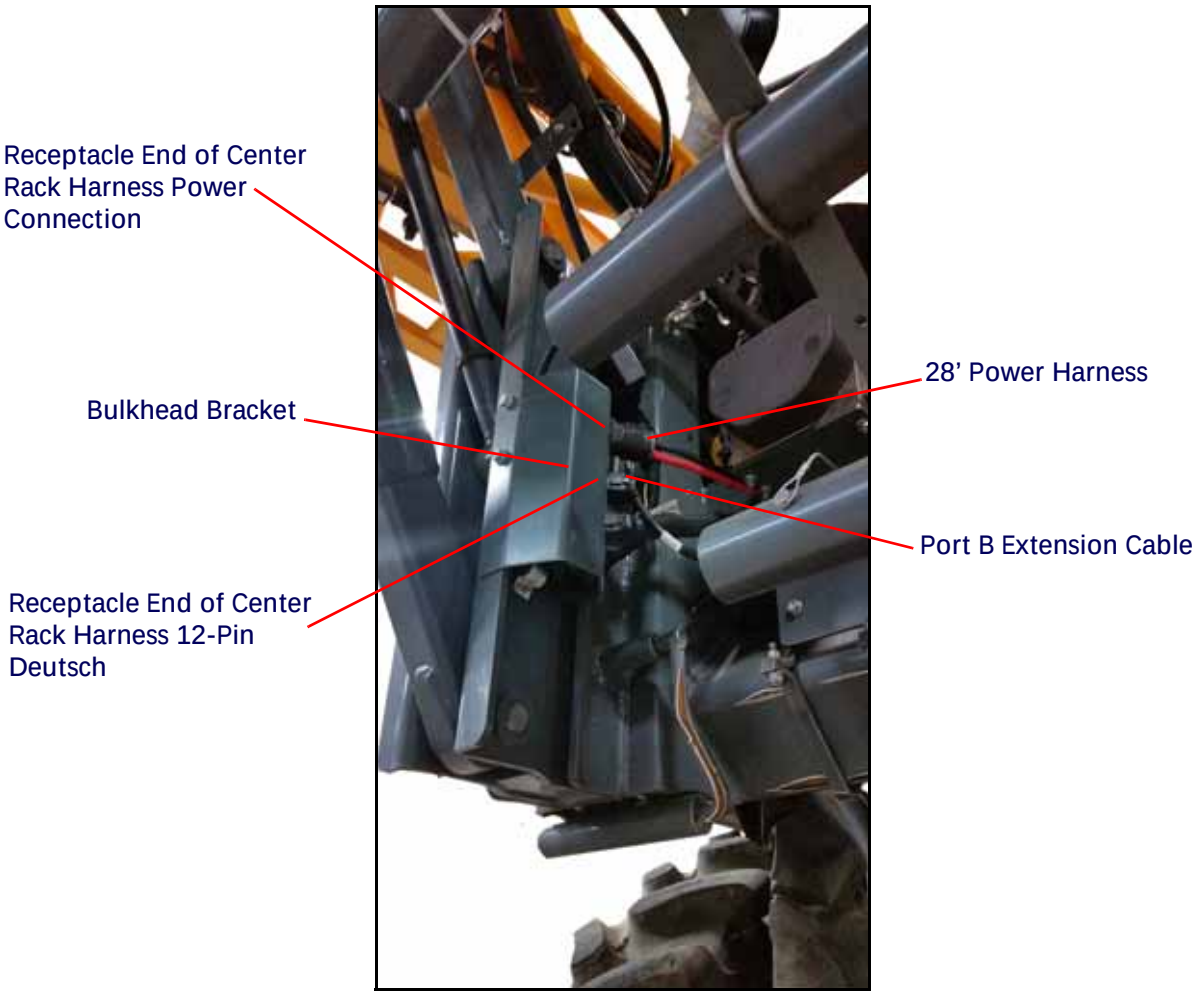
FIGURE 13. Power Stud Location

9. Connect the ignition power ring terminal to the power stud located towards the right-hand side of the machine from the constant power stud.

CENTER RACK CABLE HARNESS INSTALLATION

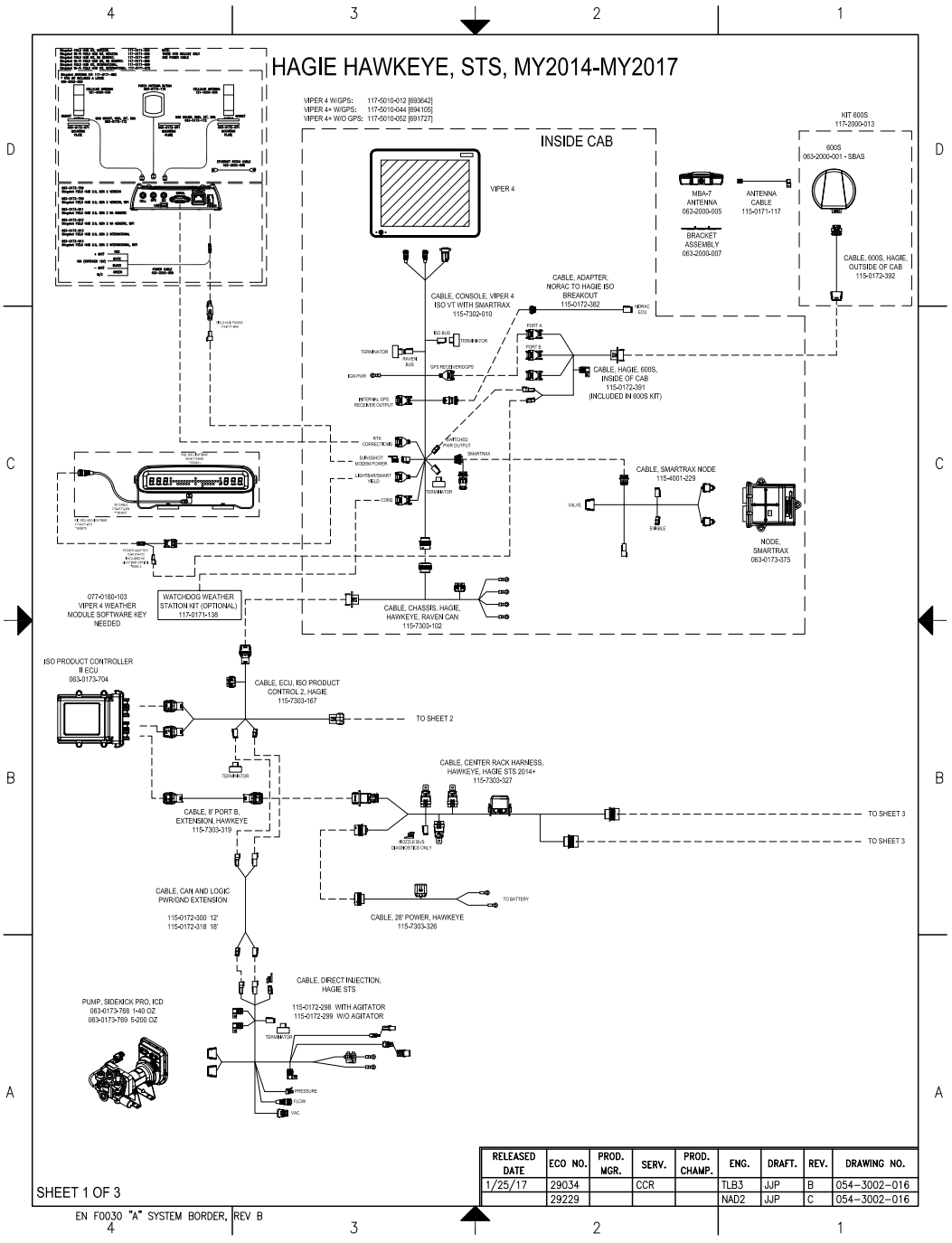
1. Locate the provided center rack cable harness (P/N 115-7303-327).
2. Locate the breakout with the 12-pin Deutsch receptacle and the large-round connector.
3. Install these connectors into the bulkhead bracket near the right hand linkage of the center rack.

FIGURE 14. Center Rack Connections



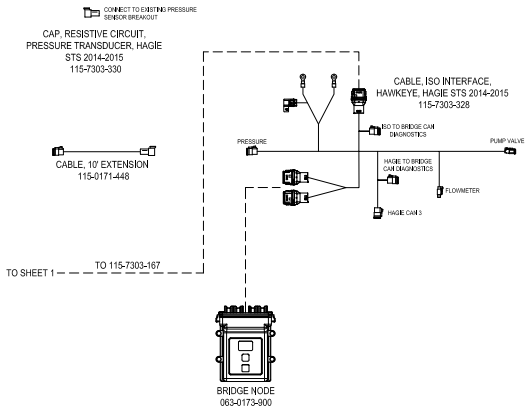
4. Locate the round connector of the 28' power harness and connect it to the round connection of the center rack power connection.
5. Locate the 12-pin Deutsch connector of the port b extension cable and connect it to the 12-pin Deutsch receptacle of the center rack harness.
6. Follow existing cables to route the center rack harness along the top bar of the linkage towards the center rack.
7. Connect the right and left primary boom cables to the center rack harness. Use the labels on the center rack harness to identify left and right boom cable connections.
8. Locate the 3-pin Deutsch plug of the transducer extension cable and route this along with the center rack harness.
9. Secure the cabling with zip ties while ensuring there is enough slack in the cables for the center rack to move as needed.

APPENDIX A SYSTEM DIAGRAM

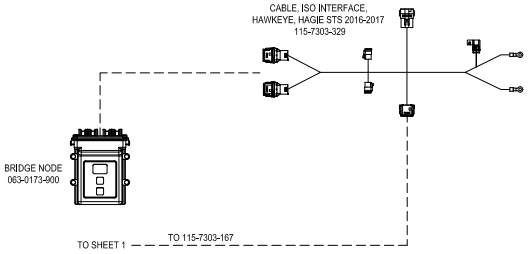


RELEASED DATE	ECO NO.	PROD. MGR.	SERV.	PROD. CHAMP.	ENG.	DRAFT.	REV.	DRAWING NO.
1/25/17	29034		CCR		TLB3	JJP	B	054-3002-016
	29229				NAD2	JJP	C	054-3002-016

HAGIE HAWKEYE, STS, MY2014-MY2015
ECU, PRODUCT CONTROL CONNECTIONS



HAGIE HAWKEYE, STS, MY2016-MY2017
ECU, PRODUCT CONTROL CONNECTIONS



RELEASED DATE	ECO NO.	PROD. MGR.	SERV.	PROD. CHAMP.	ENG.	DRAFT.	REV.	DRAWING NO.
1/25/17	29034		CCR		TLB3	JJP	B	054-3002-016
	29229				NAD2	JJP	C	054-3002-016

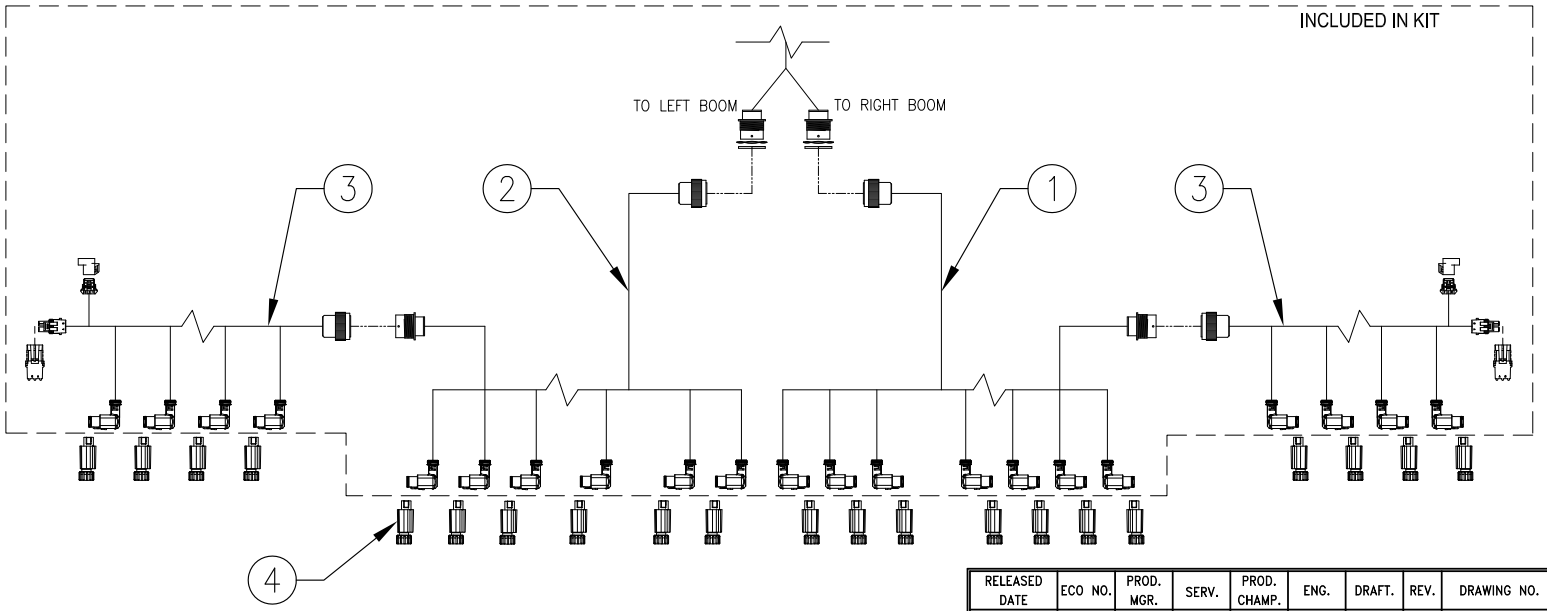
SHEET 2 OF 3

EN F0030 "A" SYSTEM BORDER, REV B

NOTES:

1. CABLES SHORTENED FOR GRAPHICAL PURPOSES

ITEM	DESCRIPTION	HAGIE STS 2014-2015 90' BOOM 15" SPACING IN KIT P/N: 117-1007-043	HAGIE STS 2016-2017 90' BOOM 15" SPACING IN KIT P/N: 117-1007-044	HAGIE STS 2014-2015 100' BOOM 15" SPACING IN KIT P/N: 117-1007-045	HAGIE STS 2016-2017 100' BOOM 15" SPACING IN KIT P/N: 117-1007-046	HAGIE STS 2014-2015 120' BOOM 15" SPACING IN KIT P/N: 117-1007-040	HAGIE STS 2016-2017 120' BOOM 15" SPACING IN KIT P/N: 117-1007-041
1	CABLE, RIGHT PRIMARY	115-7303-345	115-7303-345	115-7303-345	115-7303-345	115-7303-095	115-7303-095
2	CABLE, LEFT PRIMARY	115-7303-346	115-7303-346	115-7303-346	115-7303-346	115-7303-096	115-7303-096
3	CABLE, SECONDARY (QTY: 2)	115-7303-347	115-7303-347	115-7303-348	115-7303-348	115-7303-097	115-7303-097
4	WILGER NCV	063-0173-674 (QTY: 73)	063-0173-674 (QTY: 73)	063-0173-674 (QTY: 81)	063-0173-674 (QTY: 81)	063-0173-674 (QTY: 97)	063-0173-674 (QTY: 97)



RELEASED DATE	ECO NO.	PROD. MGR.	SERV.	PROD. CHAMP.	ENG.	DRAFT.	REV.	DRAWING NO.
1/25/17	29034		CCR		TLB3	JJP	B	054-3002-016
	29229				NAD2	JJP	C	054-3002-016

SHEET 3 OF 3

EN F0029 "A" SYSTEM BORDER, REV B

APPENDIX B 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 of 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)).

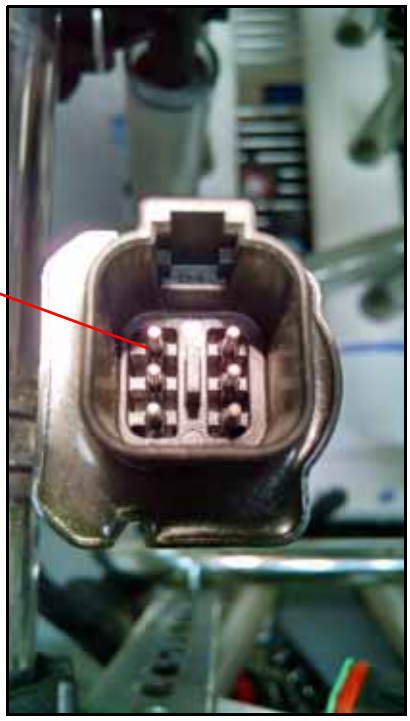
3. Clean contacts with a small wire brush (P/N 321-0000-477).

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.

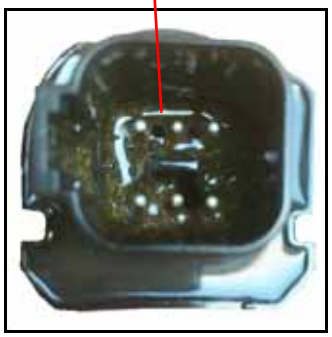
NOTE: To determine is corrosion inhibitor has been applied, inspect for a thick liquid in the bottom of the connector (as shown in the Corrosion Inhibitor Applied image below).

NCV Connector



Applying Corrosion Inhibitor

Corrosion Inhibitor Applied



B

C

E

J

P

V

We Solve Great Challenges.

EXTENDED WARRANTY

WHAT DOES THIS WARRANTY COVER?

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

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

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

WHERE CAN I REGISTER MY PRODUCT FOR THE EXTENDED WARRANTY?

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

HOW LONG IS THE EXTENDED WARRANTY COVERAGE PERIOD?

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

HOW CAN I GET SERVICE?

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

WHAT WILL RAVEN INDUSTRIES DO?

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

WHAT IS NOT COVERED BY THE EXTENDED WARRANTY?

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

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

RAVEN

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