

**Miller and New Holland Hawkeye®
Installation Manual**

P/N 016-0171-586 Rev. B 04/17

E29377

Disclaimer

While every effort has been made to ensure the accuracy of this document, Raven Industries assumes no responsibility for omissions and errors. Nor is any liability assumed for damages resulting from the use of information contained herein.

Raven Industries shall not be responsible or liable for incidental or consequential damages or a loss of anticipated benefits or profits, work stoppage or loss, or impairment of data arising out of the use, or inability to use, this system or any of its components. Raven Industries shall not be held responsible for any modifications or repairs made outside our facilities, nor damages resulting from inadequate maintenance of this system.

As with all wireless and satellite signals, several factors may affect the availability and accuracy of wireless and satellite navigation and correction services (e.g. GPS, GNSS, SBAS, etc.). Therefore, Raven Industries cannot guarantee the accuracy, integrity, continuity, or availability of these services and cannot guarantee the ability to use Raven systems, or products used as components of systems, which rely upon the reception of these signals or availability of these services. Raven Industries accepts no responsibility for the use of any of these signals or services for other than the stated purpose.

Chapter 1	Important Safety Information	1
	Instructions for Wire Routing	2
Chapter 2	Introduction	5
	Required Components	5
	Tools and Materials Needed	6
	Point of Reference	6
	Kit Contents	7
	Updates	12
Chapter 3	Installation Preparation	13
Chapter 4	Nozzle Control Valve Installation	15
	Hawkeye Nozzle Control Valve Installation	15
	Best Practices and Recommendations	15
	Boom Cable Routing and Connection	17
	Managing Wet Boom Tubes	17
	Best Practices and Recommendations	17
	Secondary Boom Cable Routing and Connections	18
	Primary Boom Cable Routing and Connections	19
Chapter 5	Boom Pressure Transducer Installation	21
	Boom Pressure Transducer Installation	21
Chapter 6	Cab Preparation and Wiring	23
	Chassis Cable Routing and Connection	23
	Best Practices and Recommendations	23
	Viper 4 Connections	23
	SmarTrax Node Cable Installation (2013-2014 Machines)	24
	SmarTrax Foot Switch Installation (2013-2014 Machines)	24
Chapter 7	ISOBUS ECU Mounting and Connection	25
	Product Controller II and Bridge ECU Installation	25
	Best Practices and Recommendations	25
	ECU Harness Routing	25
	Power Cable Routing	27
	PWM Valve Installation (2015 and Older Machines Only)	27
	ISO Autoboom ECU Installation	29
	Battery Connections	29

Chapter A	Cable and Connector Maintenance	33
	Power and ECU Harness Maintenance	33
	Hawkeye Boom Harness Connector Maintenance	33

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

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.

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	Chassis Kits	Boom Configuration
Miller Nitro New Holland Guardian F	Model Year 2013-2014 Kit P/N 117-1007-009	120' Boom 20" Spacing Kit P/N 117-1007-006
		100' Boom 20" Spacing Kit P/N 117-1007-004
	Model Year 2015 Kit P/N 117-1007-008	90' Boom 20" Spacing Kit P/N 117-1007-002
		120' Boom 15" Spacing Kit P/N 117-1007-005
	Model Year 2016 Kit P/N 117-1007-007	100' Boom 15" Spacing Kit P/N 117-1007-003
		90' Boom 15" Spacing Kit P/N 117-1007-001

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 (Included in Chassis Kit)
- Raven compatible flow meter
- Raven compatible pressure transducer (Included in Chassis Kit)
- 80 (or finer) mesh strainer

NOTE: Air induction style spray tips should not be used 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
- 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. Nitro and Guardian F (120' Boom, 20" Spacing) Kit (P/N 117-1007-006)
 Nitro and Guardian F (100' Boom, 20" Spacing) Kit (P/N 117-1007-004)
 Nitro and Guardian F (90' Boom, 20" Spacing) Kit (P/N 117-1007-002)**










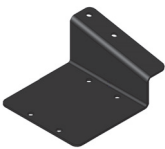
Picture	Item Description	Part Number	Qty.		
			117-1007-		
			006	004	002
	Hawkeye Nozzle Control Valve, TeeJet	063-0173-672	73	61	55
Not Pictured	Kit, Hawkeye System Service, TeeJet (Refer to "Hawkeye Service Kit Components (P/N 117-1005-056)" on page 12 for a list of parts included in the	117-1005-056	1		
	O-Ring, Viton, Green Coated, -115, 56 Pack (for TeeJet QJS Series (Straight) Nozzle Bodies)	219-1005-115M	2	2	1
	O-Ring, Viton, Brown, -116, 56 Pack (For TeeJet QJ Series (Turret) Nozzle Bodies)	219-1005-115M	2	2	1
Not Pictured	Cable - Secondary Boom Nitro 120' 20" Hawkeye	115-7303-033	2		
	Cable - Secondary Boom Nitro 100' 20" Hawkeye	115-7303-052		2	
	Cable - Second Nitro 90' 20" Hawkeye	115-7303-053			2
	Cable, Right Primary Boom Nitro 120' 20" Hawkeye	115-7303-031	1		
	Cable, Left Primary Boom Nitro 120' 20" Hawkeye	115-7303-032	1		
	Cable, Right Primary Boom Nitro 90/100' 20" Hawkeye	115-7303-050		1	1
	Cable, Left Primary Boom Nitro 90/100' 20" Hawkeye	115-7303-051		1	1

**TABLE 3. Nitro and Guardian F (120' Boom, 15" Spacing) Kit (P/N 117-1007-005)
 Nitro and Guardian F (100' Boom, 15" Spacing) Kit (P/N 117-1007-003)
 Nitro and Guardian F (90' Boom, 15" Spacing) Kit (P/N 117-1007-001)**

Picture	Item Description	Part Number	Qty.		
			117-1007-		
			005	003	001
	Hawkeye Nozzle Control Valve, TeeJet	063-0173-672	97	81	73
Not Pictured	Kit, Hawkeye System Service, TeeJet (Refer to "Hawkeye Service Kit Components (P/N 117-1005-056)" on page 12 for a list of parts included in the	117-1005-056	1		
	O-Ring, Viton, Green Coated, -115, 56 Pack	219-1005-115M	2		
	O-Ring, Viton, Brown, -116, 56 Pack	219-1005-116M	2		
Not Pictured	Cable - Secondary Boom Nitro 120' 15" Hawkeye	115-7303-045	2		
	Cable - Secondary Boom Nitro 100' 15" Hawkeye	115-7303-048		2	
	Cable - Secondary Boom Nitro 90 15" Hawkeye	115-7303-049			2
	Cable, Right Primary Boom Nitro 120' 15" Hawkeye	115-7303-043	1		
	Cable, Left Primary Boom Nitro 120' 15" Hawkeye	115-7303-044	1		
	Cable, Right Primary Boom Nitro 90/100' 15" Hawkeye	115-7303-046		1	1
	Cable, Left Primary Boom Nitro 90/100' 15" Hawkeye	115-7303-047		1	1

**TABLE 4. Kit, Hawkeye, Chassis, Miller Sprayer (P/N 117-1007-007)
 Kit, Hawkeye, Chassis, Miller Nitro & NH Guardian F, MY 2015 (P/N 117-1007-008)
 Kit, Hawkeye, Chassis, Miller Nitro & NH Guardian F, MY 2013-2014 (P/N 117-1007-009)**

Picture	Item Description	Part Number	Qty. 117-1007-		
			007	008	009
Not Pictured	Cable, ECU Nitro 120' 20" Hawkeye	115-7303-030	1		
Not Pictured	Cable, 28' Power Hawkeye	115-7303-034	1		
	Transducer Press 1-5 V 0-250 PSI	422-0000-090	1		
	Miller Bridge ECU	063-0173-717	1		
	Product Controller II ECU (Hawkeye ECU)	063-0173-704	1		
Not Pictured	Manual, Operation, Hawkeye	016-0171-584	1		
Not Pictured	Miller and New Holland Hawkeye® Installation Manual	016-0171-586	1		
Not Pictured	Hawkeye Start Up Quick Guide	016-0171-598	1		
	1/4" NPT Tee, Stainless Steel	333-0004-020	1		
	Nipple, Close, 1/4" NPT, Stainless	333-0008-165	1		
	Bolt, 1/4 - 20 x 2" LG HEX Head	311-0050-109	4		

Picture	Item Description	Part Number	Qty. 117-1007-		
			007	008	009
	Washer, 1/4"	313-2300-120	8		
	Nut, 1/4 - 20, Nylon Lock	312-4000-057	4		
	Bolt, 5/16" - 18 x 4-1/2" LG Hex Head	311-0052-118		2	2
	Bolt, 3/8" - 16 x 1-1/4" LG Hex Head	311-0054-106		3	3
	Nut, 3/8 - 16, Flanged Lock	312-1001-167		3	3
	Nut, 5/16" - 18, Nylon Lock	312-4000-059		2	2
	Washer, 5/16", Split, Zinc	313-1000-019		4	4
	Washer, 3/8"	313-2300-014		3	3
	Bracket, PWM Valve, Miller	107-0172-469		1	1
	Bracket, Adapter, Miller, Hawkeye/Bridge ECU	107-0172-468			1

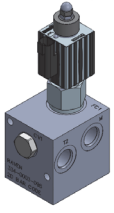
Picture	Item Description	Part Number	Qty. 117-1007-		
			007	008	009
Not Pictured	Cable, Extension, 2-Pin Deutsch	115-0172-331		1	1
	Valve, Hydraulic PWM Flow Control, Comp, 20 GPM	334-0003-098		1	1

TABLE 5. Kit, Hydraulic, Miller, Product Pump PWM Control

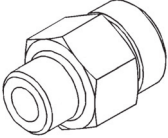

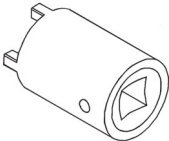
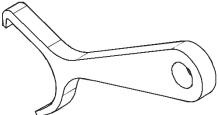
Picture	Item Description	Part Number	Quantity
	Fitting, Adapter, Straight, -10 SAE O-ring (M) to -12 ORFS (M)	333-0012-444	4
Not Pictured	Hose, 60", Size 12, -12 Face Seal 90 Degree to -12 Face Seal Straight	214-1004-113	1

TABLE 6. Hawkeye Service Kit Components (P/N 117-1005-056)

Picture	Item Description	Part Number	Quantity
	Hawkeye Nozzle Control Valve, TeeJet	063-0173-672	1
Not Pictured	Kit, Seal, Hawkeye Valve, TeeJet	117-1005-050	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

- Miller and New Holland Hawkeye® Installation Manual
- P/N 016-0171-586 Rev. B
- 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.

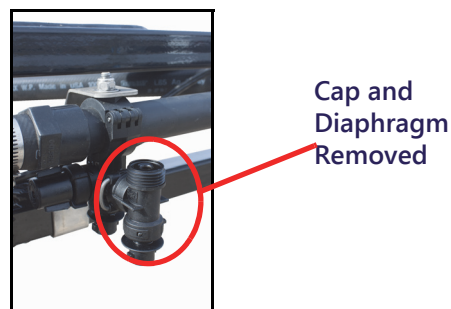
Thank you for your time.

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

	<p>CAUTION</p> <p>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.</p>
---	--

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. 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



CHAPTER

4

NOZZLE CONTROL VALVE INSTALLATION

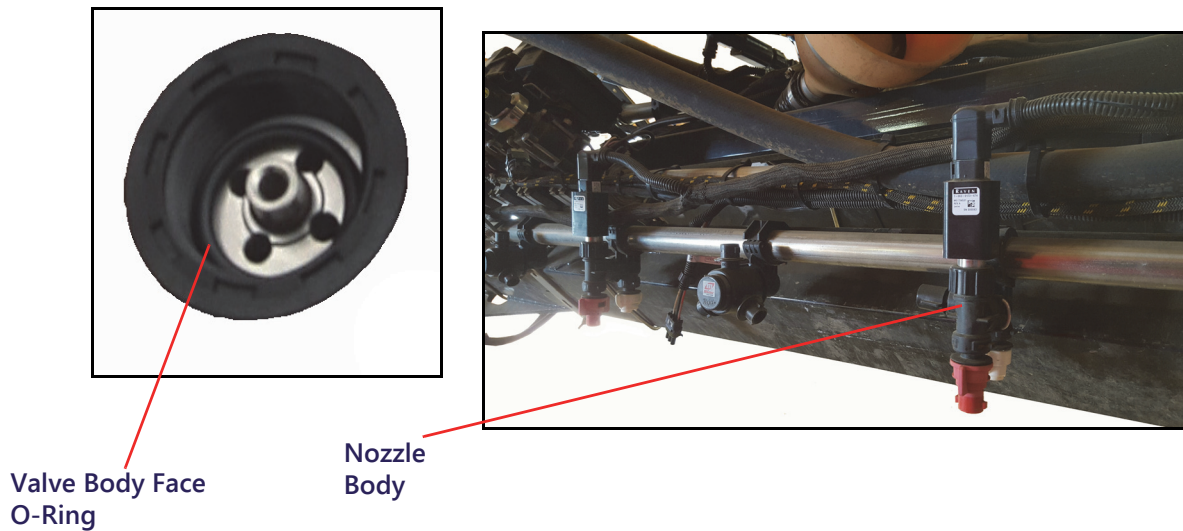
HAWKEYE NOZZLE CONTROL VALVE INSTALLATION

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.

GENERAL VALVE INSTALLATION

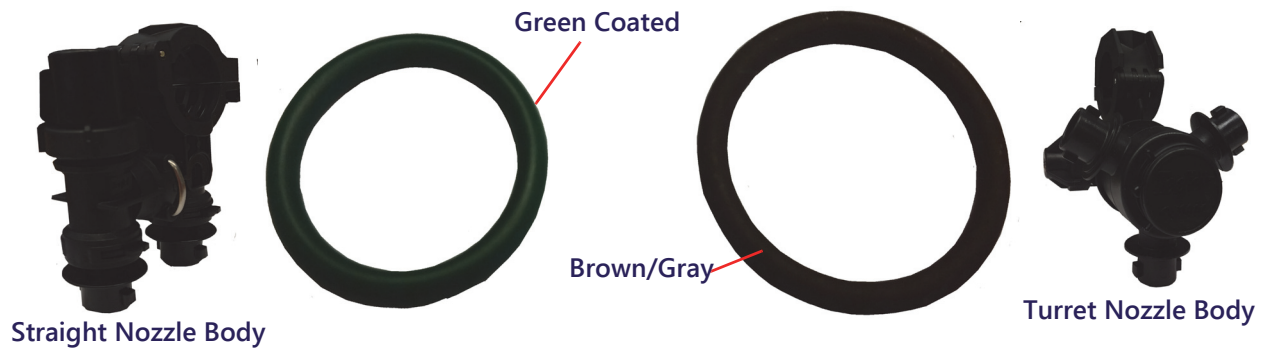
FIGURE 1. Valve Face O-Ring and Nozzle Control Valve



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

NOTE: If using TeeJet QJS (straight) 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. 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

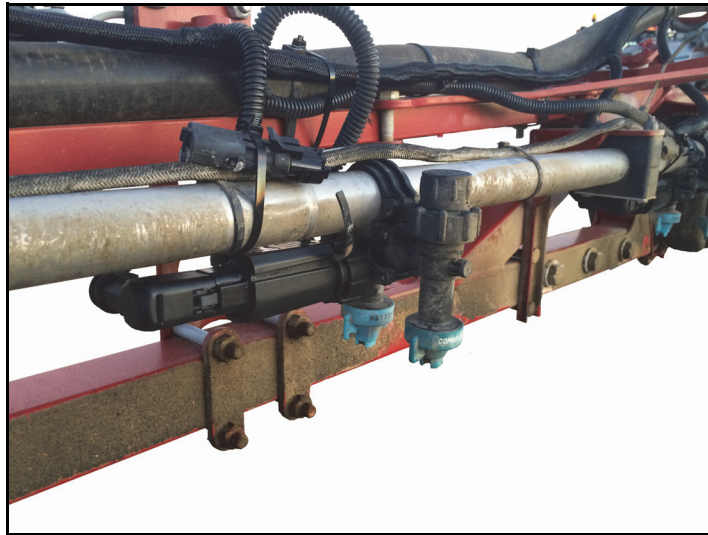
In some locations on the spray boom, boom equipment or hardware may interfere with mounting the Hawkeye nozzle control valves. In these locations, it may be necessary to rotate the nozzle control valve or to relocate existing hardware to provide additional clearance.

In some instances, replacing a turret-style nozzle body with a straight-style nozzle body may solve interference issues. Also, removing the nozzle body from the boom tube and flipping the nozzle body may solve interference issues. After flipping the nozzle body, verify it is not spraying into the boom or other components.

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

See Figure 3 on page 17 for an example of modified installations of the nozzle control valve.

FIGURE 3. Modified Nozzle Control Valve Installation

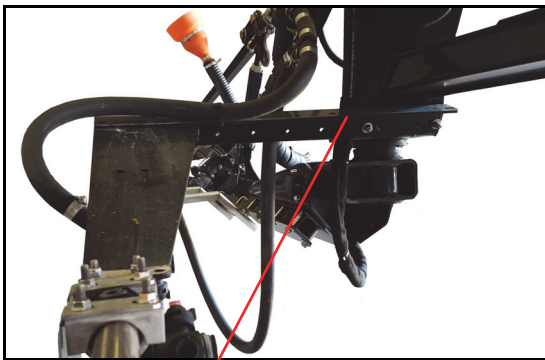


BOOM CABLE ROUTING AND CONNECTION

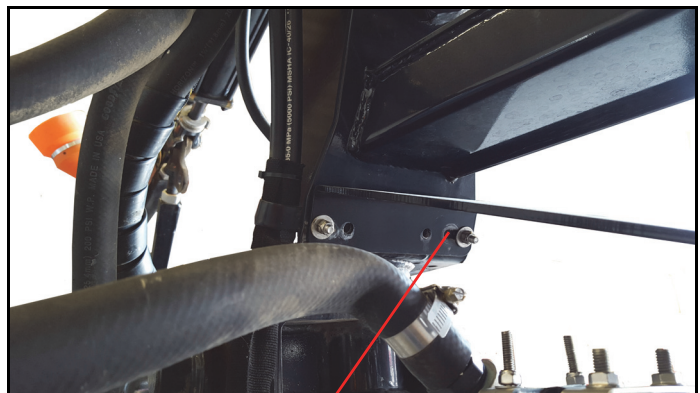
MANAGING WET BOOM TUBES

For machines with wet boom tubes extended in front of the boom near the center section, either remove the extension tubes or move the wet boom tubes back as close to the boom as possible.

FIGURE 4. Managing Wet Boom Tubes



Remove Extensions



Wet Booms Mounted Directly to Center

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 Managing Wet Boom Tubes section on page 17 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 7).

FIGURE 5. Secondary Cable ISOBUS Powell Terminator



2. 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 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 along existing cable or plumbing runs and through any existing cable retention devices as appropriate.

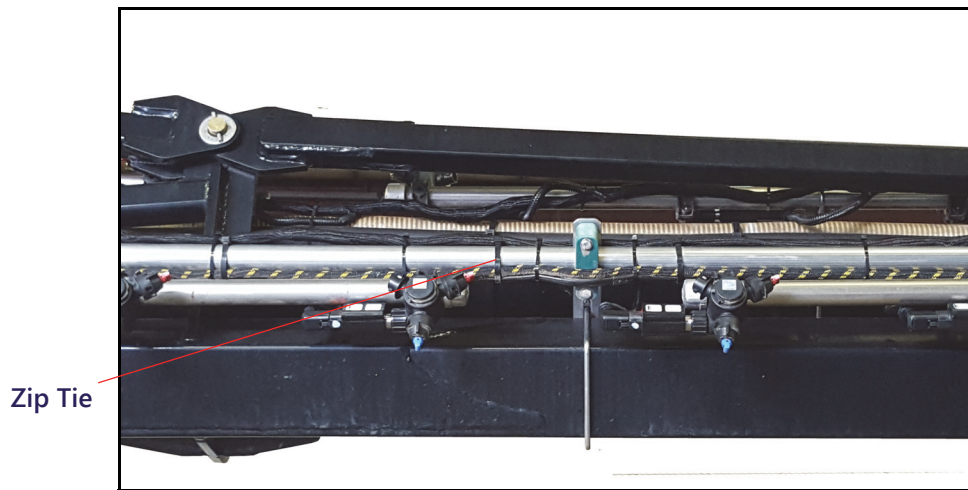
NOTE: If there is interference between the connector and boom components, remove the connector back shell. Refer to Figure 7 on page 19.

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

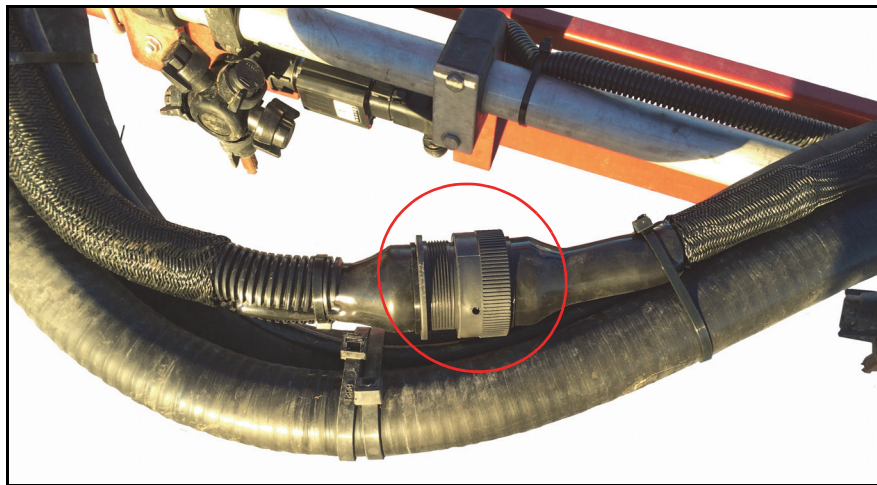
6. Once the secondary boom cable is routed appropriately, begin connecting the valve tee branches to the nozzle control valves, starting with the nozzle control valve at the outer end of the boom.

FIGURE 6. Securing Valve Branches



- 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. Boom Cable Connection at Fold Points



- 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: Review the Managing Wet Boom Tubes section on page 17 before routing or securing the boom cables on the implement. It is recommended not to 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 7). 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 8. Primary Cable Ends



**Male Connector
To Center Rack/Chassis Connector**



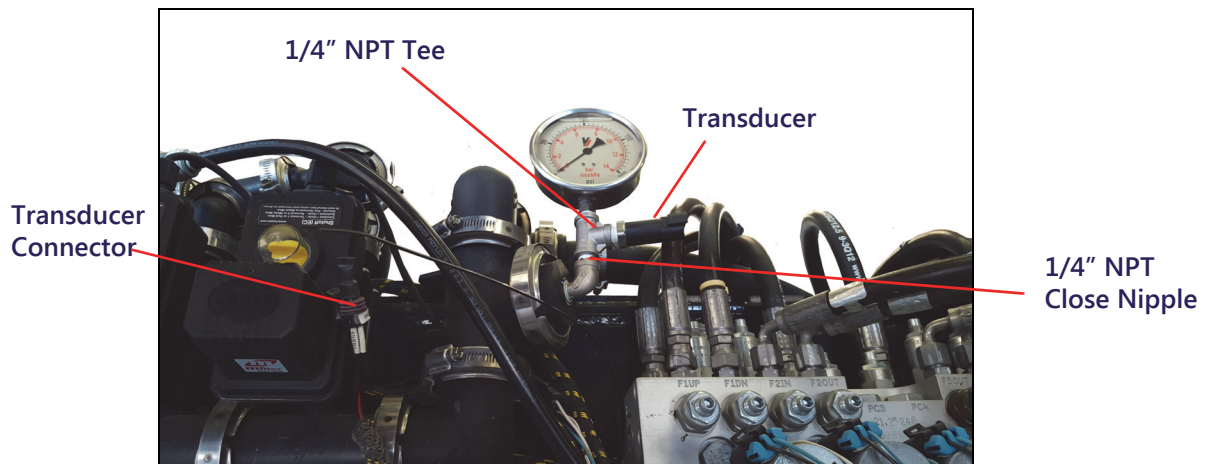
**Female Receptacle
To Secondary Boom**

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 connectors on the primary and secondary boom cables.
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 cables using zip ties to protect the connector from damage during folding and unfolding operations.
6. Connect the valve tee 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 6 on page 19. 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.

BOOM PRESSURE TRANSDUCER INSTALLATION

1. Locate the boom pressure gauge near the boom valves on the center rack.
2. Locate the 1/4" NPT tee (P/N 333-0004-020), 1/4" close nipple (P/N 333-0008-165), and pressure transducer (P/N 422-0000-090) in the kit.
3. Verify there is no pressure in the boom.
4. Remove the pressure gauge from the boom plumbing.
5. Apply teflon tape (or equivalent thread sealant) to all threaded fittings.
6. Install the tee, close nipple, pressure gauge (installed in vertical port), and pressure transducer (installed in the horizontal port) into the port where the pressure gauge was previously installed.

FIGURE 1. Installed Tee, Transducer, and Gauge



7. Locate the transducer connection on the machine harness. This should be located near where the pressure gauge was located and is labeled "BM024".
8. Remove the dust boot from the transducer connection and plug it into the pressure transducer.

CHAPTER

6

CAB PREPARATION AND WIRING

CHASSIS CABLE ROUTING AND CONNECTION

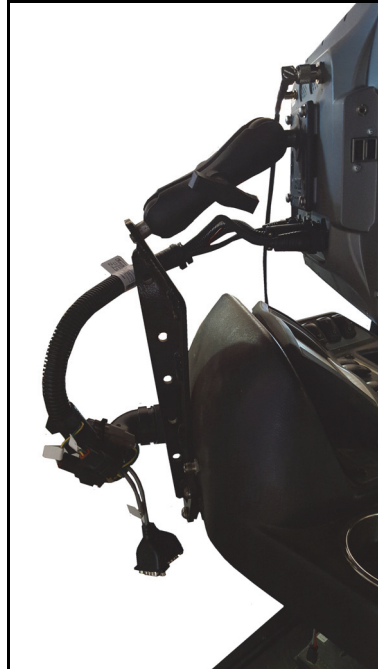
BEST PRACTICES AND RECOMMENDATIONS

- 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.

VIPER 4 CONNECTIONS

1. Install the V4 using the RAM mount. Follow the console installation instructions.
2. Remove the existing Viper 4 cable and install cable 115-0172-220 to the Viper 4 console and machine armrest connection (2013-2014 Machines Only).

FIGURE 1. Viper4 Connections



3. Locate the four Deutsch connectors (labeled A, B, C, D) on the console cable.
4. Connect Deutsch connectors A and D together.
5. Connect Deutsch connectors B and C together.

SMARTRAX NODE CABLE INSTALLATION (2013-2014 MACHINES)

1. Locate the SmarTrax node and harness.
2. Disconnect the harness from the node and all other connections.
3. Connect the provided SmarTrax cable harness (P/N 115-4001-218) to the SmarTrax node and other connections from step 2.
4. Locate the two-pin connector labeled "A" and plug it into connector "C".

NOTE: Connector B will not be used.

SMARTRAX FOOT SWITCH INSTALLATION (2013-2014 MACHINES)

A foot switch is required to engage the SmarTrax auto steering on 201-2014 machines with Hawkeye since the engage button on the hand grip will no longer function. To install a foot switch:

1. Locate the knockout (or grommet) in front right corner on the floor of the cab.
2. If required, use a punch and hammer to remove the knockout.
3. Install a rubber grommet (or similar item) to protect the cable.
4. Route the foot switch out of the cab.
5. Locate the enable connector under the cab by the SmarTrax hydraulic cable.
6. Unplug the existing connector and plug in the foot switch connector.

CHAPTER

7

ISOBUS ECU MOUNTING AND CONNECTION

PRODUCT CONTROLLER II AND BRIDGE ECU INSTALLATION

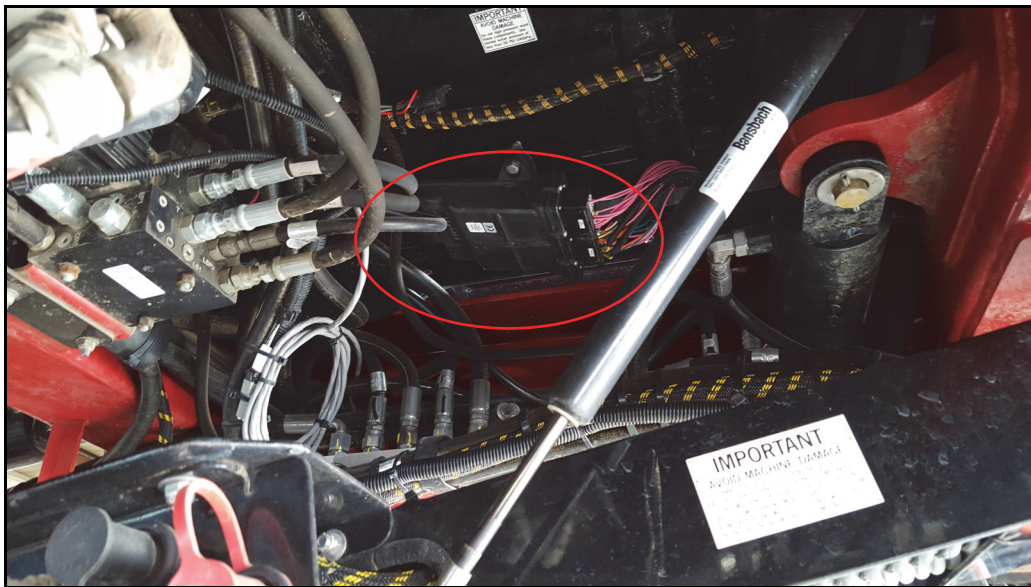
BEST PRACTICES AND RECOMMENDATIONS

- 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.

ECU HARNESS ROUTING

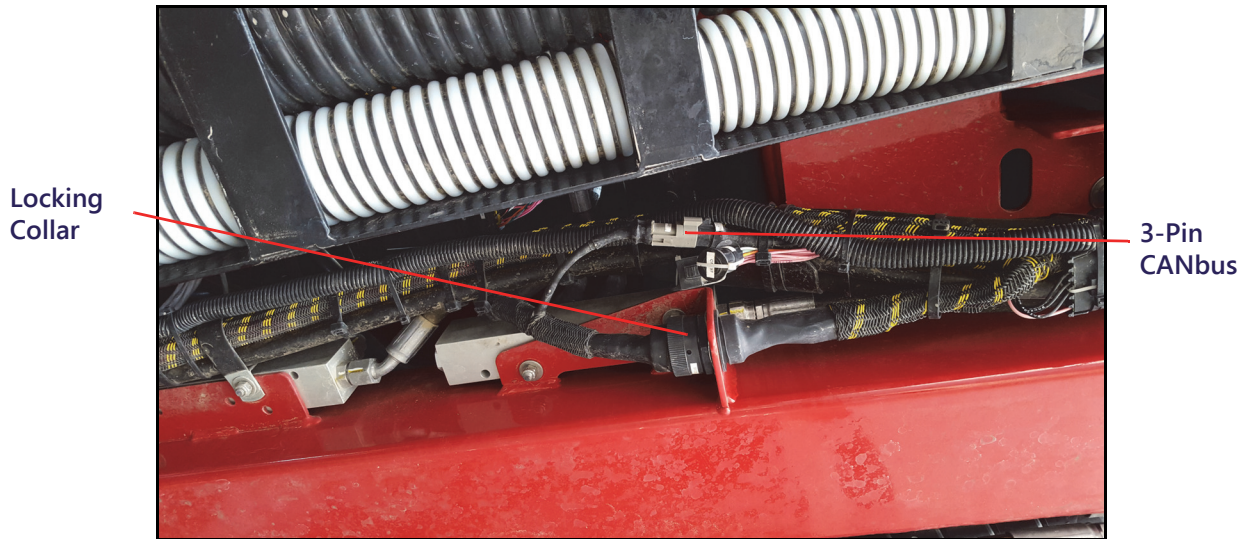
1. Locate and remove the existing product control node. It is above the front fill station under the right side of the cab.

FIGURE 1. Locate the PC Node.



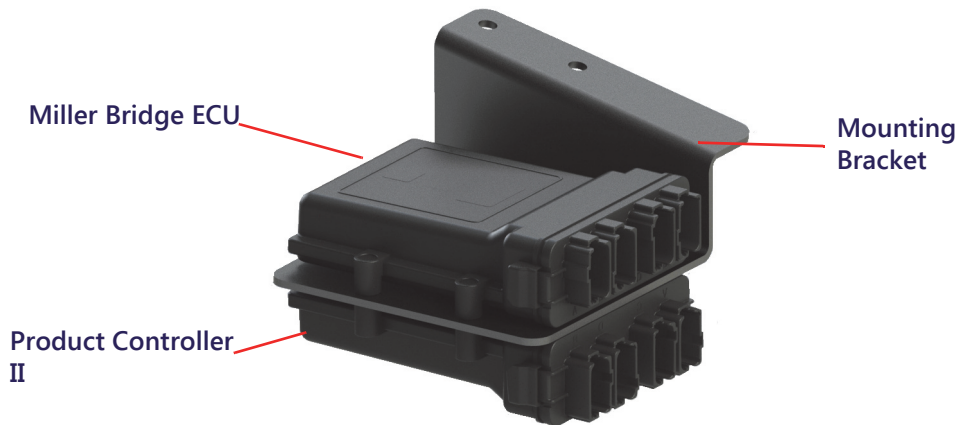
2. Disconnect the product control harness from the large round connector (rotate the locking collar) and disconnect the 3-pin Deutsch CANbus connector on the right frame rail.

FIGURE 2. Remove PC Harness



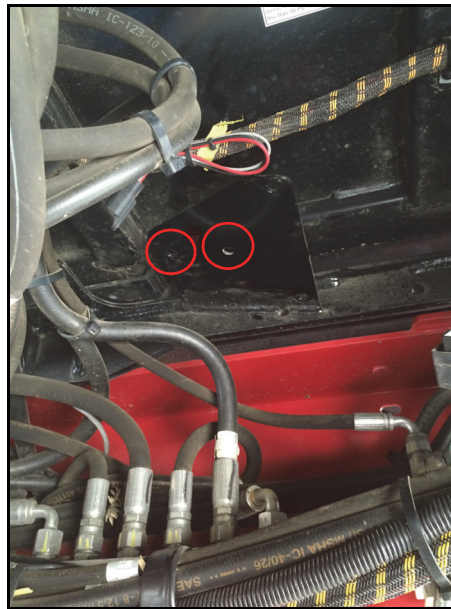
3. Place the Miller Bridge ECU on the top of the (provided) mounting bracket (P/N 107-0172-468).

FIGURE 3. Bridge and PCII ECU on Mounting Bracket



4. Place the Product Controller II ECU on the bottom of the mounting bracket.
5. Secure the Miller Bridge ECU and the Product Controller II to the mounting bracket using the four bolts, nuts, and eight washers (provided).
6. Mount the ECU and bracket assembly to the two center holes of the original product node mounting location.

FIGURE 4. ECU Plate Mounting Holes



7. Connect the 3-pin Deutsch and the large round connector on the ECU harness (P/N 115-7303-030) to the bulk head connectors on the right frame rail (where the original harness was removed).
8. Route the ECU harness to the Miller Bridge ECU and Product Controller II Assembly.
9. Connect the harness breakout with the two 12-pin Deutsch connectors to the Miller Bridge ECU.
10. Connect the breakout with the four 12-pin Deutsch connectors to the Product Controller II ECU.
11. Route the two boom cable connectors along the frame rail towards the front booms of the machine.

NOTE: Follow the linkage of the center rack while ensuring cables will not pinch or stretch. Orient the Boom cable connections horizontally to prevent moisture buildup in the rubber boots on the back side of the round connectors.

POWER CABLE ROUTING

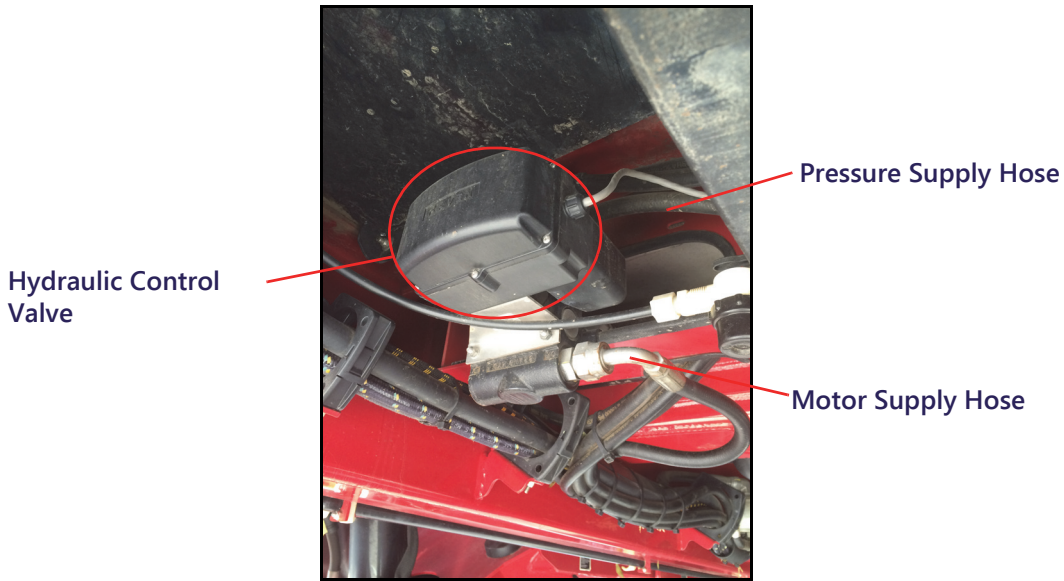
1. Locate the provided power cable (P/N 115-7303-034).
2. Connect the round 8-pin connector to the receptacle of the ECU harness.
3. Route the power cable along the frame rail to the battery connections at the rear of the machine.

NOTE: Do not connect the cable to battery power at this time.

PWM VALVE INSTALLATION (2015 AND OLDER MACHINES ONLY)

1. Locate the hydraulic control valve under the back-left side of the machine.

FIGURE 5. Hydraulic Control Valve

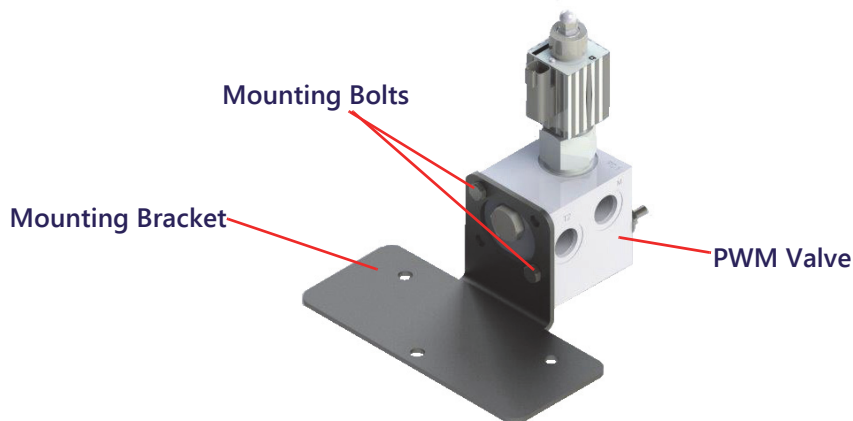


2. Disconnect the electrical connector from the hydraulic control valve.
3. Disconnect the pressure supply hose and motor supply hose from the hydraulic control valve.
4. Remove the three bolts and nuts securing the hydraulic control valve bracket to the chassis.

NOTE: Save fasteners for later use.

5. Locate the new hydraulic PWM valve (P/N 334-0003-098), mounting hardware, and bracket (P/N 107-0172-469).
6. Mount the valve to the bracket using the provided hardware.

FIGURE 6. Mounting PWM Valve to Bracket



7. Mount the bracket to the chassis using the fasteners saved from step 4.
8. Install the four provided hydraulic adapter fittings into ports M, T1, T2, and P.
9. Connect the pressure supply hose to port P on the PWM valve.
10. Connect the motor supply hose to the Port M on the PWM valve.

11. Disconnect the -12 tank hose from the hydraulic motor and connect it to port T1.

NOTE: Perform this step quickly as hydraulic oil will flow freely from the tank through this hose.

12. Connect the provided hydraulic tank hose to port T2 on the PWM valve and to the tank port of the hydraulic motor.

FIGURE 7. Installed PWM Valve



13. Plug the extension cable (P/N 115-0172-331) into the PWM valve cartridge.

14. Route the other end of the extension cable and connect it to the connector unplugged in step 2.

ISO AUTOBOOM ECU INSTALLATION

For 2013 - 2015 machines with Raven Can AutoBoom, replace the node with an ISO AutoBoom ECU.

1. Locate the Raven CAN AutoBoom Node.
2. Remove the two cable connectors using a 1/4" socket or nut driver.
3. Remove the hardware mounting the node to the machine.
4. Replace the CAN AutoBoom Node with the ISO AutoBoom ECU (P/N 063-0130-016) with the existing hardware.
5. Reconnect the cable connectors using the 1/4" driver or socket.

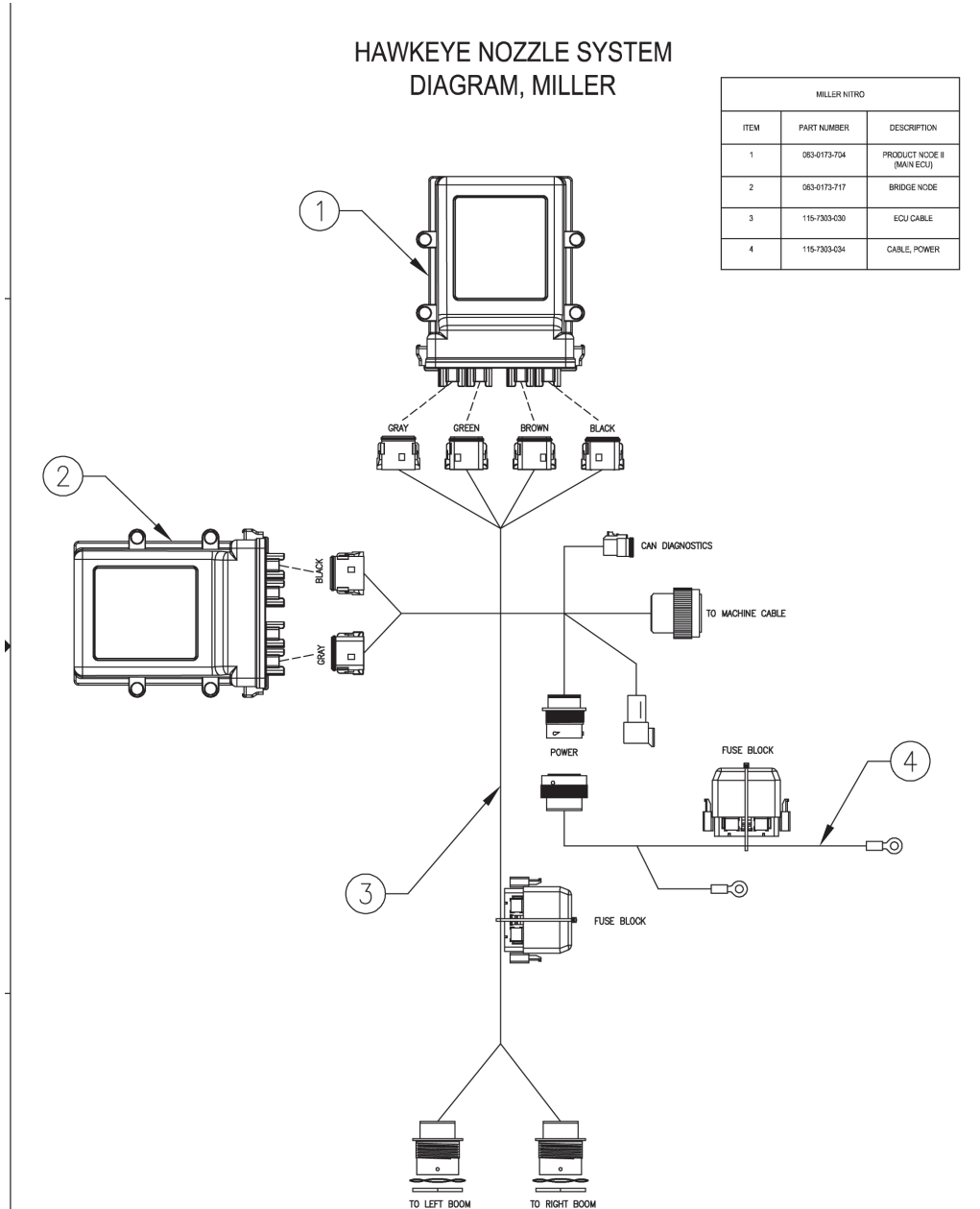
BATTERY CONNECTIONS

1. Locate the battery disconnect near the rear of the machine.
2. Connect the red ring terminal to the side of the battery disconnect switch that does not receive power when turned off. If necessary, switch the disconnect and verify with a voltmeter.
3. Connect the black ring terminal to the ground bus bar located near the battery disconnect.

A

HAWKEYE NOZZLE SYSTEM
DIAGRAM, MILLER

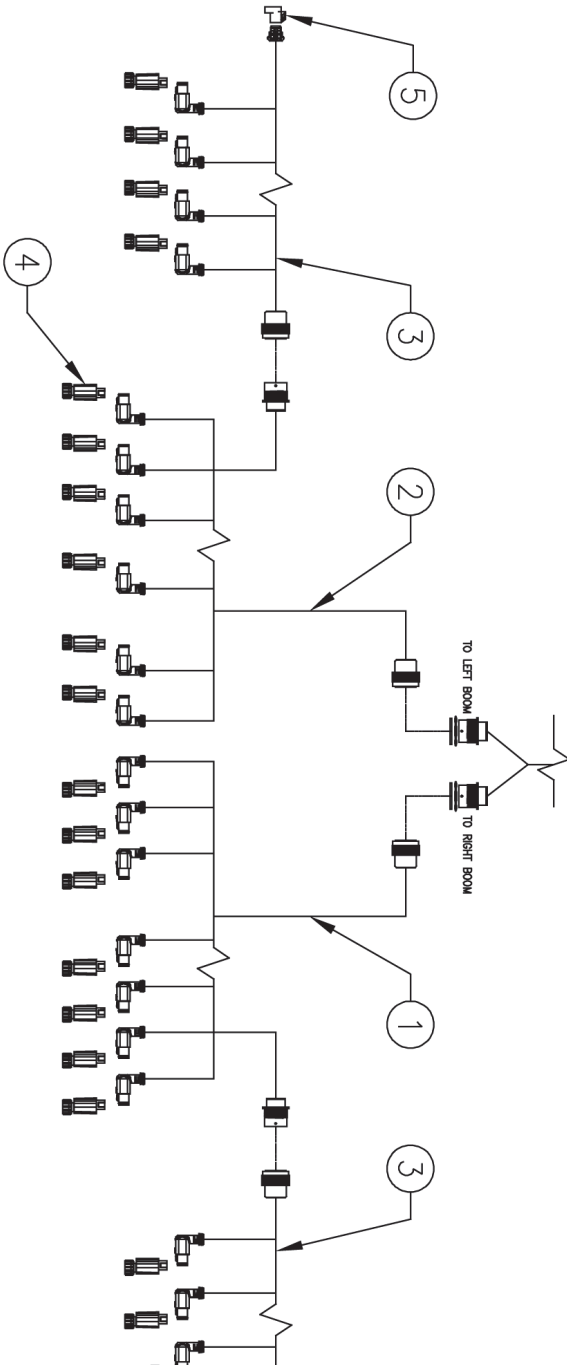
MILLER NITRO		
ITEM	PART NUMBER	DESCRIPTION
1	083-0173-704	PRODUCT NODE II (MAIN ECU)
2	083-0173-717	BRIDGE NODE
3	115-7303-030	ECU CABLE
4	115-7303-034	CABLE, POWER



HAWKEYE NOZZLE SYSTEM DIAGRAM, MILLER

- NOTES:
1. CABLES SHORTENED FOR GRAPHICAL PURPOSES

MILLER NITRO							
ITEM	DESCRIPTION	9'7" BOOM 15' SPACING	9'7" BOOM 20' SPACING	10'9" BOOM 15' SPACING	10'9" BOOM 20' SPACING	12'7" BOOM 15' SPACING	12'7" BOOM 20' SPACING
1	RH PRIMARY CABLE	115-7203-048	115-7203-050	115-7203-048	115-7203-050	115-7203-043	115-7203-031
2	LH PRIMARY CABLE	115-7203-047	115-7203-051	115-7203-047	115-7203-051	115-7203-044	115-7203-032
3	SECONDARY CABLE	115-7203-046	115-7203-033	115-7203-046	115-7203-032	115-7203-045	115-7203-033
4	HAWKEYE NOZZLE	083-0173-872	083-0173-872	083-0173-872	083-0173-872	083-0173-872	083-0173-872
5	TERMINATOR	083-0172-864	083-0172-864	083-0172-864	083-0172-864	083-0172-864	083-0172-864



RELEASED DATE	ECO NO.	PROD. MGR.	SERV. CHAMP.	ENG.	DRAFT.
23/7/19				GDB	JJP

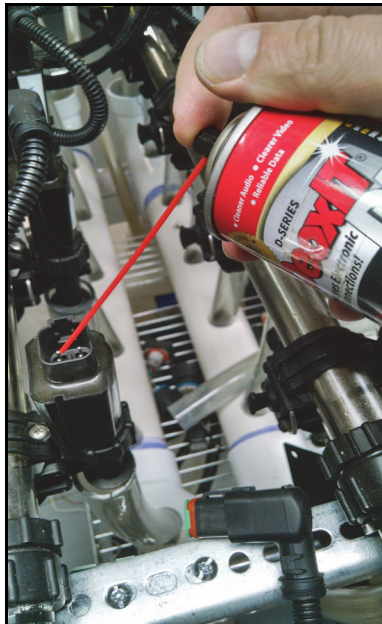
POWER AND ECU HARNESS MAINTENANCE

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.

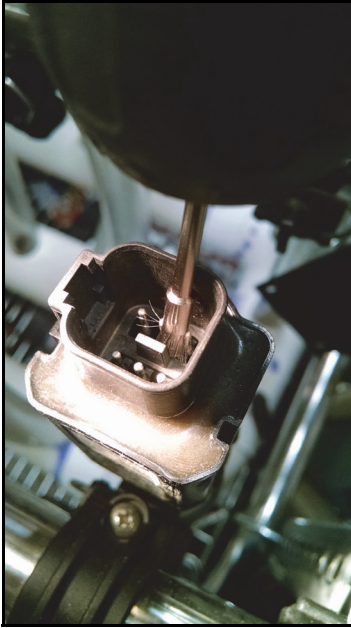
HAWKEYE BOOM HARNESS CONNECTOR MAINTENANCE

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.

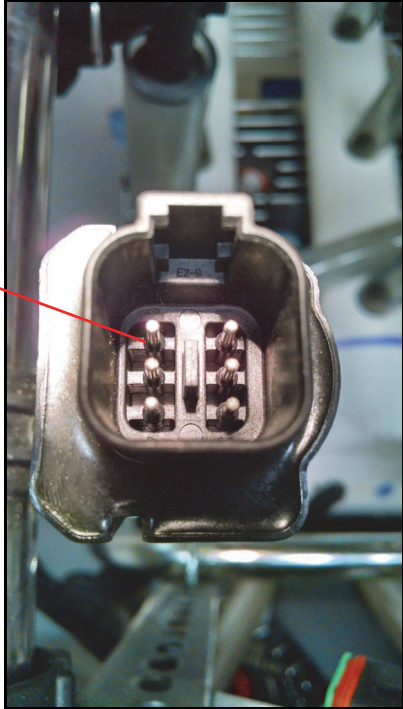


7. If not already applied, apply a single short burst of corrosion inhibitor (Corrosion X HD (Raven P/N 222-0000-020 or available from <http://www.corrosionx.com/corrosionx-heavy-duty.html>)) into the NCV connection. Be sure the corrosion inhibitor has coated the NCV contacts and recessed portions of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

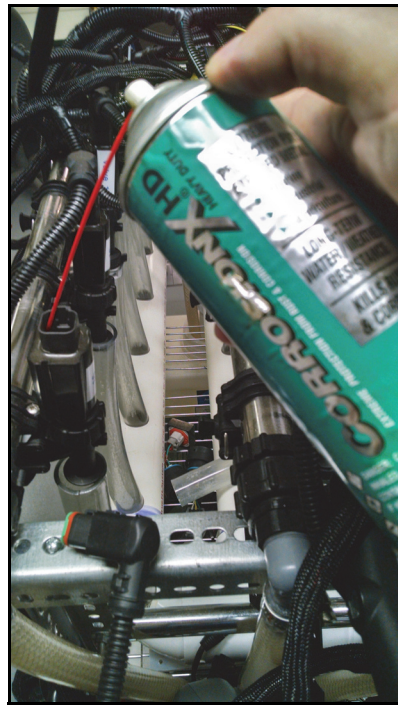
NOTE: To determine if corrosion inhibitor has been applied, inspect for a thick liquid in the bottom of the connector (as shown in the Corrosion Inhibitor Applied image below).

NCV Connector

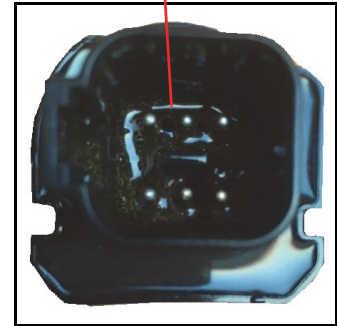
Spray in Void Between Pins



Applying Corrosion Inhibitor



Corrosion Inhibitor Applied



RAVEN

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.