

# Miller N4000 Hawkeye® Installation Manual

*P/N 016-0171-634 Rev. B 04/17*

*E29396*

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## Table of Contents

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<b>Chapter 1</b>	<b>Important Safety Information</b> .....	<b>1</b>
	Instructions for Wire Routing .....	2
	Instructions for Hose Routing .....	3
<b>Chapter 2</b>	<b>Introduction</b> .....	<b>7</b>
	Required Components .....	7
	Tools and Materials Needed .....	8
	Point of Reference .....	8
	Kit Contents .....	9
	Updates .....	11
<b>Chapter 3</b>	<b>Installation Preparation</b> .....	<b>13</b>
<b>Chapter 4</b>	<b>Nozzle Control Valve Installation</b> .....	<b>15</b>
	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
<b>Chapter 5</b>	<b>Boom Pressure Transducer Installation</b> .....	<b>21</b>
	Boom Pressure Transducer Installation .....	21
<b>Chapter 6</b>	<b>Cab Preparation and Wiring</b> .....	<b>23</b>
	Chassis Cable Routing and Connection .....	23
	Best Practices and Recommendations .....	23
	Product Controller II, ECU Nozzle Cable, and Chassis Cable Installation .....	23
	Power and Chassis Cable Installation .....	25
	Connecting to Viper 4 .....	26
	Boom Sense/speed node and harness installation .....	27
<b>Chapter 7</b>	<b>PWM Valve Installation</b> .....	<b>29</b>
	PWM Valve Installation .....	29
	Battery Connections .....	30
<b>Appendix A</b>	<b>System Diagram</b> .....	<b>33</b>
<b>Chapter B</b>	<b>Cable and Connector Maintenance</b> .....	<b>37</b>
	Power and ECU Harness Maintenance .....	37
	Hawkeye Boom Harness Connector Maintenance .....	37

Appendix C    Run Screen Examples ..... 41

## 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.

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## 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.

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## 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

**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.

**IMPORTANT:**



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 N4000	2007-2012 Kit P/N 117-1007-013	120' Boom 20" Spacing Kit P/N 117-1007-006
		120" Boom 15" Spacing Kit P/N 117-1007-005
		100' Boom 20" Spacing Kit P/N 117-1007-004
		100' Boom 15" Spacing Kit P/N 117-1007-003
		90' Boom 20" Spacing Kit P/N 117-1007-002
		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.

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## 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)

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## POINT OF REFERENCE

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

## KIT CONTENTS

The table below provides images and descriptions included in most kits. Familiarize yourself with the kit contents before starting the installation process. Some parts listed below will not be included in every kit. The table does not include common hardware and plumbing included with the kid. Refer to the machine specific system diagrams in Appendix A, System Diagram for wire part numbers and a wiring diagram.

**TABLE 2. Nitro N4 Boom Kits**




Picture	Item Description	Part Number
	Hawkeye Nozzle Control Valve, TeeJet	063-0173-672
Not Pictured	Kit, Hawkeye System Service, TeeJet (Refer to "Hawkeye Service Kit Components, TeeJet (P/N 117-1005-056)" on page 11 for a list of parts included in the kit)	117-1005-056
	O-Ring, Viton, Green Coated, -115, 56 Pack (for TeeJet QJS Series (Straight) Nozzle Bodies)	219-1005-115M
	O-Ring, Viton, Brown, -116, 56 Pack (For TeeJet QJ Series (Turret) Nozzle Bodies)	219-1005-116M

TABLE 3. Kit, Hawkeye, Chassis, Miller Sprayer N4 (P/N 117-1007-013)

Picture	Item Description	Part Number
	Transducer Press 1-5 V 0-250 PSI	422-0000-090
	Product Controller II ECU (Hawkeye ECU)	063-0173-704
	Bracket, PWM Valve, Miller	107-0172-469
	Kit, Magnetic Mount, Raven CAN Node, Universal ECU	117-0171-299
Not Pictured	Cable, Extension, 2-Pin Deutsch	107-0172-331
	Valve, Hydraulic PWM Flow Control, Comp, 20 GPM	334-0003-098

TABLE 4. Kit, Hydraulic, Miller, Product Pump PWM Control

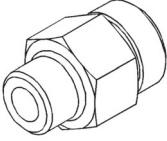

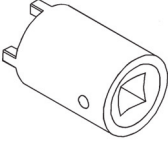
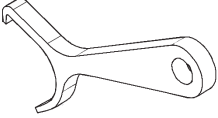
Picture	Item Description	Part Number
	Fitting, Adapter, Straight, -10 SAE O-ring (M) to -12 ORFS (M)	333-0012-444
Not Pictured	Hose, 60", Size 12, -12 Face Seal 90 Degree to -12 Face Seal Straight	214-1004-113

TABLE 5. Hawkeye Service Kit Components, TeeJet (P/N 117-1005-056)

Picture	Item Description	Part Number
	Hawkeye Nozzle Control Valve, TeeJet	063-0173-672
Not Pictured	Kit, Seal, Hawkeye Valve, TeeJet	117-1005-050
Not Pictured	Hawkeye Valve Jumper	115-7303-139
	Hawkeye Valve Tool	321-0000-457
	Hawkeye Fly Nut Wrench	321-0000-459

## UPDATES

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

[www.ravenhelp.com](http://www.ravenhelp.com)

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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](mailto:techwriting@ravenind.com)

- Miller N4000 Hawkeye® Installation Manual
- P/N 016-0171-634 Rev. A
- 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.



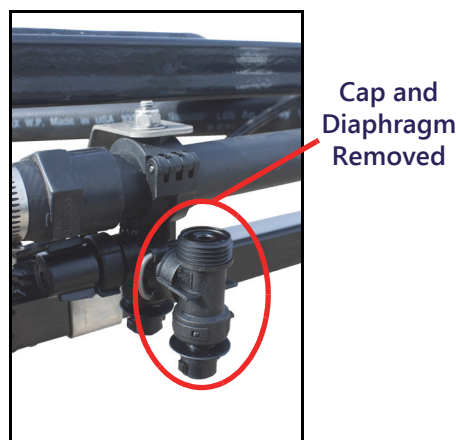


Perform the following procedure to prepare the implement for installation of the Hawkeye nozzle control system.

	<p><b>CAUTION</b></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>
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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**





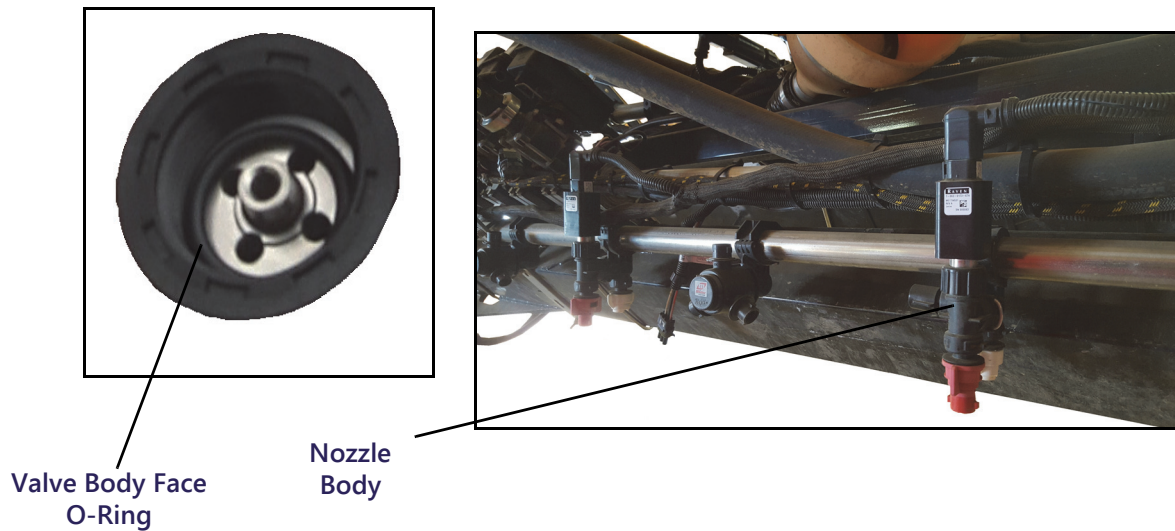
## HAWKEYE NOZZLE CONTROL VALVE INSTALLATION

## 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.

## 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

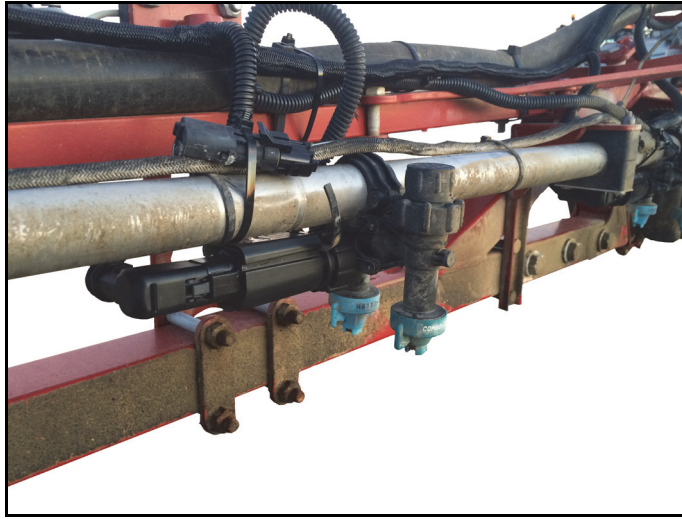
In some locations on the spray boom, boom equipment or hardware may interfere with mounting the Hawkeye nozzle control valves. In these locations, it may be necessary to rotate the nozzle control valve or to relocate existing hardware to provide additional clearance.

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

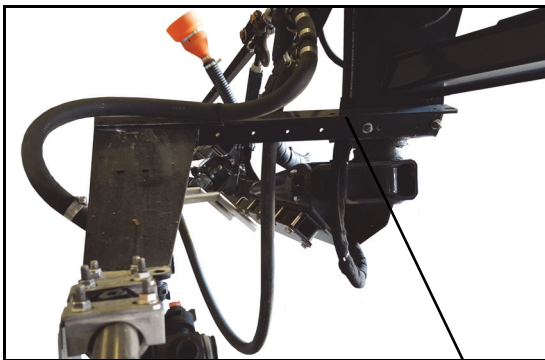


## BOOM CABLE ROUTING AND CONNECTION

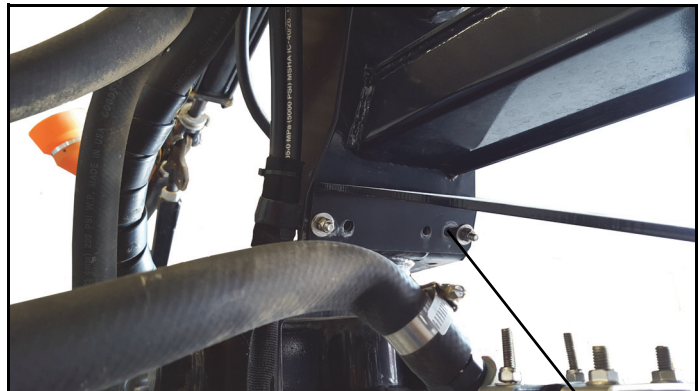
### MANAGING WET BOOM TUBES

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.

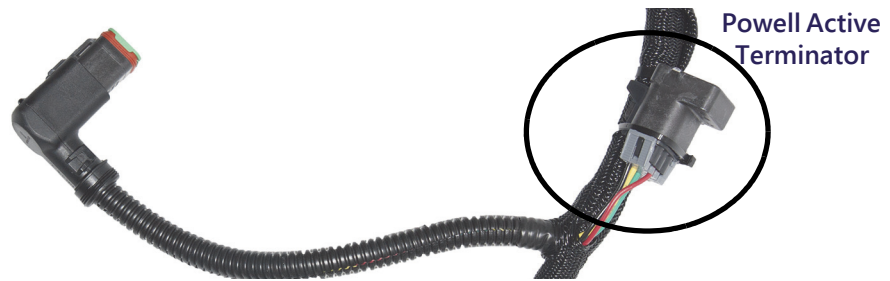
- When securing the primary and secondary boom cables on the implement, begin at the outer boom tips. Adjust the cable position to provide sufficient slack between valve tee branches while working toward the center of the implement.
- Route the boom cables on the inside of the boom frame work.
- Secure 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 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 9).

**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 along the boom framework along existing cable or plumbing runs and through any existing cable retention devices as appropriate.

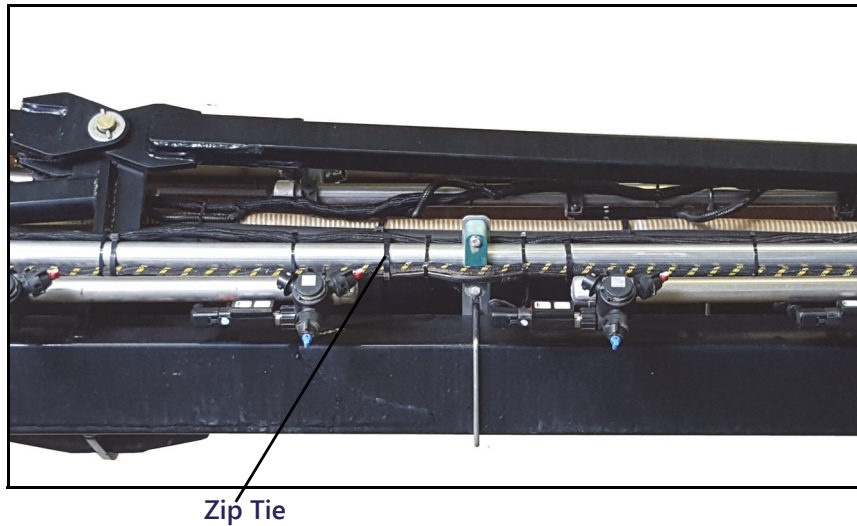
**NOTE:** If there is interference between the connector and boom components, remove the connector back shell. Refer to Figure 7 on page 19.

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.

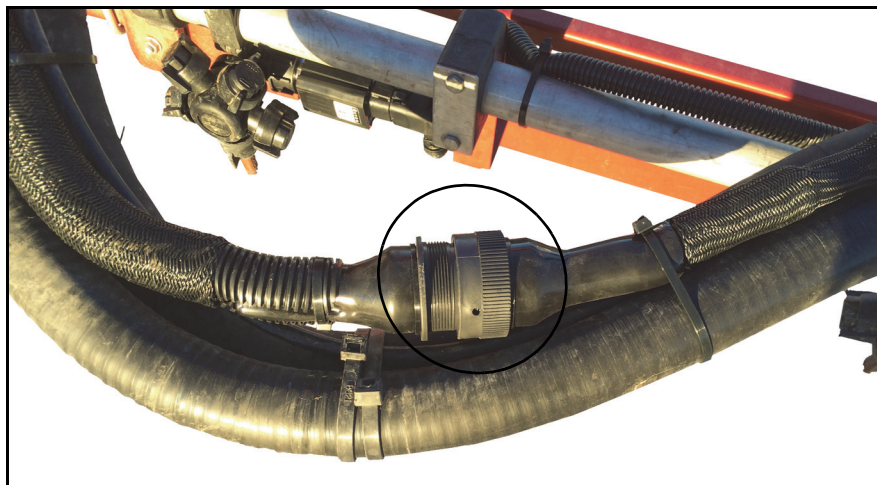
6. Once the secondary boom cable is routed appropriately, begin connecting the valve tee branches to the nozzle control valves, starting with the nozzle control valve at the outer end of the boom.

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 9). 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**

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**Male Connector  
To Center Rack/Chassis**



**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.



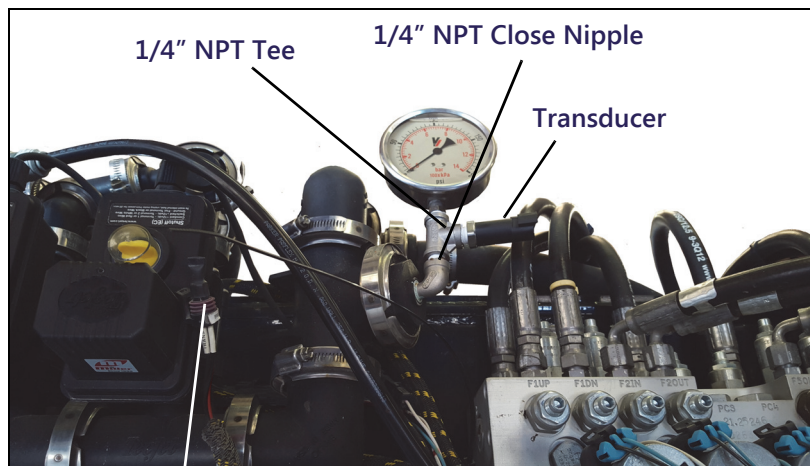
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**BOOM PRESSURE TRANSDUCER INSTALLATION**

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**

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**Transducer Connector**

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.



## CHASSIS CABLE ROUTING AND CONNECTION

### BEST PRACTICES AND RECOMMENDATIONS

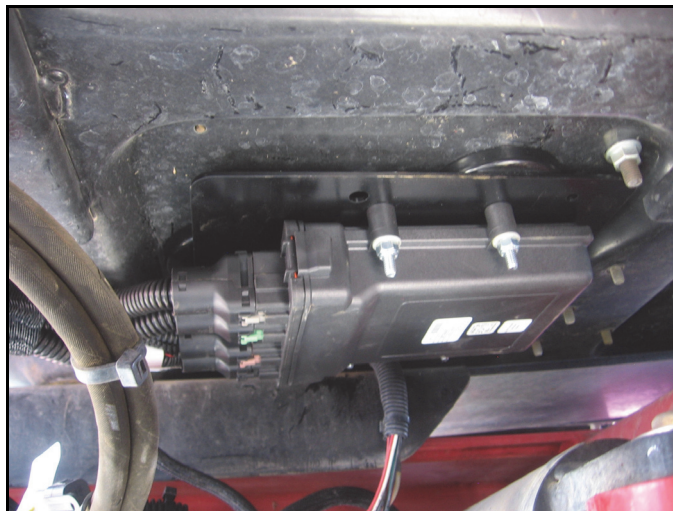
- Do not connect battery leads until all cables are installed and connected.
- Route chassis cabling along existing cabling or plumbing to help avoid pinch points or stretching the cable during normal equipment operation.

### PRODUCT CONTROLLER II, ECU NOZZLE CABLE, AND CHASSIS CABLE INSTALLATION

1. Use the provided hardware to mount the magnets to the universal mounting bracket.
2. Use the provided hardware to attach the Product Controller II to the universal mounting bracket.
3. Place the bracket on the bottom of the cab.

**FIGURE 1. Bracket and Product Controller II Mounted to Cab**

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4. Connect the harness breakout on the ECU Nozzle cable with the four 12-pin Deutsch connectors to Product Controller II.
5. Connect the single 31 pin Deutsch connector on the Miller N4 Interface cable to the mating connector on the ECU Nozzle cable.
6. Route the branch on the Miller N4 Interface cable to the front of the machine and along the right side lift arms.
7. Connect the Miller N4 Interface cable tee connectors into the section control valve harness on the machine's right lift arm.

**FIGURE 2. Miller N4 Interface Cable Connected to Machine Harness**



8. Route the Left Boom and Right Boom connectors on the ECU cable to the front of the machine. Follow the same route as the Miller N4 Interface cable.
9. Connect the primary cables installed in Chapter 4, Nozzle Control Valve Installation to the left and right boom connectors.
10. Route the 5-pin receptacle on the Miller N4 Interface cable to the cabling bundle on the right-side exterior of the cab.

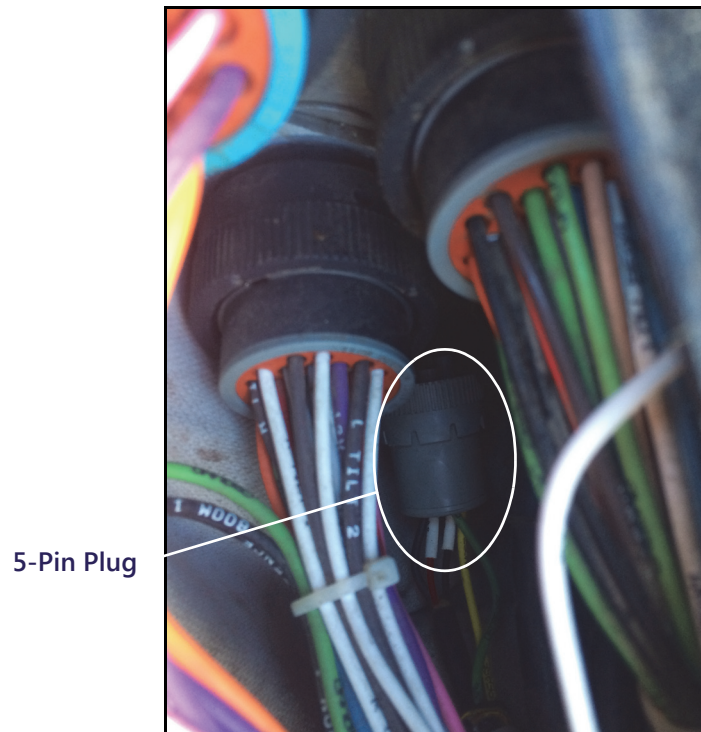
**FIGURE 3. Cable Bundle on Side of Cab**



Cable Bundle on Side of Cab

11. Open the boot protecting the wire bundle and identify the 5-pin plug near the bottom.
12. Remove the 5-pin plug from the receptacle.

FIGURE 4. 5-Pin Plug in Boot



13. Connect the 5-pin receptacle from the Miller N4 Interface cable to the 5-pin plug removed in the previous step.

FIGURE 5. Miller N4 Interface Connected to 5-Pin Plug In Boot



## POWER AND CHASSIS CABLE INSTALLATION

1. Attach the Hawkeye Nozzle Power cable to the ECU nozzle cable.
2. Route the ring terminals on the Nozzle Power cable towards the rear of the machine.

3. Connect the negative ring terminals on the Nozzle Power cable to the negative terminal on the battery.
4. Connect the positive ring terminal on the Nozzle Power cable to the positive terminal on the battery.

**NOTE:** If desired, the positive ring terminal on the Nozzle Power cable may be connected to a suitable location after the battery disconnect switch.

5. Connect the Chassis cable to the mating connector on the Miller N4 Interface cable.
6. Route the Chassis cable ring terminals to the back of the machine.
7. Connect the Chassis cable ring terminals to the same location as the Nozzle Power cables installed earlier.

**FIGURE 6. Installed Chassis and Nozzle Power Cables**

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### CONNECTING TO VIPER 4

1. Connect the Console Extension cable to the mating connector on the Chassis cable.
2. Route the other end of the Console extension cable into the cab via the access plate on the right side of the floor board.

**FIGURE 7. Cab Access Plate**

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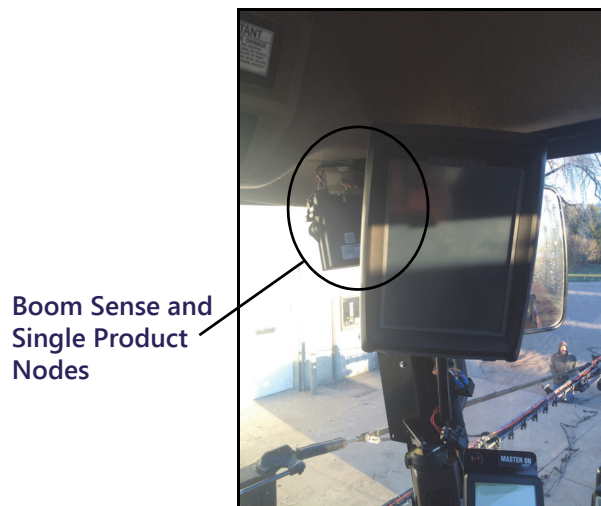


3. Attach the Console cable to the corresponding ports on the Viper 4.
4. Connect the other end of the Console cable to the Console Extension cable.
5. If the machine has SmarTrax installed:
  - Gen I Cabling: Order the tee adapter (PN 115-0171-364). See the system diagram for installation details.
  - Gen II Cabling: Connect the node cable to the SmarTrax connector on the Console cable.

## BOOM SENSE/SPEED NODE AND HARNESS INSTALLATION

1. Remove the CAN Boom Sense and Single Product nodes from the upper right corner of the cab.

**FIGURE 8. Existing Boom Sense and Single Product Nodes**



2. Remove the cabling that runs from the boom sense and single product nodes.
3. Connect the 16-pin connector from the Boom sense cable to the factory harness where the cable was removed in step 2.
4. Identify the 9-pin plug on the Boom Sense cable and connect it to the CAN Stub receptacle on the Console cable.
5. Insert the two 12-pin Deutsch connectors into the provided ISO Boom Sense/Speed Node.
6. Secure the ISO Boom Sense/Speed Node under the floor mat.





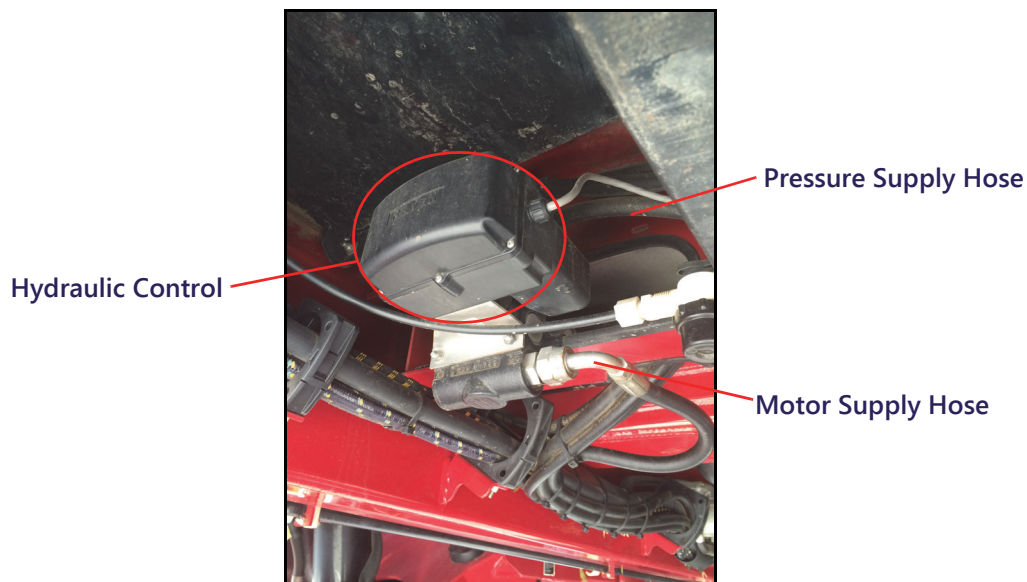
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**PWM VALVE INSTALLATION**

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

**FIGURE 1. Hydraulic Control Valve**

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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 2. Installed PWM Valve



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.
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.

## BATTERY CONNECTIONS

1. Locate the battery disconnect near the rear of the machine.
2. Connect the red ring terminal to the positive starter post. This ensures the Hawkeye system is disconnected from power when the battery disconnect switch is turned off. If necessary, switch the disconnect and verify with a voltmeter.
3. Connect the black ring terminal to the ground post on the battery.



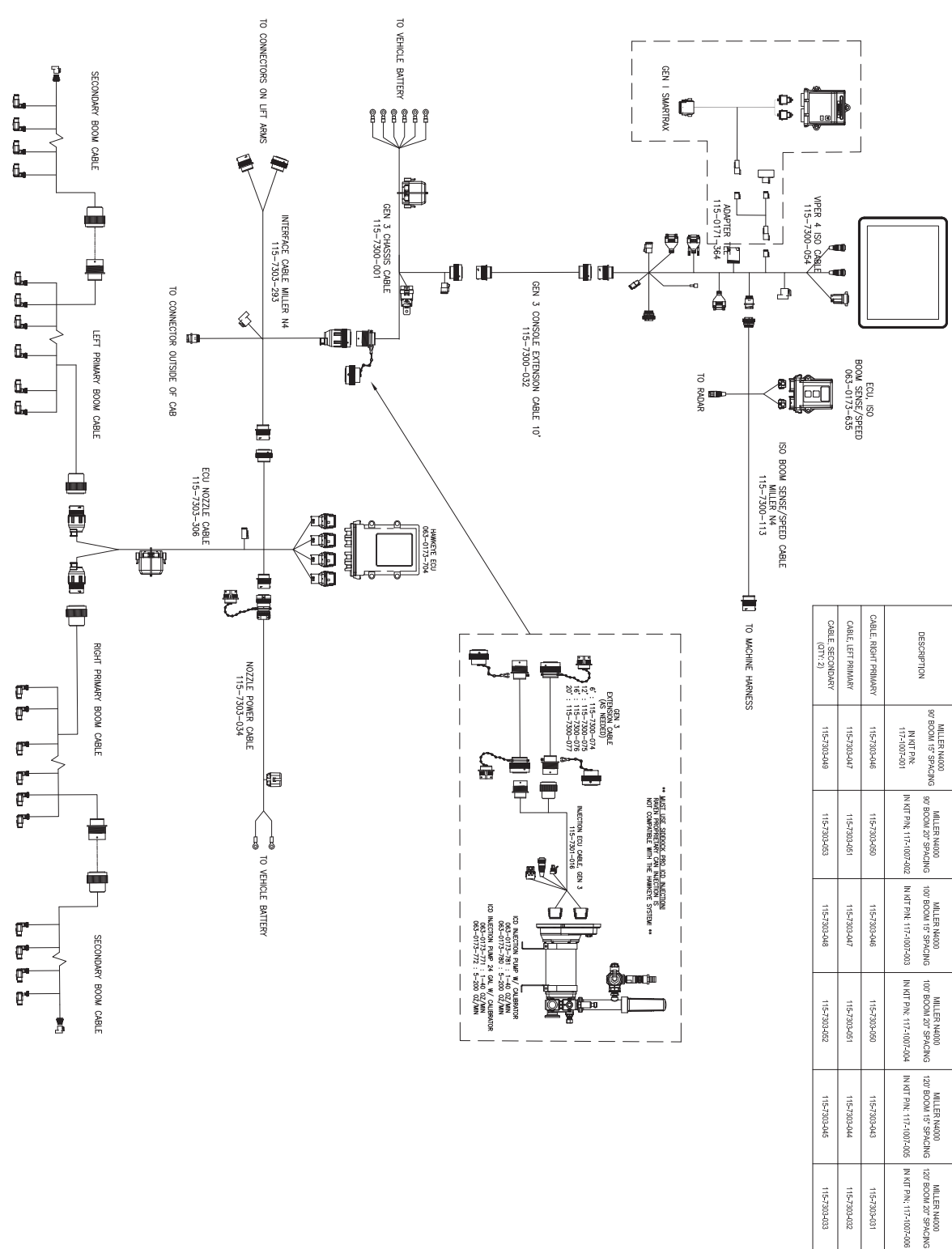


**A**

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# HAWKEYE CABLING FOR MILLER N4 SELF PROPELLED SPRAYER

WER 4



DESCRIPTION	MILLER N4000 97' BOOM 15' SPACING IN KIT P/N: 117-1007-001	MILLER N4000 97' BOOM 20' SPACING IN KIT P/N: 117-1007-002	MILLER N4000 100' BOOM 15' SPACING IN KIT P/N: 117-1007-003	MILLER N4000 100' BOOM 20' SPACING IN KIT P/N: 117-1007-004	MILLER N4000 120' BOOM 15' SPACING IN KIT P/N: 117-1007-005	MILLER N4000 120' BOOM 20' SPACING IN KIT P/N: 117-1007-006
CABLE RIGHT PRIMARY	115-7300-046	115-7300-050	115-7300-048	115-7300-050	115-7300-043	115-7300-031
CABLE LEFT PRIMARY	115-7300-047	115-7300-051	115-7300-047	115-7300-051	115-7300-044	115-7300-032
CABLE SECONDARY (KIT - 2)	115-7300-049	115-7300-053	115-7300-048	115-7300-052	115-7300-045	115-7300-033







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## POWER AND ECU HARNESS MAINTENANCE

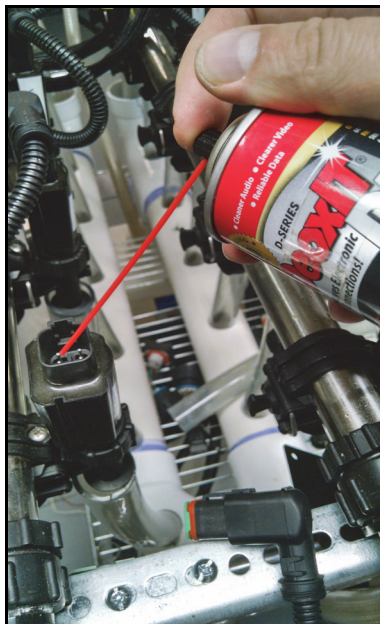
1. Disconnect the ECU harness connector and inspect for signs of moisture or corrosion.
2. If moisture or corrosion is detected, use Deoxit D5, brushes, and compressed air to clean and dry the connector.
3. When clean, apply a coating of Corrosion X HD to the connector mating surfaces and contacts.
4.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

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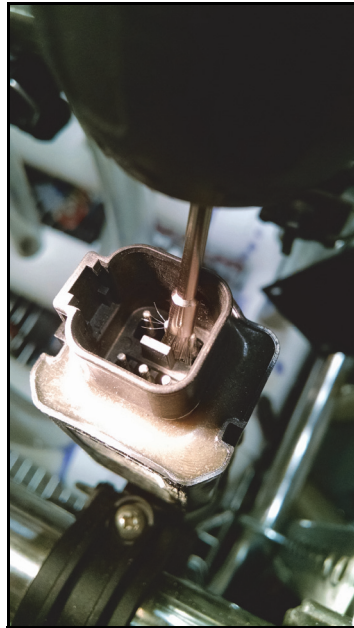
## HAWKEYE BOOM HARNESS CONNECTOR MAINTENANCE

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.

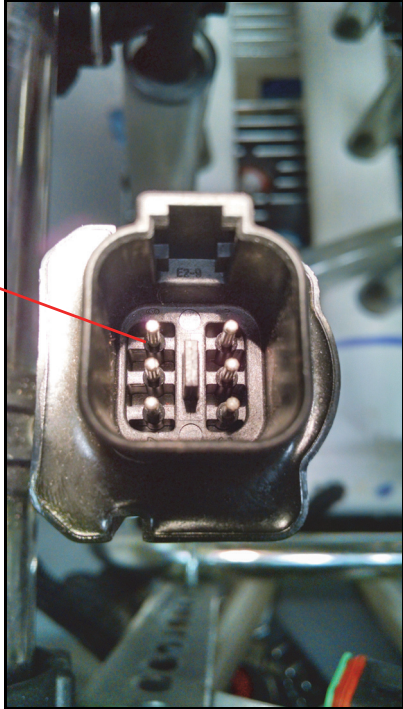


7. If not already applied, apply a single short burst of corrosion inhibitor (Corrosion X HD (Raven P/N 222-0000-020 or available from <http://www.corrosionx.com/corrosionx-heavy-duty.html>)) into the NCV connection. Be sure the corrosion inhibitor has coated the NCV contacts and recessed portions of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

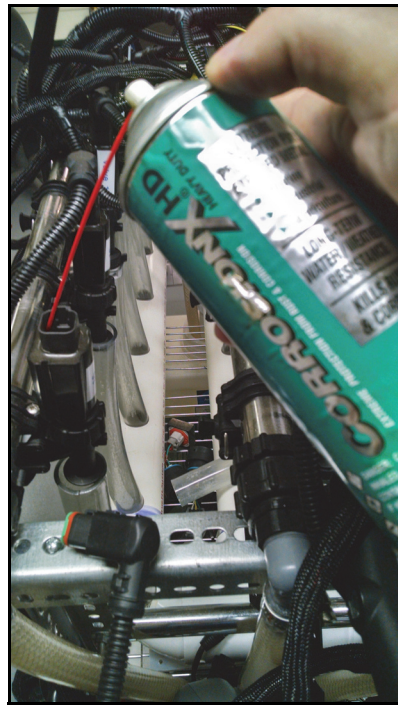
**NOTE:** To determine if corrosion inhibitor has been applied, inspect for a thick liquid in the bottom of the connector (as shown in the Corrosion Inhibitor Applied image below).

**NCV Connector**

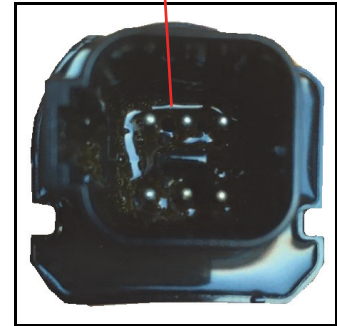
Spray in  
Void  
Between  
Pins



**Applying Corrosion Inhibitor**



**Corrosion Inhibitor Applied**





C

The following images provide examples of run screen configurations. Refer to Viper 4+ Operation manual and the Hawkeye Operation manual to learn more about available widgets and their function.

FIGURE 1. Viper 4+ Screen Example 1

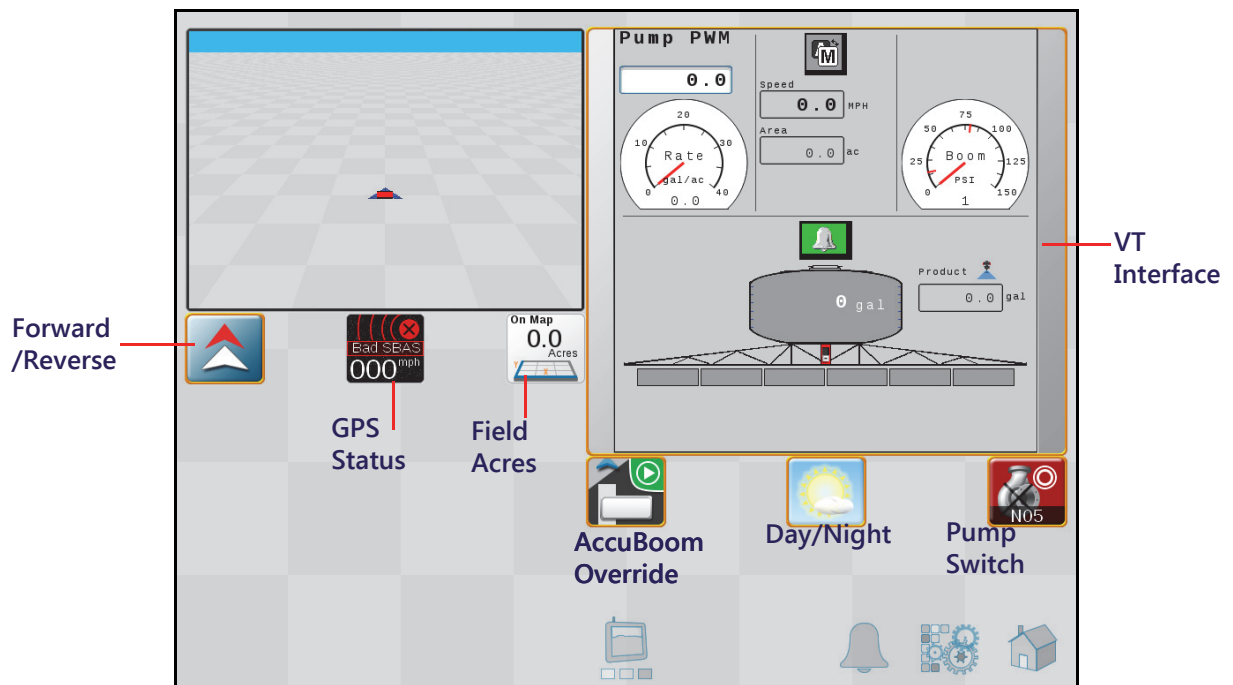


FIGURE 2. Viper 4+ Screen Example 2



# RAVEN

## Limited Warranty

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### ***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](http://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.**