

Hawkeye® 2 Installation Manual for Case IH Patriot (MY 2009-2016)

016-2005-004 Rev. A

3/2021

E35627



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SAFETY

NOTICE

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

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

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

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

WARNING

AGRICULTURAL CHEMICAL SAFETY

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

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

CAUTION

ELECTRICAL SAFETY

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

TOUCH SCREEN

- Only touch the touch-screen with your finger or by using a special touch-screen stylus/pen. Operating the touch-screen with sharp objects may cause permanent damage to the screen.
- Only clean the screen using a damp cloth. Never use caustic or other aggressive substances.

RECOMMENDATIONS AND BEST PRACTICES

HARNESS ROUTING

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

- Leave protective caps/covers over harness connectors until needed to avoid dirt and moisture from contaminating electrical circuits.
- Secure the harness to the frame or solid structural members at least every 12 in [30 cm].
- Follow existing harness runs already routed on the implement as much as possible. Proper harness routing should:
 - Secure harnessing and prevent the harness from hanging below the implement.
 - Provide sufficient clearance from moving components and operational zones around shafts; universal joints and suspension components; pulleys, gears, belts, and chains; moving linkages, cylinders, articulation joints, etc.
 - Protect harnessing from field debris and surrounding hazards (e.g. tree limbs, fence posts, crop stubble, dirt clumps or rocks that may fall or be thrown by the implement).
 - Protect harnessing from sharp bends, twisting, or flexing over short distances and normal implement operation.
 - Connectors and splices should not be located at bending points or in harness sections that move.
 - Ensure sufficient length for free movement of the implement during normal operation and prevent pulling, pinching, catching, or rubbing, especially in articulation and pivot points. Clamp harnessing securely to force controlled movement of the harness.
 - Avoid abrasive surfaces and sharp edges such as sheared or flame cut corners, fastener threads or cap screw heads, hose clamp ends, etc.
- Do not connect, affix, or allow harnessing to come into contact with components with high vibration forces, hot surfaces, or components carrying hot fluids beyond the temperature rating of harness components.
 - Harnessing should be protected or shielded if routing requires the hose to be exposed to conditions beyond harnessing component specifications.
- Avoid routing harnesses in areas where damage may occur due to build up of material (e.g. dirt, mud, snow, ice, etc.).
- Avoid routing harnesses in areas where the operator or service personnel might step or use as a grab bar.

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

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

MAKE AND MODEL COMPATIBILITY

Hawkeye® 2 is a pressure-based product control system and allows for precise sprayer application over a range of conditions and reduced spray drift. Each nozzle is controlled by an individual pulsing valve giving you a consistent spray pattern as speed and conditions change.

Hawkeye® 2 is built on the ISOBUS communication platform which allows the system to work with most ISO Universal Terminals (UTs) and task controllers, including the Viper® 4.

This manual is intended to provide installation instructions on the following equipment:

TABLE 1. Compatible Equipment Information

Make and Model	Nozzle Body Type	Nozzle Spacing	Boom Width	Kit Number
Model Years 2009-2016 CNH Patriot 3330/40 and 4410/20/30/40	Wilger	20"	90'	117-2005-220
			100'	117-2005-221
			120'	117-2005-006

NOTE: Machines must have the Aim Command Flex or Hawkeye® Product Control system to be compatible with the cabling in this kit. If the machine does not have either of these systems installed, a Raven CAN to ISO Product Control Upgrade kit (P/N 117-2005-005) will be required. See the kit contents in Figure 4 on page 9. Machines with a Raven SCS 4600 console or similar with a built-in product control node are not compatible with this Hawkeye® 2 system.

INSTALLATION OVERVIEW

The recommended process for installing the Hawkeye® 2 nozzle control system is as follows:

1. Confirm Hawkeye® 2 kit contents.
2. Replace existing strainer with an 80 mesh (or finer) strainer.
3. Remove spray tips and flush each section individually for a minimum of 20 seconds to thoroughly flush the boom.
4. Mount Hawkeye® 2 nozzle control valves.
5. Mount the RCM - Sprayer.
6. Route and connect the inner, mid, and outer boom cables (as applicable).
7. Route and connect chassis and RCM - Sprayer cables.
8. Review the Post-Installation Notes for machine configuration tips.

REQUIRED COMPONENTS

The following components must be installed with the Hawkeye® 2 nozzle control system:

- Updated software on field computers or control monitors
- PWM pump control valve
- Raven compatible flow meter
- Raven compatible pressure transducer
- 80 (or finer) mesh strainer

NOTE: Air induction style spray tips should not be used with the Hawkeye® 2 nozzle control system. A fan or cone style spray tip is required for the Hawkeye® 2 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
- Corrosion X HD
- 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

FIGURE 1. Hawkeye® 2 Case Patriot MY 2009-2016, 100'/20" Boom Kit Components (P/N 117-2005-220 Rev. A

QTY	PART #	DESCRIPTION
1	053-0159-197	BOX, SHIPPING
1	063-0173-956	RCM, HAWKEYE 2
1	053-0159-015	ENVELOPE, PLASTIC
1	016-0171-649	SHEET, WARRANTY/HELP
1	115-2005-027	CABLE, ECU, CASE PATRIOT MY09-16, HAWKEYE 2
1	115-2005-008	CABLE, NCV POWER, 28', HAWKEYE 2
2	115-2005-121	CABLE, MID BOOM, CNH, 100' / 20", HAWKEYE 2
2	115-2005-122	CABLE, OUTER BOOM, CNH, 100' / 20", HAWKEYE 2
1	117-2005-052	KIT, HAWKEYE 2 SYSTEM SERVICE, WILGER
1	107-0172-707	BRACKET, RCM, PATRIOT, MY 09-16
1	053-0159-074	ENVELOPE, PLASTIC
2	107-0171-616	U-BOLT, SQR, 2-9/16 W x 3-1/2 L x 3/8-16 UNC
4	312-1001-164	NUT, FLANGED LOCK, 3/8-16 UNC
1	053-0159-110	ENVELOPE, PLASTIC
1	311-4050-145K	BOLT, HEX, M6-1 X 65MM, GRADE 8, CLASS II COATING
2	311-4050-147K	BOLT, HEX, M6-1 X 75MM GRADE 8, CLASS II COATING
3	312-4000-216	NUT, FLANGE, NYLOCK, M6-1, ZINC COATED
3	313-1000-046	WASHER, FLAT, M6, ZINC COATED
1	115-2005-120	CABLE, PRIMARY BOOM, CNH, 100' / 20", HAWKEYE 2
1	115-2005-120	CABLE, PRIMARY BOOM, CNH, 100' / 20", HAWKEYE 2
36	063-2005-003	NOZZLE CONTROL VALVE, HAWKEYE 2, WILGER
1	219-2005-116M	O-RING, 38 PACK, SIZE -116, BLACK
24	063-2005-003	NOZZLE CONTROL VALVE, HAWKEYE 2, WILGER
1	053-0159-110	ENVELOPE, PLASTIC
25	219-2005-116	O-RING, VITON, BLACK, SIZE -116

FIGURE 2. Hawkeye® 2 Case Patriot MY 2009-2016, 90'/20" Boom Kit Components (P/N 117-2005-221 Rev. A)

QTY	PART #	DESCRIPTION
1	053-0159-197	BOX, SHIPPING
1	063-0173-956	RCM, HAWKEYE 2
1	053-0159-015	ENVELOPE, PLASTIC
1	016-0171-649	SHEET, WARRANTY/HELP
1	115-2005-027	CABLE, ECU, CASE PATRIOT MY09-16, HAWKEYE 2
1	115-2005-008	CABLE, NCV POWER, 28', HAWKEYE 2
2	115-2005-121	CABLE, MID BOOM, CNH, 90'-100' / 20", HAWKEYE 2
2	115-2005-206	CABLE, OUTER BOOM, CNH, 90' / 20", HAWKEYE 2
1	117-2005-052	KIT, HAWKEYE 2 SYSTEM SERVICE, WILGER
1	107-0172-707	BRACKET, RCM, PATRIOT, MY 09-16
1	053-0159-074	ENVELOPE, PLASTIC
2	107-0171-616	U-BOLT, SQR, 2-9/16 W x 3-1/2 L x 3/8-16 UNC
4	312-1001-164	NUT, FLANGED LOCK, 3/8-16 UNC
1	053-0159-110	ENVELOPE, PLASTIC
1	311-4050-145K	BOLT, HEX, M6-1 X 65MM, GRADE 8, CLASS II COATING
2	311-4050-147K	BOLT, HEX, M6-1 X 75MM GRADE 8, CLASS II COATING
3	312-4000-216	NUT, FLANGE, NYLOCK, M6-1, ZINC COATED
3	313-1000-046	WASHER, FLAT, M6, ZINC COATED
1	115-2005-120	CABLE, PRIMARY BOOM, CNH, 90'-100' / 20", HAWKEYE 2
1	115-2005-120	CABLE, PRIMARY BOOM, CNH, 90'-100' / 20", HAWKEYE 2
36	063-2005-003	NOZZLE CONTROL VALVE, HAWKEYE 2, WILGER
1	219-2005-116M	O-RING, 38 PACK, SIZE -116, BLACK
1	053-0159-291	BOX, SHIPPING
2	053-0159-292	INSERT, DIVIDER SHEET
1	053-0159-293	INSERT, 14-PCS DIVIDER
14	063-2005-003	NOZZLE CONTROL VALVE, HAWKEYE 2, WILGER
1	053-0159-110	ENVELOPE, PLASTIC
20	219-2005-116	O-RING, VITON, BLACK, SIZE -116
1	053-0159-106	BOX, SHIPPING
4	063-2005-003	NOZZLE CONTROL VALVE, HAWKEYE 2, WILGER


FIGURE 3. Hawkeye® 2 Case Patriot MY 2009-2016, 120'/20" Boom Kit Components (P/N 117-2005-006 Rev. A)

QTY	PART #	DESCRIPTION
1	053-0159-197	BOX, SHIPPING
1	016-0171-649	SHEET, WARRANTY/HELP
1	063-0173-956	RCM, HAWKEYE 2
1	115-2005-027	CABLE, ECU, CASE PATRIOT MY09-16, HAWKEYE 2
1	115-2005-008	CABLE, NCV POWER, 28', HAWKEYE 2
2	115-2005-006	CABLE, MID BOOM, CNH, 120' / 20", HAWKEYE 2
2	115-2005-007	CABLE, OUTER BOOM, CNH, 120' / 20", HAWKEYE 2
1	117-2005-052	KIT, HAWKEYE 2 SYSTEM SERVICE, WILGER
1	107-0172-707	BRACKET, RCM, PATRIOT, MY 09-16
1	053-0159-074	ENVELOPE, PLASTIC
2	107-0171-616	U-BOLT, SQR, 2-9/16 W x 3-1/2 L x 3/8-16 UNC
4	312-1001-164	NUT, FLANGED LOCK, 3/8-16 UNC
1	053-0159-110	ENVELOPE, PLASTIC
1	311-4050-145K	BOLT, HEX, M6-1 X 65MM, GRADE 8, CLASS II COATING
2	311-4050-147K	BOLT, HEX, M6-1 X 75MM GRADE 8, CLASS II COATING
3	312-4000-216	NUT, FLANGE, NYLOCK, M6-1, ZINC COATED
3	313-1000-046	WASHER, FLAT, M6, ZINC COATED
1	115-2005-005	CABLE, PRIMARY BOOM, CNH, 120' / 20", HAWKEYE 2
1	115-2005-005	CABLE, PRIMARY BOOM, CNH, 120' / 20", HAWKEYE 2
36	063-2005-003	NOZZLE CONTROL VALVE, HAWKEYE 2, WILGER
1	219-2005-116M	O-RING, 38 PACK, SIZE -116, BLACK
36	063-2005-003	NOZZLE CONTROL VALVE, HAWKEYE 2, WILGER
1	219-2005-116M	O-RING, 38 PACK, SIZE -116, BLACK

FIGURE 4. CAN Product Control to Hawkeye® 2 Upgrade, Case Patriot MY 2009-2016 Kit Components (P/N 117-2005-005 Rev. A)

QTY	PART #	DESCRIPTION
1	053-0159-072	BOX, SHIPPING
1	063-0173-635	ECU, ISO, CAN, BOOM SENSE SPEED
1	115-7303-115	CABLE, CASE ISO/CAN ADAPTER
1	115-7303-146	CABLE, ADAPTER, PWM VALVE

TABLE 2. Hawkeye® 2 Service Kit Components for Wilger Nozzle Bodies (P/N 117-2005-052)

Picture	Item Description	Part Number	Quantity
	Valve, Wilger Hawkeye® 2 Nozzle Control	063-2005-003	1
Not Pictured	Kit, Individual Repair, NCV2, Wilger	117-2005-062	3
Not Pictured	Cable, Hawkeye® 2 8-pin Ampseal Jumper	115-2005-070B	2
Not Pictured	O-Ring, Size -116 Black Viton (Single)	219-2005-116	1
Not Pictured	Tool, Hawkeye® 2 Universal	321-0000-490	2
Not Pictured	Relay, SPST Micro 12V N.O. 280 SRS	415-1001-020	2
Not Pictured	Fuse, Mini-Blade Type 15 Amp	510-1003-041	2

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

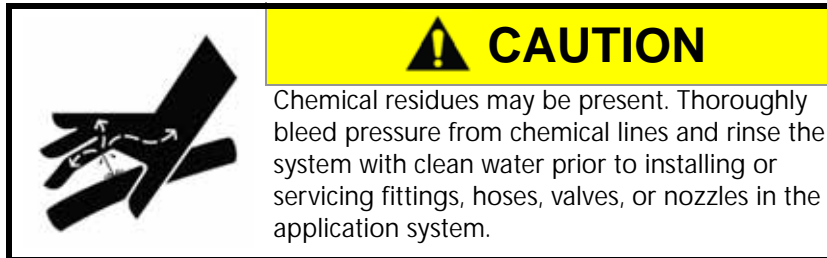
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- 016-2005-004 Rev. A
- Any comments or feedback (include chapter or page numbers if applicable).
- Let us know how long have you been using this or other Raven products.

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® 2 nozzle control system.



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

FIGURE 1. Nozzle Body Cap and Diaphragm Removed



Cap and Diaphragm
Removed

CHAPTER

4

HAWKEYE® 2 NCV AND BOOM CABLE INSTALLATION

HAWKEYE® 2 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® 2 nozzle control valve to the straight nozzle port to avoid excessive pressure drop across the nozzle.

NOZZLE CONTROL VALVE 2 INSTALLATION

1. Locate the Hawkeye® 2 NCVs and the O-rings provided with the kit.

NOTE: Wilger NCV2 and nozzle body will use the black-colored (size 116) O-rings (P/N 219-2005-116)

2. Place the O-ring on the face of the stainless valve body of the NCV2 and press the O-ring into place in the outer groove as shown in below.

FIGURE 1. Hawkeye® 2 NCV Installation



3. Remove the diaphragm check valve from the threaded port of each nozzle body as needed.
4. Align the NCV2 with the port of the nozzle body while being careful not to lose the O-ring.

NOTE: On Wilger nozzle bodies, the NCV2 should always be located on the port closest to the wet boom tube unless interferences do not allow this. This will create the least amount of stress on the nozzle body and should allow satisfactory cable routing.

5. Turn the fly nut of the NCV2 to engage the threads of the nozzle body. Tighten the fly nut using the supplied universal wrench (P/N 333-0002-490), included in the system service kit, until the NCV2 no longer rotates freely, or approximately 50 in-lbs.
6. Repeat step 1 through step 5 for each nozzle location on the spray boom.

BOOM CABLE ROUTING AND CONNECTION

BEST PRACTICES AND RECOMMENDATIONS

- Route the Hawkeye® 2 inner, mid, and outer boom cables along existing cables or plumbing to avoid cable damage.
- Route cables to avoid pinch points and to avoid stretching the cable during folding and unfolding operations. Pay special attention to cable routing near folding or break-away points.
- Route cables through existing cable retention devices as appropriate.
- When securing the inner, mid, and outer boom cables on the implement, begin at the outer boom tips. Adjust the cable position to provide sufficient slack between valve tee branches while working toward the center of the implement.
- Route the boom cables on the inside of the boom frame when possible.
- Secure cables using a zip tie at each nozzle control valve tee branch, and one between each tee branch along the cable length.

BOOM CABLE ROUTING AND CONNECTIONS (INNER, MIDDLE, AND OUTER BOOM CABLES)

1. Locate the boom cables included with the Hawkeye® 2 installation kit. There are typically six boom cables for a single system:
 - 2 inner boom cables (may be left and right specific).
 - 2 mid boom cables.
 - 2 outer boom cables.
2. On the inner boom cable, locate the end of the cable with the rotating locking collar.
3. Start with the rotating locking collar end of the cable near the center of the center rack and route the cable so the first group of 8-pin connector drops align with the group of NCVs on the center rack of the boom. The inner cable will then route over the boom pivot point, towards the end of the boom, following plumbing routing whenever possible.

FIGURE 2. Boom Cable Routing - Over Pivot



NOTE: Keep the boom connections clean and off the ground while routing.

Do not secure cables with cable ties until all cables are in place and routings are checked for pinch points and other interferences.

Ensure sufficient slack is available at fold and break-away joints to allow for full range of motion without stretching the cable.

4. Next, repeat step 1 through 3 for the inner boom cable for the opposite side.
5. Continue routing both mid and outer boom cables while aligning the 8-pin connector drops with the Hawkeye® 2 NCVs.
6. The Hawkeye® 2 boom cables may need to be routed over the mid fold joints and boom break-away joints as applicable.

FIGURE 3. Boom Cable Routing - Over Mid Fold Joint



NOTE: The connector with the rotating locking collar will always go towards the center of the machine.

7. If not already applied, apply a single, short burst of corrosion inhibitor to each electrical connection before mating the connection. Corrosion X HD (P/N 222-0000-020 or available from <http://www.corrosionx.com/corrosionx-heavy-duty.html>) is recommended.
8. Be sure the corrosion inhibitor has coated the electrical 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.

9. Once all boom cables are routed along the boom as desired, begin connecting the boom cables to the Hawkeye® 2 NCVs previously installed.

10. Use provided cable ties to secure the boom cables to the boom components as needed to ensure they are secure.

NOTE: Do not put strain on cables and connections while applying tie-downs.

Do not leave any exposed cable loops that may get caught on crops or other debris while the vehicle is in use.

11. The inner boom cables will be connected to the ECU cable in a later section.

FIGURE 4. Outer Boom Cable Section Installed



CHAPTER

5

RCM - SPRAYER MOUNTING AND CONNECTION

RCM - SPRAYER INSTALLATION

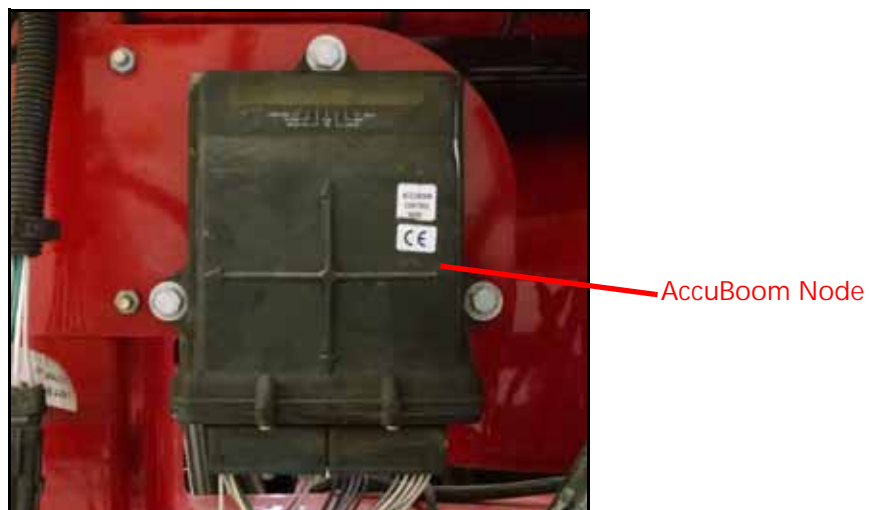
BEST PRACTICES AND RECOMMENDATIONS

- 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® 2 RCM - Sprayer with the connectors facing down toward the ground to help keep moisture from accumulating in the electrical connections.

MOUNTING PLATE PREPARATION

NOTE: If Hawkeye® is already installed on this sprayer, skip step 1 through step 4 and begin with step 5.

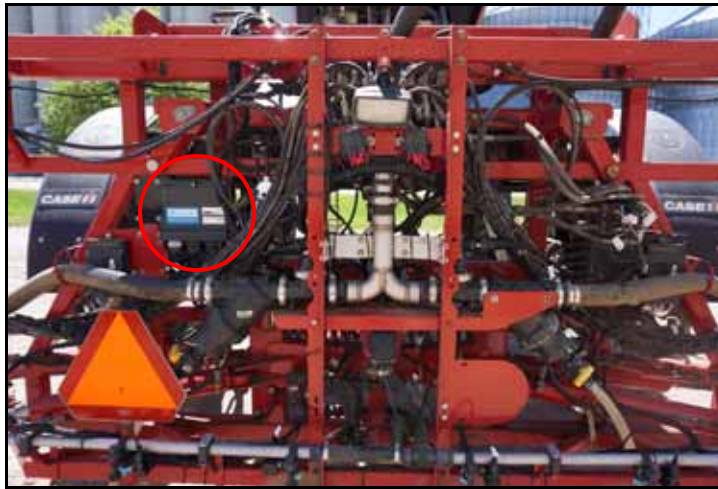
FIGURE 1. AccuBoom Node



1. Locate the existing AccuBoom node mounted to the center rack of the boom.
2. Use a socket to remove the three bolts that secure the existing AccuBoom node to the mounting plate.
3. Disconnect and remove the AccuBoom node harness.
4. Remove the two U-bolts securing the AccuBoom plate to the frame.
5. Locate the following items to mount the RCM - Sprayer:
 - RCM - Sprayer Mounting Bracket
 - 3/8" U-Bolts and Nuts
 - M6 Hex Bolts, Washers, and Nuts
 - RCM - Sprayer

6. Find the location where the RCM - Sprayer is mounted as shown in Figure 2, "RCM - Sprayer Installation Location," below. This location is on the rear center rack of the spray boom.

FIGURE 2. RCM - Sprayer Installation Location



7. Position the mounting plate against the center rack frame as shown in Figure 3, "RCM - Sprayer Mounting Plate Installed," below.
8. Secure mounting plate to the frame using the provided U-bolts and nuts.

FIGURE 3. RCM - Sprayer Mounting Plate Installed



9. Use the provided M6 hex bolts, washers, and nuts to secure the RCM - Sprayer to the mounting plate, observing the different length bolt and taller mounting boss of the RCM - Sprayer.

NOTE: Do not over-tighten the bolts.

FIGURE 4. RCM - Sprayer Secured to Mounting Plate



HAWKEYE® ECU AND POWER CABLE REMOVAL

NOTE: If Hawkeye® ISO Product Control System is installed on the sprayer, follow the steps below to remove the Hawkeye® Product Controller II ECU and ECU harness from the system. If Hawkeye® is not installed, skip this section.

1. Locate the Product Controller II (PCII) ECU mounted on the center rack of the sprayer.
2. Remove the necessary fasteners securing the PCII ECU to the mounting plate.
3. Disconnect the four 12-pin Deutsch DT connectors from the PCII ECU.
4. Remove the PCII mounting plate from the machine and set aside.
5. Follow the PCII ECU cable to each of its connections, including left/right boom cables, flow/pressure and valve connections, ISObus, logic power, and section valves, and disconnect all connections.
6. Remove and set aside the PCII ECU harness.
7. Locate and remove the Hawkeye® high current power cable routed from the PCII ECU cable (previously disconnected) up to the battery of the machine.

RCM - SPRAYER CABLE INSTALLATION

1. Locate the Hawkeye® 2 RCM - Sprayer harness (115-2005-027).
2. Locate the three RCM - Sprayer connectors (two black, one gray) on the cable and connect these to the RCM - Sprayer connections as shown in Figure 5, "RCM - Sprayer Connections," below.

NOTE: Press firmly to ensure that the connectors latch into place.

FIGURE 5. RCM - Sprayer Connections



3. Connect the two-pin plug and receptacle of the RCM - Sprayer cable, labeled "HC PWR/GND," to gray plug and receptacle on the machine harness.

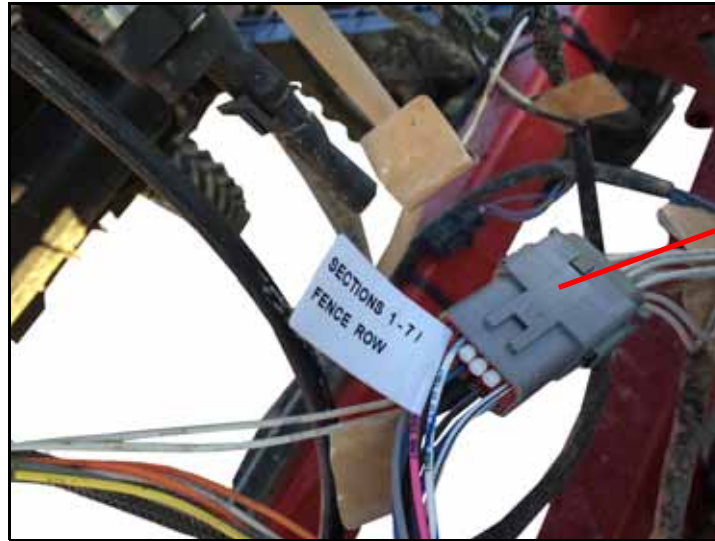
FIGURE 6. RCM - Sprayer Power/Ground and ISObus Connections



4. Locate the 12-pin gray connector labeled Sections 1-9 / Fence Row and connect it to the machine harness.

NOTE: The number of sections may vary.

FIGURE 7. 12-Pin Fence Row Connector



Section and
Fence Row Valve
Connection

5. Locate the four-pin plug on the CAN tee cable (115-7303-115) that was previously connected to the original Hawkeye® ECU cable.

NOTE: If Hawkeye® was not previously installed on the machine, the 117-2005-005 kit, CAN Product Control to Hawkeye® 2 Upgrade, Case Patriot MY 2009-2016, will be needed to route an ISObus up to the field computer in the cab.

FIGURE 8. Four-Pin from RCM- Sprayer Harness

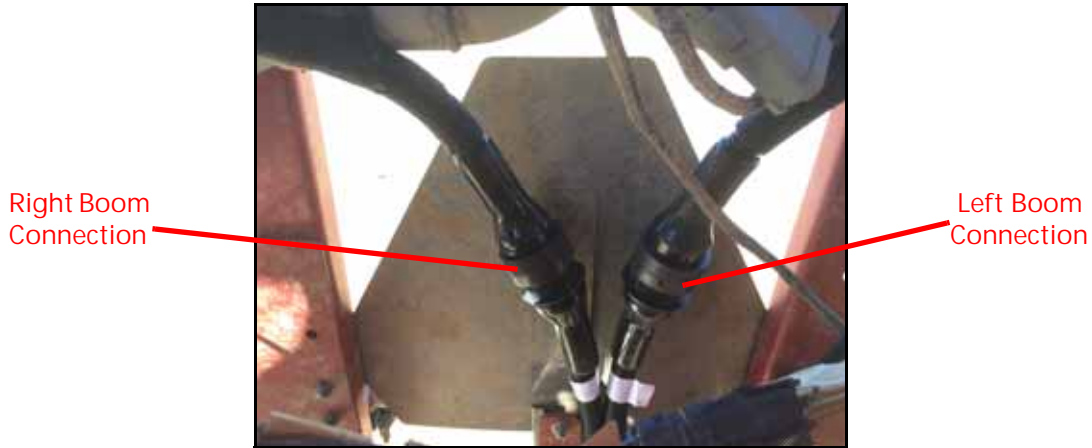


From Cab

Four-Pin
from RCM -
Sprayer
Harness

6. Connect the left and right inner boom cables that were routed towards the center rack in Chapter 4, *Hawkeye® 2 NCV and Boom Cable Installation*, to the two round mating connections on the Hawkeye® 2 RCM - Sprayer cable (P/N 115-2005-027).

FIGURE 9. Boom Cable Connections



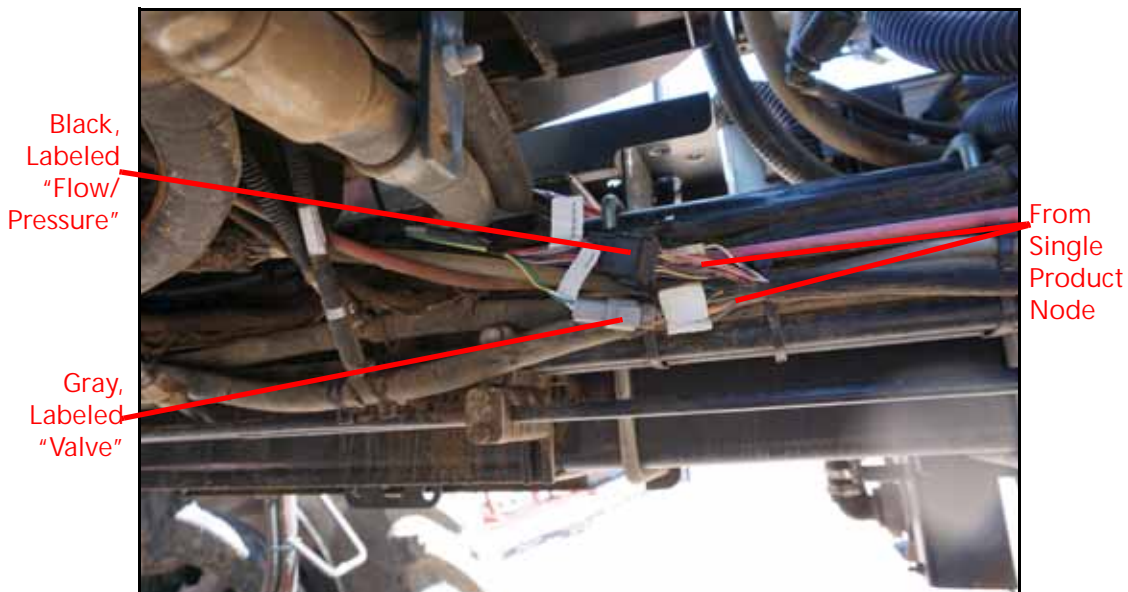
NOTE: Observe the left and right connector ID tags on the cable.

7. Locate the two 12-pin mini Deutsch receptacles, labeled "Flow/Pressure" and "Valve," on the Hawkeye® 2 RCM - Sprayer harness (115-2005-027) and route them over the center rack and along the left frame rail towards the cab.

NOTE: Follow existing cables and power wires.

8. Locate and disconnect the existing black and gray single product node connections along the left frame rail. If Hawkeye® was previously installed, these would have been connected to the Hawkeye® ECU harness previously removed.
9. Connect the 12-pin mini-Deutsch receptacles of the Hawkeye® 2 RCM - Sprayer harness (P/N 115-2005-027) to the gray and black plugs along the left frame rail.

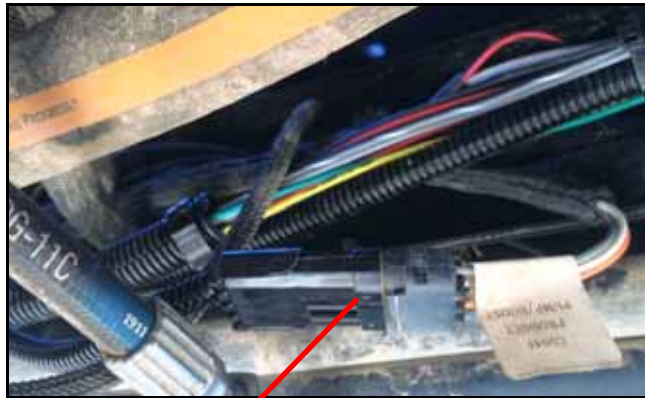
FIGURE 10. 12-Pin Mini Receptacles



IMPORTANT: The following steps to remove the boost box are only necessary if Hawkeye® was not previously installed on the machine. If Hawkeye® was not previously installed, the CAN Product Control to ISO Upgrade Kit (P/N 117-2005-005), will be required.

10. Locate the machine boost box located near the single product node.
11. Un-install the boost box from the machine. One end is connected to the PWM valve and the other end is connected to the machine chassis harness.

FIGURE 11. Installed Boost Box



Chassis Harness Connect



PWM Valve Connection

12. Install the 115-7303-146 as a jumper to replace the boost box wiring.

HAWKEYE® 2 NCV POWER ELECTRICAL CONNECTION

1. Connect the black ground cable from the Hawkeye® 2 power cable (115-2005-008) to the main disconnect on the inside right rear of the battery box as shown in Figure 12, "NCV2 High Current Power Battery Box Connections," below.

FIGURE 12. NCV2 High Current Power Battery Box Connections



2. Route the Hawkeye® 2 power cable through one of the battery box pass-through holes and to the inside right frame rail and lower center rack linkage to the RCM - Sprayer cable.

NOTE: Follow existing hoses and wires.

FIGURE 13. NCV HC Power Cable



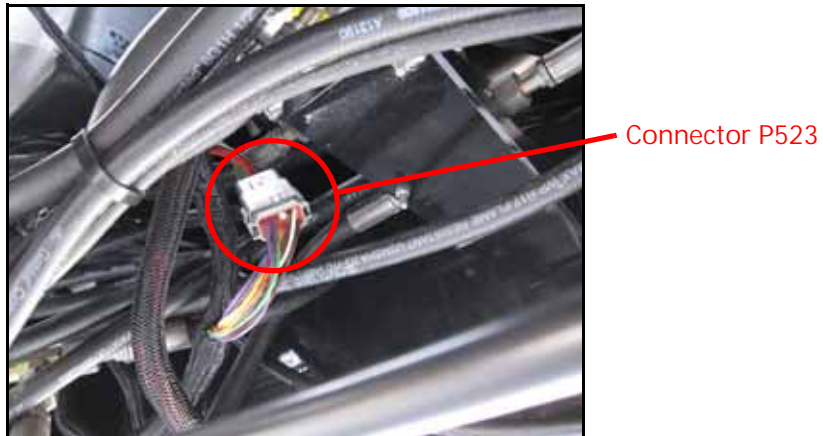
3. Connect the round 3-pin plug to the mating receptacle on the Hawkeye® 2 RCM - Sprayer cable (P/N 115-2005-027).
4. Connect positive cable from the Hawkeye® 2 power cable (P/N 115-2005-008) to the positive battery post terminal.

IMPORTANT: Ensure the rubber isolators are installed on the circuit breaker posts and secure the circuit breaker so that the posts cannot come into contact with metal or the battery posts.

5. Secure to the sprayer chassis with cable ties.

NON-ACCUBOOM MACHINES WITHOUT HAWKEYE® PREVIOUSLY INSTALLED - CONNECT THE FENCE ROW NOZZLE

FIGURE 14. **Fence Row Nozzle Connection**



1. Locate and disconnect the 12-pin Deutsch Case boom cable connection, located directly behind the cab.

FIGURE 15. **Fence Row Adapter Cable Installed**



2. Connect the fence row adapter cable (P/N 115-1001-048) to the corresponding connections on the machine's harness cable.

CHAPTER

6

CAB PREPARATION AND WIRING - NON-HAWKEYE® MACHINES ONLY

NOTE: This chapter is only needed for machines that did not previously have Hawkeye® Product Control installed. This chapter will require CAN Product Control to ISO Upgrade Kit (P/N 117-2005-005).

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.

CAB CONNECTIONS

FOR CLASS 3XX0 MACHINES

1. Remove the packing net located near the floor at the back of the cab.

FIGURE 1. Packing Net



2. Take off the wing nuts securing the SmarTrax node and mounting plate (if applicable) to the back of the cab.

3. Lay the SmarTrax node and mounting plate to the side. Keep the node connected to the cabling.

FIGURE 2. SmarTrax Node on Mounting Plate



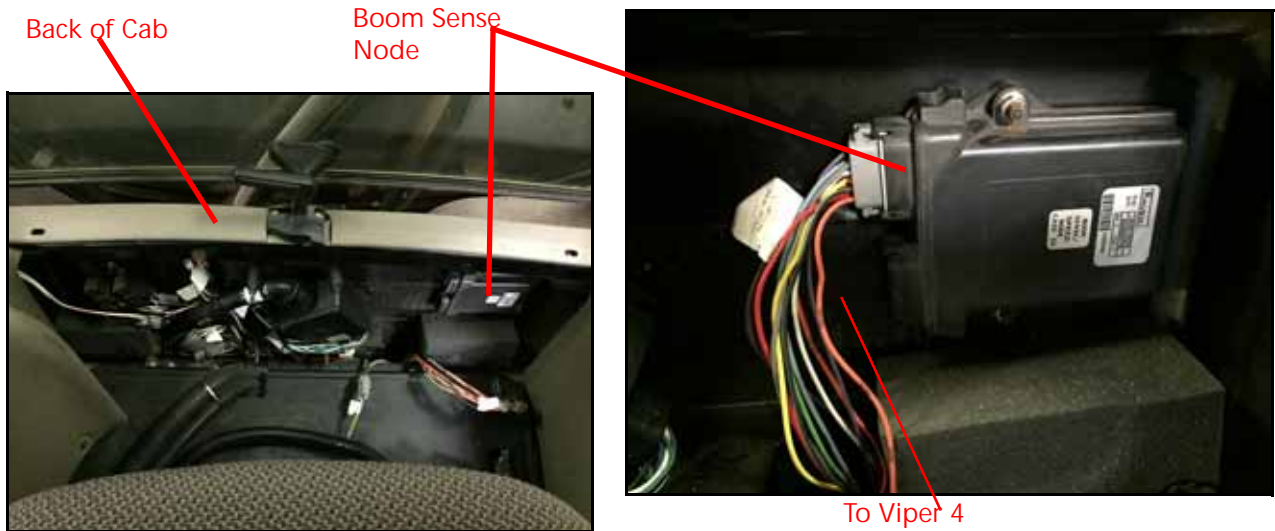
4. Remove the two standoffs that supported the mounting plate.
5. Remove the cover plate.
6. Loosen the four quarter-turn knobs that secure the back panel to the back of the cab.

FIGURE 3. Quarter-Turn Latches for Back Panel



7. Locate the boom sense node.

FIGURE 4. Boom Sense Node



8. Remove the two nuts that secure the boom sense node to the back of the cab.
9. Install the new ISO boom sense node to the location the original boom sense node was mounted.
10. Disconnect gray connector from the original boom sense node and install it in the top gray connector on the new ISO boom sense node.
11. Disconnect the black plug from the original boom sense node. This will not be used for the Hawkeye® 2 installation.
12. Connect the black 12-pin connector on the 115-7303-115 cable and connect it to the bottom black connector of the new ISO sense node.
13. Route the round black seven pin plug on the 115-7303-115 to the back of the Viper 4 and connect it to port 5.
14. Locate the cable feed through in the back cab window.

FIGURE 5. Feed Through in Back Window



15. Route the four-pin can connector out of the cab towards the rear of the sprayer. This will connect to the RCM - Sprayer cable (115-2005-027).
16. Reinstall the back panel, cover, SmarTrax node (if applicable) and package net.

FOR CLASS 4XX0 MACHINES

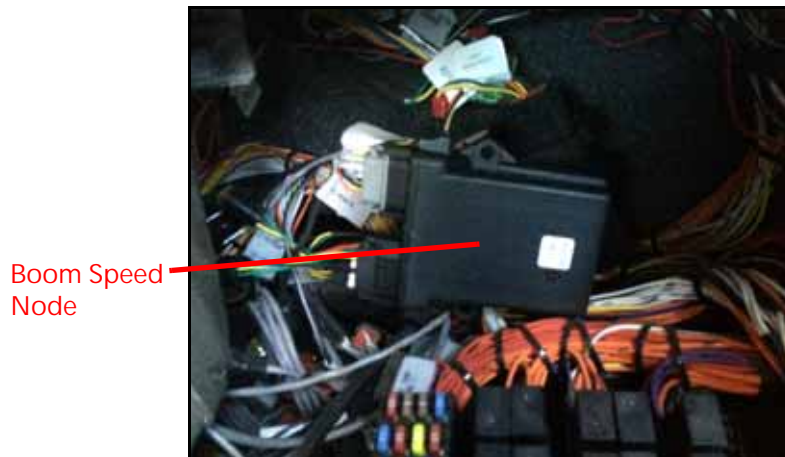
1. Lift the instructional seat cushion and remove any contents.

FIGURE 6. Instruction Seat



2. Remove the plastic compartment.
3. Locate the boom speed node near the back wall of the cab.

FIGURE 7. Boom Speed Node



4. Install the new ISO boom sense node to the location the original boom sense node was mounted.
5. Disconnect gray connector from the original boom sense node and install it in the gray receptacle on the new ISO boom sense node.
6. Disconnect the black plug from the original boom sense node. This will not be used with the Hawkeye® 2 installation.
7. Locate the black 12-pin connector on the 115-7303-115 cable and connect it to the black receptacle on the new ISO boom sense node.

8. Remove the rear vent cover at the back of the cab for access to route cables.

FIGURE 8. Vent Cover



9. Route the remaining connectors on the 115-7303-115 cable to the right side of the cab.
10. Feed the four-pin plug through the foam pass-through and out of the cab and towards the back of the sprayer.
11. Feed the seven-pin towards the right-front of the cab.
12. Reinstall the vent cover.
13. Connect the round black seven-pin plug to port number five on the back of the Viper 4.

LEAK TEST

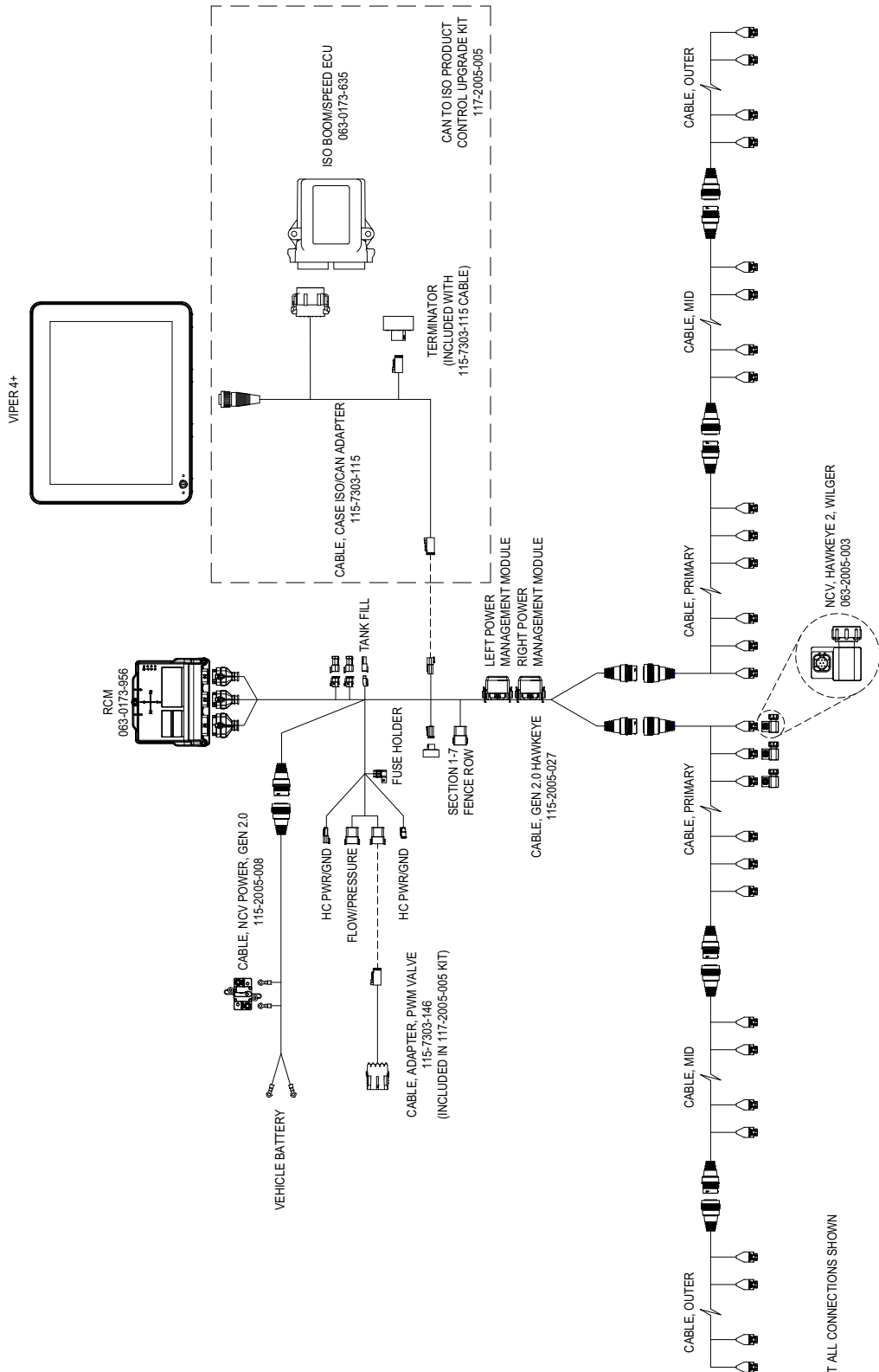
After installation is complete, a leak test is recommended to verify the NCV2s and seals are installed correctly.

1. Complete the Hawkeye® 2 calibration wizard. Refer to the Hawkeye® 2 Calibration and Operations Manual as necessary.
2. With flushed plumbing and water in the tank, set the system boom pressure to 40 psi.
3. Visually observe for any leaks in any components of the machine.
4. If leaks are observed, turn off the sprayer pump and open a boom section to bleed down the pressure to 0 psi.
5. Verify the NCV2 seals are properly installed and the NCV fly nut is tight.
6. Then, repeat step 2 through 5 as necessary until no leaks are observed.

SYSTEM DIAGRAM

The example below is a generic system diagram and is for reference purposes only.

KIT PART NUMBER	SYSTEM DESCRIPTION	NCV TOTAL	CABLE, PRIMARY	CABLE, MID	CABLE, OUTER
117-2005-006	PATRIOT, 120/20" BOOM, WILGER	72	115-2005-005	115-2005-006	115-2005-007
117-2005-220	PATRIOT, 100/20" BOOM, WILGER	60	115-2005-120	115-2005-121	115-2005-122
117-2005-221	PATRIOT 90/20" BOOM, WILGER	54	115-2005-120	115-2005-121	115-2005-206



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® 2 BOOM HARNESS CONNECTOR MAINTENANCE

NOTE: The electrical connection of the Hawkeye® 2 NCVs should come with CorrosionX HD pre-applied and protected with a dust cap. Verify the pins are coated adequately with CorrosionX HD when removing the dust caps from the NCV.

Prior to connecting the Hawkeye® 2 boom cable to the Nozzle Control Valves (NCV), perform the following steps to all 8-pin NCV connectors and 19-pin circular connectors between the boom cables and RCM - Sprayer 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® 2 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)).

FIGURE 1. Deoxidizing Agent Applied to Connection



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

FIGURE 2. Connection Contact Cleaning



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.

FIGURE 3. Compressed Air Applied for Drying



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).

FIGURE 4. Corrosion Inhibitor Check



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.