

# Hawkeye® 2 Installation Manual for ET Apache Sprayers MY 2017+

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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.

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## 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.





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**MAKE AND MODEL COMPATIBILITY**

Hawkeye® 2 is a pressure-based product control system which 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 Type	Boom Width	Kit Number	
Model Year 17 & 18: 720 730 840 1020 1025 1030 1040 1220 1230 1240	TeeJet	15"	Standard	60'/90'	117-2005-178	
				90'	117-2005-180	
				100'	117-2005-182	
			Pommier	100'	117-2005-184	
				120'	117-2005-186	
				132'	N/A	
		20"	Standard	60'/90'	117-2005-179	
				90'	117-2005-181	
			Pommier	100'	117-2005-183	
				100'	117-2005-185	
				Pommier	120'	117-2005-187
					132'	117-2005-189

TABLE 2. Compatible Equipment Information

Make and Model	Nozzle Body Type	Nozzle Spacing	Boom Type	Boom Width	Kit Number
Model Year 19+:	Wilger	15"	Standard	60'/90'	117-2005-132
				90'	117-2005-134
				100'	117-2005-136
			Pommier	100'	117-2005-138
				120'	117-2005-140
				132'	N/A
		20"	Standard	60'/90'	117-2005-133
				90'	117-2005-135
				100'	117-2005-137
			Pommier	100'	117-2005-139
				120'	117-2005-130
				132'	117-2005-131
	TeeJet	15"	Standard	60'/90'	117-2005-143
				90'	117-2005-145
				100'	117-2005-147
			Pommier	100'	117-2005-149
				120'	117-2005-151
				132'	N/A
		20"	Standard	60'/90'	117-2005-144
				90'	117-2005-146
				100'	117-2005-148
			Pommier	100'	117-2005-150
				120'	117-2005-141
				132'	117-2005-142
Hypro/Arag	15"	Standard	60'/90'	117-2005-156	
			90'	117-2005-158	
			100'	117-2005-160	
		Pommier	100'	117-2005-162	
			120'	117-2005-164	
			132'	N/A	
	20"	Standard	60'/90'	117-2005-157	
			90'	117-2005-159	
			100'	117-2005-161	
		Pommier	100'	117-2005-163	
			120'	117-2005-154	
			132'	117-2005-155	

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## INSTALLATION OVERVIEW

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

1. Confirm Hawkeye® 2 kit contents. See “Kit Contents” on page 8.
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. Route and connect the inner, mid, and outer boom cables (as applicable).
6. Mount the RCM - Sprayer.
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

TABLE 3. Kit Contents for ET Apache Equipment with Wilger Nozzle Bodies

Item Description	Part Number	Qty.										
		117-2005-										
		132	134	136	138	140	133	135	137	139	130	131
Sheet, Warranty/ Help	016-0171-649	1	1	1	1	1	1	1	1	1	1	1
RCM - Sprayer	063-0173-956	1	1	1	1	1	1	1	1	1	1	1
Cable, NCV Power, Hawkeye 2, Apache Sprayers	115-2005-091	1	1	1	1	1	1	1	1	1	1	1
Cable, Adapter, ISO PCII to RCM	115-2005-095	1	1	1	1	1	1	1	1	1	1	1
Cable, Mid 60/90 15" Spacing Apache STD Boom	115-2005-155	2										
Cable, Mid 60/90 15" Spacing Apache STD Boom	115-2005-148		2									
Cable, Mid 100/ 15" SPacing Apache STD Boom	115-2005-150			2								
Cable, Outer 60/ 90 15" Spacing Apache STD Boom	115-2005-149	2	2	2								
Cable, Mid 100/ 15" Spacing Apache Pommier Boom	115-2005-145				2							
Cable, Mid 100/ 15" Spacing Apache Pommier Boom	115-2005-102					2						
Cable, Outer 100/15" Spacing Apache Pommier Boom	115-2005-103				2	2						
Cable, Mid 60/ 90' 20" Spacing Apache STD Boom	115-2005-075						2					

Item Description	Part Number	Qty.											
		117-2005-											
		132	134	136	138	140	133	135	137	139	130	131	
Cable, Outer 60'/ 90' 20" Spacing Apache STD Boom	115-2005-076						2						
Cable, Mid 90'/ 20" Spacing Apache STD Boom	115-2005-156							2					
Cable, Outer 90'/ 20" Spacing Apache STD Boom	115-2005-157							2					
Cable, Mid 100'/ 20" Spacing Apache STD Boom	115-2005-142								2				
Cable, Mid 100'/ 20" Spacing Appache Pommier Boom	115-2005-134									2			
Cable, Mid, Apache 120'/20", Hawkeye 2	115-2005-089										2		
Cable, Mid, Apache, 132'/ 20", Hawkeye 2	115-2005-093												2
Cable, Outer Pommier 20" Spacing Apache Boom	115-2005-090									2	2	2	2
Kit, Hawkeye 2 System Service, Wilger	117-2005-052	1	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 130MM, A2-70 Stainless (304)	311-4053-158	1	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 140MM, A2-70 Stainless (304)	311-4053-159	2	2	2	2	2	2	2	2	2	2	2	2
Spacer, 1/4 ID x 1/2 OD x 1/2 L, Nylon Black	305-1001-009	1	1	1	1	1	1	1	1	1	1	1	1

Item Description	Part Number	Qty.										
		117-2005-										
		132	134	136	138	140	133	135	137	139	130	131
Washer, M6, Flat, 304 SS	313-6000-011	6	6	6	6	6	6	6	6	6	6	6
Nut, M6, Nylock, 304 SS	312-6001-019	3	3	3	3	3	3	3	3	3	3	3
Hex Bolt, DIN931, M6 X 70MM, A2-70 Stainless (304)	311-4053-146	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 80MM, A2-70 Stainless (304)	311-4053-148	2	2	2	2	2	2	2	2	2	2	2
Nozzle Control Valve, Hawkeye 2, Wilger	063-2005-003	73	73	81	81	97	54	54	62	60	72	80
O-Ring, Viton, Black, Size -116	219-2005-116	2	2	11	11	27	20	20	28	26		9
O-Ring, 38-Pack, Viton, Black, Size -166	219-2005-116M	2	2	2	2	2	1	1	1	1	2	2
Cable, Left Inner 90-100/15 Apache	115-2005-146	1	1									
Cable, Right Inner 90-100/15 Apache	115-2005-147	1	1									
Cable, Left Inner 90-100/15 Apache	115-2005-146			1								
Cable, Right Inner 90-100/15 Apache	115-2005-147			1								
Cable, Left Inner 100/15 Apache	115-2005-143				1							
Cable, Right Inner 100/15 Apache	115-2005-144				1							
Cable, Left Inner 120/15 Apache	115-2005-100					1						
Cable, Right Inner 120/15 Apache	115-2005-101					1						
Cable, Inner 60'-90'/20" Apache	115-2005-074						2	2				

Item Description	Part Number	Qty.										
		117-2005-										
		132	134	136	138	140	133	135	137	139	130	131
Cable, Inner 100'/20" Apache	115-2005-141								2			
Cable, Inner 100'/20" Apache	115-2005-133									2		
Cable, Inner, Apache, 120'/ 20", Hawkeye 2	115-2005-088										2	
Cable, Inner, Apache, 132'/ 20", Hawkeye 2	115-2005-092											2

TABLE 4. Kit Contents for ET Apache Equipment with TeeJet (MY 17 & 18) Nozzle Bodies

Item Description	Part Number	Qty.										
		117-2005-										
		178	180	182	184	186	179	181	183	185	187	189
Sheet, Warranty/ Help	016-0171-649	1	1	1	1	1	1	1	1	1	1	1
RCM - Sprayer	063-0173-956	1	1	1	1	1	1	1	1	1	1	1
Cable, NCV Power, 28', Hawkeye 2	115-2005-008	1	1	1	1	1	1	1	1	1	1	1
Cable, ECU, Apache Sprayers	115-7303-143	1	1	1	1	1	1	1	1	1	1	1
Cable, Adapter, ISO PCII to RCM	115-2005-095	1	1	1	1	1	1	1	1	1	1	1
Cable, Mid 60'/ 90' 15" Spacing Apache STD Boom	115-2005-155	2										
Cable, Mid 90/ 15", Apache, STD Boom, Hawkeye 2	115-2005-148		2									
Cable, Mid 100/ 15" Spacing Apache STD Boom	115-2005-150			2								

Item Description	Part Number	Qty.										
		117-2005-										
		178	180	182	184	186	179	181	183	185	187	189
Cable, Outer 90'/100'/15" Spacing Apache STD Boom	115-2005-149	2	2	2								
Cable, Mid 100'/15" Spacing Apache Pommier Boom	115-2005-145				2							
Cable, Mid 100'/15" Spacing Apache Pommier Boom	115-2005-102					2						
Cable, Outer 100'/15" Spacing Apache Pommier Boom	115-2005-103				2	2						
Cable, Mid 60'/90' 20" Spacing Apache STD Boom	115-2005-075						2					
Cable, Outer 60'/90' 20" Spacing Apache STD Boom	115-2005-076						2					
Cable, Mid 90'/20" Spacing Apache STD Boom	115-2005-156							2				
Cable, Outer 90'/20" Spacing Apache STD Boom	115-2005-157							2				
Cable, Mid 100'/20" Spacing Apache STD Boom	115-2005-142								2			
Cable, Mid 100'/20" Spacing Apache Pommier Boom	115-2005-134									2		
Cable, Mid, Apache, 120'/20", Hawkeye 2	115-2005-089										2	



Item Description	Part Number	Qty.											
		117-2005-											
		178	180	182	184	186	179	181	183	185	187	189	
Cable, Mid, Apache, 132'/20", Hawkeye 2	115-2005-093												2
Cable, Outer Pommier 20" Spacing Apache Boom	115-2005-090								2	2	2	2	
Kit, Hawkeye 2 System Service, TeeJet	117-2005-050	1	1	1	1	1	1	1	1	1	1	1	1
Cable, ECU, Generic, Hawkeye 2	115-2005-001	1	1	1	1	1	1	1	1	1	1	1	1
Dust Cap, Size 24, HDP20, Receptical	408-4002-333	2	2	2	2	2	2	2	2	2	2	2	2
Hex Bolt, DIN931, M6 X 130MM, A2-70 Stainless (304)	311-4053-158	1	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 140MM, A2-70 Stainless (304)	311-4053-159	2	2	2	2	2	2	2	2	2	2	2	2
Spacer, 1/4 ID x 1/2 OD x 1/2 L, Nylon Black	305-1001-009	1	1	1	1	1	1	1	1	1	1	1	1
Washer, M6, Flat, 304 SS	313-6000-011	6	6	6	6	6	6	6	6	6	6	6	6
Nut, M6, Nylock, 304 SS	312-6001-019	3	3	3	3	3	3	3	3	3	3	3	3
Hex Bolt, DIN931, M6 X 70MM, A2-70 Stainless (304)	311-4053-146	1	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 80MM, A2-70 Stainless (304)	311-4053-148	2	2	2	2	2	2	2	2	2	2	2	2
Nozzle Control Valve, Hawkeye 2, TeeJet	063-2005-001	73	73	81	81	97	54	54	62	60	72	80	
O-Ring, Viton, Black, Size -116	219-2005-116	2	2	11	11	27	20	20	28	26		9	

Item Description	Part Number	Qty.										
		117-2005-										
		178	180	182	184	186	179	181	183	185	187	189
O-Ring, Viton, Purple Coated, Size -115	219-2005-115	2	2	11	11	27	20	20	28	26		9
O-Ring, 38-Pack Viton, Black, Size -116	219-2005-116M	2	2	2	2	2	1	1	1	1	2	2
O-Ring, 38-Pack, Viton, Purple Coated, Size -115	219-2005-115M	2	2	2	2	2	1	1	1	1	2	2
Cable, Left Inner 90-100/15 Apache	115-2005-146	1	1	1								
Cable, Right Inner 90-100/15 Apache	115-2005-147	1	1	1								
Cable, Left Inner 100/15 Apache	115-2005-143				1							
Cable, Right Inner 100/15 Apache	115-2005-144				1							
Cable, Left Inner 120/15 Apache	115-2005-100					1						
Cable, Right Inner 120/15 Apache	115-2005-101					1						
Cable, Inner 60'/90' 20" Apache	115-2005-074						2	2				
Cable, Inner 100'/20" Apache	115-2005-141								2			
Cable, Inner 100'/20" Apache	115-2005-133									2		
Cable, Apache, 120'/20", Hawkeye 2	115-2005-088										2	
Cable, Inner, Apache, 132'/20", Hawkeye 2	115-2005-092											2

TABLE 5. Kit Contents for ET Apache Equipment with TeeJet (MY 17+) Nozzle Bodies

Item Description	Part Number	Qty.										
		117-2005-										
		143	145	147	149	151	144	146	148	150	141	142
Sheet, Warranty/Help	016-0171-649	1	1	1	1	1	1	1	1	1	1	1
RCM - Sprayer	063-0173-956	1	1	1	1	1	1	1	1	1	1	1
Cable, NCV Power, Hawkeye 2, Apache Sprayers	115-2005-091	1	1	1	1	1	1	1	1	1	1	1
Cable, Adapter, ISO PCII to RCM	115-2005-095	1	1	1	1	1	1	1	1	1	1	1
Cable, Mid 60'/90' 15" Spacing Apache STD Boom	115-2005-155	2										
Cable, Mid 60/90 15" Spacing Apache STD Boom	115-2005-148		2									
Cable, Mid 100/15" Spacing Apache STD Boom	115-2005-150			2								
Cable, Outer 90'/100'/15" Spacing Apache STD Boom	115-2005-149	2	2	2								
Cable, Mid 100/15" Spacing Apache Pommier Boom	115-2005-145				2							
Cable, Mid 100/15" Spacing Apache Pommier Boom	115-2005-102					2						
Cable Outer 100/15" Spacing Apache Pommier Boom	115-2005-103				2	2						
Cable, Mid 60'/90' 20" Spacing Apache STD Boom	115-2005-075						2					

Item Description	Part Number	Qty.										
		117-2005-										
		143	145	147	149	151	144	146	148	150	141	142
Cable, Outer 60'/ 90'/20" Spacing Apache STD Boom	115-2005-076						2					
Cable, Mid 90'/ 20" Spacing Apache STD Boom	115-2005-156							2				
Cable, Outer 90'/ 20" Spacing Apache STD Boom	115-2005-157							2				
Cable, Mid 100'/ 20" Spacing Apache STD Boom	115-2005-142								2			
Cable, Mid 100'/ 20" Spacing Apache Pommier Boom	115-2005-134									2		
Cable, Mid, Apache, 120'/ 20", Hawkeye 2	115-2005-089										2	
Cable, Mid, Apache, 132'/ 20", Hawkeye 2	115-2005-093											2
Cable, Outer Pommier 20" Spacing Apache Boom	115-2005-090								2	2	2	2
Kit, Hawkeye 2 System Service, TeeJet	117-2005-050	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 130MM, A2-70 Stainless (304)	311-4053-158	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 140MM, A2-70 Stainless (304)	311-4053-159	2	2	2	2	2	2	2	2	2	2	2
Spacer, 1/4 ID x 1/2 OD x 1/2 L, Nylon Black	305-1001-009	1	1	1	1	1	1	1	1	1	1	1

Item Description	Part Number	Qty.										
		117-2005-										
		143	145	147	149	151	144	146	148	150	141	142
Washer, M6, Flat, 304 SS	313-6000-011	6	6	6	6	6	6	6	6	6	6	6
Nut, M6, Nylock, 304 SS	312-6001-019	3	3	3	3	3	3	3	3	3	3	3
Hex Bolt, DIN931, M6 X 70MM, A2-70 Stainless (304)	311-4053-146	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 80MM, A2-70 Stainless (304)	311-4053-148	2	2	2	2	2	2	2	2	2	2	2
Nozzle Control Valve, Hawkeye 2, TeeJet	063-2005-001	73	73	81	81	97	54	54	62	60	72	80
O-Ring, Viton, Black, Size -116	219-2005-116	2	2	11	11	27	20	20	28	26		9
O-Ring, Viton, Purple Coated, Size -115	219-2005-115	2	2	11	11	27	20	20	28	26		9
O-Ring, 38-Pack Viton, Black, Size -116	219-2005-116M	2	2	2	2	2	1	1	1	1	2	2
O-Ring, 38-Pack, Viton, Purple Coated, Size -115	219-2005-115M	2	2	2	2	2	1	1	1	1	2	2
Cable, Left Inner 90-100/15 Apache	115-2005-146	1	1	1								
Cable, Right Inner 90-100/15 Apache	115-2005-147	1	1	1								
Cable, Left Inner 100/15 Apache	115-2005-143				1							
Cable, Right Inner 100/15 Apache	115-2005-144				1							
Cable, Left Inner 120/15 Apache	115-2005-100					1						
Cable, Right Inner 120/15 Apache	115-2005-101					1						

Item Description	Part Number	Qty.										
		117-2005-										
		143	145	147	149	151	144	146	148	150	141	142
Cable, Inner 60'/90' 20" Apache	115-2005-074						2	2				
Cable, Inner 100'/20" Apache	115-2005-141								2			
Cable, Inner 100'/20" Apache	115-2005-133									2		
Cable, Apache, 120'/20", Hawkeye 2	115-2005-088										2	
Cable, Inner, Apache, 132'/20", Hawkeye 2	115-2005-092											2

TABLE 6. Kit Contents for ET Apache Equipment with Arag/Hydro Nozzle Bodies

Item Description	Part Number	Qty.										
		117-2005-										
		156	158	160	162	164	157	159	161	163	154	155
Sheet, Warranty/Help	016-0171-649	1	1	1	1	1	1	1	1	1	1	1
RCM - Sprayer	063-0173-956	1	1	1	1	1	1	1	1	1	1	1
Cable, NCV Power, Hawkeye 2, Apache Sprayers	115-2005-091	1	1	1	1	1	1	1	1	1	1	1
Cable, Adapter, ISO PCII to RCM	115-2005-095	1	1	1	1	1	1	1	1	1	1	1
Cable, Mid 60'/90' 15" Spacing Apache STD Boom	115-2005-155	2										
Cable, Mid 60/90 15" Spacing Apache STD Boom	115-2005-148		2									
Cable, Mid 100/15" Spacing Apache STD Boom	115-2005-150			2								

Item Description	Part Number	Qty.												
		117-2005-												
		156	158	160	162	164	157	159	161	163	154	155		
Cable, Outer 90'/100'/15" Spacing Apache STD Boom	115-2005-149	2	2	2										
Cable, Mid 100'/15" Spacing Apache Pommier Boom	115-2005-145				2									
Cable, Mid 100'/15" Spacing Apache Pommier Boom	115-2005-102					2								
Cable Outer 100'/15" Spacing Apache Pommier Boom	115-2005-103				2	2								
Cable, Mid 60'/90' 20" Spacing Apache STD Boom	115-2005-075							2						
Cable, Outer 60'/90'/20" Spacing Apache STD Boom	115-2005-076							2						
Cable, Mid 90'/20" Spacing Apache STD Boom	115-2005-156								2					
Cable, Outer 90'/20" Spacing Apache STD Boom	115-2005-157								2					
Cable, Mid 100'/20" Spacing Apache STD Boom	115-2005-142									2				
Cable, Mid 100'/20" Spacing Apache Pommier Boom	115-2005-134										2			
Cable, Mid, Apache, 120'/20", Hawkeye 2	115-2005-089											2		

Item Description	Part Number	Qty.											
		117-2005-											
		156	158	160	162	164	157	159	161	163	154	155	
Cable, Mid, Apache, 132' / 20", Hawkeye 2	115-2005-093												2
Cable, Outer Pommier 20" Spacing Apache Boom	115-2005-090									2	2	2	2
Kit, Hawkeye 2 System Service, Arag/Hypro	117-2005-051	1	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 130MM, A2-70 Stainless (304)	311-4053-158	1	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 140MM, A2-70 Stainless (304)	311-4053-159	2	2	2	2	2	2	2	2	2	2	2	2
Spacer, 1/4 ID x 1/2 OD x 1/2 L, Nylon Black	305-1001-009	1	1	1	1	1	1	1	1	1	1	1	1
Washer, M6, Flat, 304 SS	313-6000-011	6	6	6	6	6	6	6	6	6	6	6	6
Nut, M6, Nylock, 304 SS	312-6001-019	3	3	3	3	3	3	3	3	3	3	3	3
Hex Bolt, DIN931, M6 X 70MM, A2-70 Stainless (304)	311-4053-146	1	1	1	1	1	1	1	1	1	1	1	1
Hex Bolt, DIN931, M6 X 80MM, A2-70 Stainless (304)	311-4053-148	2	2	2	2	2	2	2	2	2	2	2	2
Nozzle Control Valve, Hawkeye 2, Arag/Hypro	063-2005-002	73	73	81	81	97	54	54	62	60	72	80	
O-Ring, Viton, Purple Coated, Size -115	219-2005-115	2	2	11	11	27	20	20	28	26			9
O-Ring, 38-Pack, Viton, Purple Coated, Size -115	219-2005-115M	2	2	2	2	2	1	1	1	1	2		2



Item Description	Part Number	Qty.										
		117-2005-										
		156	158	160	162	164	157	159	161	163	154	155
Cable, Left Inner 90-100/15 Apache	115-2005-146	1	1	1								
Cable, Right Inner 90-100/15 Apache	115-2005-147	1	1	1								
Cable, Left Inner 100/15 Apache	115-2005-143				1							
Cable, Right Inner 100/15 Apache	115-2005-144				1							
Cable, Left Inner 120/15 Apache	115-2005-100					1						
Cable, Right Inner 120/15 Apache	115-2005-101					1						
Cable, Inner 60'/90' 20" Apache	115-2005-074						2	2				
Cable, Inner 100'/20" Apache	115-2005-141								2			
Cable, Inner 100'/20" Apache	115-2005-133									2		
Cable, Apache, 120'/20", Hawkeye 2	115-2005-088										2	
Cable, Inner, Apache, 132'/20", Hawkeye 2	115-2005-092											2

TABLE 7. Hawkeye® 2 Service Kit Components for TeeJet Nozzle Bodies (P/N 117-2005-050)

Picture	Item Description	Part Number	Quantity
	Valve, TeeJet Hawkeye® 2 Nozzle Control	063-2005-001	1
Not Pictured	Kit, TeeJet Hawkeye® 2 Valve Seal	117-2005-060	3
Not Pictured	Cable, Hawkeye® 2 8-pin Ampseal Jumper	115-2005-070B	2
Not Pictured	O-Ring, Size -115 Purple Viton (Single)	219-2005-115	1
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

TABLE 8. Hawkeye® 2 Service Kit Components for Hypro/Arag Nozzle Bodies (P/N 117-2005-051)

Picture	Item Description	Part Number	Quantity
	Valve, TeeJet Hawkeye® 2 Nozzle Control	063-2005-002	1
Not Pictured	Kit, TeeJet Hawkeye® 2 Valve Seal	117-2005-061	3
Not Pictured	Cable, Hawkeye® 2 8-pin Ampseal Jumper	115-2005-070B	2
Not Pictured	O-Ring, Size -115 Purple Viton (Single)	219-2005-115	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

TABLE 9. Hawkeye® 2 Service Kit Components for Wilger Nozzle Bodies (P/N 117-2005-052)

Picture	Item Description	Part Number	Quantity
	Valve, TeeJet Hawkeye® 2 Nozzle Control	063-2005-003	1
Not Pictured	Kit, TeeJet Hawkeye® 2 Valve Seal	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

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## UPDATES

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

[portal.ravenprecision.com](http://portal.ravenprecision.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)


- Hawkeye® 2 Installation Manual for ET Apache Sprayers MY 2017+
- 016-0171-716 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.

	<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® 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





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# CHAPTER

# 4

# HAWKEYE® 2 NCV AND BOOM CABLE INSTALLATION

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## 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: If using TeeJet QJS (straight) nozzle bodies, use the purple coated (size 115) O-rings.

If using TeeJet QJ (turret) nozzle bodies, use the black (size 116) O-rings.

If Using Hypro/Arag nozzle bodies, use the purple (size 115) O-rings.

If Using Wilger nozzle bodies, use the black (size 116) O-rings.

2. Place the O-ring on the face of the stainless valve body of the NCV2. For Wilger nozzle bodies, press the O-ring into place in the outer groove.

FIGURE 1. Hawkeye® 2 NCV Installation

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Purple (Size 115)  
O-Ring



Black (Size 116)  
O-Ring



3. Align the NCV2 with the port of the nozzle body while being careful not to lose the O-ring.

**NOTE:** 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.

4. 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.
5. Repeat step 1 through step 4 for each nozzle location on the spray boom.

**NOTE:** A leak test is recommended after the installation is complete.

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## 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. For each boom cable, beginning with the inner boom cables, locate the end of the cable with the rotating locking collar.
3. Start with the rotating locking collar end of the cable near the middle 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 through the boom pivot point, towards the end of the boom, following plumbing routing whenever possible.



FIGURE 2. Boom Cable Routing - Over Pivot - Pommier Boom



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 2 through 3 for the inner boom cable for the opposite side.
5. Continue routing both mid and outer boom cables by starting each consecutive cable at the end of the previous cable, and repeat step 2 through 4 until all cables have been routed.

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

6. If not already applied, apply a single, short burst of corrosion inhibitor to all connections. Corrosion X HD (P/N 222-0000-020 or available from <http://www.corrosionx.com/corrosionx-heavy-duty.html>) is recommended.

FIGURE 3. Boom Cable Routing - Over Mid Fold Joint



7. Be sure the corrosion inhibitor has coated the connector 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.

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

10. The inner boom cables will be connected to the LEFT/RIGHT chassis cable in a later section.

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# CHAPTER

# 5

# RCM - SPRAYER MOUNTING AND CONNECTION

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## MOUNTING PLATE PREPARATION

NOTE: If Raven Autoboam XRT is already installed on this machine, skip this section and refer to “Mount the RCM - Sprayer with Raven Autoboam XRT” on page 33.

1. Locate the electrical panel on top of the center rack on the back of the machine and above the section valves.

NOTE: For older machines, loosen the two bolts that secure the electrical box hood in place, and lift the cover off of the electrical box to find the electrical mounting plate.

FIGURE 1. Electrical Panel Location



2. Locate the existing product controller ECU.
3. Remove the bolts that secure the existing product controller ECU to the mounting plate.
4. Remove the existing product controller ECU and disconnect the harness. The product controller ECU will not be used and can be set aside.
5. For older machines, remove the three bolts that secure the Ultraglide node to the mounting plate.
6. Mount the Ultraglide node to the available mounting location on the left side of the mounting plate.

## RCM - SPRAYER INSTALLATION

### INSTALL THE RCM - SPRAYER

1. Locate the RCM - Sprayer (P/N 063-0173-956), M6 bolts (1x70MM and 2x80MM), nuts, and M6 washers provided with the Hawkeye® 2 kit.
2. Begin mounting the RCM - Sprayer by holding it up against the mounting plate on the right side and marking the top center hole location on the mounting plate.

**NOTE:** It is recommended to use a long nail to mark the metal mounting plate through the small bolt holes of the RCM - Sprayer housing.

FIGURE 2. RCM - Sprayer Mounting Location and Orientation

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3. Drill a hole for the M6 bolt to pass through at the marked location.
4. Insert the 80MM M6 bolt through the RCM - Sprayer top hole and the previously drilled hole.
5. Loosely tighten a washer and lock nut to hold the RCM - Sprayer in place, but still allow it to rotate.
6. Rotate the RCM - Sprayer until the top is parallel to the top of the mounting plate.
7. Mark the bottom two hole locations.
8. Rotate the RCM - Sprayer out of the way to drill two holes for the bottom two M6 bolt locations.
9. Insert the two 70MM M6 bolts through the RCM - Sprayer bottom holes and the previously drilled holes.
10. Tighten all three washer and lock nuts on the back side of the mounting plate to secure the RCM - Sprayer in place.

## MOUNT THE RCM - SPRAYER WITH RAVEN AUTOBOOM XRT

This section is only meant to be referenced if the machine already has Raven Autoboam XRT installed.

FIGURE 3. RCM - Sprayer Mounting with Raven Autoboam XRT



1. Locate the Raven Autoboam XRT module on the right side of the mounting bracket.
2. Remove the three M6 hex bolts securing the module to the bracket.
3. In the Hawkeye® 2 kit, locate the M6 hex bolts (one 130MM and two 140MM bolts), black nylon spacer, M6 washers, and lock nuts.
4. Insert the 130MM bolt through the top hole of the RCM - Sprayer and equip with a nylon spacer.
5. Insert the end of the 130MM bolt through the Autoboam module and through the existing mounting plate hole.
6. Insert the two 140MM bolts through the bottom holes of both modules and through the existing mounting plate holes. These 140MM bolts do not require a nylon spacer.
7. Secure the modules tightly with the washers and lock nuts.

## INSTALL THE RCM - SPRAYER CABLES AND SYSTEM POWER CABLES

1. Locate the RCM - Sprayer adapter cable (P/N 115-2005-095) provided in the kit.
2. Identify the two RCM - Sprayer connectors (one black, one gray) and connect these to the RCM - Sprayer.

FIGURE 4. RCM - Sprayer Connections

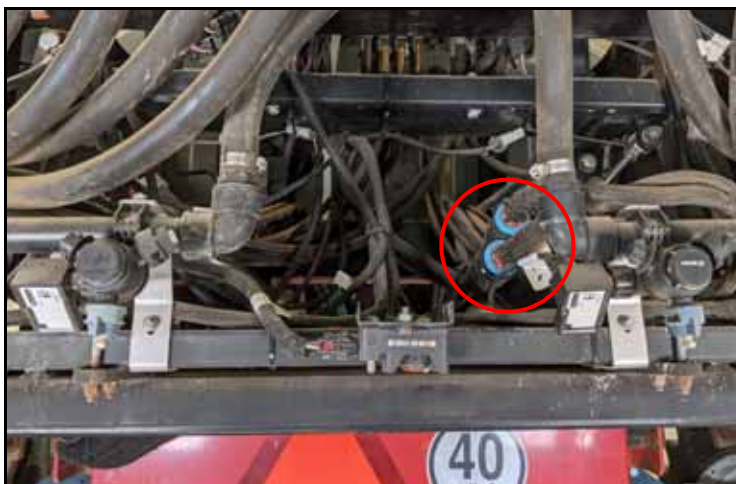


3. For model years 2019 & 2020, identify the four 12-pin Deutsch connectors (one of each: gray, black, green, brown) grouped together and connect them to the matching disconnected PCII cable connections.

NOTE: For model years 2017 & 2018, the four 12-pin Deutsch connectors will be connected in a later step.

4. Locate the RCM - Sprayer breakout cable (P/N 115-2005-001 or 115-2005-091) provided in the kit.
5. Connect the 23-pin connector (black) of the breakout cable to the remaining connector (also black) of the RCM - Sprayer.
6. Route the breakout cable down the center rack to the center boom section break as shown in Figure 5, "Left/Right Inner Cable Breakout," following existing cabling and hose plumbing where possible.
7. Connect the large, round female receptacles to the mating connectors on the left and right inner boom cables previously installed as shown in Figure 5, "Left/Right Inner Cable Breakout," below.

FIGURE 5. Left/Right Inner Cable Breakout



8. Secure the power modules on the breakout cable to existing cables and plumbing.

NOTE: Secure the RCM - Sprayer cables to nearby existing cables with zip ties, ensuring not to pull on any connections and prevent any cable loops from drooping below chassis.

### ET APACHE ECU CONNECTIONS (MY 2017 & 2018)

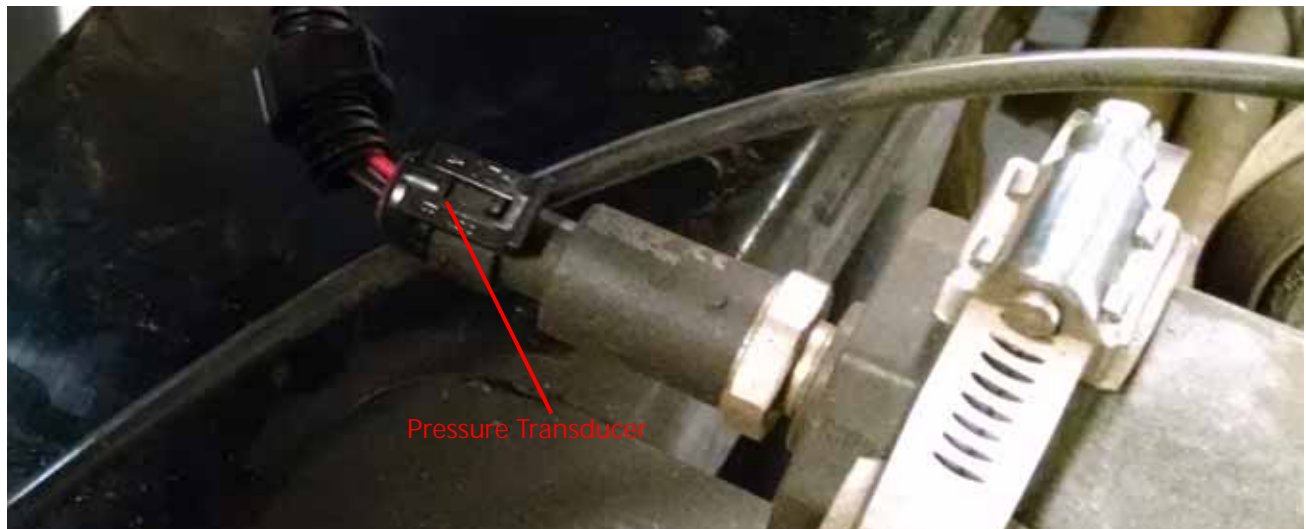
1. Locate the Hawkeye ECU cable harness (P/N 115-7303-143) provided in the kit.
2. Locate the four 12-pin Deutsch connectors (one of each: gray, black, green, brown) grouped together, and connect them to the matching connectors of the RCM - Sprayer adapter cable (P/N 115-2005-095) previously installed.
3. Connect the four pin ISOBus plug from the cab to the four pin receptacle ISOBus connector on the Hawkeye ECU harness (P/N 115-7303-143).

FIGURE 6. ISOBus Connector



4. Connect the three pin plug to existing pressure transducer in the boom plumbing.

FIGURE 7. Pressure Transducer.



5. Connect the three pin jack to the flowmeter.

FIGURE 8. Flowmeter Connection

---

Flowmeter  
Connection



6. Connect the 12 pin receptacle on the Hawkeye ECU harness (P/N 115-7303-143) to the 12 boom section valve plug on the machine harness.

FIGURE 9. Boom Section Valve Connection.

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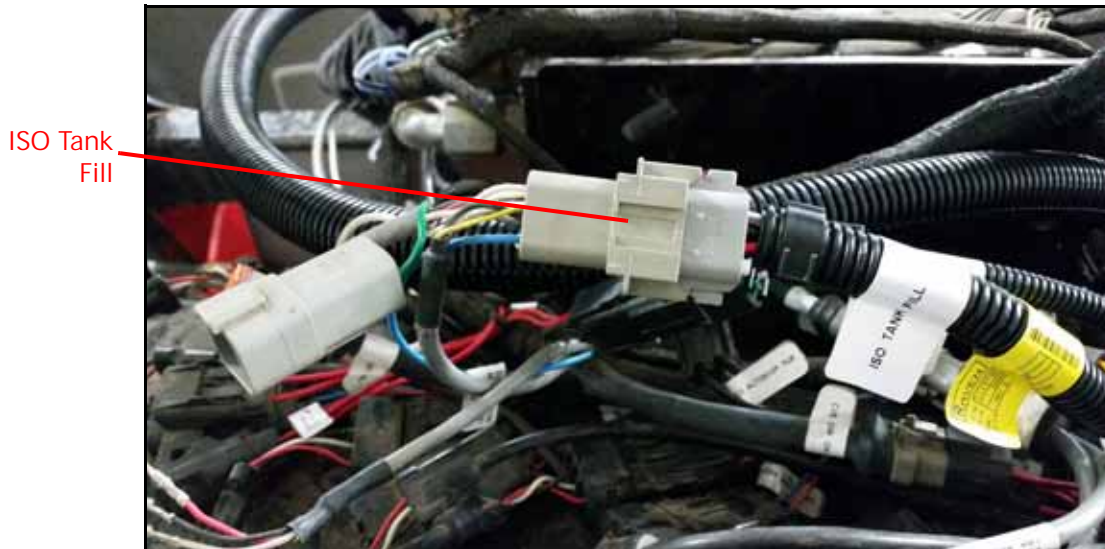
Boom Section  
Valve  
Connector





7. Connect the ISO tank fill plug on the Hawkeye ECU harness (P/N 115-7303-143) to the tank fill receptacle on the machine cable harness (if applicable).

FIGURE 10. ISO Tank Fill



8. Connect the four-pin high current and switched power plug on the Hawkeye ECU harness (P/N 115-7303-143) to the receptacle on the machine cable harness.

FIGURE 11. High Current and Switched Power Connection



## SYSTEM POWER CONNECTION (MY 2017 & 2018)

1. Locate the RCM - Sprayer power cable (P/N 115-2005-008) provided in the kit.

FIGURE 12. Harness Under Electrical Box

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2. Locate the large, round connector of the breakaway cable (P/N 115-2005-001) and connect it to the corresponding connector of the power cable.
3. Open the hood of the sprayer to access the power connections, and route the power cable towards the sprayer battery compartment.

**NOTE:** Follow the right frame rail towards the front of the machine.

4. Locate the Ground Aux. terminals on the power connection.
5. Connect the ground cable from the power cable (115-2005-008) to the ground aux terminal.
6. Connect the power ring to the Aux. Power terminal.
7. Secure all cables with zip ties.

### SYSTEM POWER CONNECTION (MY 2019 & 2020)

1. Locate the black 8-pin connector on the RCM - Sprayer breakout cable (P/N 115-2005-091).
2. Locate the black receptacle on the power module box near where the RCM - Sprayer was installed.

FIGURE 13. ET Apache Center Rack Power Module



3. Connect the breakout cable black, power connector to the matching connector on the power module box.
4. Locate the ring terminal on the RCM - Sprayer breakout cable.
5. Locate the ground terminal on the back side of the mounting plate behind the power module.

FIGURE 14. ET Apache Center Rack Ground Connection



6. Remove one of the ground nuts from the ground bolts.
7. Place the ring terminal on the ground bolt and secure the nut back into place.



A

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SYSTEM DIAGRAM

The system diagrams begin on the next page.

FIGURE 1. Hawkeye 2, Apache MY 17 & 18 System Diagram (P/N 054-2005-004 Rev. B)

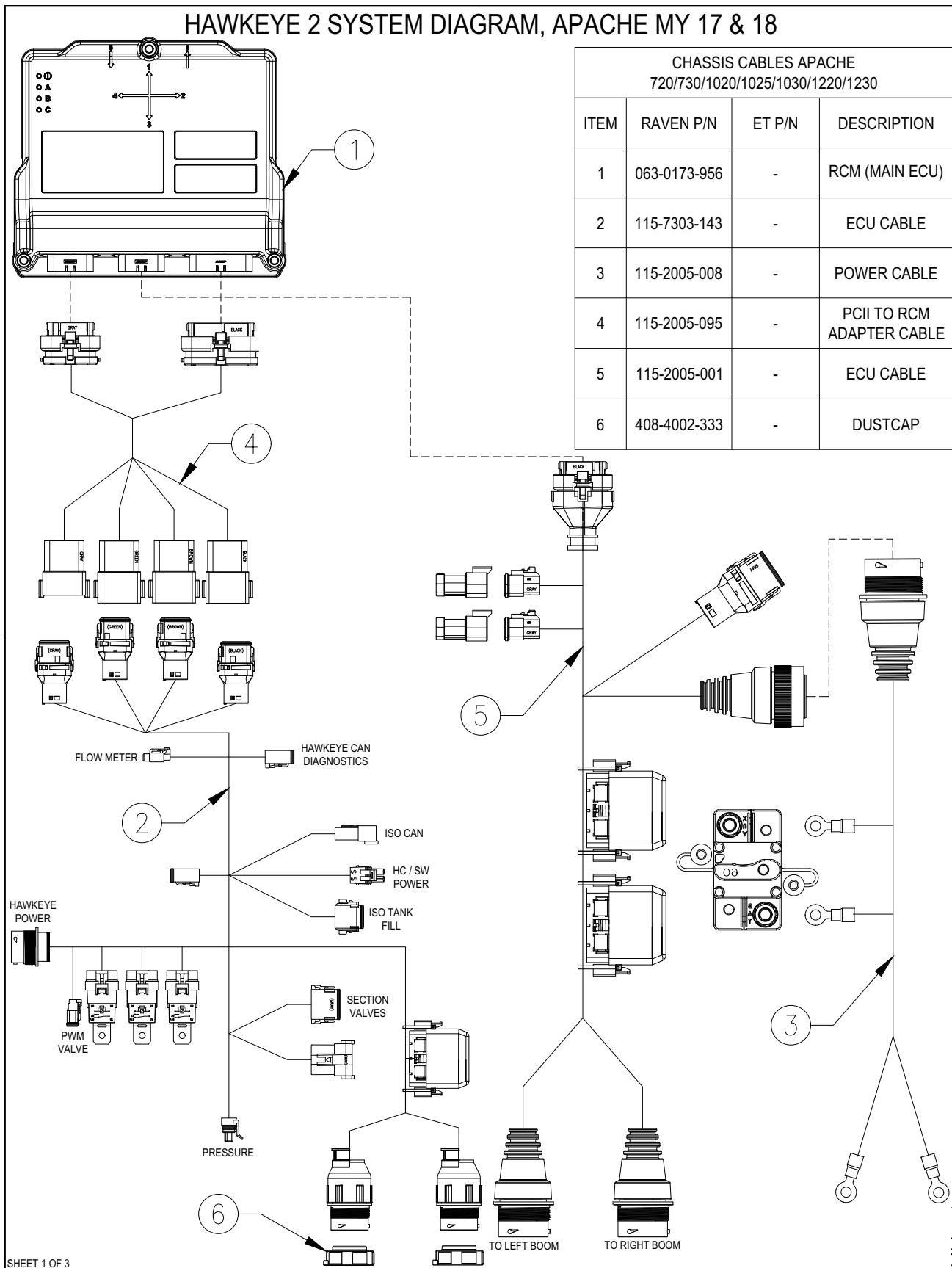
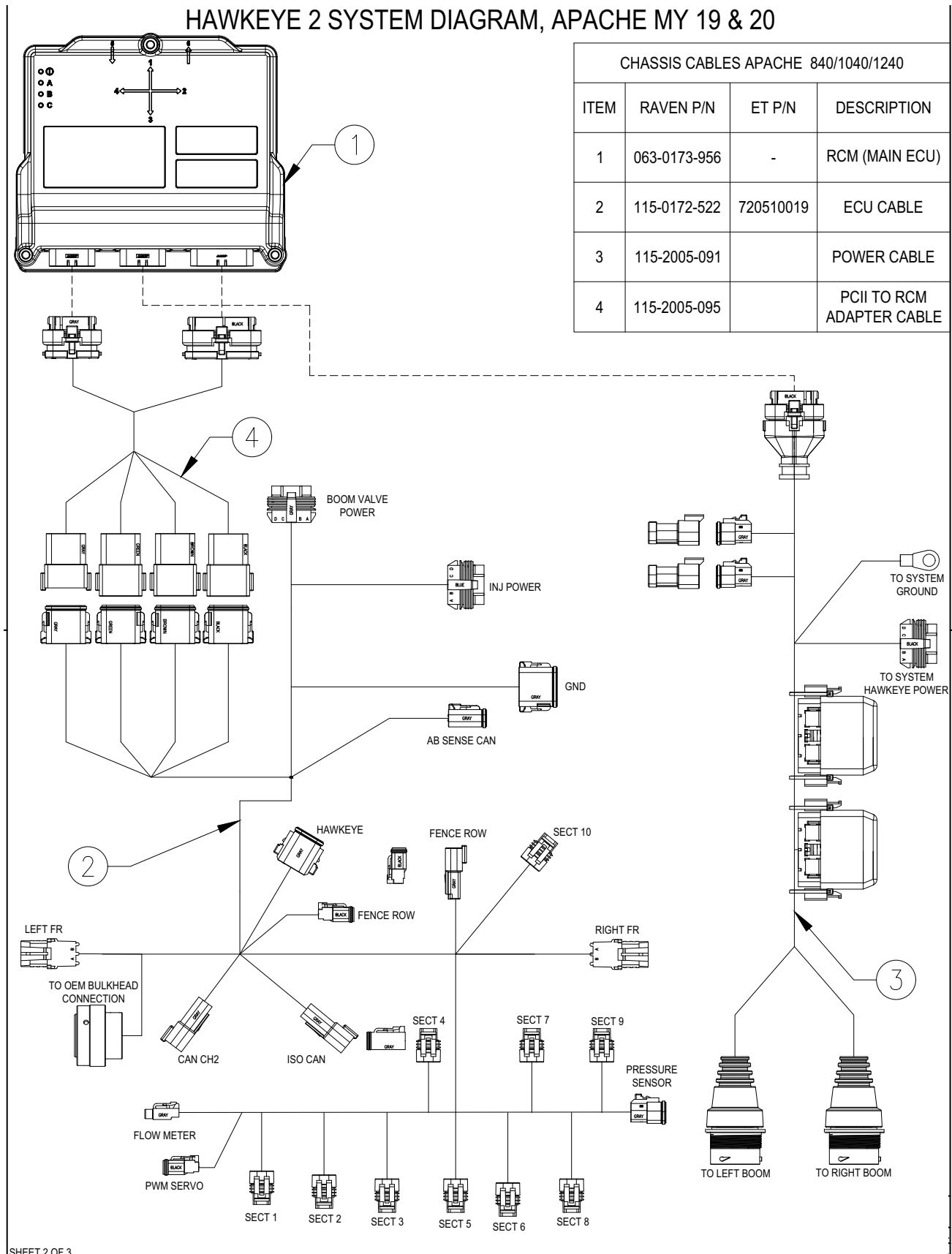


FIGURE 2. Hawkeye 2, Apache MY 19 & 20 System Diagram (P/N 054-2005-004 Rev. B)



SHEET 2 OF 3





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## APPENDIX

# CABLE AND CONNECTOR MAINTENANCE

## B

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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.

### HAWKEYE® 2 BOOM HARNESS CONNECTOR MAINTENANCE

Prior to connecting the boom cable to the Hawkeye® 2 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 through 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.

NOTE: DeoxIT D5 (P/N 222-4001-006) is recommended.

FIGURE 1. DeoxIT D5 Applied to Hawkeye® 2 NCV




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

FIGURE 2. Cleaning Contacts with a Wire Brush

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4. Spray the contacts again with the deoxidizing agent to help rinse out debris.
5. Remove residue of the deoxidizing agent from the connection.

	<p style="text-align: center;"><b>CAUTION</b></p> <p>Damage to the connector seal may occur if residue is not removed from the connector.</p>
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6. Dry out the connection with dry, compressed air such as Dust Off Electronics Duster (P/N 222-4001-007) or equivalent air duster suitable for electronic components.

NOTE: If using compressed air from a large volume air compressor, be sure the lines are free of moisture.

FIGURE 3. Electronics Duster Used on NCV

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7. If not already applied, apply a single, short burst of corrosion inhibitor such as CorrosionX HD (P/N 222-0000-020) to the NCV2 connection. Be sure the corrosion inhibitor has coated the NCV2 contacts and recessed portions of the connector.

NOTE: To determine whether corrosion inhibitor has been applied, inspect for a thick liquid in the bottom of the connector as shown in the image below.

CorrosionX may also be purchased from the manufacturer website:

<https://www.corrosionx.com/products/corrosionx-heavy-duty>.

FIGURE 4. Applying Corrosion Inhibitor





# 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](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.**