

**Miller Nitro 5000 Series &  
New Holland Guardian F Series  
Steering-Ready  
RS1™ HDU Guidance and  
Steering Installation Manual**

*P/N 016-5032-115 Rev. A*

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# CHAPTER

# 1

# IMPORTANT SAFETY INFORMATION

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## NOTICE

Read this manual and the operation and safety instructions included with your implement and/or controller carefully before installing the RS1™ HDU system.

- Follow all safety information presented within this manual.
- If you require assistance with any portion of the installation or service of your Raven equipment, contact your local Raven dealer for support.
- Follow all safety labels affixed to the RS1 HDU system components. Be sure to keep safety labels in good condition and replace any missing or damaged labels. To obtain replacements for missing or damaged safety labels, contact your local Raven dealer.

When operating the machine after installing RS1 HDU, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate RS1 HDU or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Remain in the operator's position or a safe working distance away from the booms at all times when RS1 HDU is engaged.
- Disable RS1 HDU when exiting from the operator's seat and machine.
- Do not drive the machine with RS1 HDU enabled on any public road.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling RS1 HDU when the safe working distance has diminished.
- Ensure RS1 HDU is disabled prior to starting any maintenance work on RS1 HDU or the machine.

## WARNING

- When starting the machine for the first time after installing RS1 HDU, be sure that all persons stand clear in case a hose has not been properly tightened.
- The machine must remain stationary and switched off, with the booms unfolded and supported, during installation or maintenance.

## CAUTION

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## HYDRAULIC

### GENERAL

- Raven Industries recommends that appropriate protective equipment be worn at all times when working on the hydraulic system.
- Never attempt to open or work on a hydraulic system with the equipment running. Care should always be taken when opening a system that has been previously pressurized.
- When disconnecting the hydraulic hoses or purging is required, be aware that the hydraulic fluid may be extremely hot and under high pressure. Caution must be exercised.
- Any work performed on the hydraulic system must be done in accordance with the machine manufacturer's approved maintenance instructions.
- When installing RS1 HDU hydraulics or performing diagnostics, maintenance, or routine service, ensure that precautions are taken to prevent any foreign material or contaminants from being introduced into the machine's hydraulic system. Objects or materials that are able to bypass the machine's hydraulic filtration system will reduce performance and possibly damage the steering hydraulic valve.

### INSTRUCTIONS FOR HOSE ROUTING

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

Hoses should not contact or be attached to:

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

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

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

Routing should not allow hoses to:

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

Hoses should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in RS1 HDU and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For hose sections that move during machine operation:

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

Protect hoses from:

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

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## ELECTRICAL

### GENERAL

- Always verify that the power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the equipment.
- Ensure that the power cable is the last cable to be connected.
- A minimum of 12 VDC is required for system operation with a maximum of 15 VDC.

### INSTRUCTIONS FOR WIRE ROUTING

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

Harness should not contact or be attached to:

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

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

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads

- Ends of adjustable hose clamps
- Wire exiting conduit without protection, either ends or side of conduit
- Hose and tube fittings

Routing should not allow harnesses to:

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

Harnessing should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in RS1 HDU and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For harness sections that move during machine operation:

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

Protect harnesses from:

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

### **IMPORTANT:**

- Avoid directly spraying electrical components and connections with high pressure water. High pressure water sprays can penetrate seals and cause electrical components to corrode or otherwise become damaged. When performing maintenance:
- Inspect all electrical components and connections for damage or corrosion. Repair or replace components, connections, or cable as necessary.
- Ensure connections are clean, dry, and not damaged. Repair or replace components, connections, or cable as necessary.
- Clean components or connections using low pressure water, pressurized air, or an aerosol electrical component cleaning agent.

- Remove visible surface water from components, connections, or seals using pressurized air or an aerosol electrical component cleaning agent. allow components to dry completely before reconnecting cables.



Congratulations on your purchase of the RS1 HDU system!

The following instructions are designed to assist with the proper installation of the RS1 HDU system. Refer to the RS1 Calibration & Operation Manual (P/N 016-4010-001) for assistance with calibrating the software and using the RS1 HDU system.

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### PREPARING FOR INSTALLATION

Before installing the RS1 HDU system, park the machine where the ground is level, clean, and dry. Turn off the machine and leave it turned off for the duration of the installation process.

During the installation process, follow good safety practices. Be sure to carefully read the instructions in this manual as you complete the installation process.

### RECOMMENDATIONS

Raven Industries recommends the following best practices when installing or operating the RS1 HDU system for the first time, at the start of the season, or when moving the RS1 HDU system to another machine:

- Install the RS1 unit in the recommended location.
- Use part numbers to identify the parts.
- Do not remove the plastic wrap from a part until it is necessary for installation.
- Do not remove plastic caps from a part until it is necessary for installation.

### POINT OF REFERENCE

The instructions in this manual assume that you are standing behind the machine, looking toward the cab.

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### UPDATES

Software and manual updates are available on the Raven Applied Technology website:

<https://portal.ravenprecision.com>

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

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

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

[techwriting@ravenind.com](mailto:techwriting@ravenind.com)

- Miller Nitro 5000 Series & New Holland Guardian F Series - Steering-Ready RS1™ HDU Guidance and Steering Installation Manual
- P/N 016-5032-115 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.

## KIT CONTENTS

This section contains a list of the components that are included in the RS1 HDU kit. Before beginning the system installation, compare the items in the kit with the components on this list. If you have questions about the kit, contact your Raven dealer.

**TABLE 1. RS1 HD Installation Kit (P/N 117-5032-115)**

Item Description	Part Number	Qty.
Sheet - Help/Warranty	016-0171-649	1
ECU - Hydraulic Drive Unit (HDU)	063-0173-887	1
Bracket - HDU Mounting	107-0172-543	1
Plate - Electrical Bulkhead Cover	107-0172-193	1
Cable - RS1 HDU Harness	115-4010-063	1

TABLE 1. RS1 HD Installation Kit (P/N 117-5032-115)

Item Description	Part Number	Qty.
Cable - RS1 Harness	115-4010-064	1
Cable - 4-Wheel Steering Lockout	115-4010-073	1
Switch - Master	063-0173-961	1
Transducer - 0-3000 PSI Pressure	422-0000-086	1
Latch - Over-Center Padlock	319-1000-015	5
Screw - #6-32 Zinc Torx	311-0004-107	2
Bolt - M6 1.0 x 20 mm Class 5.8-8.8 Flanged Lock	311-0070-051	3
Nut - 1/4"-20 UNC Flanged Lock	312-1001-168	2
Nut - #6-32 Zinc Nylon Insert Lock	312-4000-052	2

TABLE 2. RS1 Mounting Kit (P/N 117-5001-053)

Item Description	Part Number	Qty.
Bracket - RS1 Mounting	107-0172-498	1
Screw - 1/4"-20 x 1/2" UNC Countersink Machine	311-0003-041	4

TABLE 3. RS1 Unit Kit

Item Description	Part Number	Qty.
Manual - RS1 Operation	016-4010-001	1
Unit - RS1	063-0173-820, 063-0173-921, or 063-0173-922	1

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## CHAPTER

# 3

## CAB COMPONENT INSTALLATION

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### INSTALL THE PRESSURE TRANSDUCER IN THE STEERING VALVE

FIGURE 1. Pressure Transducer to be Removed



1. Locate and remove the existing pressure transducer from Port PS of the steering valve.
2. Install the provided 0-3000 PSI pressure transducer (P/N 422-0000-086) in Port PS of the steering valve.

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### INSTALL THE RS1 UNIT

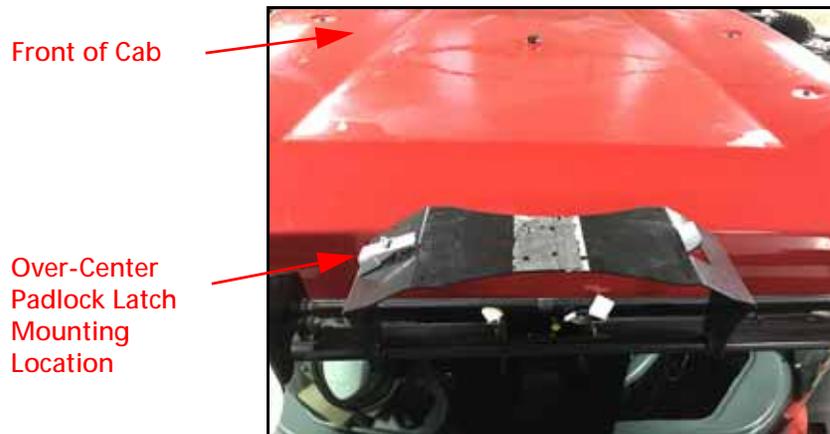
FIGURE 2. Mounting Bracket Installed



3. Install the RS1 mounting bracket (P/N 107-0172-498) on the bottom of the RS1 unit using four 1/4"-20 x 1/2" flat head machine screws (P/N 311-0003-041).

**FIGURE 3. Machine's Existing Receiver Mounting Bracket**

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4. Install the over-center padlock latch on the machine's mounting bracket located on the rear of the cab roof using two #6-32 zinc torx screws (P/N 311-0004-107) and two #6-32 nylon insert lock nuts (P/N 312-4000-052).

**FIGURE 4. RS1 Unit Installed on Cab Roof**

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5. Insert the tab of the RS1 latch mounting bracket into the slotted tab of the receiver mounting bracket to interlock the brackets.
6. Secure the RS1 mounting bracket to the latch mounting bracket by securing the latch.

**NOTE:** It may be necessary to adjust the latch in order to secure the RS1 unit.

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## INSTALL THE HYDRAULIC DRIVE UNIT (HDU)

**NOTE:** If SmarTrax is installed on the machine, remove the SmarTrax node and node harness.

FIGURE 5. Plastic Tray to be Removed



1. Remove the plastic tray located in the right-rear corner of the cab.
2. Locate the factory-installed node mounting bracket in the front of the compartment.

FIGURE 6. HDU Installed



3. Install the HDU mounting bracket (P/N 107-0172-543) on the machine's existing plate using three M6 1.0 x 20 mm class 5.8-8.8 flanged bolts (P/N 311-0070-051).
4. Install the HDU (P/N 063-0173-887) on the HDU mounting bracket using two 1/4"-20 lock nuts (P/N 312-1001-168).

## INSTALL THE RS1 CABLES

### INSTALL THE RS1 HARNESS

FIGURE 7. RS1 Harness Installed on RS1 Unit



1. Connect the black 12-pin connector of the RS1 harness cable (P/N 115-4010-064) to the back of the RS1 unit.

FIGURE 8. RS1 Harness Connected to Bulkhead



2. Connect the other end of the RS1 harness to the machine's bulkhead connector.

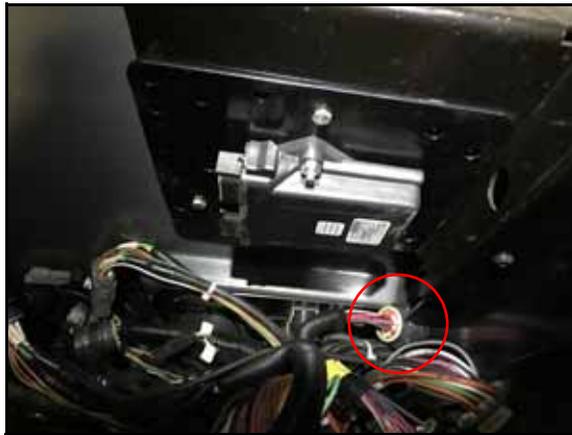
## INSTALL THE HDU HARNESS

FIGURE 9. GPS POWER/CAN Connector



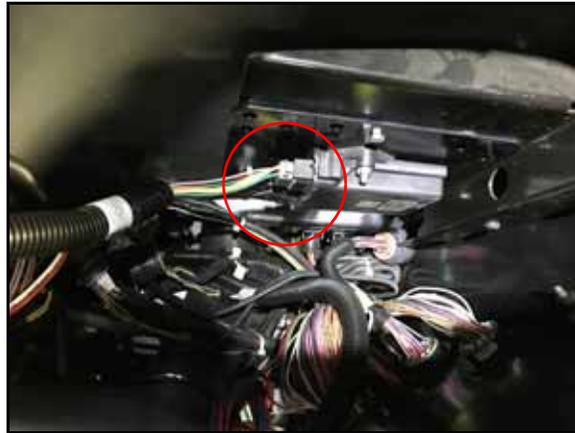
1. Trace the cable from the machine's GPS bulkhead connector down the rear wall of the machine and into the instructional seat compartment.
2. Install the GPS POWER/CAN connector of the HDU harness cable (P/N 115-4010-063) to the machine's mating AR067 harness connector.

FIGURE 10. HDU Harness Bulkhead Connector Connected to Machine's Bulkhead



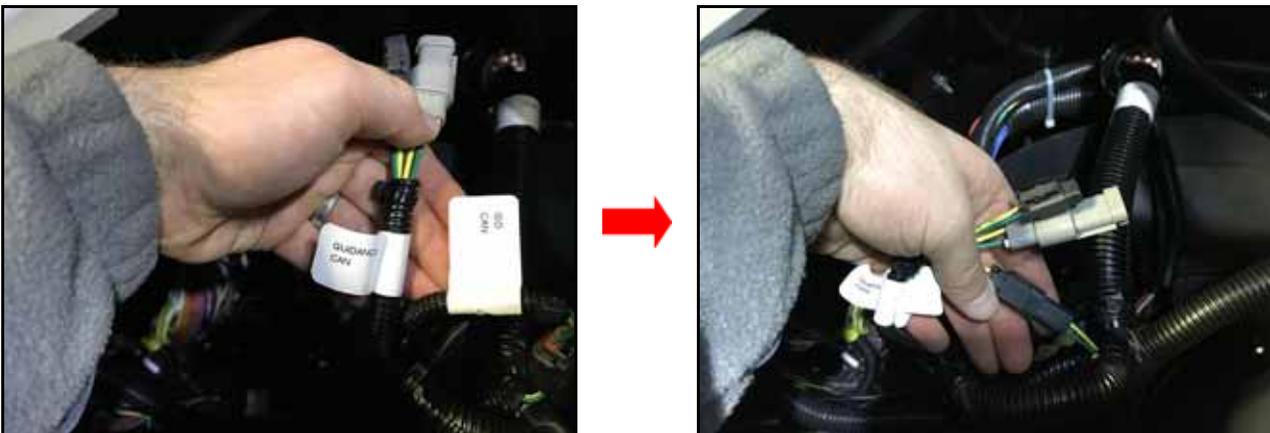
3. Connect the CAN/PWR connector of the HDU harness to the machine's bulkhead connector labeled AR064.

FIGURE 11. HDU Harness Connectors Connected to HDU



4. Install the two rectangular connectors of the HDU harness into the mating ports of the HDU (P/N 063-0173-887).

FIGURE 12. CAN Connection



5. Determine the machine's method of product control:
  - If the machine has ISO product control, connect the ISO CAN connector to the unmarked 2-pin connector in the center of the HDU harness.
  - If the machine has Raven product control, connect the GUIDANCE CAN connector to the unmarked 2-pin connector in the center of the HDU harness.

FIGURE 13. Side Console Cover to be Removed



6. Remove the cover from the machine's side console.

FIGURE 14. Machine's AR193 Connectors



7. Connect the J1939 CAN connector of the HDU harness to the machine's mating AR193 connector.

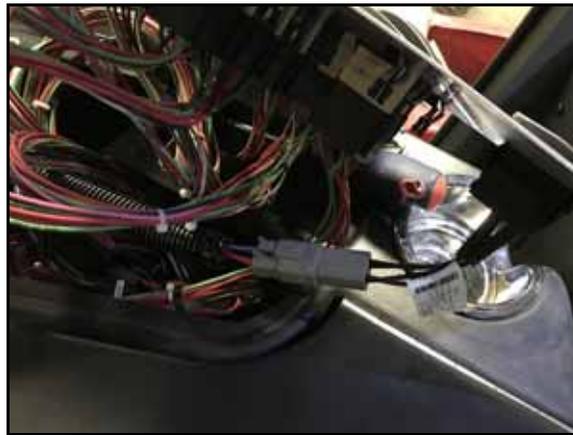
**NOTE:** Only one of the J1939 CAN connectors of the HDU harness cable are used in the RS1 system installation. The remaining connector may be used for an auxiliary display if necessary.

FIGURE 15. Open Port of Side Console Cover



8. Identify an open port on the machine's side console cover.

FIGURE 16. STEERING LOCKOUT SWITCH Connector



9. Position the master switch (P/N 063-0173-961) over the open port in the side console cover, feeding the switch cable through the opening.
10. Connect the STEERING LOCKOUT SWITCH connector of the HDU harness cable (P/N 115-4010-063) to the master switch connector.

FIGURE 17. Steering Lockout Switch Installed



11. Replace the side console cover.
12. Press on the switch casing to ensure the switch is securely installed.

FIGURE 18. Shroud to be Removed



13. Remove the plastic shroud located on the outside of the machine, in the right-rear corner of the cab.

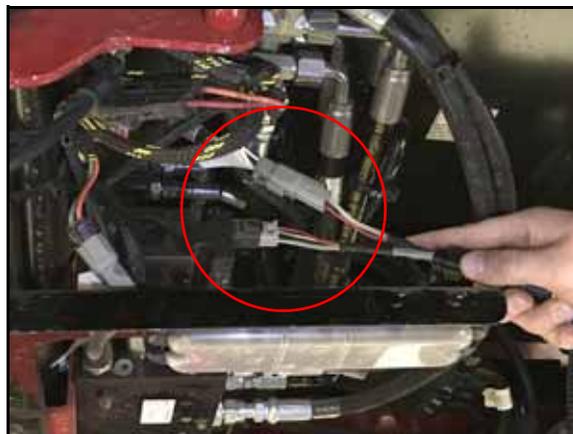
FIGURE 19. Cover Plate to be Removed



14. Remove the cover plate from the bulkhead as shown in the figure above.
15. Install the supplied bulkhead cover plate (P/N 107-0172-193) on the bulkhead cover panel using the nuts and bolts removed in step 9.
16. From inside the cab, install the round bulkhead connector of the HDU harness through the hole in the bulkhead cover panel.
17. Connect the machine's steering valve harness to the bulkhead connector of the HDU harness.
18. Tighten the bulkhead nut to secure the connection.

## INSTALL THE FOUR-WHEEL STEER LOCKOUT HARNESS - FOUR-WHEEL STEER MACHINES ONLY

FIGURE 20. Steering Lockout Cable Valve Connection



1. Disconnect the PVES connector of the valve harness (P/N 115-4001-140) from the steering valve.
2. Install the TO VALVE HARNESS connector of the steering lockout switch cable (P/N 115-4010-073) on the PVES connector of the valve harness.
3. Connect the TO VALVE connector to the open port of the steering valve.

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**FIGURE 21. Steering Lockout Cable Routing**

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4. Route the remaining connector to the left-rear tire of the machine.

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**FIGURE 22. Steering Lockout Cable Connection**

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5. Connect the TO MACHINE'S FOUR WHEEL STEER (FW355) CONNECTOR to the machine's FW355 connection.



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## C

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# RAVEN

## Limited Warranty

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### ***What Does this Warranty Cover?***

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

### ***How Long is the Coverage Period?***

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

### ***How Can I Get Service?***

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

### ***What Will Raven Industries Do?***

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

### ***What is not Covered by this Warranty?***

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

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



## Extended Warranty

### ***What Does this Warranty Cover?***

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

### ***Do I Need to Register My Product to Qualify for the Extended Warranty?***

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

### ***Where Can I Register My Product for the Extended Warranty?***

To register, go online to [www.ravenhelp.com](http://www.ravenhelp.com) and select Product Registration.

### ***How Long is the Extended Warranty Coverage Period?***

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

### ***How Can I Get Service?***

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

### ***What Will Raven Industries Do?***

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

### ***What is Not Covered by the Extended Warranty?***

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

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