

TC1/HDU Installation
Manual for Buhler
Versatile 4WD 380, 405,
430, 460, 520, 570, and
610 (Steer Ready)

016-5031-104 Rev. A

11/2019

E34162



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Chapter 1	Important Safety Information.....	1
	Electrical Safety	2
Chapter 2	Introduction.....	3
	Preparing for Installation	3
	Recommendations	4
	Point of Reference	4
	Updates	4
	Kit Contents	4
Chapter 3	Cab Component Installation.....	7
	Install the TC1 and HDU ECUs	7
	Mount the TC1 and HDU ECUs	7
	Install the Foot Switch (Optional)	10
	Install the Node Harness	10
	Install the Master Switch	13
	Install the Valve Harness	13
	System Diagrams	15
Chapter 4	Startup Procedures	17
	Calibrate the TC1 System	17

CHAPTER

1

IMPORTANT SAFETY INFORMATION

NOTICE

Read this manual and the operation and safety instructions included with your implement and/or controller carefully before installing the TC1™ 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 TC1 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 TC1, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate TC1 or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Remain in the operator's position in the machine at all times when TC1 is engaged.
- Disable TC1 when exiting the operator's seat and machine.
- Do not drive the machine with TC1 enabled on any public road.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling TC1 when the safe working distance has diminished.
- Ensure TC1 is disabled prior to starting any maintenance work on TC1 or the machine.

WARNING

- When starting the machine for the first time after installing TC1, be sure that all persons stand clear in case a hose has not been properly tightened.
- The machine must remain stationary and switched off during TC1 installation or maintenance.

CAUTION

ELECTRICAL SAFETY

- Always verify that the power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the equipment.
- Ensure that the power cable is the last cable to be connected.

Thank you for selecting the Raven TC1 steering system. The TC1 system is designed to provide hands-free steering of agricultural equipment using Global Navigation Satellite System (GNSS) position data.

This manual applies to the following machines:

MAKE: Buhler Versatile

MODEL: 380, 405, 430, 460, 520, 570, and 610 Steer-Ready Tractors

FIGURE 1. Buhler Versatile 2375



PREPARING FOR INSTALLATION

Before installing the TC1 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 TC1 system for the first time, at the start of the season, or when moving the TC1 system to another machine:

- Ensure the machine's hydraulic filters have been recently changed and there are no issues with the machine's hydraulic system (e.g., pump issues, faulty hydraulic motors, fine metal deposits in the hydraulic hoses, etc.).
- Ensure the machine's hydraulic system is using fresh oil and debris is flushed from the hydraulic hoses, valves, and filters.

Raven Industries recommends the following best practices when installing the TC1 system:

- 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.

UPDATES

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

<http://www.ravenhelp.com>

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

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

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

techwriting@ravenind.com

- TC1/HDU Installation Manual for Versatile 380, 405, 430, 460, 520, 570, and 610 (Steer Ready)
- 016-5031-104 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 TC1 kit. Before beginning the TC1 installation, compare the items in the kit with the components on this list. If you have questions about the kit, contact your Raven dealer.

FIGURE 2. TC1/HDU Installation Kit for Versatile Articulated Tractors (MY 2015 and Newer)

THIS KIT TO CONTAIN THE FOLLOWING ITEMS LISTED BELOW:

#	QTY	PART #	DESCRIPTION	O
	1	053-0159-079	BOX, SHIPPING	
	1	016-0171-649	SHEET, WARRANTY/HELP (016-5031-104)	
	1	063-0173-887	ECU, HYDRAULIC DRIVE UNIT (HDU)	
	1	063-0174-070	ECU, ISO, TC1, LOW SPEED STEERING	
	1	115-4010-127	CABLE, HDU, RS1, VERSATILE TRACTORS	
	1	115-4010-128	CABLE, HDU, VALVE, RS1, VERSATILE ARTICULATED TRACTORS	
	1	063-0173-961	ASSEMBLY, MASTER SWITCH, RS1	
	1	107-0172-647	BRACKET, TC1/HDU, VERSATILE ARTICULATED TRACTORS	
	1	115-7300-073	CABLE, CAN/POWER, RAVEN/ISO BULKHEAD TO VT, 21P RECE	
	1	053-0159-074	ENVELOPE, PLASTIC	
	1	118-0159-056	HOUSING, ROCKER SWITCH, BASE	
	1	118-0159-057	HOUSING, ROCKER SWITCH, COVER	
	2	305-1000-013	STANDOFF, 1/4"-20 X 1.50" F/F	
	2	311-0050-108	BOLT, HEX HEAD, 1/4"-20 X 1-3/4" UNC-2A	
	4	311-0008-027	SCREW, #4-40 UNC X 1/2" PHILLIPS	



CHAPTER

3

CAB COMPONENT INSTALLATION

INSTALL THE TC1 AND HDU ECUS

MOUNT THE TC1 AND HDU ECUS

1. Remove the panel located in the cab behind the operator seat.

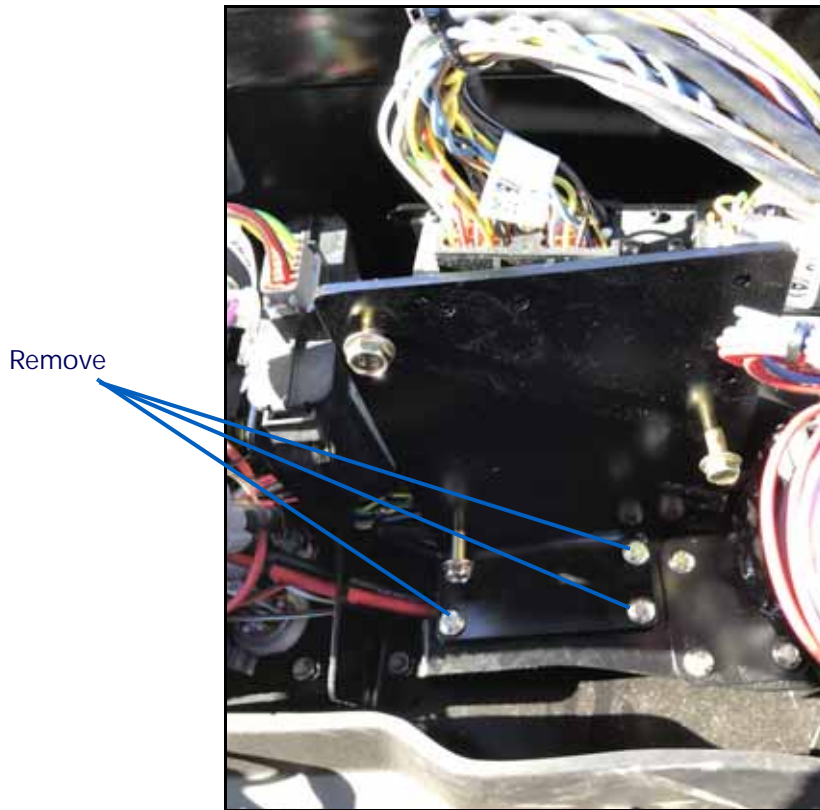
FIGURE 1. In-Cab Panel Removed



Panel
Removed

2. Remove the 3 bolts that hold the mounting bracket in place.

FIGURE 2. Existing Machine Bracket



3. Replace the existing bracket with the TC1/HDU bracket (P/N 107-0172-647) and secure using the previously removed bolts.
4. Thread the standoffs on the 1/4"-20 PEM studs (P/N 305-1000-013).
5. Mount the HDU ECU (P/N 063-0173-887) with the sticker facing down and ports facing toward the right of the machine.
6. Mount the TC1 ECU (P/N 063-0174-070) with the sticker facing up on top of the HDU and the ports facing toward the right of the machine. Secure the ECUs to the standoffs using the 1/4"-20 bolts.

FIGURE 3. TC1 and HDU ECU Mounting

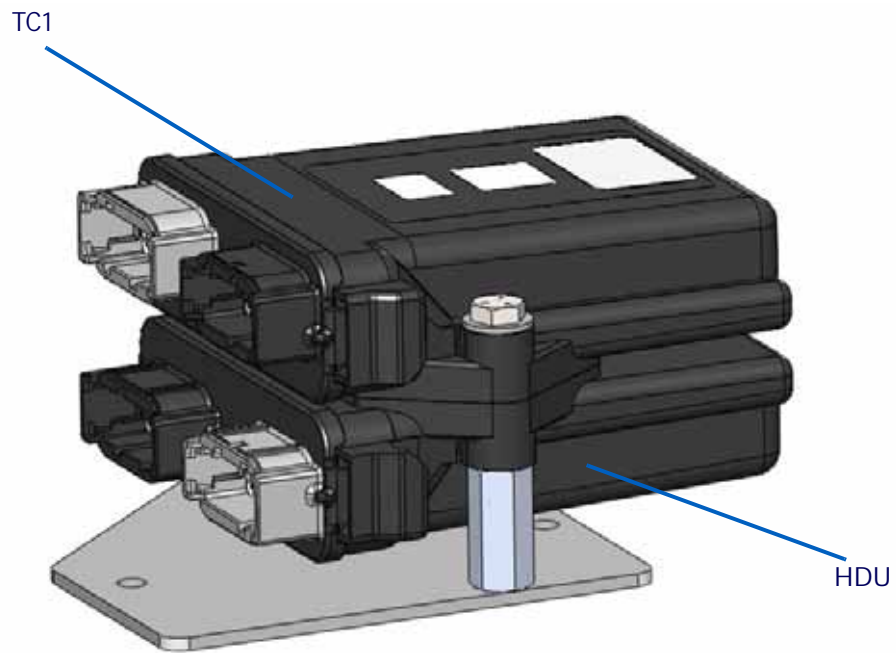


FIGURE 4. TC1 and HDU ECU Mounting



NOTE:

INSTALL THE FOOT SWITCH (OPTIONAL)

FIGURE 5. Foot Switch Installed



1. Select a suitable location for the foot switch (P/N 063-0172-470) to be installed.

NOTE: The foot switch should be installed in a location where the operator has easy access to it and is able to fully press the pedal.

2. Using the holes in the foot switch as a template, drill holes in the floor of the cab.
3. Secure the foot switch to the floor by installing the supplied screws in each of the mounting holes.
4. Route the foot switch cable connector to the node mounting location.

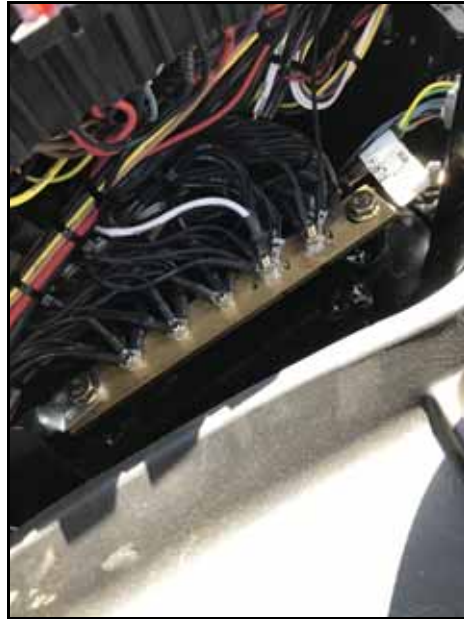
INSTALL THE NODE HARNESS

1. Connect the 12-pin Deutsch connectors on the (P/N 115-4010-127) to the HDU and TC1. The gray and green connectors go to the TC1, while the gray and black connectors go to the HDU.

NOTE: Nodes are keyed to prevent connecting matching colors to the wrong node.

2. (Optional) Locate the ENABLE connector on the node harness and connect it to the foot switch cable connector.
3. Connect the yellow and blue ring terminals in the same conduit to the ground bar behind the seat.

FIGURE 6. Ground Bar



4. Connect the single yellow ring terminal with the fuse box to the power bar located behind the seat to the right side of the cab.

FIGURE 7. Power Bar Connection

Power Ring Terminal
from TC1 Harness



5. Connect the 6-pin PWR/ENABLE connector to the tractor connector labeled RAVEN.

FIGURE 8. Raven Connector Located in Compartment Behind the Seat



6. Tee OPERATOR PRESENCE connector into the seat switch with the 12-pin connectors labeled SEAT.

FIGURE 9. Operator Presence Tee Connection with Seat Connector



7. Connect the 21-pin connector to the mating 21-pin connector on the (P/N 115-7300-073) cable. Route the cable in a convenient location to where the field computer will be installed.

INSTALL THE MASTER SWITCH

1. Use the provided hardware to install the Master Switch (P/N 063-0173-961) in the provided enclosure.

FIGURE 10. Master Switch in Enclosure



2. Install the master switch in a convenient location using either self-tapping screws or double sided tape (not provided).
3. Locate the 4-pin connector on the cab harness (P/N 115-4010-127) labeled "Steering Lockout Switch" and connect it to the master switch.

INSTALL THE VALVE HARNESS

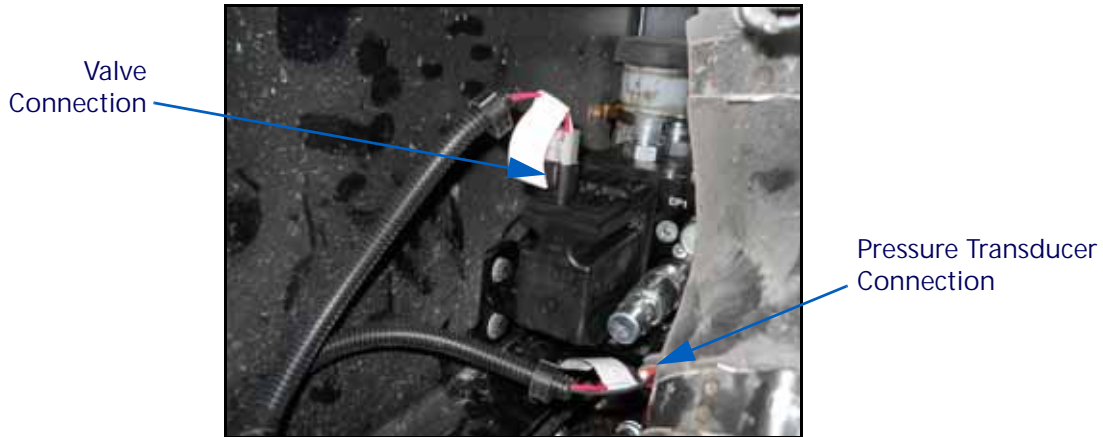
1. Connect the 21-pin connector of the valve harness (P/N 115-4010-128) to the mating connector of the node harness (P/N 115-4010-127)

FIGURE 11. Valve Harness Routed Outside the Cab



2. Route the valve harness outside and under the cab through the access hole located under the floor mat and behind the seat.
3. Route the valve harness toward the machine steering valve.

FIGURE 12. Valve Harness Connected to TC1 Valve



4. Connect the TRANSDUCER connector to the pressure transducer.
5. Connect the VALVE connector to the valve.
6. Connect the WAS connectors by teeing into the wheel angle sensor near the steering cylinder.

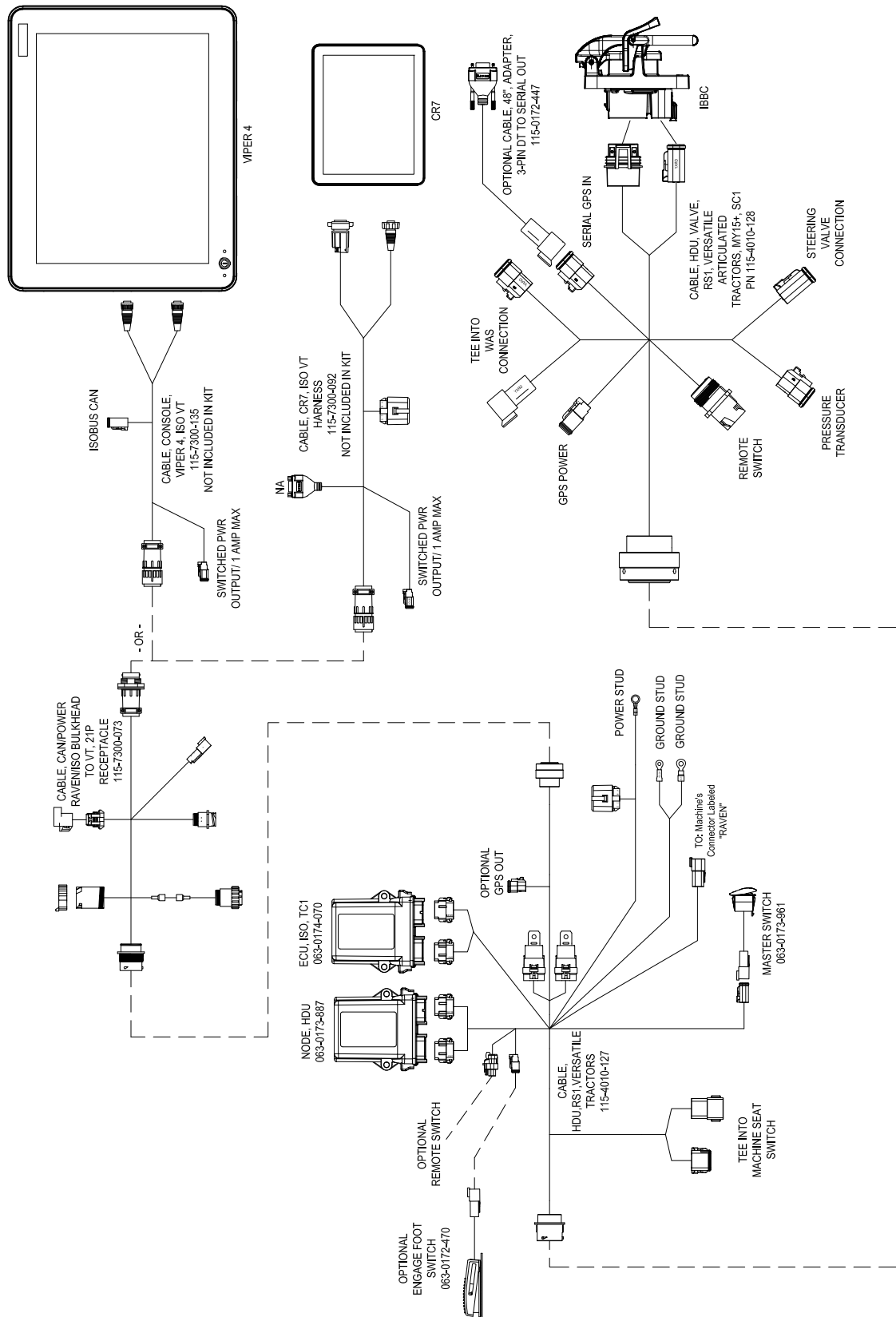
FIGURE 13. WAS Connection on Articulated Machine



7. Connect to the GPS receiver with the Serial GPS IN and GPS PWR connectors.

SYSTEM DIAGRAMS

FIGURE 14. TC1/HDU System Diagram for Versatile Articulated Tractors



CALIBRATE THE TC1 SYSTEM

Refer to the SC1/TC1 Calibration & Operation Manual (P/N 016-4010-005) for instructions on calibrating the TC1 system, adjusting system settings, and system operation.

C

- Cab Component Installation 7
 - Install the Node Harness 10
 - Installing the Foot Switch 10
 - Installing the TC1 Node 7
 - Installing the Valve Harness 13
 - Mount the TC1 and HDU ECUs 7

I

- Important Safety Information
 - Electrical Safety 2
- Introduction
 - Kit Contents 4
 - Preparing for Installation 3
 - Point of Reference 4
 - Recommendations 4
 - Updates 4

K

- Kit Contents 4

S

- Safety
 - Electrical 2
- Startup Procedures 17
 - Calibrating the TC1 System 17

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.