

**Case IH X010, X120, and X230 Series  
Steering Ready Combines SmarTrax™  
Installation Manual**

*P/N 016-5032-024 Rev. C*

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*E29484*

## ***Disclaimer***

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## Table of Contents

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<b>Chapter 1</b>	<b>Important Safety Information.....</b>	<b>1</b>
<b>Chapter 2</b>	<b>Introduction.....</b>	<b>3</b>
	Preparing for Installation .....	3
	Recommendations .....	4
	Point of Reference .....	4
	Updates .....	4
	Kit Contents .....	5
<b>Chapter 3</b>	<b>Cab Component Installation.....</b>	<b>7</b>
	Install the SmarTrax Node .....	7
	Mount the SmarTrax Node .....	7
	Node Mounting Locations .....	8
	Install the Foot Switch .....	9
	Install the Road Switch .....	10
	Install the Node Harness .....	10
	Install the Valve Harness .....	14
	Mount the Raven Console to the Factory-Installed Monitor (If Applicable) .....	18
	Install the Chassis Cable - SmarTrax-Only Systems (If Applicable) .....	18
	Connect SmarTrax to a Combine Console (If Applicable) .....	19
	Calibrate the SmarTrax System .....	20
	System Diagrams .....	21



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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 SmarTrax™ 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 SmarTrax 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 SmarTrax, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate SmarTrax 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 SmarTrax is engaged.
- Disable SmarTrax when exiting the operator's seat and machine.
- Do not drive the machine with SmarTrax enabled on any public road.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling SmarTrax when the safe working distance has diminished.
- Ensure SmarTrax is disabled prior to starting any maintenance work on SmarTrax or the machine.

## WARNING

- When starting the machine for the first time after installing SmarTrax, 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 SmarTrax installation or maintenance.

## CAUTION

- 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.



Congratulations on your purchase of the SmarTrax system! This system is designed to provide cutting-edge, hands-free steering of the machine via Global Positioning System (GPS) coordinates.

This manual applies to the following machines:

MAKE: Case IH Combines

MODEL: 7010/8010 - Steering Ready

7120/8120/9120 - Steering Ready

7230/8230/9230 - Steering Ready

**FIGURE 1. Case IH 8120 Combine**

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## PREPARING FOR INSTALLATION

Before installing the SmarTrax 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. Bleed pressure from the hydraulic system by loosening the hydraulic fittings slowly, where applicable.

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

- Install the GPS antenna in the recommended location. Refer to the following table for the machine-specific antenna mounting location.

**NOTE:** If your machine is not listed, install the antenna on the front-center of the cab.

**NOTE:** The units in the table below are measured in inches. To convert the values to centimeters, multiply the listed value by 2.54.

**NOTE:** The values in the table below must be converted into feet or meters before being entered into the field computer.

- To convert the values to feet, divide the listed value by 12.
- To convert the values to meters, multiply the listed value by 0.0254.

Machine Preset	Antenna X Position (left to right)	Antenna Y Position (from the rear wheel axle to the antenna position on the cab in inches)	Antenna Z Position (ground to top of antenna in inches)
CIH x010/x120/x230 Combine	Centered	154	156

- 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 SmarTrax 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](mailto:techwriting@ravenind.com)

- Case IH X010, X120, and X230 Series Steering Ready Combines SmarTrax™ Installation Manual
- P/N 016-5032-024 Rev. C
- 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 SmarTrax kit. Before beginning the SmarTrax 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. SmarTrax Installation Kit (P/N 117-5032-024)**

Picture	Item Description	Part Number	Qty.
Not Pictured	Manual - SmarTrax and SmartSteer Calibration & Operation	016-0171-277	1
Not Pictured	Manual - Case IH X010/X120/X230 Series SmarTrax Installation Manual	016-5032-024	1
	Node - SmarTrax RTK	063-0173-228	1
	Bracket - Node Mounting	107-0172-084	1

TABLE 1. SmarTrax Installation Kit (P/N 117-5032-024)

Picture	Item Description	Part Number	Qty.
	Bracket - Console Mounting	107-0172-180	1
	Bracket - Spacer	107-0172-182	1
	Cable - Node Harness	115-4001-181	1
	Cable - Valve Harness	115-4001-182	1
	Assembly - Enable Foot Switch	063-0172-470	1
	Assembly - Road Switch	063-0173-505	1
	Screw - #8-32 x 3/4" Phillips	311-0007-041	4
	Nut - 3/8" -16 Lock	312-4001-109	3

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# CHAPTER

# 3

# CAB COMPONENT INSTALLATION

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## INSTALL THE SMARTRAX NODE

### MOUNT THE SMARTRAX NODE

FIGURE 1. SmarTrax Node Installed on Mounting Bracket

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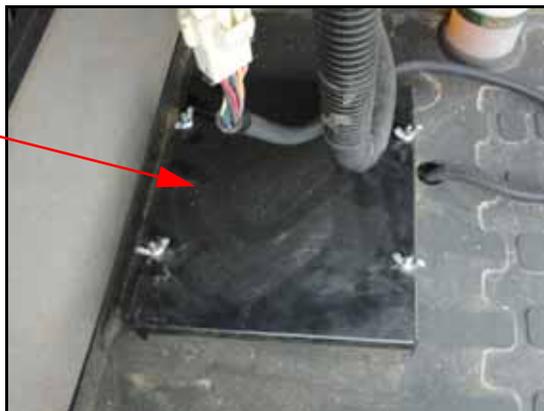


1. Install the SmarTrax node (P/N 063-0173-228) on the node mounting bracket (P/N 107-0172-084) using three 3/8"-16 lock nuts (P/N 312-4001-109).

FIGURE 2. Node Mounting Location

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Existing  
Node Cover  
Bracket



2. Identify the node mounting location on the floor to the right of the operator's seat.

FIGURE 3. Node Cover Bracket Removed



3. Remove the existing node cover bracket.

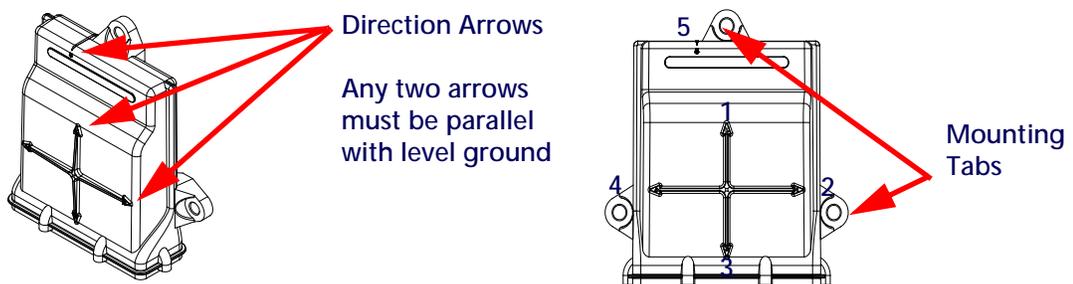
FIGURE 4. SmarTrax Node Installed



4. Align the holes in the node mounting bracket with the machine's standoffs, orienting the bracket so that the node's connectors point to the right side of the machine.
5. Reinstall the original wing nuts to secure the node mounting bracket to the standoffs.

### NODE MOUNTING LOCATIONS

FIGURE 5. Node Mounting



When choosing the location for the SmarTrax node, consider the following points:

- Mount the SmarTrax node inside the machine's cab on a flat, level surface for proper performance and cable connection.
- One of the six numbered direction arrows on the node must be oriented in the direction of forward vehicle travel, one arrow pointing straight up, and two of the arrows parallel to the ground.

**NOTE:** Make a note of the number of the arrow that is oriented in the direction of forward vehicle travel. This number will be needed during the SmarTrax calibration process.

- The node mounting location must not create tripping hazards.
- Mount the node in a location where it will not be kicked or jarred during normal equipment operation.
- The location must allow cable routing to avoid crimping or damaging the cables or the node connections.
- Securely fasten the node using bolts or screws through at least two of the three mounting holes. When mounted properly, the node should not become loose or rotate.

## INSTALL THE FOOT SWITCH

FIGURE 6. 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 to the node mounting location.

## INSTALL THE ROAD SWITCH

FIGURE 7. Road Switch Assembly



1. Select a suitable location for the road switch assembly (P/N 063-0173-505) to be installed.

**NOTE:** The road switch should be mounted in a location within the operator's reach.

2. Remove the backing from the double-sided tape.
3. Install the road switch assembly to the chosen mounting location.

## INSTALL THE NODE HARNESS

FIGURE 8. Node Harness Installed on SmarTrax Node



1. Install the two large, rectangular connectors of the node harness (P/N 115-4001-181) into the correct ports of the node, tightening the bolts on the connectors to secure the connections.
2. Locate the ENABLE connector on the node harness and connect it to the foot switch (P/N 063-0172-470) cable connector.
3. Locate the ROAD SWITCH connector and connect it to the installed road switch (P/N 063-0173-505).

FIGURE 9. Machine's Steering Column



4. Route the SPROCKET connectors to the steering column in the front of the cab.

FIGURE 10. Gear Tooth Sensor and Connections



5. Pull down the rubber shroud at the base of the steering column to expose the gear tooth sensor and its connectors.
6. Disconnect the machine's gear tooth sensor connections.

FIGURE 11. Node Harness Connected to Gear Tooth Sensor



7. Install the mating SPROCKET connectors from the node harness on the machine's gear tooth sensor connectors.

**FIGURE 12. Fuse Panel**

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8. Route the large, round bulkhead connectors from the node harness behind the seat and to the fuse panel.
9. Remove the fuse panel cover.

**FIGURE 13. Machine's Bulkhead Connection**

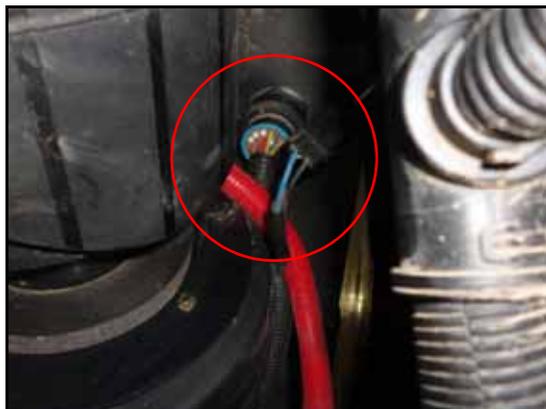
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10. Identify the machine's harness bulkhead connector below the fuse panel and toward the rear of the cab.

**FIGURE 14. Bulkhead Connector Outside the Cab**

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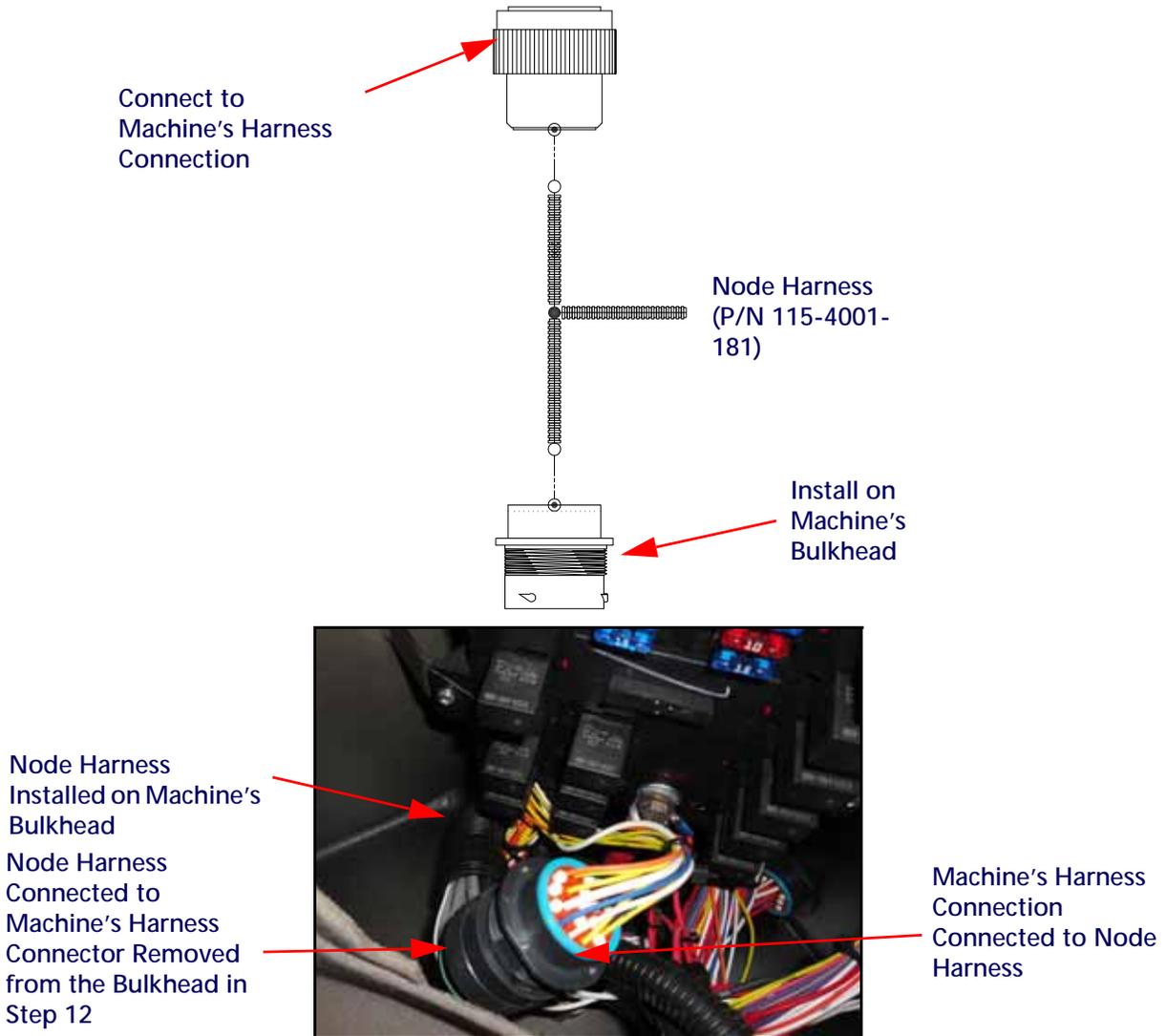


- From outside and under the cab, disconnect the machine's harness connector from the bulkhead and remove the nut and lock washer used to secure it.

**NOTE:** This connector will be connected to the SmarTrax system later in the procedure.

- From inside the cab, pull the machine's harness connection from its mounting hole.

**FIGURE 15. Machine's Harness to Node Harness Connections**



- Connect the machine's harness connector to the mating connector on the node harness.
- Route the 31-pin node harness connector into the hole from which the machine's harness connector was removed.
- From outside the cab, secure the node harness connector to the machine's bulkhead using the nut and lock washer removed in step 11.

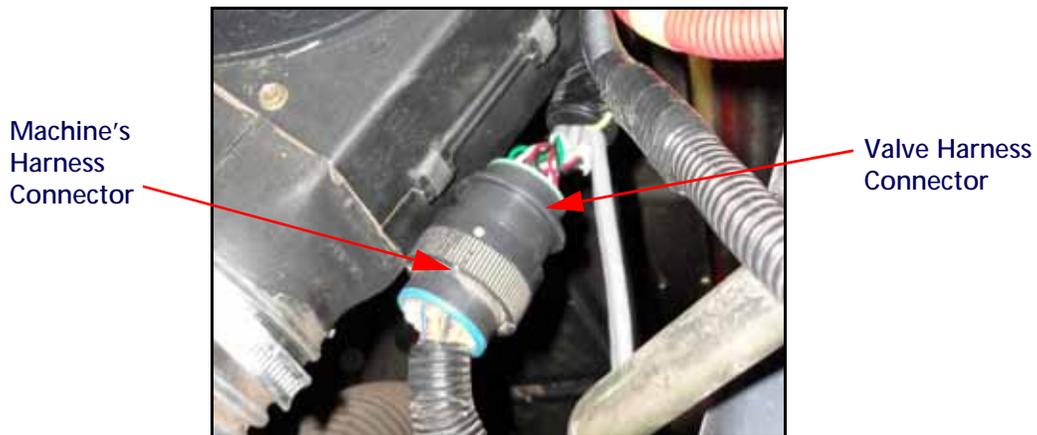
## INSTALL THE VALVE HARNESS

FIGURE 16. Valve Harness Connected to Node Harness



1. Connect the 31-pin valve harness (P/N 115-4001-182) connector to the mating 31-pin connector of the node harness (P/N 115-4001-181) installed on the machine's bulkhead under the cab.

FIGURE 17. Valve Harness Connected to Machine's Harness



2. Connect the machine's harness that was disconnected from the bulkhead during the node harness installation to the mating connector on the valve harness.

**FIGURE 18. Machine's Steering Valve**

3. Route the 6-pin Deutsch connector from the valve harness under the cab and toward the steering valve.
4. Trace the existing cables coming out of the steering valve.
5. Disconnect the 6-pin connectors located directly behind the steering valve.

**FIGURE 19. Steering Valve Connection**

6. Connect the 6-pin connector from the valve harness to the mating 6-pin steering valve connector.

**FIGURE 20. Machine's Wheel Angle Sensor Connection at Rear Axle**

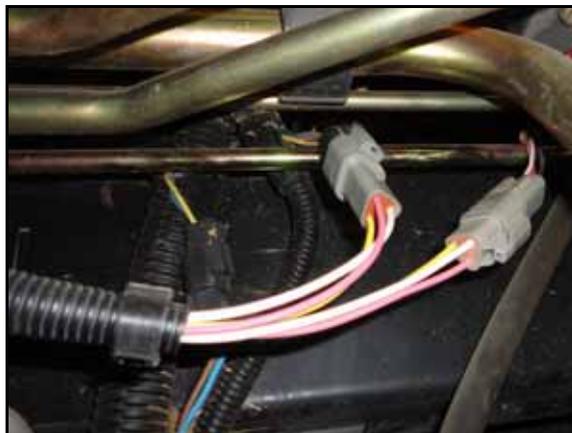
7. Locate the wheel angle sensor (WAS) cable on the left steering cylinder at the machine's rear axle.

FIGURE 21. Machine's WAS Connection on Frame



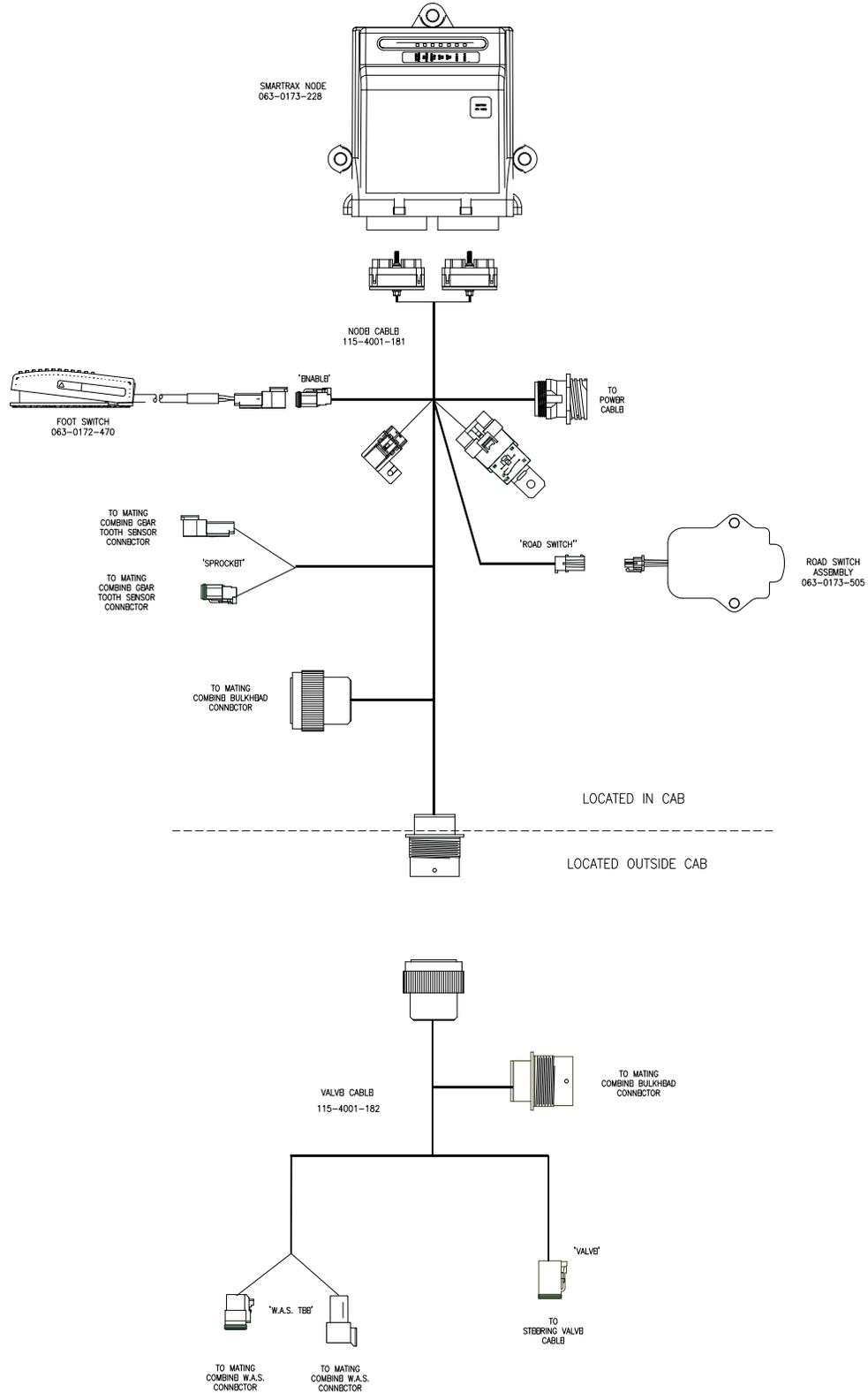
8. Trace the WAS cable along the machine's frame.
9. Disconnect the machine's WAS connection.

FIGURE 22. WAS Connection



10. Install the mating 3-pin connectors from the valve harness on the machine's WAS connectors.
11. Loop and tie-off any excess cable with plastic cable ties, ensuring the cables are secured away from moving parts and heat sources.

FIGURE 23. Valve Harness Diagram



## MOUNT THE RAVEN CONSOLE TO THE FACTORY-INSTALLED MONITOR (IF APPLICABLE)

**NOTE:** This section pertains to Envizio Pro, Envizio Pro II, and Cruiser consoles only. Envizio Pro XL and Viper Pro consoles are too large to be mounted in this manner.

**FIGURE 24. Raven Console Mounted on Factory-Installed Monitor**



1. Install the console mounting bracket (P/N 107-0172-180) on the back of the factory-installed monitor (hardware not supplied).
2. Cruiser Consoles Only - Install the spacer bracket (P/N 107-0172-182) on the console mounting bracket.
3. Secure the Raven console to the console mounting bracket using four #8-32 x 3/4" machine screws (P/N 311-0007-041).

## INSTALL THE CHASSIS CABLE - SMARTRAX-ONLY SYSTEMS (IF APPLICABLE)

**IMPORTANT:** The following steps are critical. Failure to install the system as instructed may result in damage to the SmarTrax system.

If the machine does not contain an existing chassis power system (such as SmartYield™ Pro), it is necessary to install the chassis power cable to operate the SmarTrax system. If a CAN system already exists on the machine, refer to Connect SmarTrax to a Combine Console (If Applicable) below to connect power to the SmarTrax system.

**NOTE:** The chassis cable is sold separately. Contact your local Raven dealer for ordering information.

1. Locate the SmarTrax chassis cable (P/N 115-4001-085).
2. Connect the TO SMARTRAX NODE connector from the chassis cable to the round 16-pin connector on the node harness (P/N 115-4001-181).
3. Connect the TO CONSOLE CABLE connector to the Raven console cable.
4. Install a terminator (P/N 063-0172-369) on the CAN cable connector.
5. Loop and tie-off the REMOTE SWITCH cable connection, securing it with plastic cable ties as necessary.

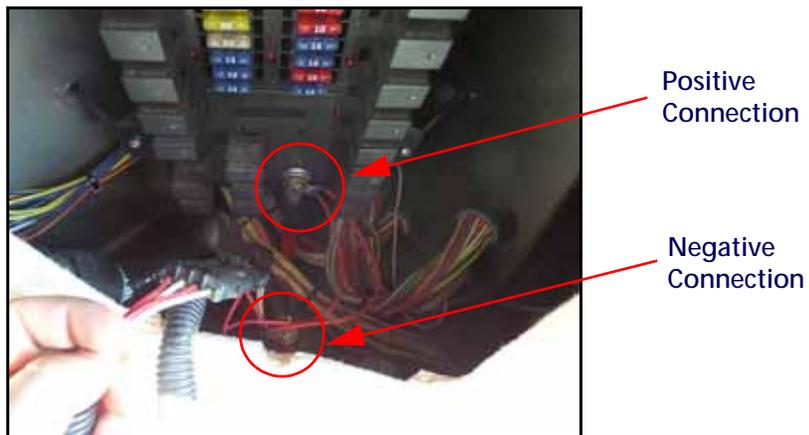
**NOTE:** The REMOTE SWITCH connector is not used in the SmarTrax system. Ensure the cable is secured away from moving parts and heat sources.

FIGURE 25. Fuse Panel



6. Locate the fuse panel in the back-left corner of the cab.

FIGURE 26. Positive and Negative Bulkhead Connections



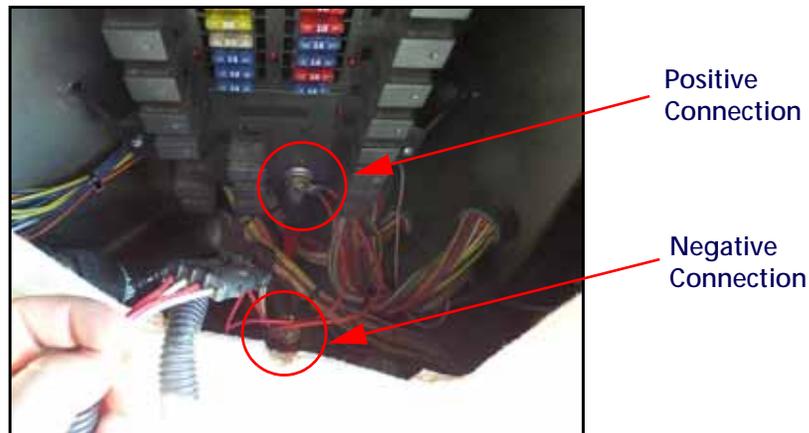
7. Unscrew the nut on the power and ground studs.
8. Connect the power and ground leads to the mating connectors on the chassis cable.

**NOTE:** The positive connectors are fused.

## CONNECT SMARTRAX TO A COMBINE CONSOLE (IF APPLICABLE)

**NOTE:** The combine console cable (P/N 115-9000-009) and 12' combine console power extension cable (P/N 115-9000-012) are sold separately. Contact your local Raven dealer for ordering information.

FIGURE 27. Positive and Negative Bulkhead Connections



1. Ensure that the 12' combine console power extension cable (P/N 115-9000-012) is connected to the positive and negative power posts located in the fuse panel.
2. Ensure that the of the combine console power extension cable is connected to the POWER port on the combine console cable (P/N 115-9000-009).
3. Locate the round 16-pin connector on the combine console cable.
4. Remove the jumper from the round 16-pin connector.
5. Connect the SmarTrax node harness (P/N 115-4001-181) to the 16-pin connector of the combine console cable.

## CALIBRATE THE SMARTRAX SYSTEM

Refer to the SmarTrax Calibration & Operation Manual (P/N 016-0171-277) for instructions on calibrating the SmarTrax system, adjusting system settings, and system operation.

**IMPORTANT:** When transporting the vehicle, press down on the side of the road switch that contains the icon. To use SmarTrax in the field, toggle the road switch in the opposite direction.









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## C

### **Cab Component Installation**

- Calibrating the SmarTrax System 20
- Connecting SmarTrax to a Combine Console 19
- Installing the Chassis Cable - SmarTrax-Only Systems 18
- Installing the Foot Switch 9
- Installing the Node Harness 10
- Installing the Road Switch 10
- Installing the SmarTrax Node 7
  - Mounting the SmarTrax Node 7
  - Node Mounting Locations 8
- Installing the Valve Harness 14
- Mounting the Raven Console to the Factory-Installed Monitor 18
- System Diagrams 21

## I

### **Important Safety Information**

- Electrical Safety 1

### **Introduction**

- Kit Contents 5
- Preparing for Installation 3
  - Point of Reference 4
  - Recommendations 4
- Updates 4

## K

- Kit Contents 5



# 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.**