

**John Deere 7X20-7X30, 8X00-8X30,
9X00, 9X20-9X30 - Steering Ready
SmarTrax™ Installation Manual**

P/N 016-5034-001 Rev A 04/16

E19726

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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 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.

CHAPTER

2

Introduction

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: John Deere

MODEL: 7X20, 7X30, 8X00, 8X10, 8X20, 8X30, 9X00, 9X20, and 9X30 Series - Steering Ready

FIGURE 1. John Deere 8130



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.

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.

Note: 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)
John Deere 7x20/7x30	Centered	60	102.25
John Deere 8x20/8x30	Centered	60	116.5
John Deere 9x00/9x20	Centered	120	144

- 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

-John Deere 7X20-7X30, 8X00- 8X30, 9X00, 9X20-9X30 Series Steering Ready SmarTrax™ Installation Manual

-Manual No. 016-5034-001 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 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 local Raven dealer.

John Deere 7X20, 7X30, 8X00, 8X10, 8X20, and 8X30 Series

TABLE 1. SmarTrax Installation Kit (P/N 117-5034-001 or 117-5034-002)

Picture	Item Description	Part Number	Qty.
Not Pictured	Manual - SmarTrax and SmartSteer Calibration & Operation	016-0171-277	1
Not Pictured	Manual - John Deere 7X20, 7X30, 8X00, 8X10, 8X20, 8X30, 9X00, 9X20, and 9X30 - Steering Ready SmarTrax Installation	016-5034-001	1

TABLE 1. SmarTrax Installation Kit (P/N 117-5034-001 or 117-5034-002)

Picture	Item Description	Part Number	Qty.
	Node - SmarTrax RTK	063-0173-228	1
	Bracket - Node Mounting	107-0171-947	1
	Cable - Valve Harness	115-4001-054	1
	Cable - Node Harness	115-4001-087	1
	Assembly - Enable Foot Switch	063-0172-470	1
	Terminator - John Deere 7XX0/8XX0 WAS	063-4001-001	1
	Terminator - Encoder	063-4001-003	2
	Terminator - Flow Meter	063-4001-007	1
	Nut - 3/8"-16 Lock	312-4001-109	3

John Deere 9X00, 9X20, and 9X30 Series

TABLE 2. SmarTrax Installation Kit (P/N 117-5034-003)

Picture	Item Description	Part Number	Qty.
Not Pictured	Manual - SmarTrax and SmartSteer Calibration & Operation	016-0171-277	1
Not Pictured	Manual - John Deere 7X20, 7X30, 8X00, 8X10, 8X20, 8X30, 9X00, 9X20, and 9X30 - Steering Ready SmarTrax Installation	016-5034-001	1
Not Pictured	Diagram - John Deere Steering Ready SmarTrax System	054-5034-003	1
	Node - SmarTrax RTK	063-0173-228	1
	Bracket - Node Mounting	107-0171-947	1
	Cable - WAS Adapter	115-0172-020	1
	Cable - Node Harness	115-4001-087	1
	Cable - Valve Harness	115-4001-100	1
	Assembly - Enable Foot Switch	063-0172-470	1
	Terminator - Encoder	063-4001-003	2

TABLE 2. SmarTrax Installation Kit (P/N 117-5034-003)

Picture	Item Description	Part Number	Qty.
	Terminator - John Deere 9X30 WAS	063-4001-004	1
	Terminator - John Deere 9X00/9X20 WAS	063-4001-005	1
	Nut - 3/8"-16 Lock	312-4001-109	3

CHAPTER

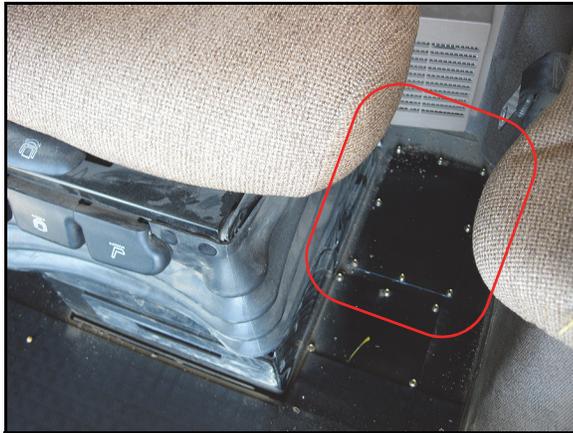
3

Cab Component Installation

Install the SmarTrax Node

Mount the SmarTrax Node

FIGURE 1. Floor Panel to be Removed



1. Remove the factory-installed access plate on the floor of the cab, to the left side of the operator's seat and under the floor mat.
2. Using the bolts removed in step 1, install the node mounting bracket (P/N 107-0171-947) on the floor of the cab.

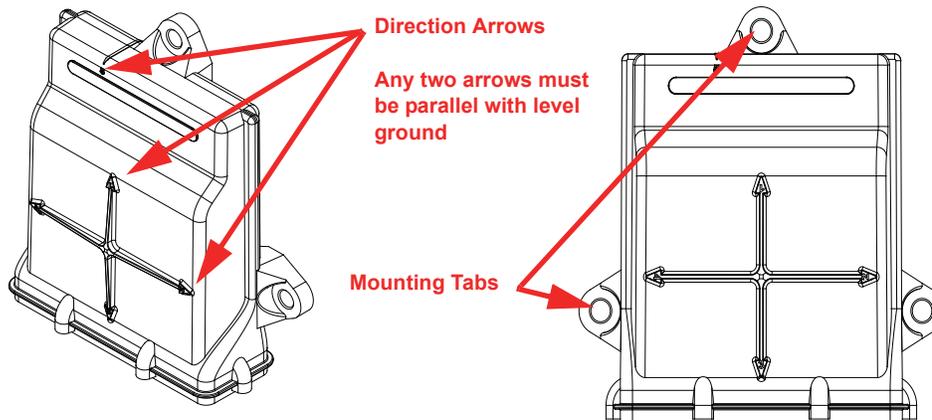
FIGURE 2. Node Harness Installed



3. Mount the SmarTrax node (P/N 063-0173-228) on the node mounting bracket (P/N 107-0171-947) using three 3/8"-16 nylon insert lock nuts (P/N 312-4001-109).
4. Insert the two large, rectangular connectors of the node harness (P/N 115-4001-087) into the correct ports of the node, tightening the bolts on the harness connectors to secure the connections.

Node Mounting Locations

FIGURE 3. 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.

Connect to the Steering Wheel Encoder

FIGURE 4. Steering Column Shroud Removed



1. Remove the shroud surrounding the steering column.

FIGURE 5. Encoder Connections

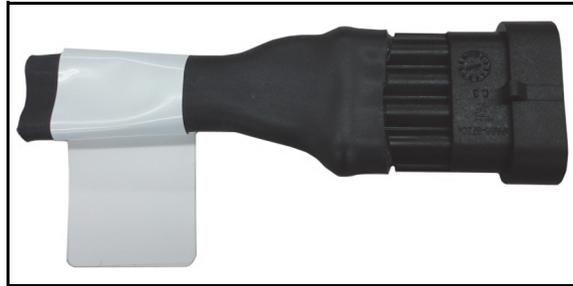


2. Locate and disconnect the machine's two encoder connections.

3. Route the STEERING WHEEL ENCODER connector from the node harness (P/N 115-4001-087) into one of the machine's mating encoder connectors.

Note: *The machine's remaining encoder connector will not be used in the SmarTrax system.*

FIGURE 6. Encoder Terminator



4. Install the two encoder terminators (P/N 063-4001-003) on the machine's cables that were disconnected from the encoder.

Install the Foot Switch

FIGURE 7. 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.*

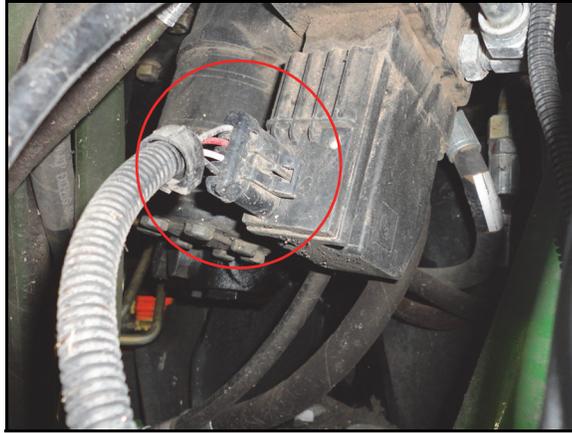
2. Using the holes in the foot switch as a template, drill holes in the floor of the cab.
3. Secure the foot switch to the floor by installing the supplied screws in each of the mounting holes.
4. Locate the 2-pin Deutsch connector on the node harness (P/N 115-4001-087) and connect it to the foot switch connector.

Install the Valve Harness

John Deere 7X20, 7X30, 8X00, 8X10, 8X20, and 8X30 Series

1. From outside the cab, route the 12-pin connector of the valve harness (P/N 115-4001-054) into the cab through the access hole in the installed node mounting bracket (P/N 107-0171-947).
2. Connect the 12-pin connector to the mating connector of the node harness (P/N 115-4001-087).

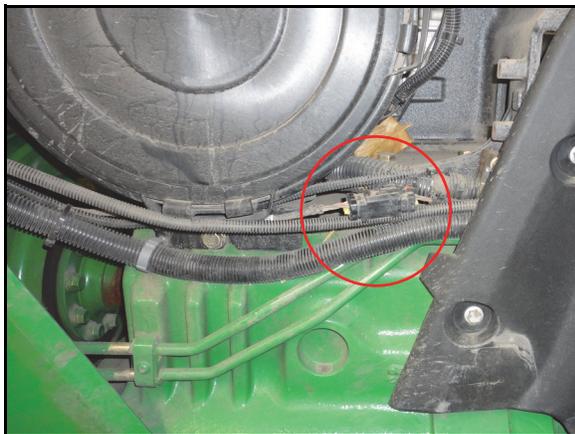
FIGURE 8. Machine's Existing Steering Valve Connection



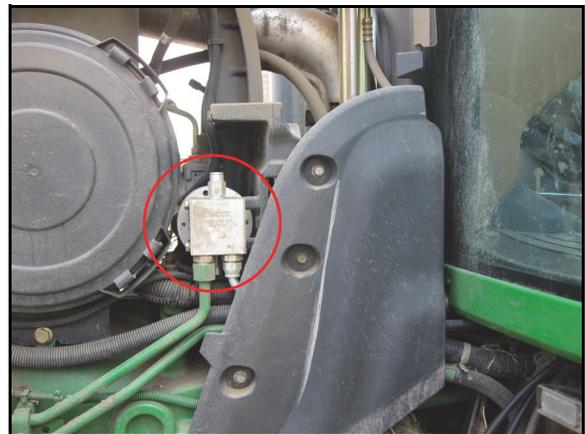
3. Disconnect the machine's existing cable connection from the steering valve located in the front of the cab.
4. Connect the VALVE connector on the valve harness to the open port of the steering valve.

FIGURE 9. Machine's Configuration - Row Crop Tractors

Wheel Angle Sensor Connection



Flow Meter



5. Determine whether the machine has a wheel angle sensor (WAS) or a flow meter installed.
 - **WAS**
 - a. Trace the WAS cable from the front-left kingpin.
 - b. Locate and disconnect the 6-pin WAS connection on the left side of the tractor, then connect the WHEEL ANGLE SENSOR connector on the valve harness to the machine's WAS connector.

- c. Install the WAS terminator (P/N 063-4001-001) on the machine's remaining cable end.

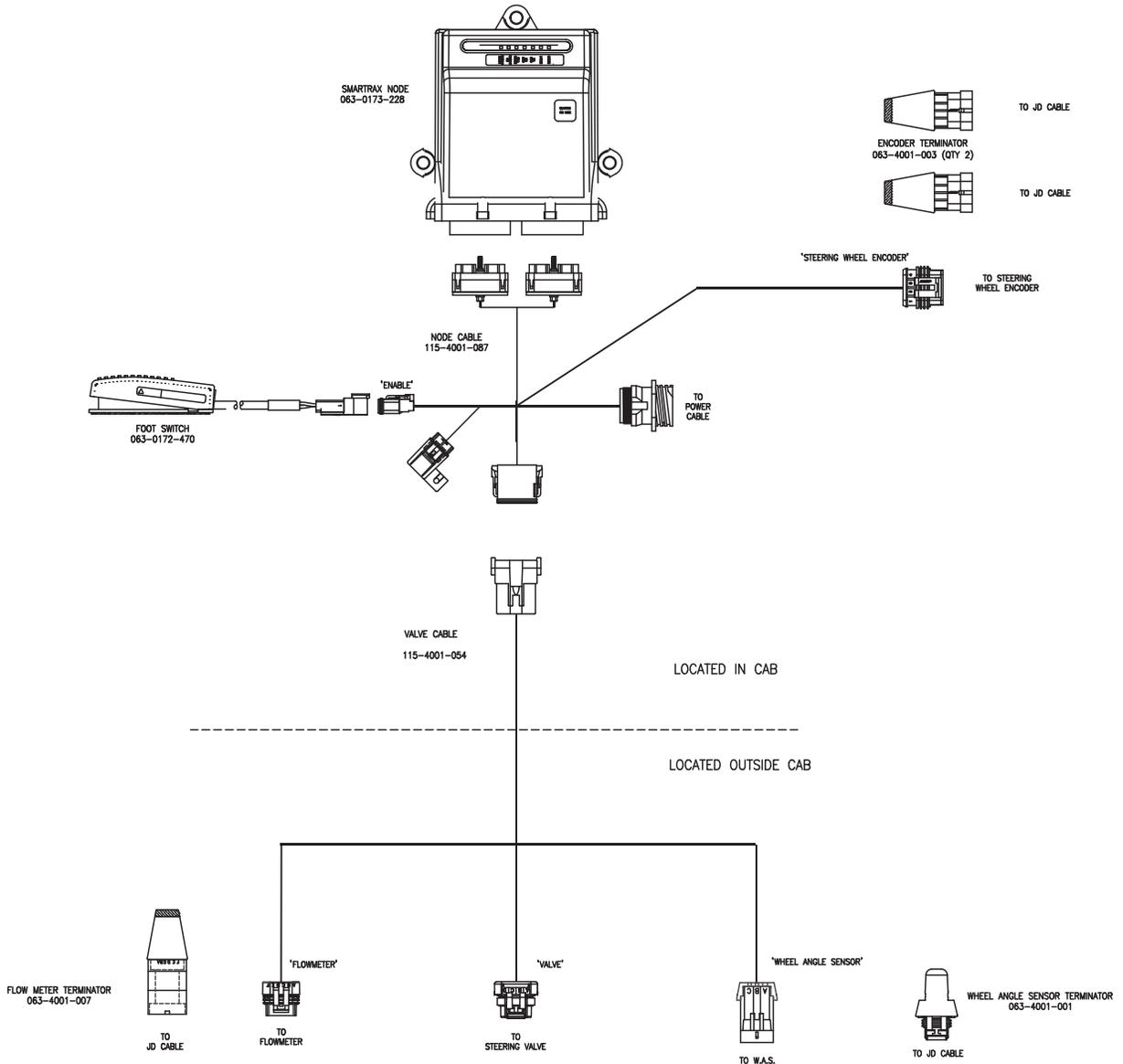
Note: *If the machine contains a WAS, the FLOWMETER connector on the valve harness will not be used.*

- **Flow Meter**

- a. Locate and disconnect the machine's flow meter connection on the left side of the tractor.
- b. Plug the FLOWMETER connector of the valve harness into the flow meter.
- c. Install the flowmeter terminator (P/N 063-4001-007) on the machine's disconnected flowmeter cable.

Note: *If the machine contains a flow meter, the WHEEL ANGLE SENSOR connector on the valve harness will not be used.*

FIGURE 10. Valve Harness Wiring Diagram - 7X20, 7X30, 8X00, 8X10, 8X20, and 8X30 Series



John Deere 9X00, 9X20, and 9X30 Series

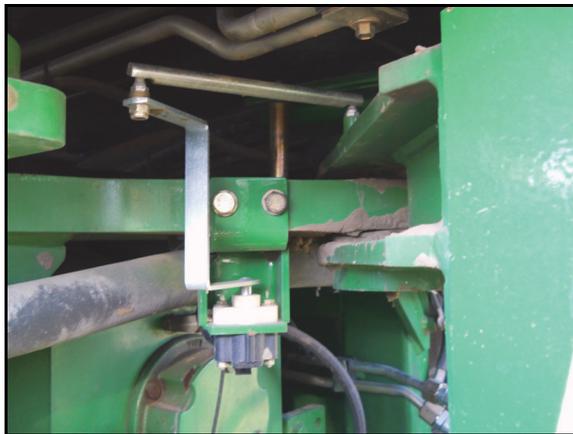
1. From outside the cab, route the 12-pin connector of the valve harness (P/N 115-4001-100) into the cab through the access hole in the installed node mounting bracket (P/N 107-0171-947).
2. Connect the 12-pin connector to the mating connector of the node harness (P/N 115-4001-087).

FIGURE 11. Machine's Existing Steering Valve Connection



3. Disconnect the machine's existing cable connection from the steering valve located in the front of the cab.
4. Connect the VALVE connector on the valve harness to the open port of the steering valve.

FIGURE 12. Wheel Angle Sensor

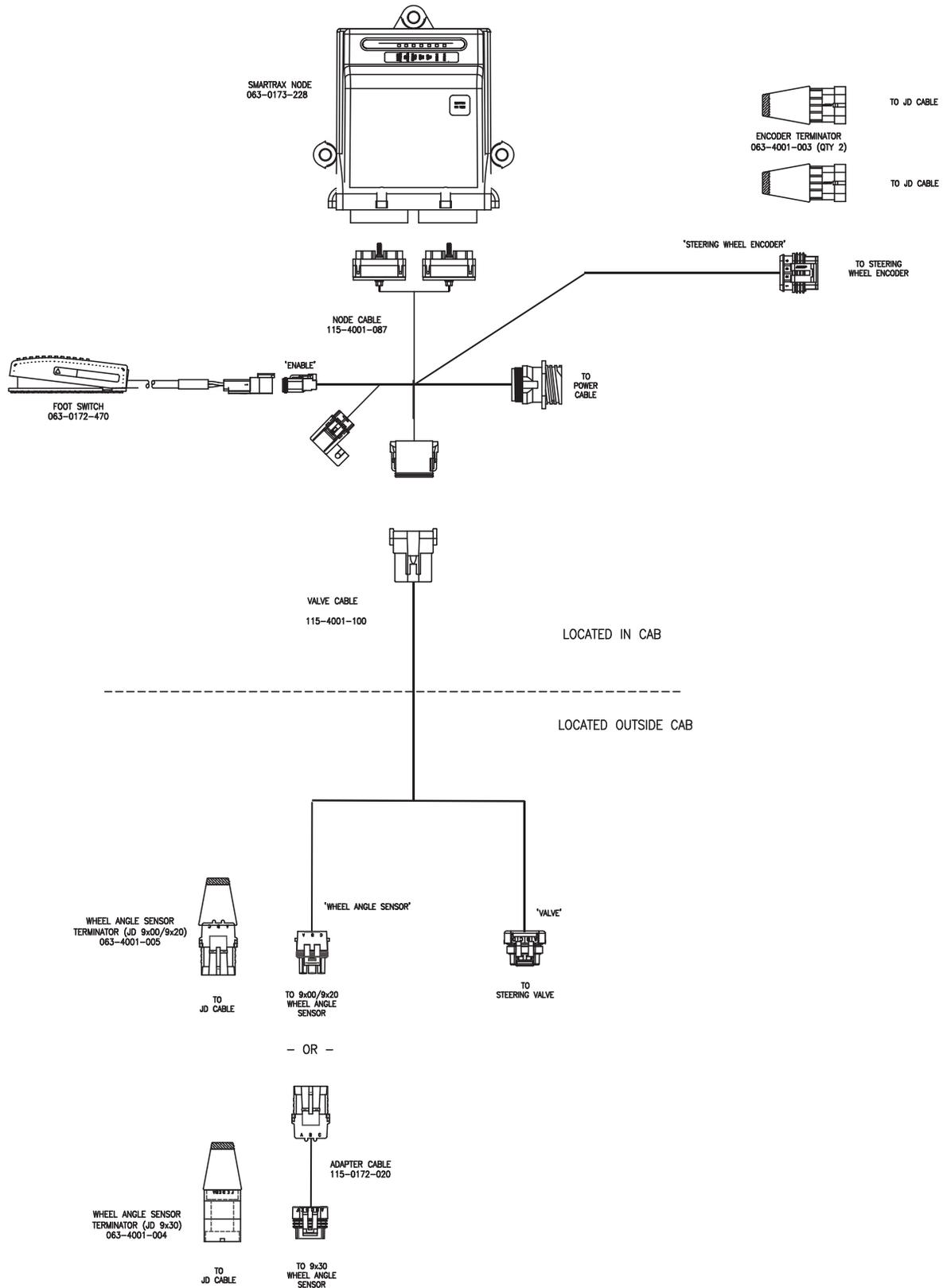


5. Locate the wheel angle sensor (WAS) at the front of the articulation joint.
6. Unplug the machine's cable from the WAS.
7. Connect the WHEEL ANGLE SENSOR connector on the valve harness into the WAS.

Note: 9X30 Models Only - It is necessary to install the WAS adapter cable (P/N 115-0172-020) between the WAS and the valve harness WHEEL ANGLE SENSOR connector.

8. Install the appropriate WAS terminator (P/N 063-4001-004 or 063-4001-005) on the machine's disconnected WAS cable.
9. Loop and tie off the machine's WAS cable, securing it with plastic cable ties as necessary.

FIGURE 13. Valve Harness Wiring Diagram - 9X00, 9X20, and 9X30 Series



Install the Chassis Cable - SmarTrax-Only Systems (If Applicable)

If the machine does not contain an existing chassis power system (such as AutoBoom, product control, etc.), 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 an Existing Chassis Cable (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 115-4001-087).
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.*

6. Connect the ring terminals to the battery.

Note: *The positive connectors are fused.*

Connect SmarTrax to an Existing Chassis Cable (If Applicable)

Note: *The SmarTrax interface tee is sold separately. Contact your local Raven dealer for ordering information.*

1. Locate and disconnect the connection between the Raven console cable and chassis cable on the machine's existing CAN system.
2. Install the SmarTrax interface tee cable (P/N 115-4001-070 or 115-4001-071) between the chassis and Raven console harness.
3. Connect the SmarTrax node harness (P/N 115-4001-087) to the remaining SmarTrax interface tee.

System Diagrams

FIGURE 14. Existing Chassis System Wiring Diagram

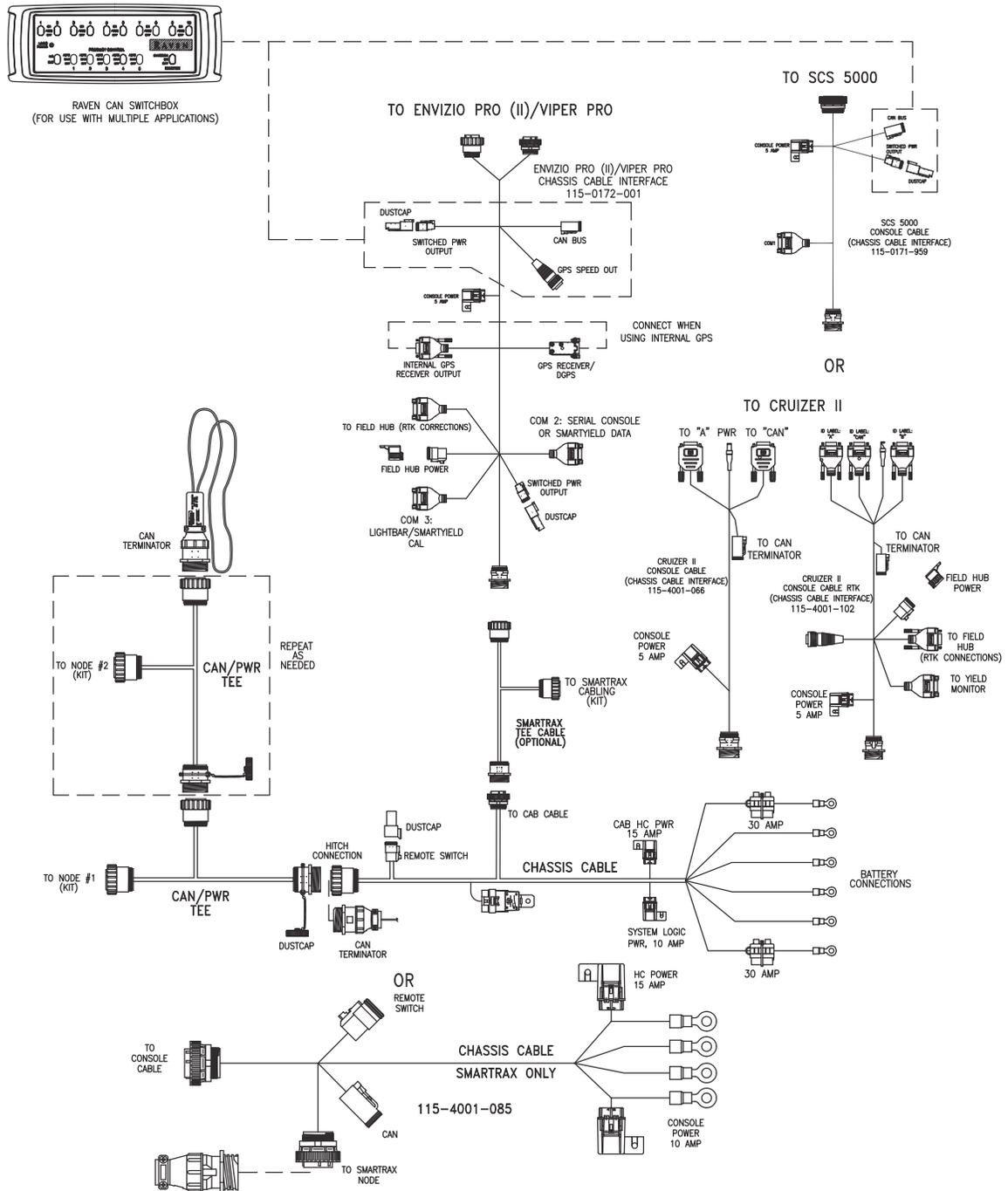
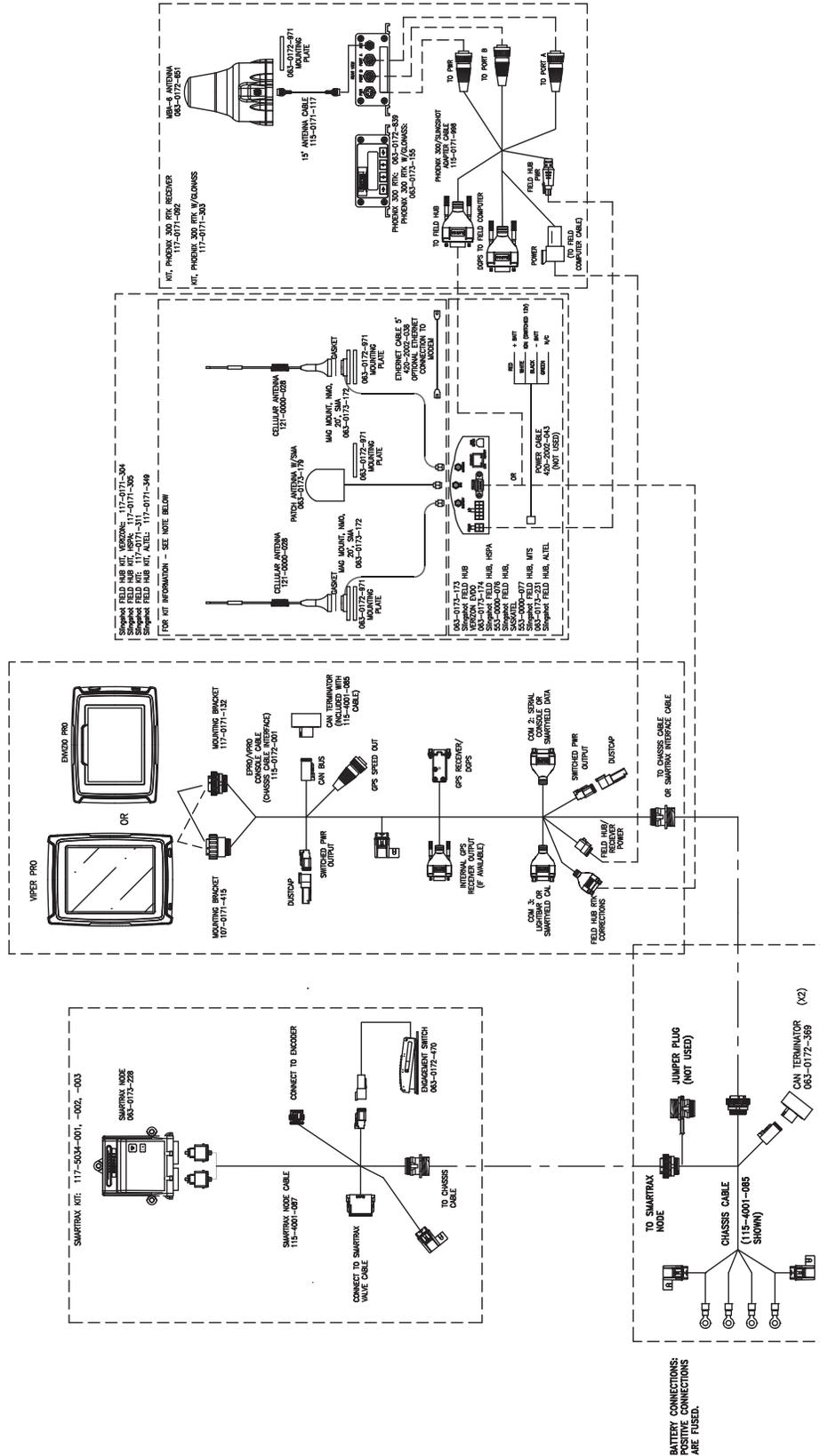


FIGURE 16. Envizio Pro/Viper Pro SmarTrax with Slingshot

ENVIZIO PRO/VIPER PRO SMARTRAX W/SLINGSHOT



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RAVEN

RAVEN INDUSTRIES

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.

How Long is the Coverage Period?

Raven Applied Technology Division products are covered by this warranty for 12 months after the date of purchase. This warranty coverage applies only to the original owner and is nontransferable.

How Can I Get Service?

Bring the defective part and proof of purchase to your Raven dealer. If your dealer agrees with the warranty claim, the dealer will send the part and proof of purchase to their distributor or to Raven Industries for final approval.

What Will Raven Industries Do?

Upon confirmation of the warranty claim, Raven Industries will, at our discretion, repair or replace the defective part and pay for return freight.

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 or other special 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.