

**RBR Enterprise Vector 300 LS/  
Venturi LS SmartTrax™ Installation  
Manual**

*P/N 016-5030-010 Rev A*

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*E20321*

## ***Disclaimer***

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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**

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## *Hydraulic Safety*

- 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 SmarTrax 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 SmarTrax valve.

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## *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.

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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: RBR**

**MODEL: Vector 300 LS/Venturi LS**

**YEAR: 2013**

**FIGURE 1. RBR Vector 300 LS**



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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.

## Chapter 2

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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.*

Machine Preset	Antenna X Position (left to right)	Antenna Y Position (from the rear wheel axle to the antenna position on the cab)	Antenna Z Position (ground to top of antenna)
Vector 300 LS	Centered	13.6 ft./4.15 m	12.9 ft./3.93 m
Venturi LS	Centered	10.0 ft./3.05 m	13.0 ft./3.96 m

- 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.

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## 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)**

- RBR Enterprise Vector 300 LS/Venturi LS SmarTrax™ Installation Manual*
- Manual No. 016-5030-010 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.*

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## 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 117-5030-010)**

Picture	Item Description	Part Number	Qty.
Not Pictured	Manual - SmarTrax and SmartSteer Calibration & Operation	016-0171-277	1
Not Pictured	Manual - BRB Vector 300 LS/Venturi SmarTrax Installation	016-5030-010	1
	Valve - SmarTrax Hydraulic	334-0003-088	1
	Node - SmarTrax 3D CAN Control	063-0173-228	1

TABLE 1. SmarTrax Installation Kit (P/N 117-5030-010)

Picture	Item Description	Part Number	Qty.
	Bracket - Hydraulic Valve Mounting	107-0171-907	1
	Cable - Node Harness	115-4001-173	1
	Cable - Valve Harness	115-4001-174	1
	Assembly - SmarTrax Enable Foot Switch	063-0172-470	1
	Bolt - 5/16"-18 x 7/8" Hex	311-0052-104	4
	Bolt - 3/8"-16 UNC x 1/4" Hex	311-0054-106	1
	Nut - 3/8"-16 UNC-3B Nylon Insert Lock	312-4000-061	1
	Washer - 5/16" Split Lock	313-1000-019	4
	Washer - 3/8" Flat	313-2300-013	2

TABLE 2. Hydraulic Installation Kit (P/N 117-0199-127)

Picture	Item Description	Part Number	Qty.
	Fitting - -6 JIC M/F 90° Swivel Elbow	333-0012-042	2
	Fitting - -4 JIC (M) to -6 SAE O-Ring (M) Straight Adapter	333-0012-044	2
	Fitting - -6 JIC (M) to -10 SAE O-Ring (M) Straight Adapter	333-0012-106	2
	Fitting - -10 JIC M/F 90° Swivel Elbow	333-0012-108	2
	Fitting - -10 JIC (M) to -8 SAE O-Ring (M) Straight Adapter	333-0012-110	2
	Fitting - -4 JIC M/F 90° Swivel Elbow	333-0012-154	1
	Hydraulic Hose - -10 JIC (F) 90° to -10 JIC (F) - 42"	214-1000-638	1
	Hydraulic Hose - -6 JIC (F) 90° to -6 JIC (F) - 44"	214-1000-780	2
	Hydraulic Hose - -4 ORFS (F) 90° to -4 ORFS (F) - 48"	214-1000-958	1
	Hydraulic Hose - -12 JIC (F) to -10 JIC (F) - 46"	214-1000-959	1



CHAPTER

3

*Hydraulic System  
Installation*



**⚠ WARNING**

Hydraulics are under pressure. Care should always be taken with a system that has been pressurized.

Before beginning the SmarTrax hydraulic installation, turn off the machine and relieve pressure by turning the steering wheel left and right.

Never work on a hot machine. Always allow it to cool before performing diagnostics, maintenance, or routine service.

When disconnecting or purging hydraulic hoses, be aware that the hydraulic fluid within the machine's system may be extremely hot and under high pressure.

Tampering with hydraulic valves may cause serious injury or death, and will void the warranty.



**⚠ CAUTION**

When installing SmarTrax hydraulics or performing diagnostics, maintenance, or routine service, ensure precautions are taken to prevent any foreign material 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 SmarTrax hydraulic valve.



**NOTICE**

The appearance of the SmarTrax hydraulic valve may vary slightly from the images contained in this manual. However, the fittings, hose connections, and cable connections remain the same.

## Install Fittings in the SmarTrax Valve

Before mounting the SmarTrax valve (P/N 334-0003-088) on the machine, install the proper fittings in the valve. This prepares the valve for installation and simplifies the hose connection process later in the procedure.

**FIGURE 1. Fittings Installed in the SmarTrax Valve**



Fitting	Part Number	Port
Fitting - -6 JIC (M) to -10 SAE O-Ring (M) Straight Adapter	333-0012-106	A, B
Fitting - -6 JIC M/F 90° Swivel Elbow	333-0012-042	A, B
Fitting - -4 JIC (M) to -6 SAE O-Ring (M) Straight Adapter	333-0012-044	LSPV, LS STEER
Fitting - -4 JIC M/F 90° Swivel Elbow	333-0012-154	LSPV
Fitting - -10 JIC (M) to -8 SAE O-Ring (M) Straight Adapter	333-0012-110	P, T
Fitting - -10 JIC M/F 90° Swivel Elbow	333-0012-108	P, T
Transducer - 0-3000 PSI Pressure	422-0000-086	PS

## Mount the SmarTrax Valve

**FIGURE 2. SmarTrax Valve Mounting Location**



1. Identify the SmarTrax valve (P/N 334-0003-088) mounting location on the inside of the machine's frame, below the walkway.

**FIGURE 3. SmarTrax Valve Installed**



2. Secure the SmarTrax valve to the valve mounting bracket using four 5/16"-18 x 7/8" hex bolts (P/N 311-0052-104) and four 5/16" lock washers (P/N 313-1000-019).
3. Remove the top bolt from the machine's catwalk.
4. Align the lip of the valve mounting bracket with the hole in the catwalk and the adjacent hole in the machine's frame.
5. Install the valve mounting bracket on the machine using the machine's bolt that was removed in step 2 and one 3/8"-16 UNC x 1-4" bolt (P/N 311-0054-106), one 3/8" flat washer (P/N 313-2300-013), and one 3/8"-16 UNC 3B nylon insert lock washer (P/N 312-4000-061).

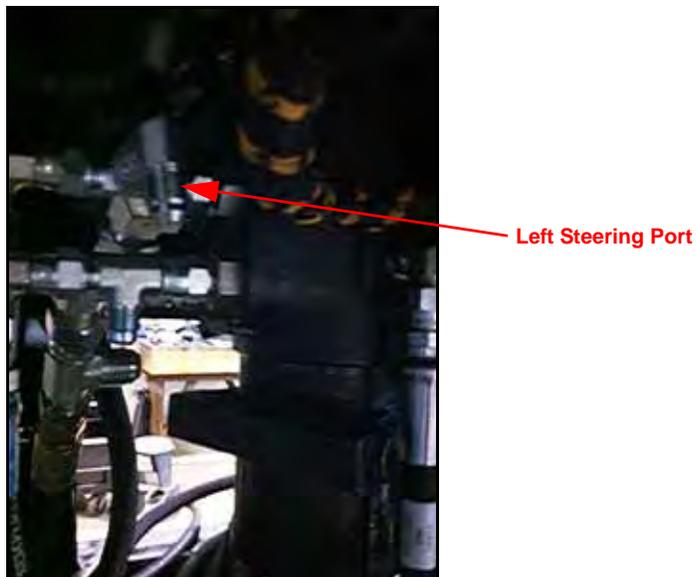
## *Install the Left and Right Steering Hoses*

**FIGURE 4. Steering Orbital Location**



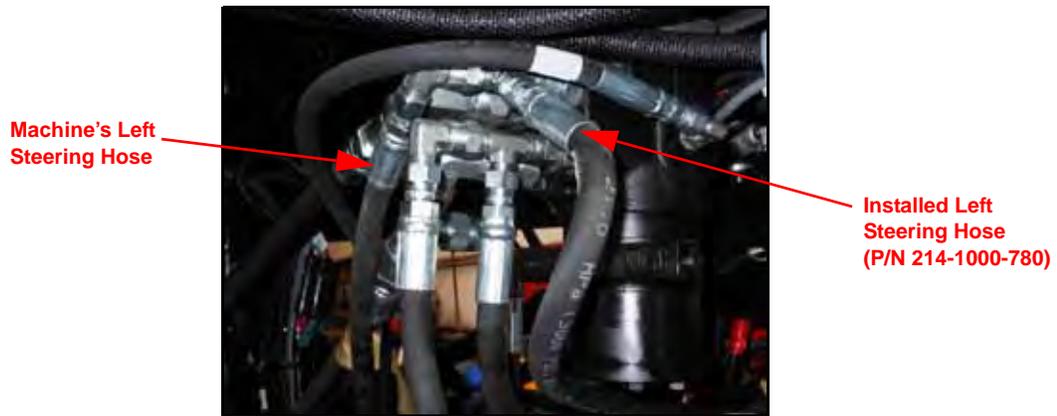
1. Locate the machine's steering orbital under the hood, just in front of the cab.

**FIGURE 5. Left Steering Port on Steering Orbital**



2. Remove the cap from the tee fitting installed in the left steering port (upper-right corner) of the steering orbital.

FIGURE 6. Left Steering Hose Installed on Steering Orbital



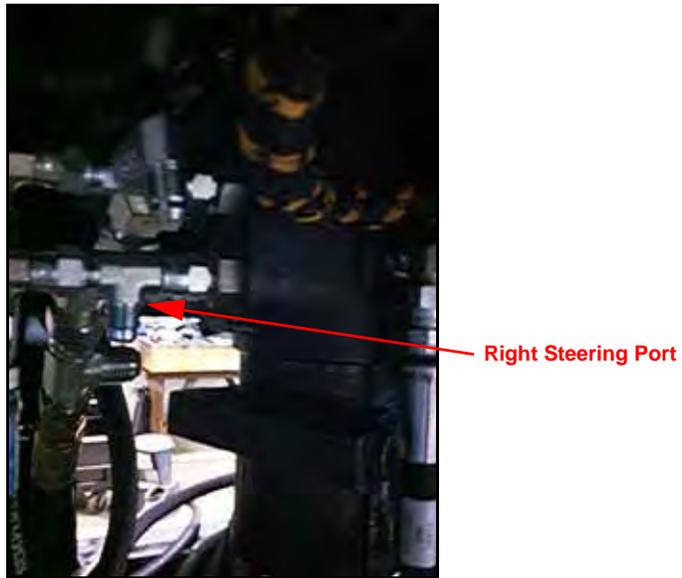
3. Install the straight end of the supplied hydraulic hose (P/N 214-1000-780) on the open port of the tee fitting.

FIGURE 7. Left Steering Hose Installed on SmarTrax Valve



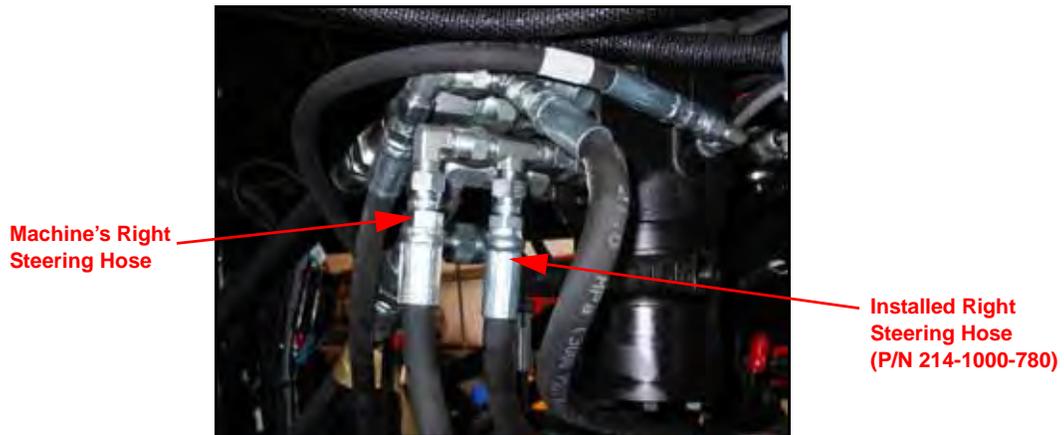
4. Connect the 90° end of the installed hydraulic hose to the fitting installed in Port A of the SmarTrax valve (P/N 334-0003-088).

FIGURE 8. Right Steering Port on Steering Orbital



5. Remove the cap from the tee fitting installed in the right steering port (lower-right corner) of the steering orbital.

FIGURE 9. Right Steering Hose Installed on Steering Orbital



6. Install the straight end of the supplied hydraulic hose (P/N 214-1000-780) in the open port of the tee fitting.

FIGURE 10. Right Steering Hose Installed on SmarTrax Valve



7. Connect the 90° end of the installed hydraulic hose to the fitting installed in Port B of the SmarTrax valve.

## *Install the Pressure and Tank Hoses*

FIGURE 11. Pressure Hose Installed on Steering Orbital



1. Remove the cap from the tee fitting installed in the pressure port (lower-left corner) of the steering orbital.
2. Install the 90° end of the supplied hydraulic hose (P/N 214-1000-638) in the open port of the tee fitting.



FIGURE 12. Pressure Hose Installed on SmarTrax Valve



3. Connect the straight end of the installed hydraulic hose to the fitting installed in Port P of the SmarTrax valve (P/N 334-0003-088).

FIGURE 13. Tank Hose Installed on Steering Orbital

Installed Tank Hose  
(P/N 214-1000-959)



Machine's Tank Hose

4. Remove the cap from the tee fitting installed in the pressure port (upper-left corner) of the steering orbital.
5. Install the -12 JIC end of the supplied hydraulic hose (P/N 214-1000-959) in the open port of the tee fitting.

FIGURE 14. Tank Hose Installed on SmarTrax Valve



6. Connect the -10 JIC end of the installed hydraulic hose to the fitting installed in Port T of the SmarTrax valve.

## *Install the Load Sense Hoses*

1. Locate and disconnect the machine's load sense hose from the right side of the steering orbital.

**FIGURE 15. LSPV Connection on SmarTrax Valve**



2. Connect the machine's load sense hose to the fitting installed in Port LSPV of the SmarTrax valve.

**FIGURE 16. Load Sense Hose Installed on Steering Orbital**



Installed Load Sense  
Hose  
(P/N 214-1000-958)

3. Install the straight end of the supplied hydraulic hose (P/N 214-1000-958) on the open load sense port on the steering orbital.

FIGURE 17. LS STEER Connection on SmarTrax Valve

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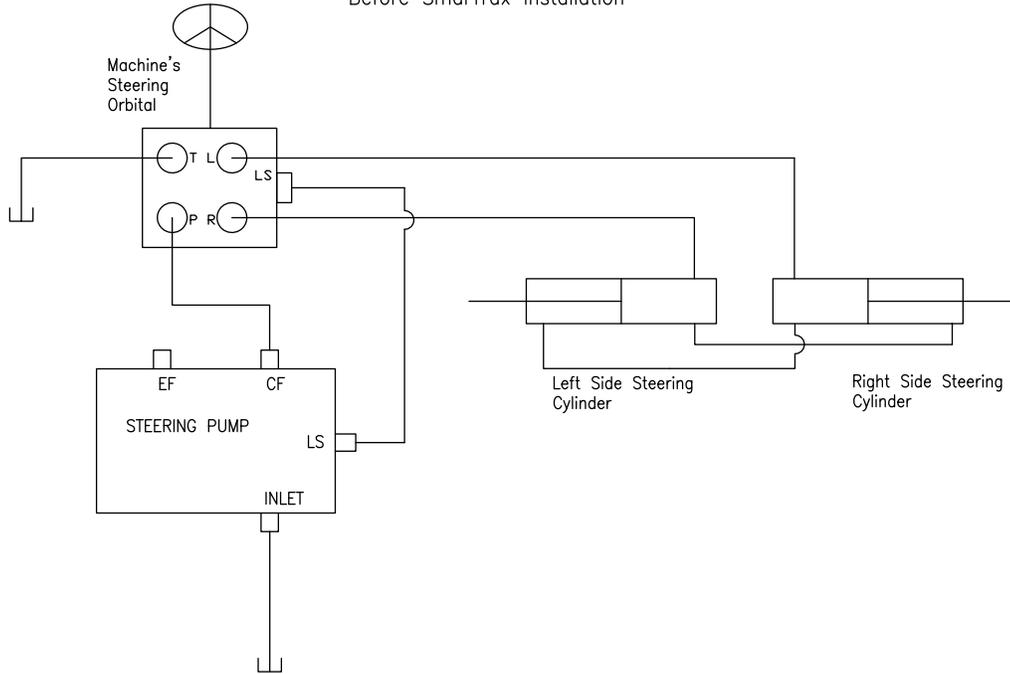


LS STEER Connection  
on Side of SmarTrax  
Valve

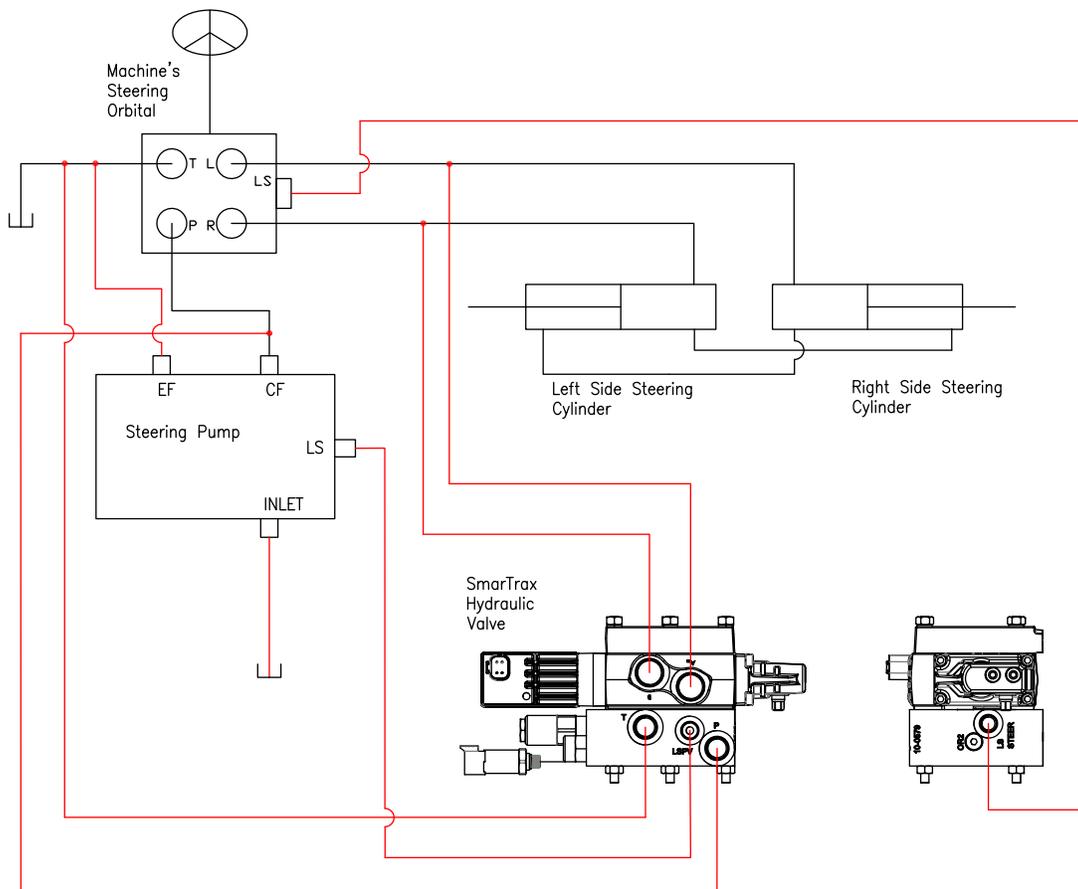
4. Connect the 90° end of the installed hydraulic hose to the fitting installed in Port LS STEER of the SmarTrax valve.

# Hydraulic Diagram

Before SmarTrax Installation



After SmarTrax Installation

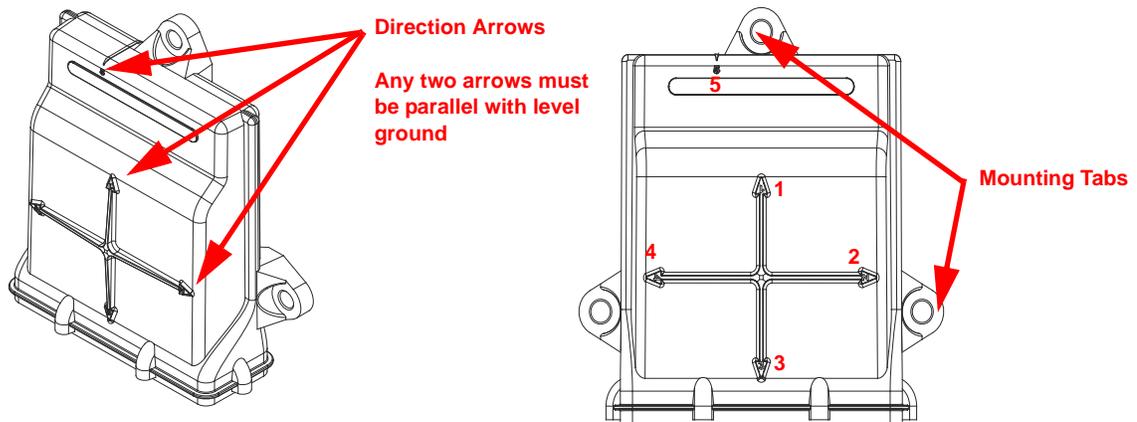






## Node Mounting Locations

FIGURE 2. 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 3. 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 Node Harness

FIGURE 4. Node Harness Installed



1. Install the two large, rectangular connectors of the node harness (P/N 115-4001-173) into the correct ports of the SmarTrax node (P/N 063-0173-228).
2. Tighten the bolts on the node connectors to secure the connections.
3. Locate the ENABLE connector and connect it to the foot switch cable connector.
4. Connect the DGPS connector to the receiver or other GPS source.
5. Connect the DGPS OUT connector to the DGPS connector on the console cable.
6. Connect the unlabeled 8-pin Deutsch connector to the mating 8-pin connector on the console cable.

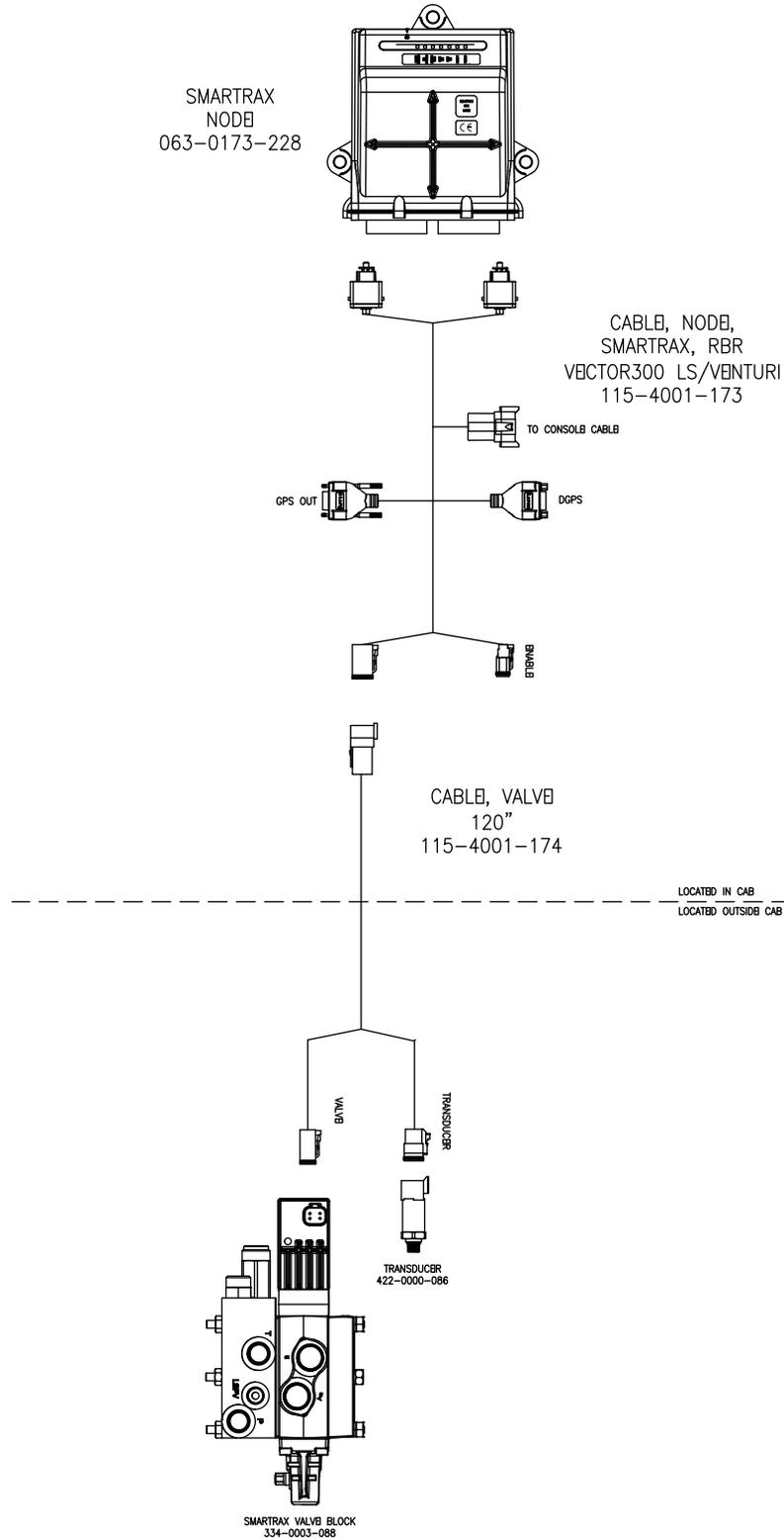
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## Install the Valve Harness

1. Connect the CHASSIS connector of the valve harness (P/N 115-4001-174) to the mating 6-pin connector of the node harness (P/N 115-4001-173).
2. Connect the TRANSDUCER connector to the pressure transducer (P/N 422-0000-086) installed in Port PS of the SmarTrax valve (P/N 334-0003-088).

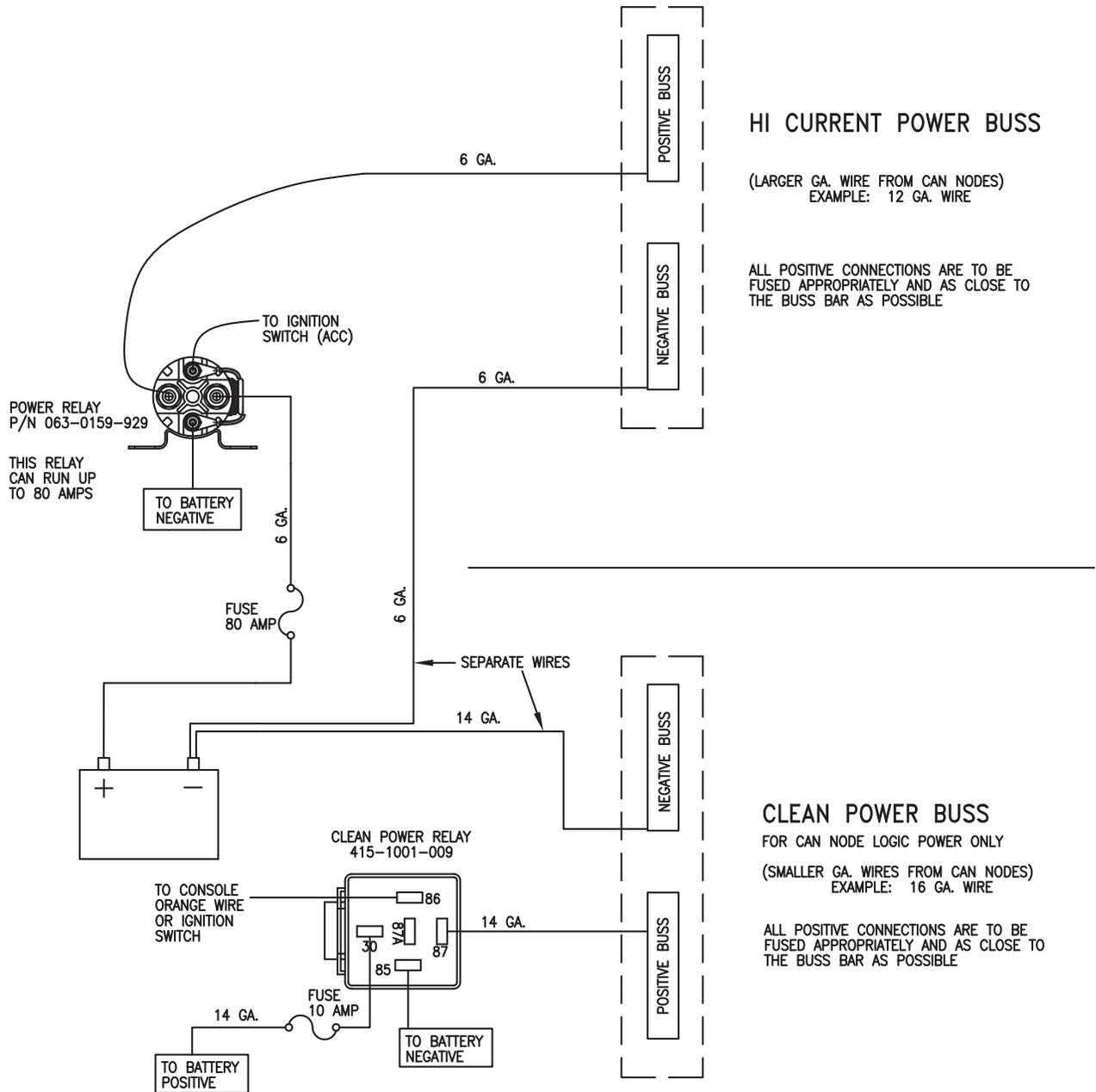
3. Connect the VALVE connector to the open 4-pin port of the SmarTrax valve.

FIGURE 5. Valve Harness Wiring Diagram

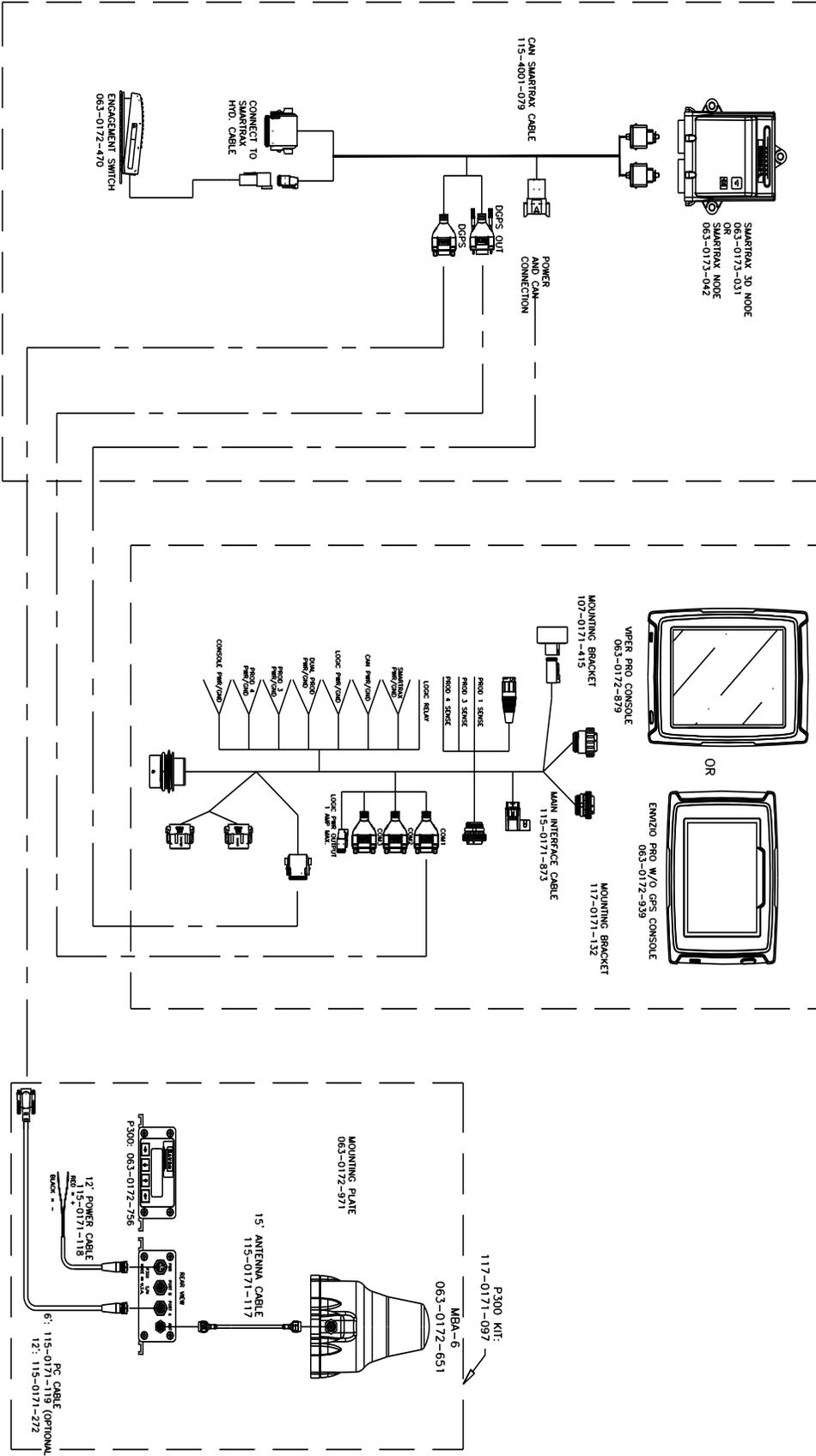


# System Diagrams

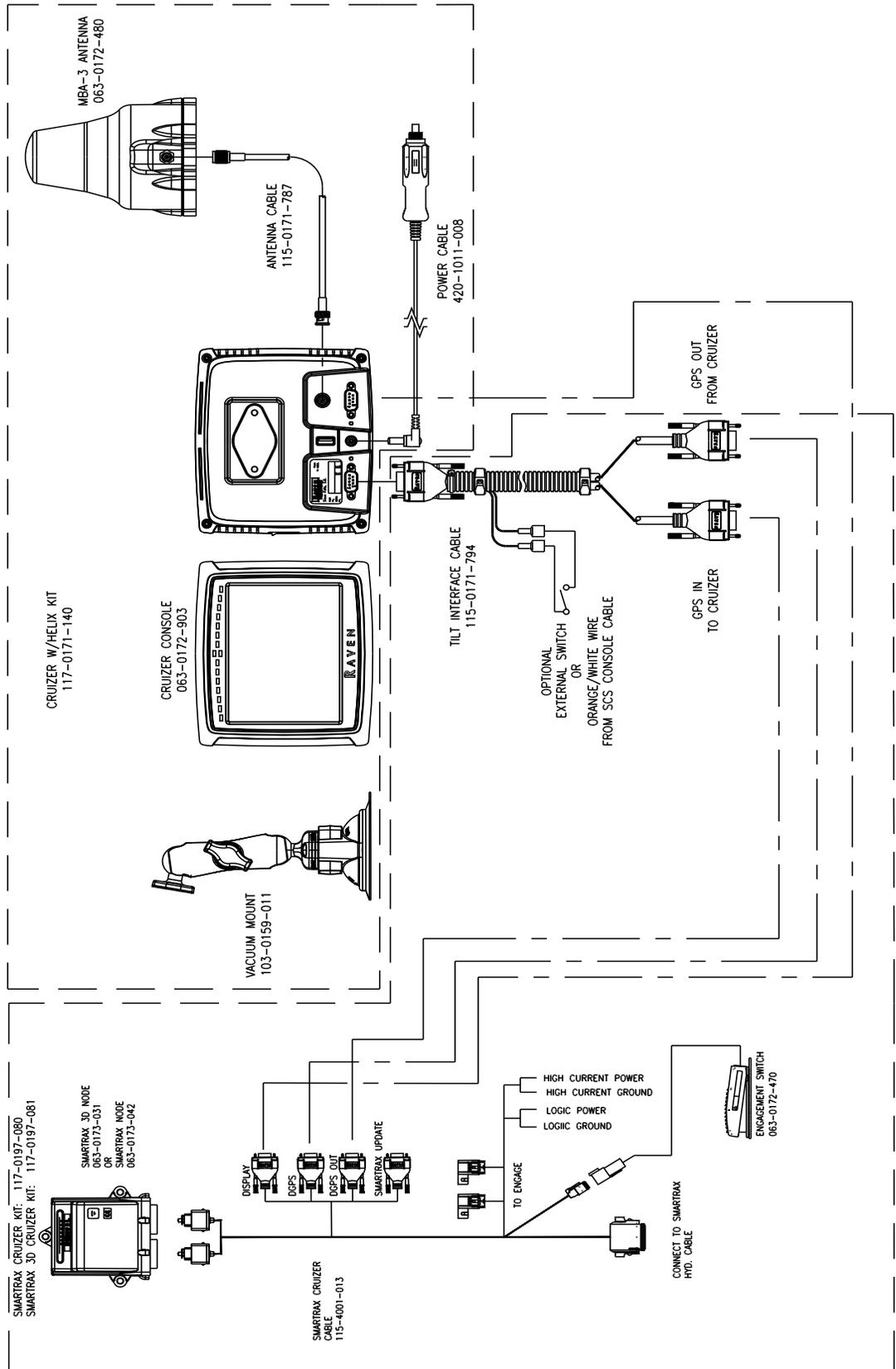
## CAN NODE WIRING



ENVIZIO PRO/VIPER PRO/SMARTRAX 3D W/PHOENIX 300/RBR



CRUZIER WITH HELIX ANTENNA/SMARTRAX 3D





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CHAPTER

5

*Startup Procedures*



**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.



**WARNING**

Do not use hands to check for leaks. Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death.

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*Verify the SmarTrax System Installation*

1. Turn on the machine.
2. Double-check all fittings and hose connections to ensure that:
  - Hoses are not rubbing on or interfering with moving parts.
  - Hydraulic fluid is not leaking for the system.
3. Turn the machine's wheels fully from side to side repeatedly to remove air from the hydraulic system.

**Note:** *During the SmarTrax system installation, whenever the hydraulic system is purged for maintenance, or when fittings are loosened or disconnected, air is introduced into the lines of the hydraulic system. If air pockets are present, the wheels may not move consistently when the steering wheel is turned.*

4. Continue turning the wheels until they move steadily and smoothly when the steering wheel is turned.

5. Access the System Diagnostic screen by selecting the MACHINE TEST option on the Machine Type screen and turn the wheels using the Raven console.

**Note:** *If there are issues with the SmarTrax system, turn off the machine and correct them immediately. For additional assistance, refer to the SmarTrax and SmartSteer Calibration & Operation Manual (P/N 016-0171-277) or contact your local Raven dealer.*

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## *Calibrate the SmarTrax System*

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

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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.**