

RAVEN

*Simply improving your position.<sup>SM</sup>*

# SmarTrax™ Installation Manual



**Case IH SPX 3320/3330**

## ***Disclaimer***

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## CHAPTER

# 1

# *Important Safety Information*

## *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 components. Be sure to keep safety labels in 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 from the operator's seat and machine.
- Do not drive the machine with SmarTrax enabled on any public thorough-fare or main 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.

Please review the operation and safety instructions included with your implement and/or controller.

### **WARNING**

- Always wear appropriate protective equipment when working on hydraulics.
- This machine must remain stationary and switched off with the booms unfolded and supported while installation or maintenance is conducted.
- Before starting the hydraulic installation, be sure to bleed pressure from the hydraulic system.
- Hydraulic fluid may be hot or under high pressure. When starting the machine for the first time after installing the SmarTrax system, be sure that all persons stand clear of the machine in case a hose or fitting has not been completely tightened.

### **CAUTION**

#### 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 first opening a system that has previously been pressurized.
- When disconnecting the hydraulic hoses or purging is required, be aware that the hydraulic oil may be extremely hot and under high pressure. Caution must be exercised.
- Any work carried out on the hydraulic system must be performed in accordance with the machine manufacturer's approved maintenance instructions.
- When installing SmarTrax hydraulics or performing diagnostics, maintenance, or routine service, ensure precautions are taken to prevent any foreign material or contaminants from being introduced in the machine's hydraulic system. Objects or materials that are able to bypass the machine's hydraulic filtration system will adversely reduce performance and possibly damage the SmarTrax hydraulic valves.

#### 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.

CHAPTER

2

*Introduction*

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

This manual applies to the following machines. For future reference, write your serial number in the space below.

Make: CaseIH SPX 3320

Year:

Serial Number:

**FIGURE 1. CaseIH SPX 3320**



### *Updates*

Updates for Raven manuals as well as software updates for Raven consoles are available at the Applied Technology Division web site:

<http://www.ravenprecision.com/Support/index2.jsp>

Sign up for e-mail alerts and we will notify you when updates for your Raven products are available on the Raven web site.

<http://www.ravenprecision.com>

### *Preparing for Installation*

Before installing SmarTrax, park the machine where the ground is level, clean, and dry. Be sure to follow proper safety practices and procedures during the SmarTrax installation procedure. Bleed pressure from the hydraulic system and leave the machine turned off for the duration of the installation process. Carefully read and follow the instructions in this manual to properly complete the installation process.

### Recommendations

Observe the following recommendations while installing the SmarTrax system:

- Use part numbers to identify parts.
- Do not remove the plastic wrapping from a part until it is necessary for installation.
- Do not remove plastic caps from a part until it is necessary for installation.

### Tools Needed

Before beginning the installation process, it is a good idea to gather all the tools that you will need. These tools include the following items:

- Screwdrivers of various sizes
- SAE Standard-sized wrenches
- Allen wrenches
- Utility knife
- Drill
- Drill bits
- Side Cutters
- Pliers

### Point of Reference

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

## Hydraulic Fittings

The following fitting types may be referenced in this manual:

**FIGURE 2. Hydraulic Fitting Types**

**JIC Fitting (M)**



**SAE O-Ring Fitting (M)**



**ORFS Fitting (M)**



## Kit Contents

This section contains a list of the kit contents that you should have received with this SmarTrax kit. Before you begin assembling the kit, compare the items in your SmarTrax kit with this list. If you have questions about your kit, contact your local Raven dealer or the Raven Customer Support Center.

*In addition to the following kits, a SmarTrax Controller or Node kit is required to complete installation of the SmarTrax system. Contact your local Raven dealer for available kits and ordering information.*

**TABLE 1. CaseIH SPX 3220 SmarTrax Installation Kit (P/N 117-0195-081)**

Picture	Item Description	Part Number	Qty
Not pictures	Manual - SmarTrax Installation	016-0190-081	1
	Sensor - Yaw	063-0172-684	1
	Cable - SmarTrax Console Harness	115-0171-777	1
	Plate - Hydraulic Valve Mounting	107-0171-705	1
	Switch - SmarTrax Hydraulic Override (with Hardware)	334-0003-024	1

TABLE 1. CaseIH SPX 3220 SmarTrax Installation Kit (P/N 117-0195-081)

Picture	Item Description	Part Number	Qty
	Valve - SmarTrax Hydraulic	334-0003-066	1
	Label - Tampering Warning	041-0159-689	1
	Washer - 5/16" Split Lock	313-1000-019	4
	Screw - 1/4"-20 x 2" Socket Head Cap	311-0050-109	2
	Bolt - 5/16" Hex Head	311-0052-104	4
	Nut - 1/4" -20 Hex	312-1001-074	2
	Washer - 1/4" Split Lock	313-1000-016	2
	Washer - 1/4" Flat Washer	313-2300-009	2

TABLE 2. CaseIH SPX 3320 SmarTrax Hydraulic Kit (P/N 117-0194-081)

Picture	Item Description	Part Number	Qty
	Fitting - 13/16" JIC Swivel Run Tee (M/M/F)	333-0012-028	1
	Fitting - 11/16" ORFS (M/F) 90° Swivel Elbow	333-0012-065	1
	Fitting - 11/16" ORFS (M/M/F) Swivel Adapter	333-0012-069	3
	Fitting - 11/16" ORFS (M) to 9/16" SAE O-Ring (M) Straight Adapter	333-0012-084	1
	Fitting - 7/16" SAE O-Ring Plug	333-0012-051	1
	Fitting - 9/16" SAE O-Ring Plug	333-0012-104	2
	Hose - 9/16" JIC (F) 90° to 9/16" JIC, 128"	214-1000-476	2
	Hose - 9/16" JIC (F) 90° to 9/16" JIC, 80"	214-1000-485	1
	Hose - 9/16" JIC (F) to 9/16" JIC, 128"	214-1000-488	1
	Hose - 3/4" JIC (F) to 9/16" JIC (F), 80"	214-1000-489	1



CHAPTER

3

*Mounting the  
SmarTrax Hydraulic  
Valve*

*Install the Hydraulic Valve Mounting Bracket*

The SmarTrax hydraulic valve mounting bracket attaches to the existing vehicle radar location, which is found beneath the cab. The SmarTrax hydraulic valve mounting bracket is attached to the inside of the vehicle's frame rail as shown in the following picture.

**FIGURE 1. The Radar Bracket**



1. Locate the radar bracket and note its orientation relative to the frame.

2. Remove the two bolts that hold the radar bracket in place.
3. Place the SmarTrax hydraulic valve mounting bracket (P/N107-0171-705) flat against the machine frame.
4. Place the radar bracket on top of the SmarTrax hydraulic valve mounting bracket.

**Note:** *Make sure that the radar bracket is oriented as it was originally in order for it to function properly.*

5. Connect and tighten the original bolts to hold both the radar bracket and the SmarTrax hydraulic valve mounting bracket to the machine frame.

**FIGURE 2. Installing the Hydraulic Valve Mounting Bracket**

---

Before

After



Remove these bolts



Hydraulic Valve Mounting Bracket

## Mount the SmarTrax Hydraulic Valve

1. On the SmarTrax hydraulic valve (P/N 334-0003-066), remove the fittings from the LS-Steer, LS-PV, and PS ports.
2. In the LS-Steer port, install an o-ring plug fitting (P/N 333-0012-104).
3. In the LS-PV port, install an o-ring plug fitting (P/N 333-0012-104).
4. In the PS port, install an o-ring plug fitting (P/N 333-0012-051).
5. Place the SmarTrax hydraulic valve on the SmarTrax hydraulic valve mounting bracket (P/N 107-0171-705).
6. Align the four threaded holes on the Smartrax hydraulic valve with the mounting holes on the SmarTrax hydraulic valve mounting bracket.
7. Fasten the valve to the SmarTrax hydraulic valve mounting bracket using the supplied 5/16" Hex Bolts (P/N 311-0052-104) and 5/16" Lock Washers (P/N 313-1000-019).

FIGURE 3. SmarTrax Hydraulic Valve Mounting Location



## Affixing the SmarTrax Tampering Warning Label

Raven Industries supplies a tampering warning label (P/N 041-0159-689) with all SmarTrax kits. This label should be applied on or near the SmarTrax hydraulic valve or mounting bracket and in a location where anyone working on the machine is able to clearly see and read the label.

1. Thoroughly clean and dry the surface to which the label will be affixed.
2. Remove the protective backing from the tampering warning label (P/N 041-0159-689).
3. Carefully apply the label to the cleaned area and rub with a dry cloth to ensure the label is firmly applied.



CHAPTER

4

*Hydraulic  
Connections*



**⚠ WARNING**

Hydraulics may be under pressure. Never attempt to open or work on a hydraulic system with the equipment running. Care should always be taken when working on a system that has previously been pressurized. When disconnecting or purging hydraulic connections, be aware that hydraulic oil within the system may be extremely hot and under high pressure.



**⚠ CAUTION**

Ensure 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 adversely reduce performance and possibly damage the SmarTrax hydraulic valves.



**⚠ CAUTION**

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

## *Install the Hydraulic Override Switch*

1. On the SmarTrax hydraulic override switch (P/N 334-0003-024) identify Port 'A'.
2. Remove the fitting from Port 'A'.
3. Install the o-ring fitting (P/N 333-0012-084) into Port 'A'.
4. Align the holes on the hydraulic override switch with those on the hydraulic valve mounting bracket (P/N 107-0171-705).
5. Place the SmarTrax hydraulic override switch on the opposite side of the SmarTrax hydraulic valve mounting bracket from the SmarTrax hydraulic valve (P/N 334-0003-066). Orient the switch so that Port 'A' is on top and Port 'B' is on the bottom.
6. Use the 1/4" hex bolts (P/N 311-0050-109), 1/4" flat washers (P/N 313-2300-009) and lock washers (P/N 313-1000-016) to secure the hydraulic override switch to the hydraulic valve mounting bracket.

**FIGURE 1. The Hydraulic Override Switch Installed**

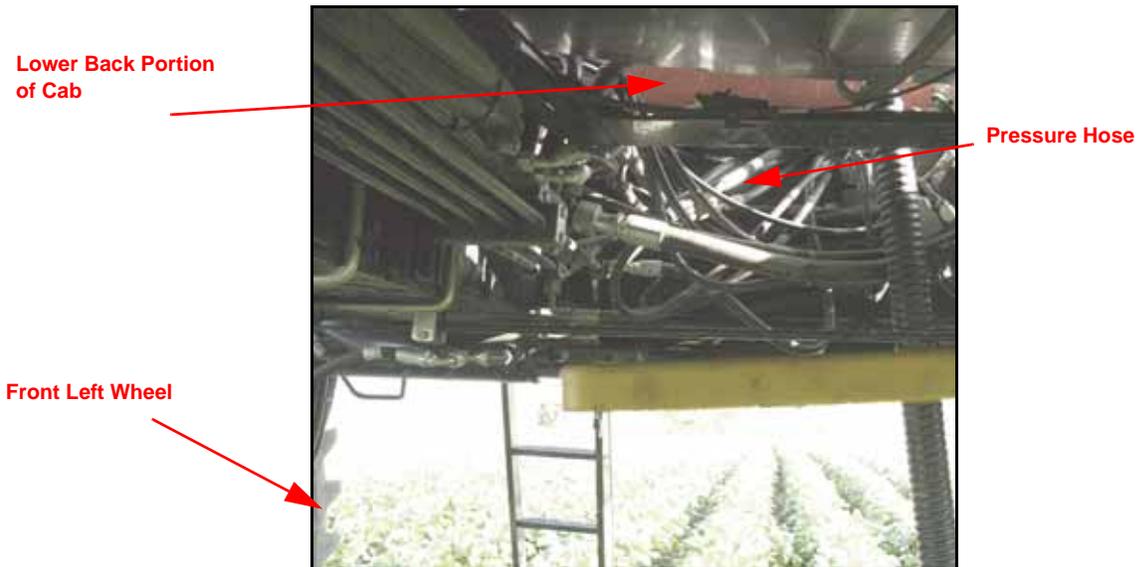
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## Install the Pressure Hose

1. Identify the steel pressure line, which runs from the rear of the machine. The pressure line runs on the inside of the frame on the left side of the sprayer and makes a 45° bend just before connecting to the hydraulic hose.

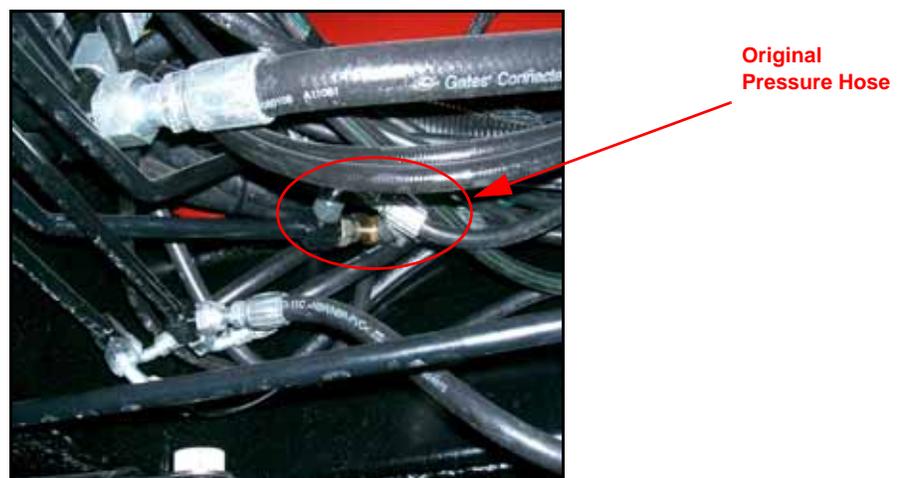
FIGURE 2. Overview Perspective



**Note:** Trace the original pressure hose from the steering orbitrol to the hydraulic pump if you are unsure of its location.

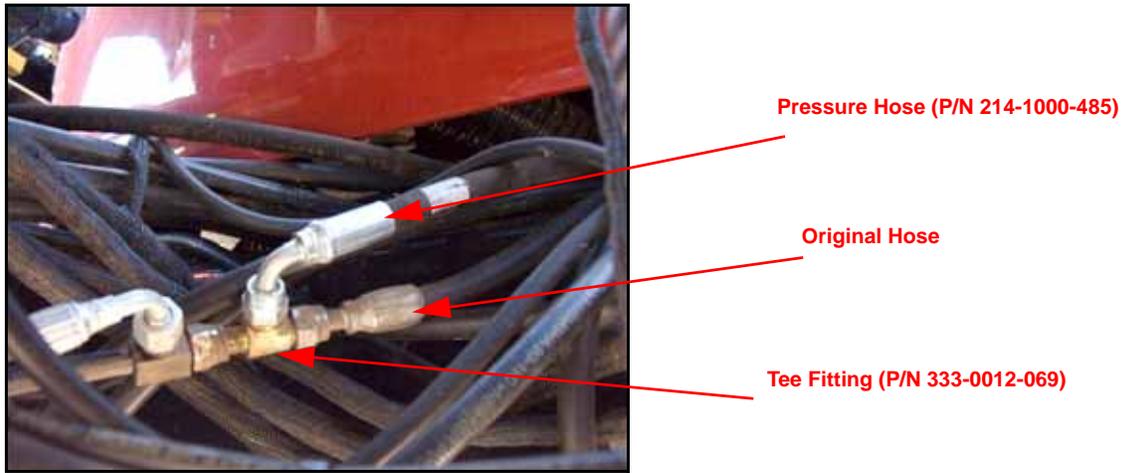
2. Disconnect the existing pressure hose from the pressure port on the steel pressure line.

FIGURE 3. Original Pressure Connection



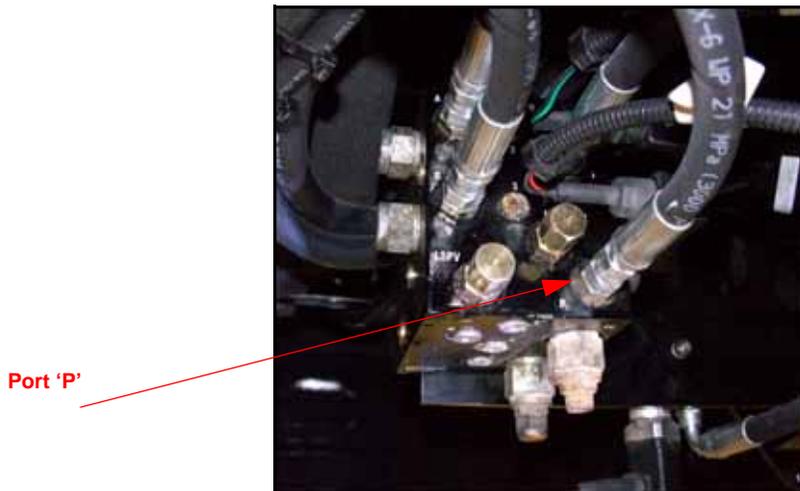
3. Install the supplied run tee fitting (P/N 333-0012-069) and reconnect the original pressure hose to the fitting.

FIGURE 4. Pressure Connection



4. Connect the supplied hose (P/N 214-1000-485) to the remaining branch of the tee fitting and route the other end of the hose to Port 'P' of the SmarTrax hydraulic valve.

FIGURE 5. Pressure Hose Connected to SmarTrax Hydraulic Valve

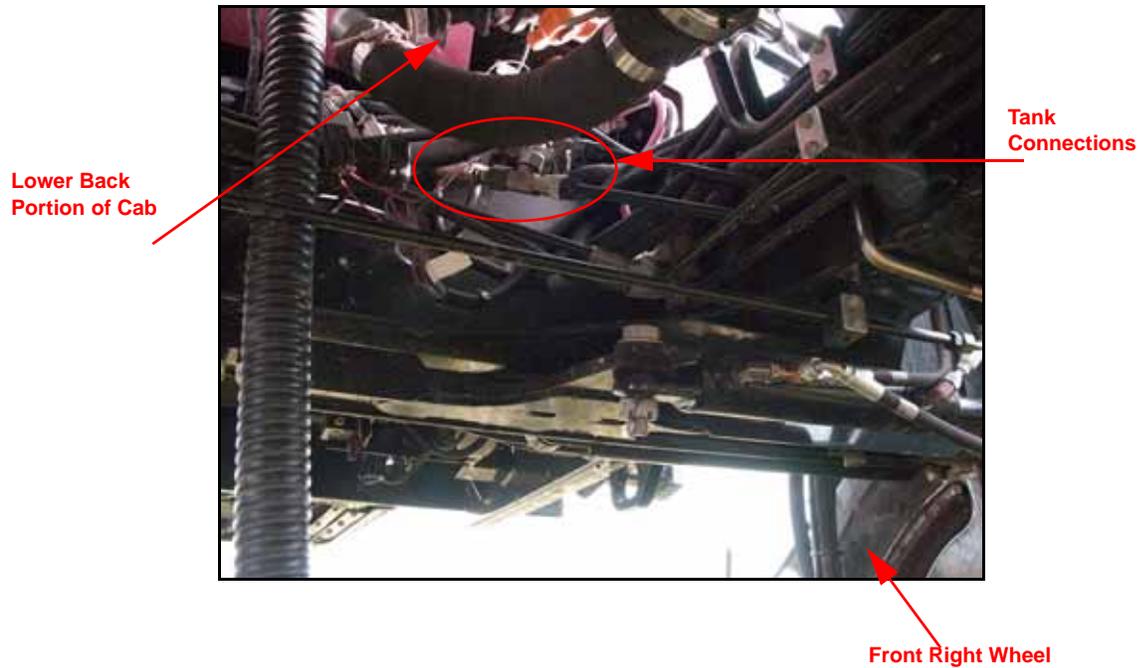


## Install the Tank Hose

1. Identify the steel tank line, which runs from the rear of the machine. The tank line runs on the inside of the frame on the right side of the sprayer.

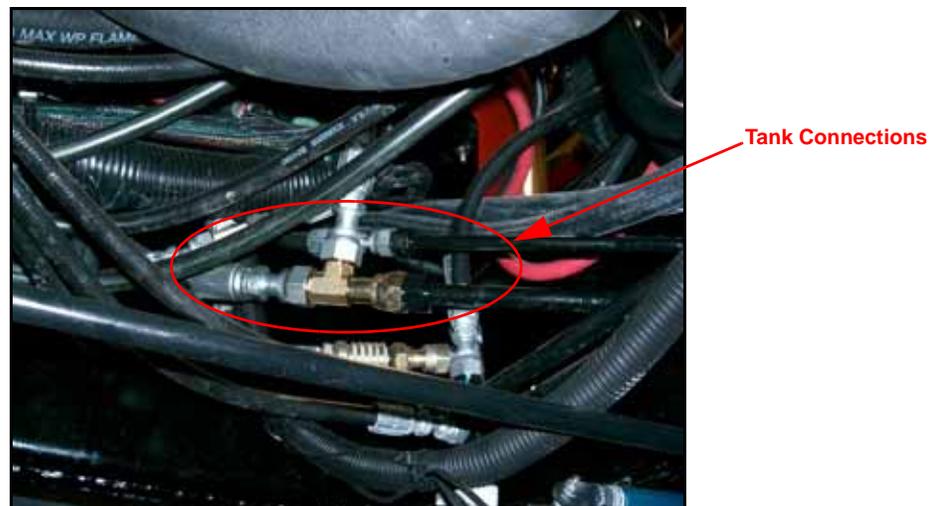
**Note:** Trace the original tank hose from the steering orbitrol to the hydraulic reservoir if you are unsure of its location.

FIGURE 6. Overview Perspective



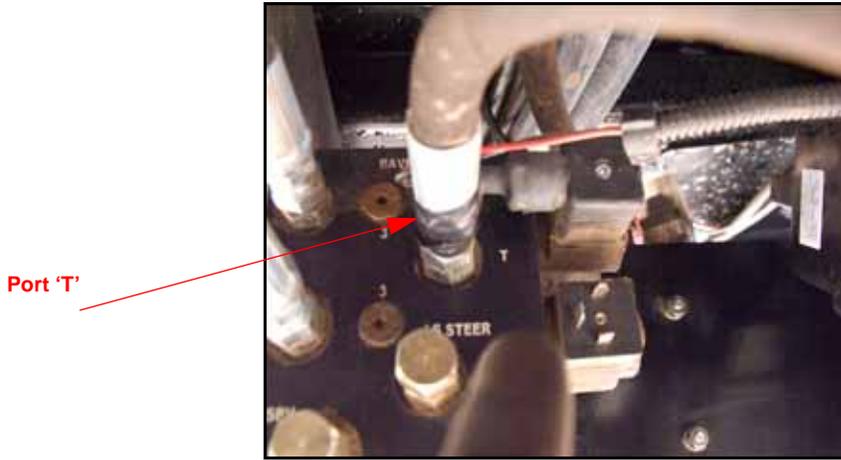
2. Disconnect the original tank hose from the tank port to the steel tank line.
3. Install the supplied run tee (P/N 333-0012-028) and reconnect the original tank hose to the fitting.

FIGURE 7. Tank Connections



4. Connect the supplied hose (P/N 214-1000-489) to the remaining branch of the tee fitting and route the other end of the hose to Port 'T' of the SmarTrax hydraulic valve.

FIGURE 8. Tank Hose Connected to SmarTrax Hydraulic Valve



## Install the Right Steer Hose

1. On this steering cylinder, disconnect the original right steer hose. This is the hose that is connected to the fitting that is located closest to the center of the machine

FIGURE 9. Overview Perspective



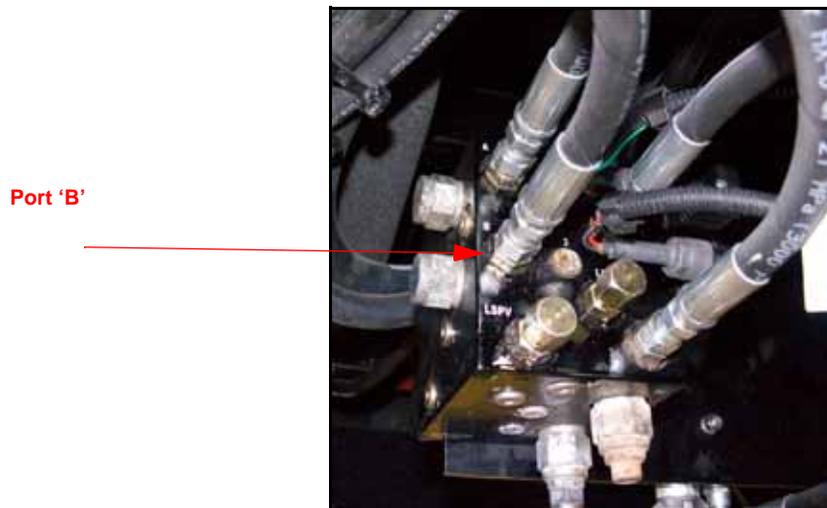
2. Install the supplied run tee (P/N 333-0012-069) and reconnect the original right steer hose to the fitting.

FIGURE 10. Right Steering Connections



3. Connect the supplied hose (P/N 214-1000-476) to the remaining branch of the tee fitting and route the other end of the hose to Port 'B' of the SmarTrax Hydraulic valve.

FIGURE 11. Right Steer Hose Connected to SmarTrax Hydraulic Valve



## Install the Left Steer Hose

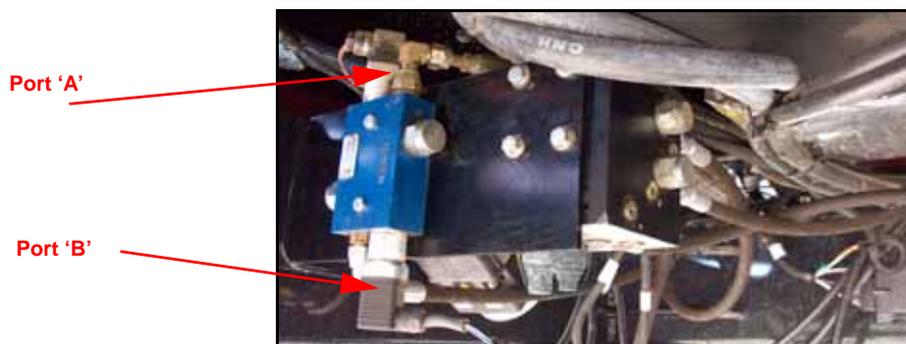
1. Disconnect the existing Left Steer hose from steering cylinder located on the right side of the machine. Disconnect the hose that is connected to the fitting located closest to the center of the machine, shown in the picture below.

FIGURE 12. Overview Perspective



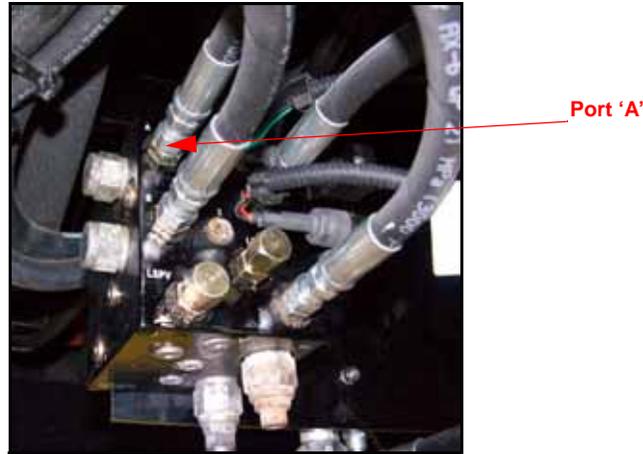
2. Route the original left steer hose to the SmarTrax hydraulic override switch (P/N 334-0003-024).
3. Using a 90° elbow (P/N 333-0012-065), connect the original left steer hose to Port 'A' on the SmarTrax hydraulic override switch.
4. Connect one of the supplied tee fittings (P/N 333-0012-069) to the steering cylinder.
5. Connect the 90° end of the supplied hose (P/N 214-1000-488) to the straight end of the tee fitting and route the hose to the SmarTrax hydraulic override switch.
6. Connect the hose to Port 'B' on the SmarTrax hydraulic override switch.

FIGURE 13. SmarTrax Hydraulic Override Connections



7. Connect the SmarTrax left steer hose (P/N 214-1000-476) to Port 'A' on the SmarTrax hydraulic valve (P/N 334-0003-066) and route to the steering cylinder.

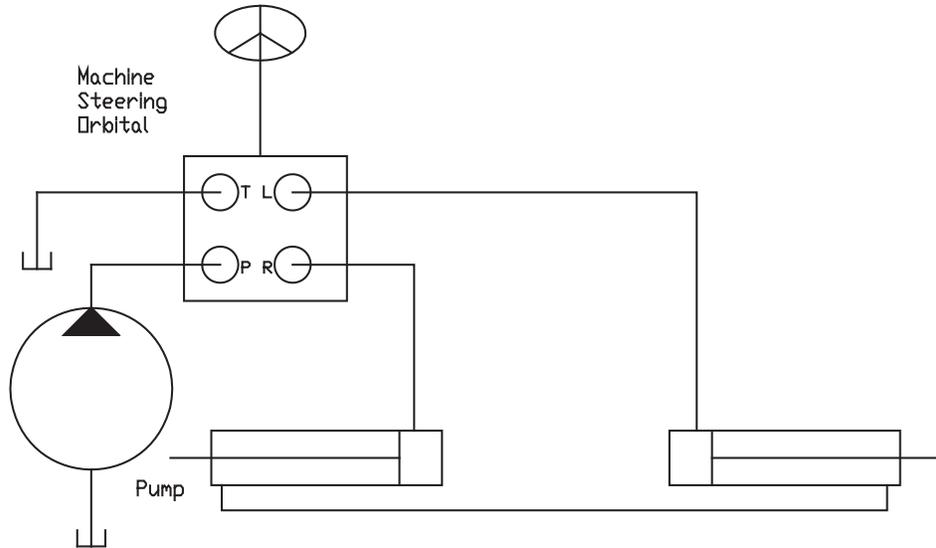
**FIGURE 14. Left Steer Hose Connected to SmarTrax Hydraulic Valve**



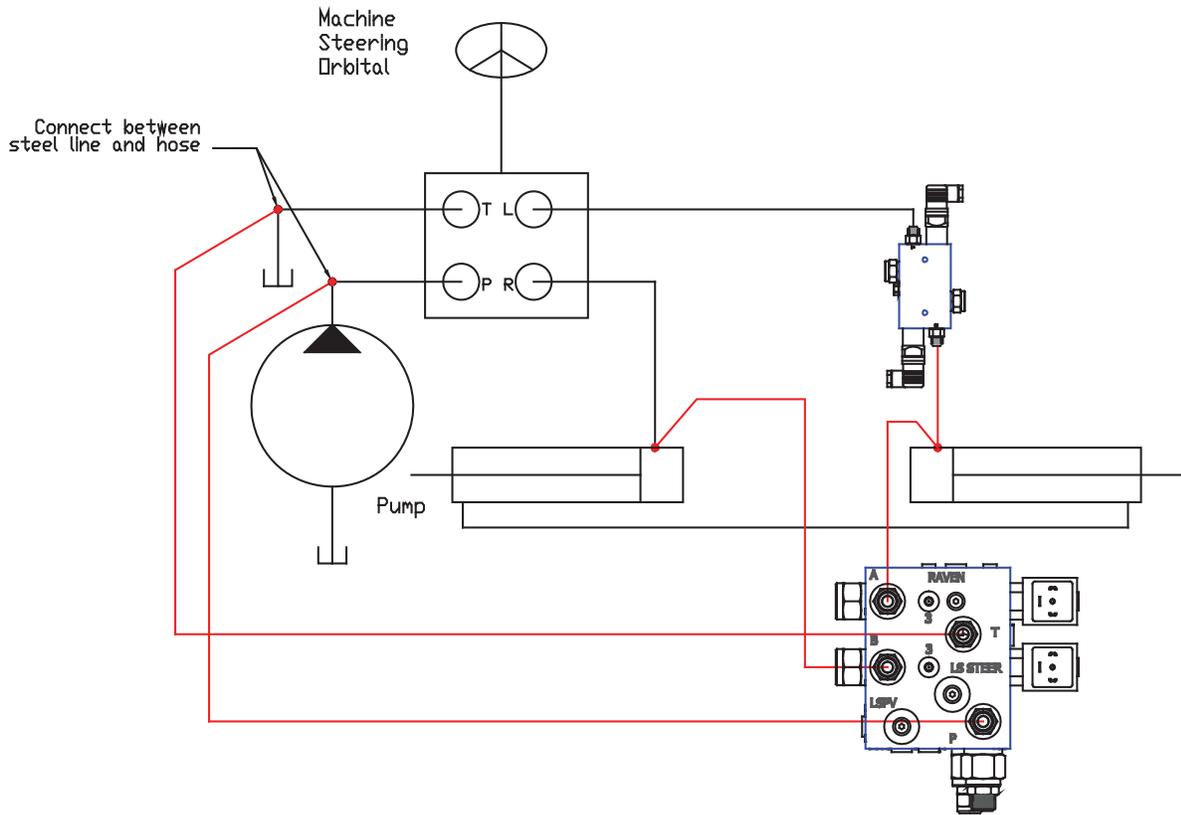
8. Connect the hose to the remaining branch of the tee fitting connected the steering cylinder.

# Hydraulic Connection Diagram

Before Smartrax Installation



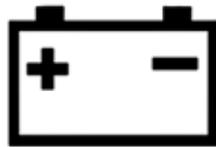
After Smartrax Installation



## CHAPTER

# 5

## *Wiring and Electrical Connections*



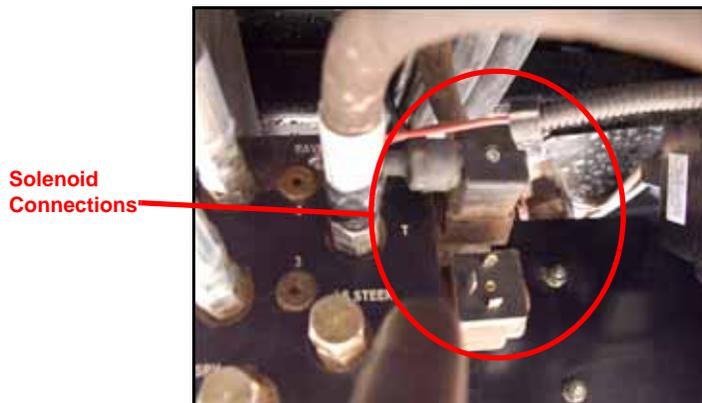
### **⚠ CAUTION**

Ensure that the power cable is the last cable connected.  
Do not reverse the power leads. Doing so will cause severe damage to the equipment.  
Ensure the leads are connected to the correct polarity.

### *Connecting the SmarTrax Hydraulic Valve*

1. Place a solenoid gasket (included in the packet with the console cable harness) on the solenoid installed in port '1A' on the SmarTrax hydraulic valve (P/N 334-0003-073).
2. Locate the connector labeled 'LEFT' on the SmarTrax console cable harness (P/N 115-0171-777).
3. Insert the connector labeled 'LEFT' to the solenoid installed in port '1A' on the SmarTrax hydraulic valve.
4. Tighten the bolt on the solenoid connector to secure the connection and to help prevent moisture penetration.
5. Repeat step 1 through step 4 to connect the 'RIGHT' connector to the solenoid on port '1B'.

**FIGURE 1. Solenoid Connections on the SmarTrax Valve**



## *Connecting the Hydraulic Override Switch*

1. On the console cable harness (P/N 115-0171-777), identify the connector labeled 'OVERRIDE'.
2. Connect the 'OVERRIDE' connector to the Hydraulic override switch.
3. Tighten the bolt on the connector to secure the connection and to help prevent moisture penetration.

---

## *Route the Console Cable Harness*

Once the SmarTrax hydraulic valve and pressure override switch are connected to the console cable harness, the remaining connectors must be routed into the cab.

1. Locate an access point through which the console cable harness (P/N 115-0171-777) may be routed into the cab.
2. Route the cable to the access point and use the provided cable ties to secure the cable to avoid catching or damaging the cable during normal equipment operation.

**Note:** *When routing the SmarTrax console cable harness, follow the path of other hoses or cables to avoid potential wear areas.*

3. Feed enough of the cable into the cab to allow each cab control component to be connected.
4. Spool and secure any excess cable.

---

## Install the Foot Switch

1. Select a location for the SmarTrax foot switch (P/N 063-0172-470) within easy reach of the operator to fully press the front of the pedal.
2. Use the SmarTrax foot switch as a template and pre-drill holes in the floor.
3. Secure the foot switch to the floor with four screws or bolts through each of the mounting holes.
4. Locate the connector labeled 'ENABLE' on the SmarTrax console cable harness (P/N 115-0171-777) and connect it to the foot switch cable.

**FIGURE 2. Foot Switch Mounting Example**



---

## Mount the SmarTrax Controller

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

- The controller is not weatherproof. Mount the controller in the vehicle's cab within easy reach of the operator.
- Mount the controller in a location where it will not impede the operator's ability to control the vehicle and where other components within the cab will not strike or jar the controller during normal operation.
- Ensure that all cabling is routed to avoid tripping hazards and prevent crimping or breaking the cables during normal operation.

### To Install the SmarTrax Controller

1. Select the preferred location for the controller using the previous recommendations and mount the controller.
2. Connect the large, round connector on the SmarTrax console cable harness (P/N 115-0171-777) to the back of the controller box.
3. Connect your receiver or source of DGPS to the connector labeled 'DGPS.'
4. Connect the console or lightbar providing machine guidance to the connector labeled 'LIGHTBAR.'
5. Insert the power cable (P/N 115-0171-465) to the Power connector on the controller box.
6. Route the power leads to the vehicle's battery and connect.
  - a. Connect the red power lead on the positive battery terminal.
  - b. Connect the black power lead on the negative battery terminal.

## Install the Yaw Sensor

When choosing the location for the yaw sensor, consider the following points:

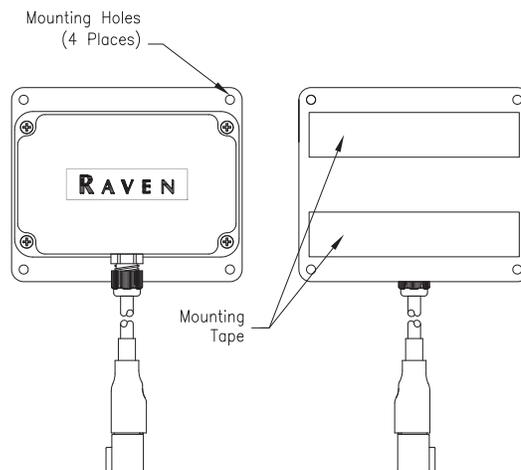
- The yaw sensor is not weatherproof. Mount the sensor inside the cab.
- Mount the yaw sensor in a location away from foot traffic.
- Mount the yaw sensor to a flat, level surface. The floor of the cab is generally ideal.
- Mount the yaw sensor so that the Raven logo faces up.
- The SmarTrax yaw sensor does not need to be oriented toward the direction of vehicle travel.

**Note:** *If you are going to use the double-sided tape to mount the SmarTrax yaw sensor, be sure to thoroughly clean and dry the mounting location first.*

### To Install the Yaw Sensor

1. Select the preferred location for the SmarTrax yaw sensor (P/N 063-0172-684). See the recommendations for choosing a mounting location above.
2. Mount the yaw sensor using one of the following methods:
  - Remove the protective covering from the double-sided tape and affix the yaw sensor to the floor.
  - Using the yaw sensor as a template, mark and pre-drill holes in the floor. Using bolts or screws (not supplied), secure the yaw sensor in position.
3. Locate the connector labeled 'YAW SENSOR' on the SmarTrax console cable harness (P/N 115-0171-777).
4. Insert this connector to the yaw sensor cable connection.

**FIGURE 3. Yaw sensor Model**

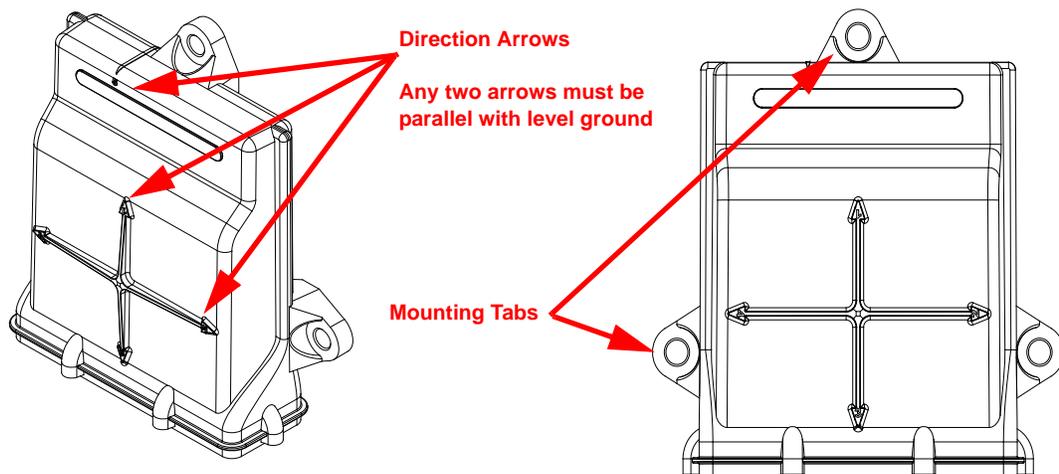


## Installing the SmarTrax Node

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

- The node is not weatherproof. Mount the SmarTrax node inside the machine's cab or driver's compartment.
- The node mounting location must not create tripping hazards and allow cable routing to avoid crimping or damaging the cables or the node connections.
- Mount the SmarTrax node to a flat surface with two of the arrows on the node parallel to the ground and in a location where it will not be kicked or jarred during normal equipment operation.
- One of the six numbered direction arrows on the node must be oriented in the direction of forward vehicle travel. Note the number of the arrow corresponding to forward travel for SmarTrax calibration. One arrow must also point straight up.
- Mount the node to a flat, level surface. The floor of the cab is generally ideal.
- 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.

**FIGURE 4. Node Mounting**

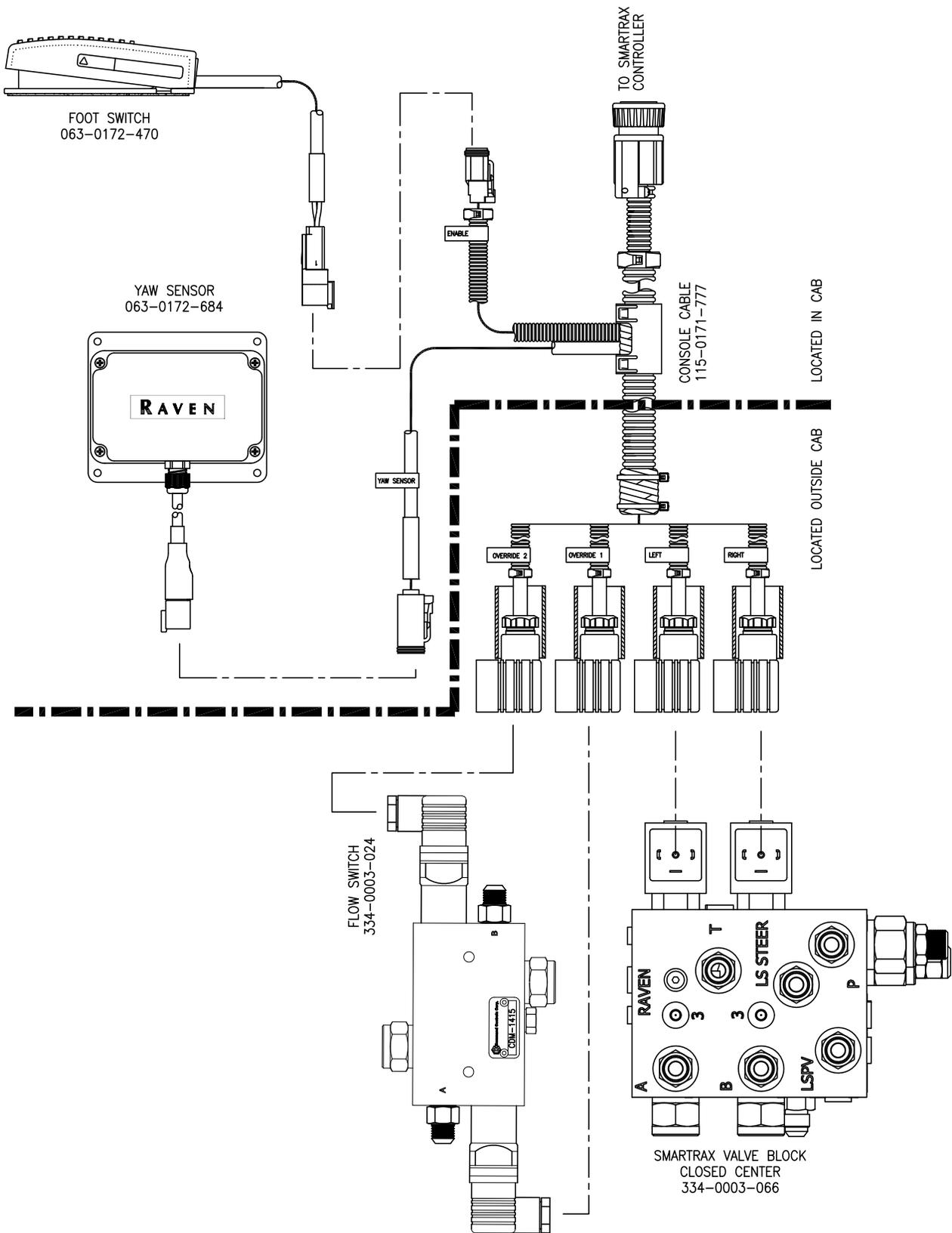


### To Install the Node:

1. Select the preferred location for the node. See the recommendations for choosing a mounting location above.
2. Using the mounting tabs on the node as a template, mark and pre-drill holes. Using bolts or screws (not supplied), secure the node in position.
3. Connect the large, round connectors on the node adapter cable (P/N 115-4001-007) and SmarTrax console cable harness (P/N 115-0171-777).
4. Connect the large, rectangular connectors to the SmarTrax node.
5. Connect your receiver or source of DGPS to the connector labeled 'DGPS' on the node adapter cable.
6. Connect the console providing machine guidance to the remaining small, round connector.
7. Connect the 4-pin deutsch plug to the vehicle's CANbus system (Viper Pro/ Envizio Pro) or the DB-9 display cable (Cruizer).
8. Electrical hookup is recommended as shown in the *Can Node Wiring Diagram* on page 32.

**Note:** *High Current Power, which is used to run steering operations, should be connected to a separate power source than Logic Power, which is used to run processing and communication between the node and the guidance console.*

FIGURE 5. Cable Harness Installation Schematic



CHAPTER

6

*Start-Up Procedures*



**⚠ WARNING**

When starting the machine for the first time, keep the area around the machine clear of people or bystanders in case a fitting or hose has not been fully tightened.



**⚠ WARNING**

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

Always wear appropriate protective equipment when working with the hydraulic system.

*Remove Air from the Hydraulic System*

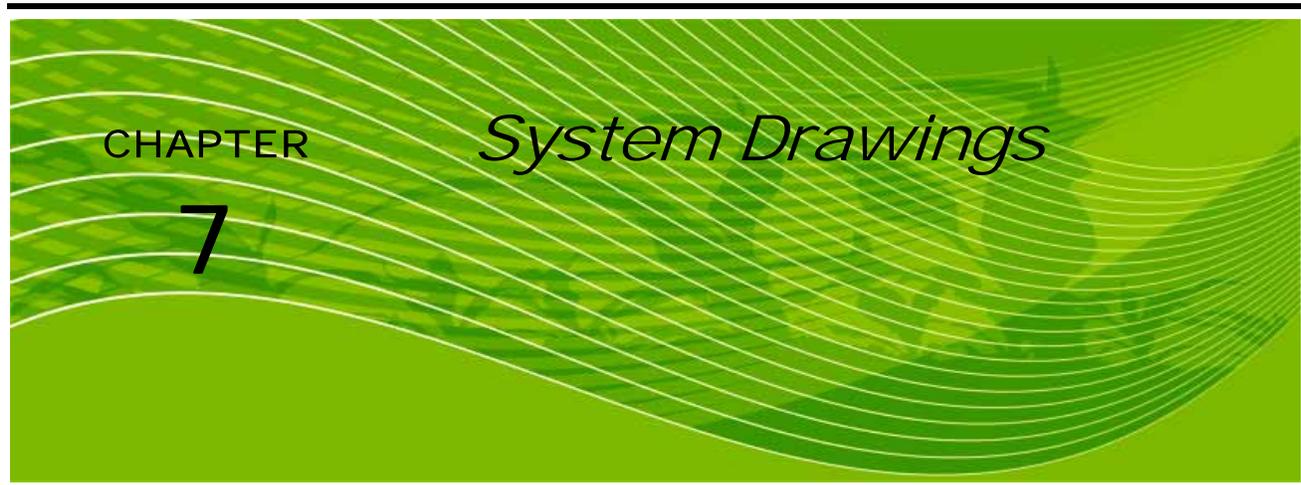
Anytime a hydraulic system is purged for maintenance, or during the SmarTrax system installation, air is introduced into the hydraulic lines. Anytime the system is purged or fittings are loosened or disconnected, it is important to remove air pockets from the hydraulic system to avoid unwanted operation of the hydraulic system.

To remove air from the hydraulic system, turn the wheels fully from side to side repeatedly. If air pockets are present, the wheels may not move consistently while the steering wheel is operated. Continue turning the wheels until the wheels move steadily and smoothly with the steering wheel.

## *Verify the SmarTrax Installation*

1. Turn on the machine.
2. With the machine running, double-check all fitting and hose connections to ensure that:
  - Hoses are not rubbing or interfering with other moving parts.
  - Hydraulic fluid is not leaking.
3. If there are any problems, shutdown the machine and correct problems immediately.

If you need additional assistance, contact your local Raven dealer or the Raven Customer Support Center at 1-800-243-5435.



The following diagrams may be helpful for installing or troubleshooting the SmarTrax system. The following diagrams may show optional features or components not required for operation and will not apply to your system if the required hardware has not been installed.

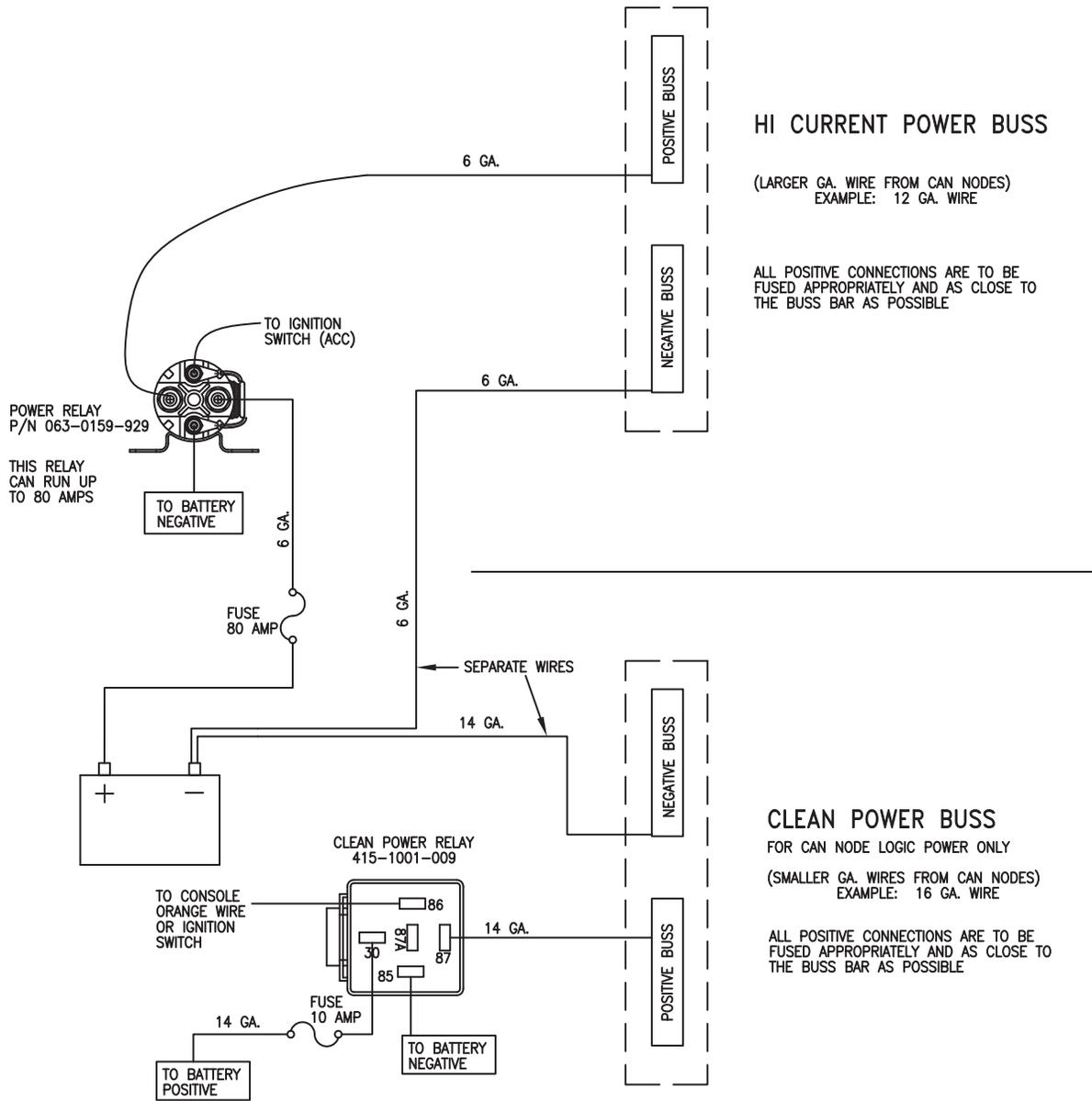
Contact your local dealer for purchasing or more information on components shown in the following diagrams.

Additional system diagrams are available from the Raven Industries web site:

<http://www.ravenprecision.com/Support/ApplicationDrawings/index2.jsp>

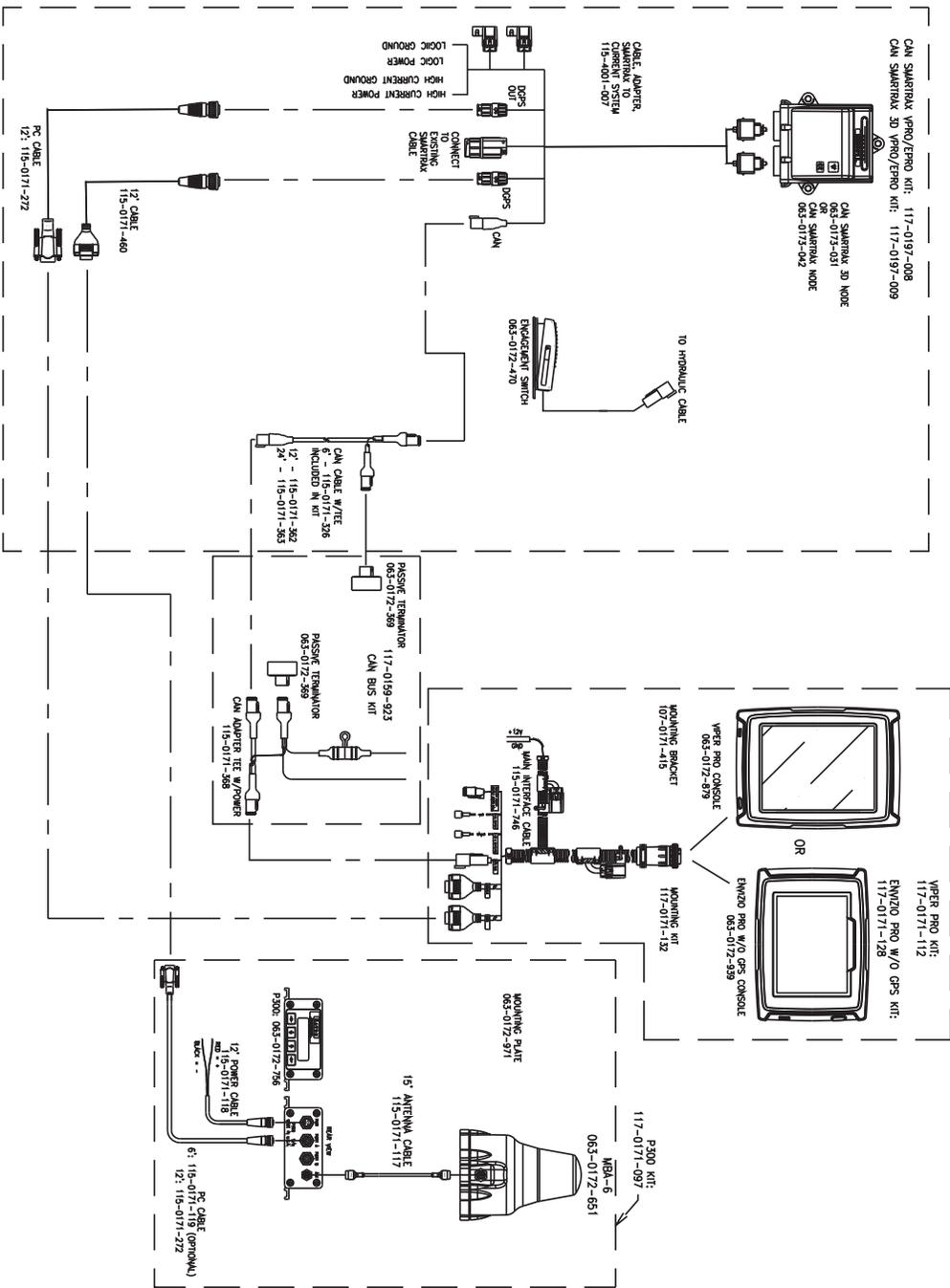
# Can Node Wiring Diagram

## CAN NODE WIRING

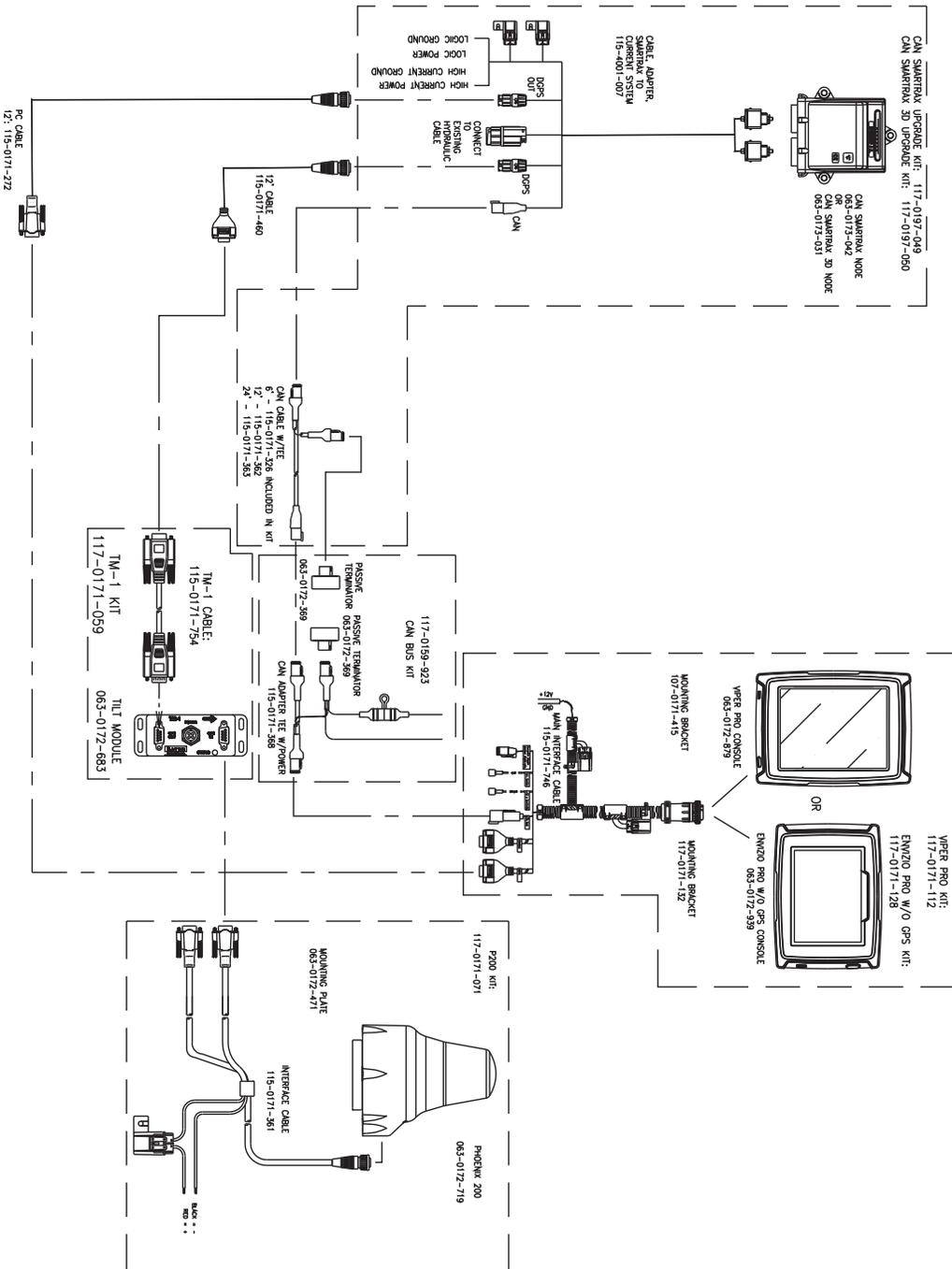


# Envizio Pro/ Viper Pro

## ENVIZIO PRO/VIPER PRO CAN SMARTRAX/SMARTRAX 3D W/PHONEIX 300



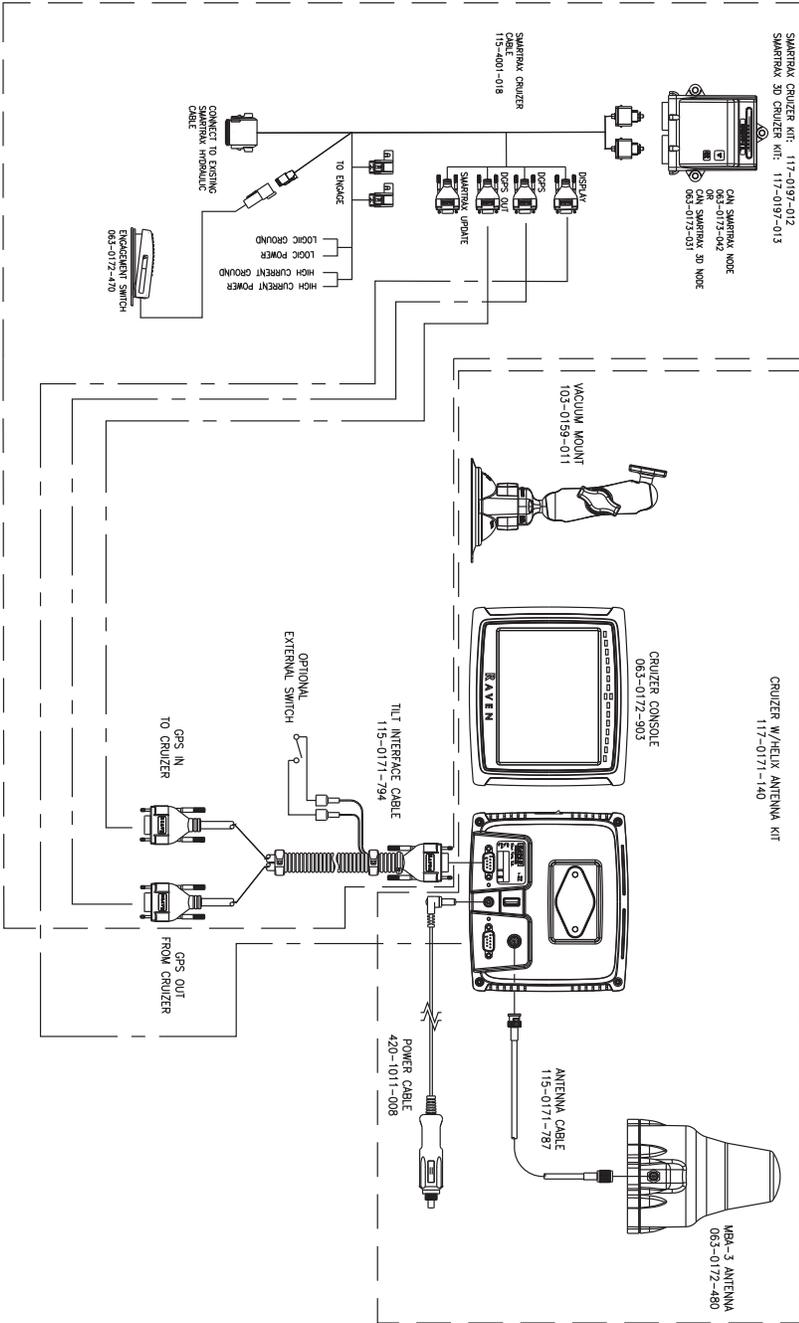
ENVIZIO PRO/VIPER PRO CAN SMARTRAX/SMARTRAX 3D UPGRADE W/PHOENIX 200, TM-1





Cruizer

CRUIZER WITH HELIX ANTENNA, SMARTRAX/SMARTRAX 3D



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Yaw Sensor 26

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**RAVEN**

# **RAVEN INDUSTRIES**

## **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 Product under normal use, maintenance, and service.

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

Raven Applied Technology 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.

**RAVEN**

CaseIH SPX 3320/3330  
SmarTrax™ Installation Manual  
(P/N 016-0190-081 Rev E 10/09)

*Simply improving your position.™*



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