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CHAPTER

1

Important Safety Information

Notice

Read this manual 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 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**

When starting the machine for the first time, be sure that all persons stand clear, in case a hose has not been completely tightened.

 **CAUTION**

Hydraulic Safety

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 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 manufacturers's approved maintenance instructions. Raven Industries recommends that appropriate protective equipment be worn at all times when working on the hydraulic system. 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

Do not reverse power leads. Doing so could cause severe damage to the equipment. Always make sure that the power leads are connected to the correct polarity as marked. 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 your machine via GPS (Global Positioning System) coordinates.

This manual applies to the following machines.

Make: John Deere

Models: 7X00/7X10

FIGURE 1. John Deere



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.

Hydraulic Fittings

This manual references three types of hydraulic fittings:

- SAE O-Ring fittings
- ORFS (O-Ring Face Seal) fittings
- JIC Fittings

Refer to the pictures below to identify fitting types.

FIGURE 2. SAE O-Ring and ORFS Fittings



Preparing for Installation

Before installing SmarTrax, park the machine where the ground is level, clean, and dry. Leave the machine 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.

Before beginning the procedures in each chapter, review the lists of parts you will need. Remove the protective plastic caps and plugs only from the parts that you will use during that phase of the installation process.

Point of Reference

References to left, right, front, and back of the machine are made assuming you are sitting in the operator's seat looking straight forward.

Reviewing SmarTrax 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 distributor.

TABLE 1. John Deere 7x00,7x10 SmarTrax Kit Steering Kit (P/N 117-0195-036)

Picture	Item Description	Part Number	Qty.
Not Pictured	Manual- Installation	016-0190-036	1
	Valve- SmarTrax Hydraulic	334-0003-066	1
	Yaw Sensor	063-0171-684C	1
	Plate- Universal Mounting	107-0171-578	1
	Cable- Yaw Sensor Hydraulic Solenoid/Override	115-0171-775	1
	Weldment- Mounting Universal Bracket	116-0159-527	1
	Pressure Switch	422-0000-074	1
	Bolt- 5/16"-18x7/8" Hex Head	311-0052-104	4
	Bolt- 3/8"-16 Hex	311-0054-105	4

TABLE 1. John Deere 7x00,7x10 SmarTrax Kit Steering Kit (P/N 117-0195-036)

Picture	Item Description	Part Number	Qty.
	Nut- 3/8"-16	312-1001-037	4
	Washer- 5/16" Lock	313-1000-019	4
	Washer- 3/8" Flat	313-2300-013	4
	Washer- 3/8" Split Lock	313-1000-022	4
	Bolt- 7/16"-14 Hex	311-0056-096	2
	Nut-7/16"	312-1001-040	2
	Washer- 7/16" Lock	313-1000-025	2
	Washer- 7/16" Flat	313-2300-016	4
	Label- Tampering Warning	041-0159-689	1

TABLE 2. John Deere 7x00,7x10 SmarTrax Kit Hydraulic Kit (P/N 117-0195-036)

Picture	Item Description	Part Number	Qty.
	Fitting- 9/16" ORFS M/M Straight Adapter	333-0012-268	1
	Fitting- 13/16" ORFS M/M/F Swivel Run Tee Adapter	333-0012-028	3
	Fitting- 11/16" ORFS M/M/F Swivel Run Tee Adapter	333-0012-069	1
	Fitting- 11/16" ORFS M/F Swivel 90° Elbow	333-0012-065	1
	Fitting- 13/16" ORFS M/F Swivel 90° Elbow	333-0012-067	2
	Fitting- 9/16" JIC M/F Swivel 90° Elbow	333-0012-042	2
	Hydraulic Hose- 3/4" ORFS(F) to 9/16" JIC(F) 90°- 96"	214-1000-586	2
	Hydraulic Hose- 3/4" ORFS(F) to 9/16" JIC(F) 90°- 28"	214-1000-587	1
	Hydraulic Hose- 11/16" ORFS(F) to 9/16" JIC(F) 90°- 13"	214-1000-588	1
	Hydraulic Hose- 9/16" ORFS(F) 45° to 9/16" JIC(F)- 72"	214-1000-589	2

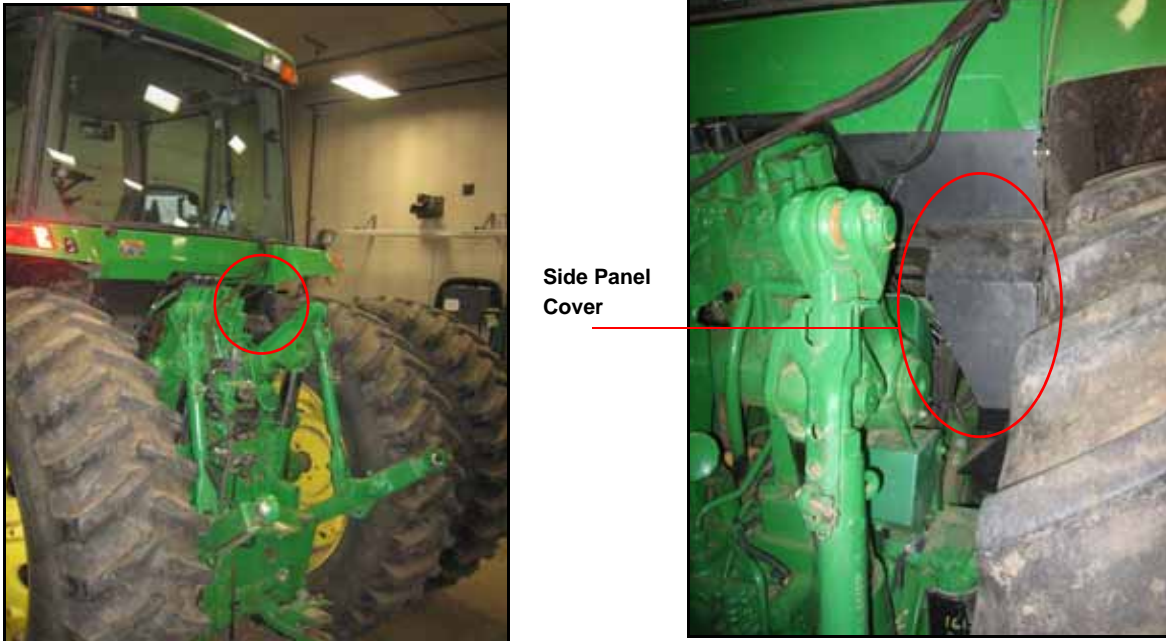
CHAPTER

3

*SmarTrax Hydraulic
Valve, Universal
Mounting Plate and
Bracket*

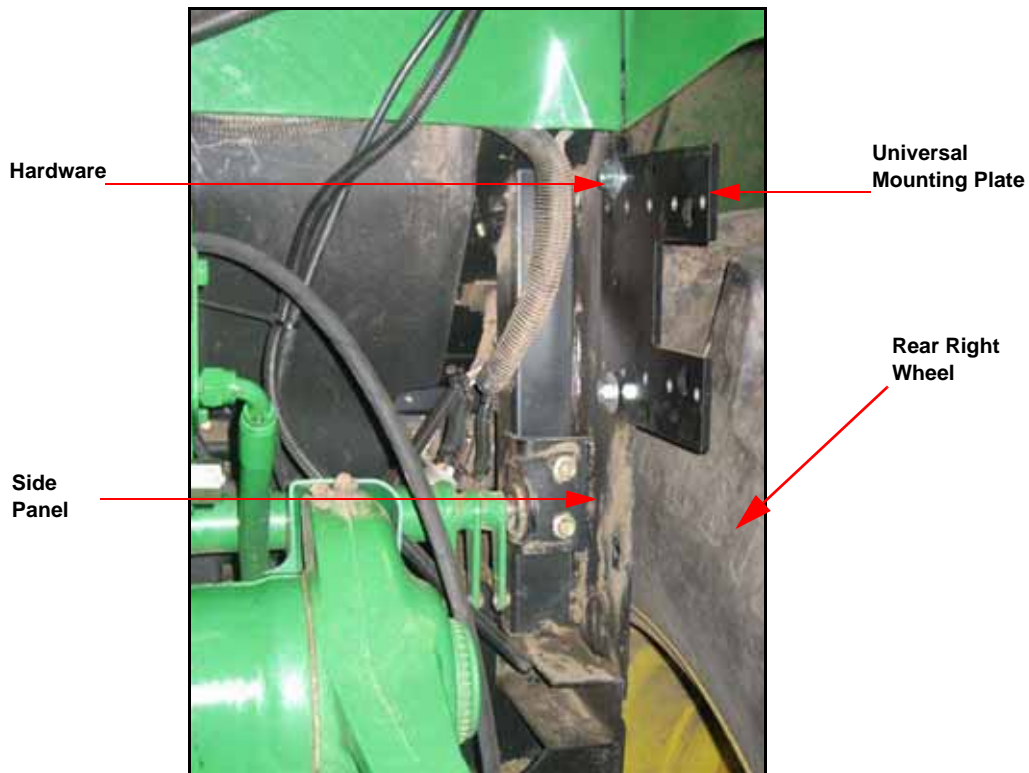
Mounting the Universal Mounting Plate

FIGURE 1. Right Side Cover Panel location



1. On the rear of the machine, locate and remove the right side panel cover (you may wish to save this panel for future use).

FIGURE 2. Universal Mounting Plate Location



2. Mount the universal mounting plate (P/N 107-0171-578) to the side panel as shown using the supplied 7/16" hex bolt (P/N 311-0056-096), 7/16" nut (P/N 312-1001-040), lock washer 7/16" (P/N 313-1001-040), and 7/16" washers (P/N 313-2300-016) and the existing bolt hole from the cover panel.
3. Drill an additional 7/16" hole in the side panel to accommodate the universal mounting plate (P/N 116-0159-527).

You have now established the SmarTrax valve mounting location.

Important: *Since space is restricted once the valve is mounted, you will first need to route all the hoses to the SmarTrax valve mounting location before mounting the SmarTrax valve.*

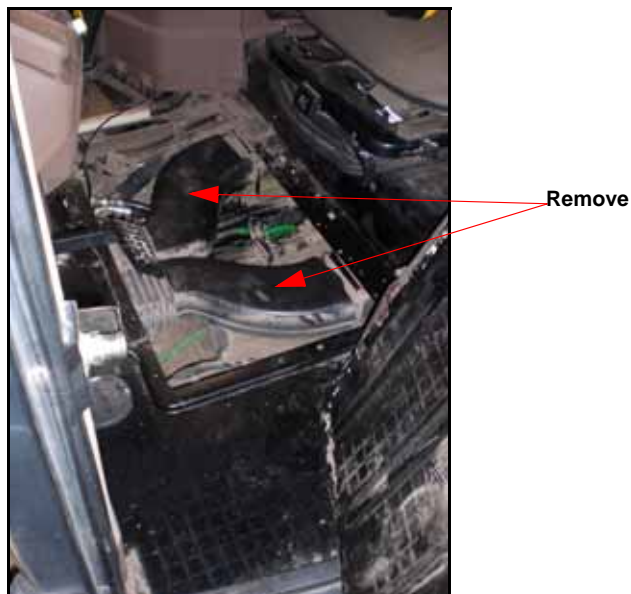
Mounting the SmarTrax Valve to the Universal Mounting Bracket

1. Mount the SmarTrax valve to the universal mounting bracket using the supplied 5/16" hex bolt (P/N 311-0052-104), and 5/16" lock washer (P/N 313-1000-019).
2. Set aside for future use.

Removing the Cab Floor Plate



	⚠ WARNING
This machine must remain stationary and switched off while installation or maintenance is conducted.	

FIGURE 1. Cab Floor Plate



Remove the cab floor plate and the air ducts. The air ducts are held in place with two bolts on each duct.

Hydraulics

	<p>⚠ WARNING</p> <p>Hydraulics are under pressure. Care should always be taken with a system that has been pressurized. When disconnecting or purging hydraulic hoses, be aware that the hydraulic oil within the machine system may be extremely hot and under high pressure.</p>
	<p>⚠ CAUTION</p> <p>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.</p> <p>Objects or materials that are able to bypass the machine's hydraulic filtration system will adversely reduce performance and possibly damage the AutoBoom hydraulic valves.</p>

General Guidelines

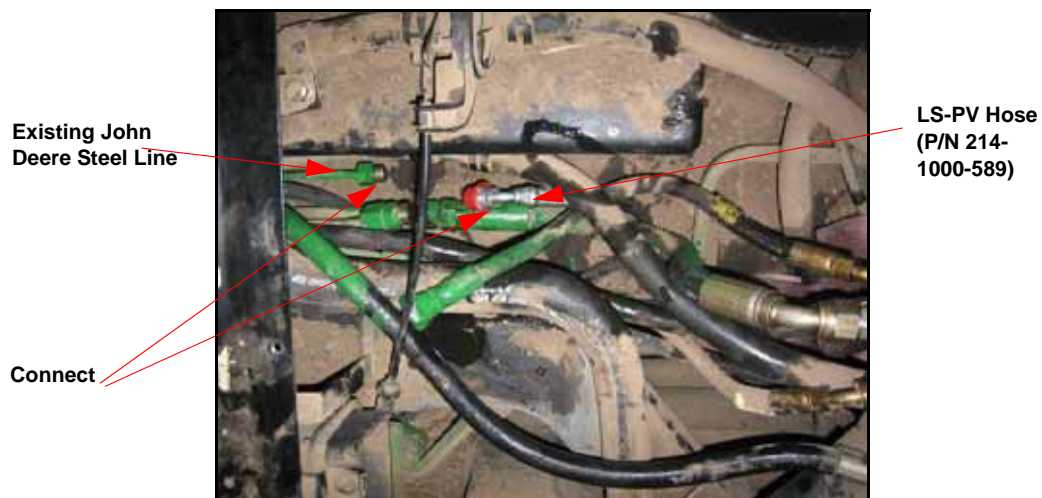
- Route all hoses to the valve mounting location before connecting them to the SmarTrax valve.
- As you connect the hoses to the machine, label the hoses in order to ensure quick and easy connection to the SmarTrax valve.
- All straight hose ends should remain loose on fittings until 90° elbow ends are attached to the valve and the valve is mounted.

FIGURE 2. Routed Hoses to Valve Mounting Location



Installing the LS-PV Hose

FIGURE 3. LS-PV Hose

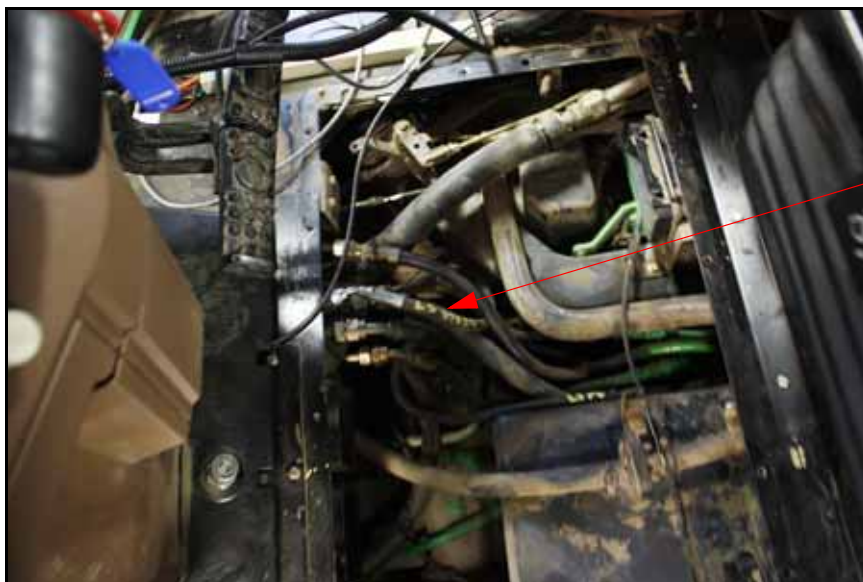


1. Disconnect existing LS Hose.
2. Connect the 45° elbow end of the supplied LS-PV Hose (P/N 214-1000-589) to the existing John Deere hose going to pump using the supplied adapter fitting (P/N 333-0012-268).
3. Route the LS-PV hose to the valve mounting location.

Note: Do not connect the hose to the SmarTrax valve until all hydraulic hoses are routed to the mounting location and you are ready to mount the SmarTrax valve.

Installing LS-Steer Hose

FIGURE 4. LS-Steer Hose



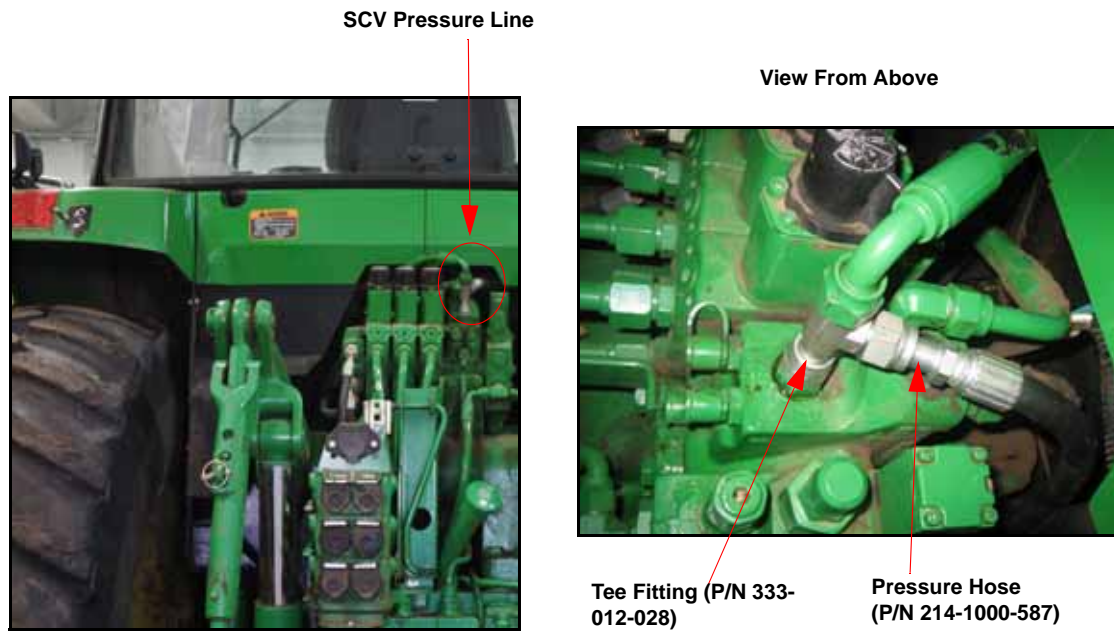
LS-Steer Hose
(P/N 214-1000-589)
Connected to Steel
Line

1. Connect the supplied LS-Steer hose (P/N 214-1000-589) to the existing John Deere steel line going to the orbitrol.
2. Route the LS-PV hose to the valve mounting location.

Note: Do not connect the hose to the SmarTrax valve until all hydraulic hoses are routed to the mounting location and you are ready to mount the SmarTrax valve.

Installing the Pressure Hose

FIGURE 5. Pressure Hose

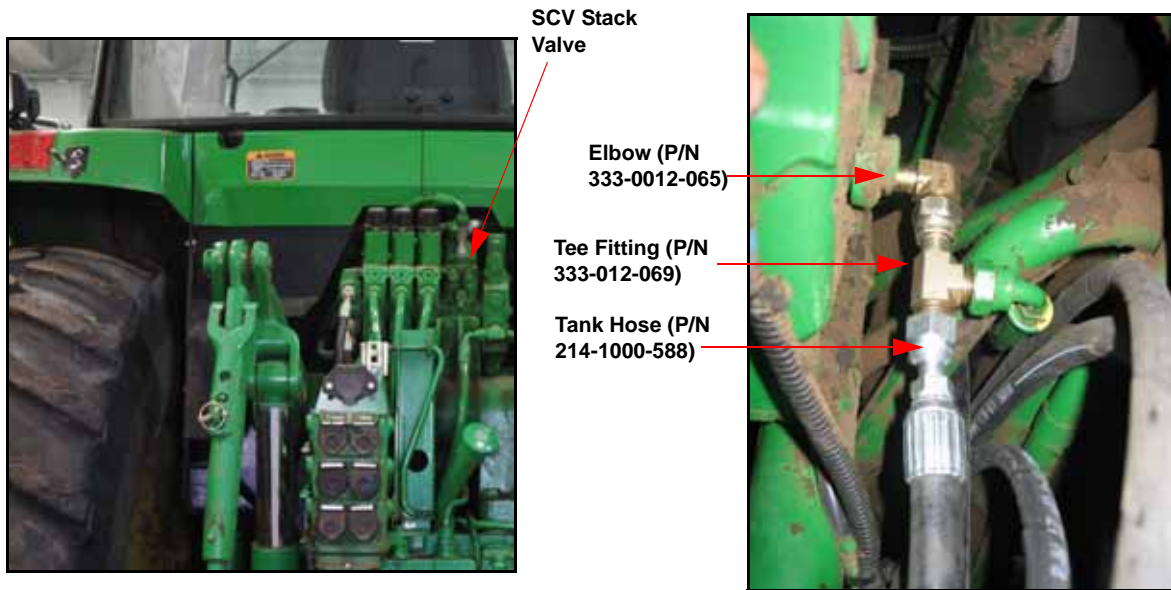


1. Locate SCV pressure line on back of tractor.
2. Remove original hose and attach supplied tee fitting (P/N 333-012-028).
3. Attach original hose to tee fitting.
4. Connect supplied Pressure hose (P/N 214-1000-587) to tee fitting.
5. Route the Pressure hose to the valve mounting location.

Note: Do not connect the hose to the SmarTrax valve until all hydraulic hoses are routed to the mounting location and you are ready to mount the SmarTrax valve.

Installing the Tank Hose

FIGURE 6. Tank Hose

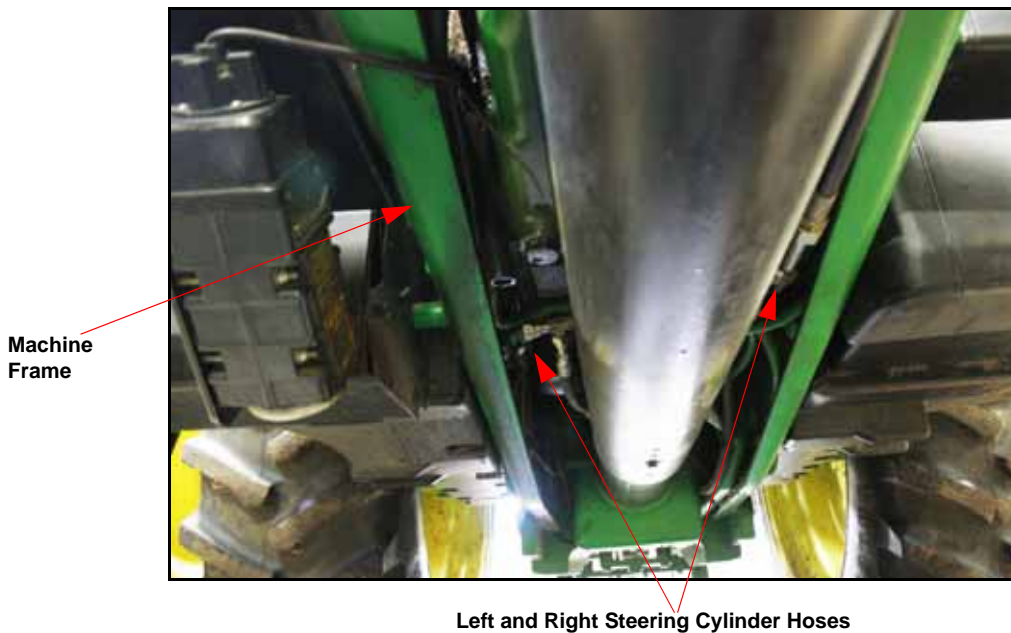


1. Locate and disconnect SCV Tank hose on valve between cab and SCV stack.
2. Install supplied elbow (P/N 333-0012-065) and tee fitting (P/N 333-0012-069) onto tank hose (P/N 214-1000-588) as shown and reattach to tank port
3. Route the Tank hose to the valve mounting location.

Note: Do not connect the hose to the SmarTrax valve until all hydraulic hoses are routed to the mounting location and you are ready to mount the SmarTrax valve.

Installing Left and Right Steering Hoses

FIGURE 7. Left and Right Steering Cylinder Hoses



1. Locate the Left and Right steering cylinder hoses. These hoses should be attached to the bulkhead fittings midway along tractor frame.
2. Remove existing hoses from bulkheads and attach supplied tee fitting (P/N 333-0012-028). Connect hose to one end of a each tee fitting.
3. Attach supplied hoses (P/N 214-1000-586) to open ends of tee fittings.

Note: Depending on bulkhead orientation, it may be necessary to attach the supplied 90° elbows (P/N 333-0012-067) to tees to route hoses rearward.

FIGURE 8.



4. Route hoses along frame and on top of transmission to SmarTrax valve mounting location.
5. All hoses are now routed to the valve mounting location.

Use the following table to connect the hoses to the appropriate ports on the SmarTrax hydraulic valve.

Hose	Port
13/16" ORFS(F) to 9/16" JIC(F) 90° (P/N 214-1000-586)	A and B port
13/16" ORFS(F) to 9/16" JIC(F) 90° (P/N 214-1000-587)	P port
11/16" ORFS(F) to 9/16" JIC(F) 90° (P/N 214-1000-588)	T port
9/16" ORFS(F) to 9/16" JIC(F) 90° (P/N 214-1000-589)	LS-PV LS Steer
Pressure Switch	PS Port

Connecting the SmarTrax Console Cable Harness to the SmarTrax Hydraulic Valve

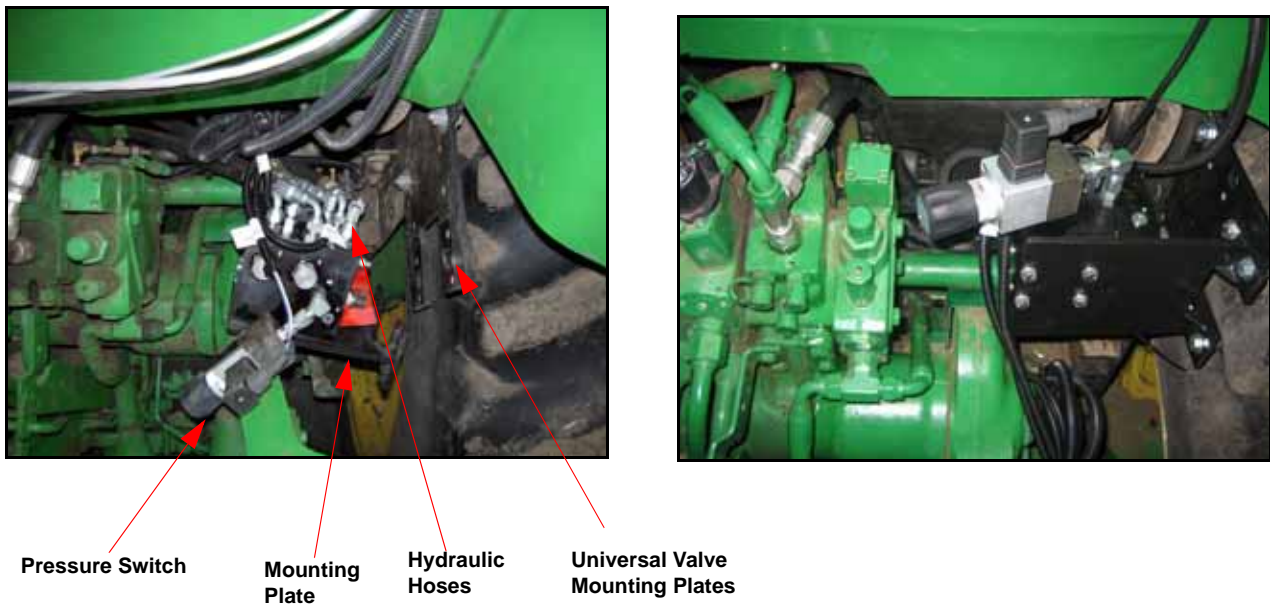
1. On the yaw sensor hydraulic solenoid/override cable (P/N 115-0171-775), identify the connector labeled LEFT.
2. On the SmarTrax hydraulic valve (P/N 334-0003-066), identify the left solenoid. It is located directly across from Port 'A.'
3. Place a solenoid gasket (included in the packet with the yaw sensor hydraulic solenoid/override cable) on the left solenoid.
4. Connect the LEFT connector to the left solenoid.
5. On the yaw sensor hydraulic solenoid/override cable, identify the connector labeled RIGHT.
6. On the SmarTrax hydraulic valve, identify the right solenoid. It is located directly across from Port 'B.'
7. Place a solenoid gasket on the solenoid.
8. Connect the RIGHT connector to the right solenoid.

Connecting the Console Cable Harness to the Pressure Switch

1. On the yaw sensor hydraulic solenoid/override cable, identify the connectors labeled OVERRIDE.
2. Connect that OVERRIDE plug to the connector on the pressure switch.

Mounting the SmarTrax Valve

FIGURE 9. SmarTrax Valve Mounting Location



1. Finish the installation by attaching the hydraulic hoses, SmarTrax valve and universal mounting bracket to the mounting plate using the supplied 3/8" hex bolts (P/N 311-0054-105), 3/8" nuts (P/N 312-1001-037), 3/8" lock washer (P/N 313-1000-019) and 3/8" flat washers (P/N 313-2300-013).
2. Tighten opposing ends to of hoses.
3. Secure hoses away from moving parts using cable ties.

Affixing the SmarTrax Tampering Warning Label

The SmarTrax Kit includes a SmarTrax tampering warning label to highlight the importance of not tampering with the SmarTrax hydraulic devices. You should affix this label to the hydraulic valve mounting bracket.

FIGURE 10. Suggested Placement Location



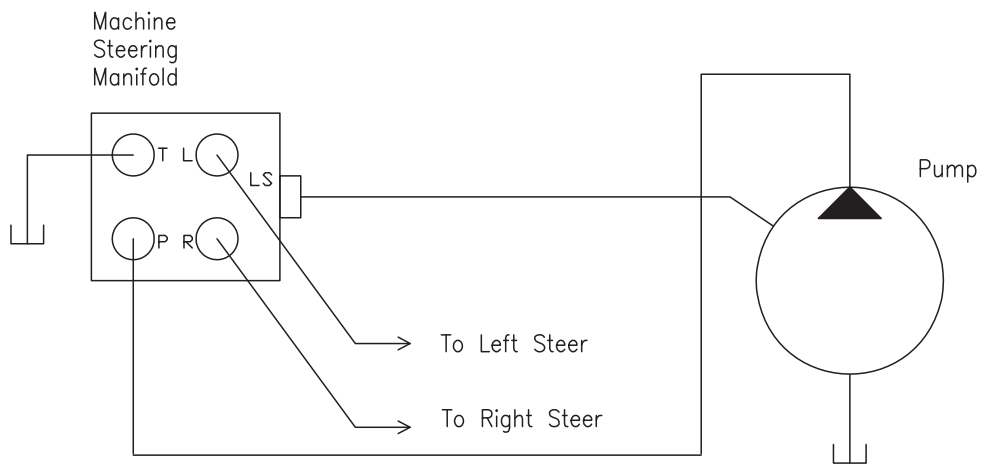
1. Verify the surface of the bracket is clean.
2. On the tamper warning label (P/N 041-0159-689), remove the protective backing.
3. Stick the tampering warning label to the right side of the hydraulic valve mounting bracket (P/N 107-0171-527).

Routing the Yaw Sensor Hydraulic Solenoid/Override Cable to the Cab

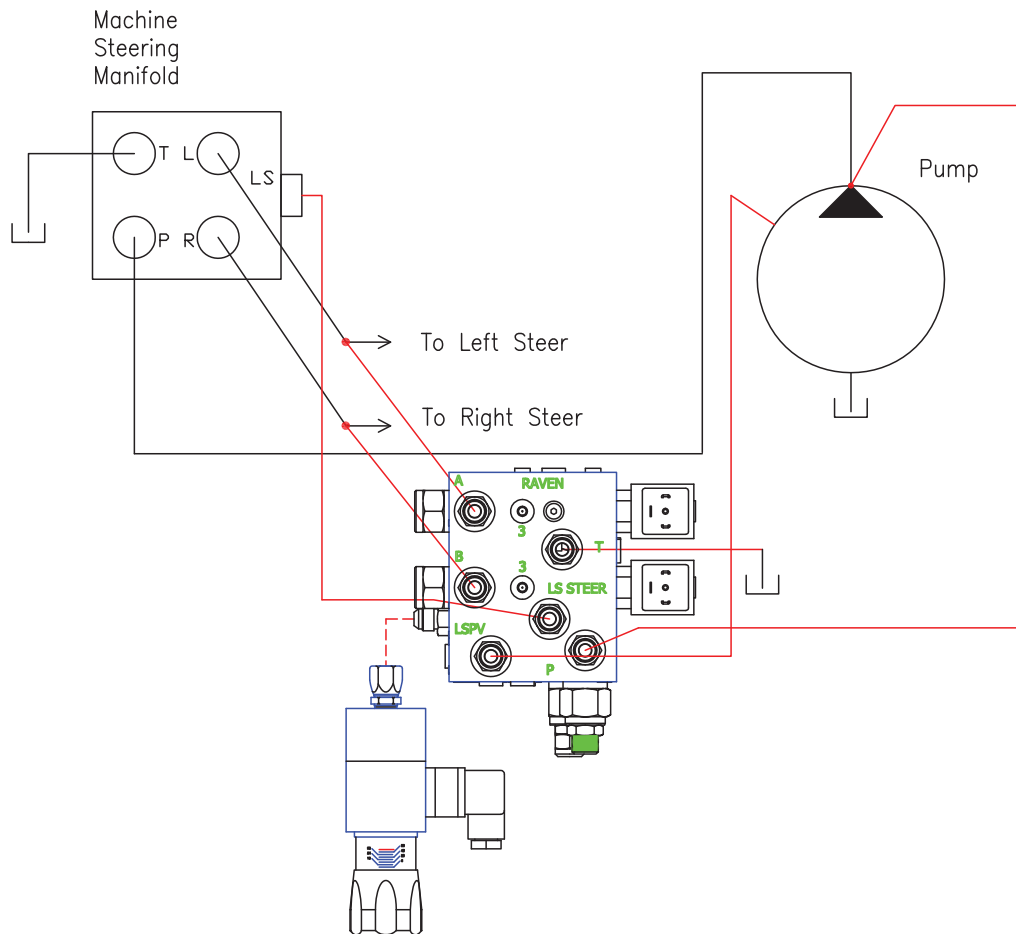
1. Route the SmarTrax console cable harness to the cab. Use the cable ties to secure the SmarTrax console cable harness as necessary.

Important: *When routing the yaw sensor hydraulic solenoid/override cable, follow the path of other hoses or cables to avoid potential wear areas.*

Before Smartrax Installation



After Smartrax Installation



Installing The SmarTrax Foot Switch

1. Select your preferred location for the SmarTrax foot switch (P/N 063-0172-470) where your foot will be able 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. Connect and tighten screws through the four mounting holes on the SmarTrax foot switch.
4. On the SmarTrax console cable harness (P/N 115-0171-777), identify the cable that is labeled, "ENABLE."
5. Connect this branch to the SmarTrax foot switch.

FIGURE 1. The SmarTrax Foot Switch



Installing the SmarTrax Yaw Sensor

Choosing Your Installation Method

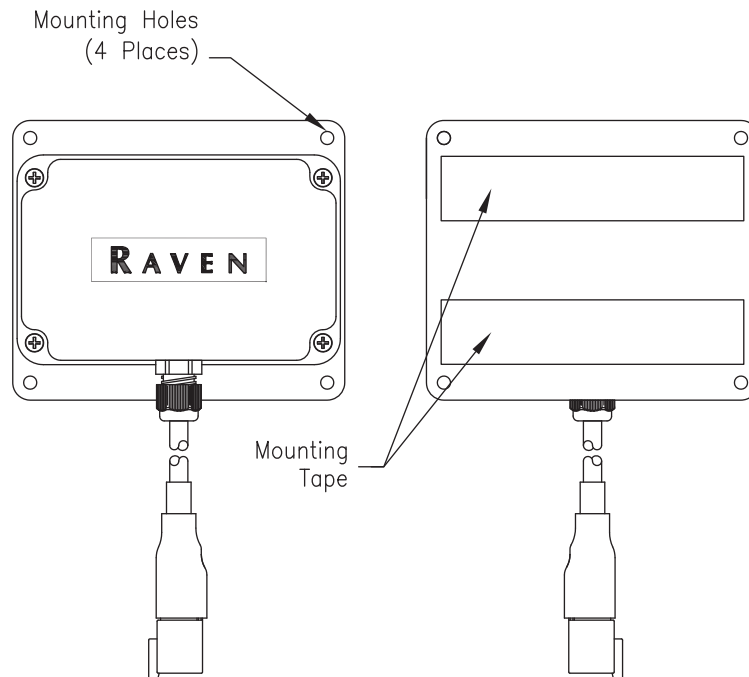
You can install the SmarTrax yaw sensor by using either the double-sided tape already affixed to the SmarTrax yaw sensor or by screwing the SmarTrax yaw sensor to the floor through its four mounting holes.

Choosing the Location for the SmarTrax Yaw Sensor

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

- Mount the SmarTrax yaw sensor inside the cab. The yaw sensor is not weatherproof.
- Mount the SmarTrax yaw sensor in a location where the operator will not kick it or trip over it.
- Mount the SmarTrax yaw sensor to a flat, level surface. The floor of the cab is generally ideal.
- Mount the SmarTrax 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.

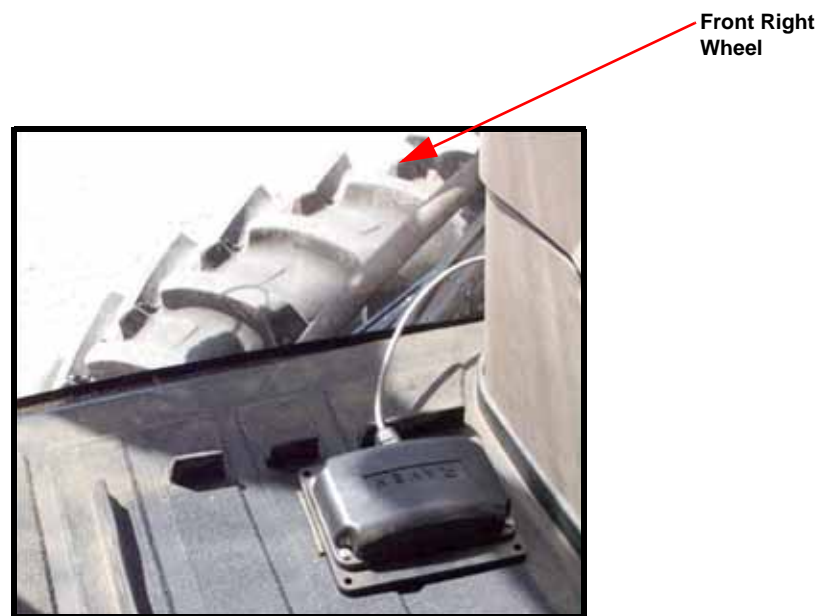
Note: *If you are going to use the double-sided tape to mount the SmarTrax yaw sensor, be sure to thoroughly clean and dry the mounting location first.*



To Install the SmarTrax Yaw Sensor

1. Select your preferred location for the SmarTrax yaw sensor (P/N 063-0172-684). For more information, see “Choosing the Location for the SmarTrax Yaw Sensor.”
2. Do one of the following:
 - Remove the protective covering from the double-sided tape and stick the SmarTrax yaw sensor to the floor.
 - Pre-drill holes in the floor. Then connect and tighten screws (not supplied) through the four mounting holes on the SmarTrax yaw sensor.

FIGURE 2. The SmarTrax Yaw Sensor

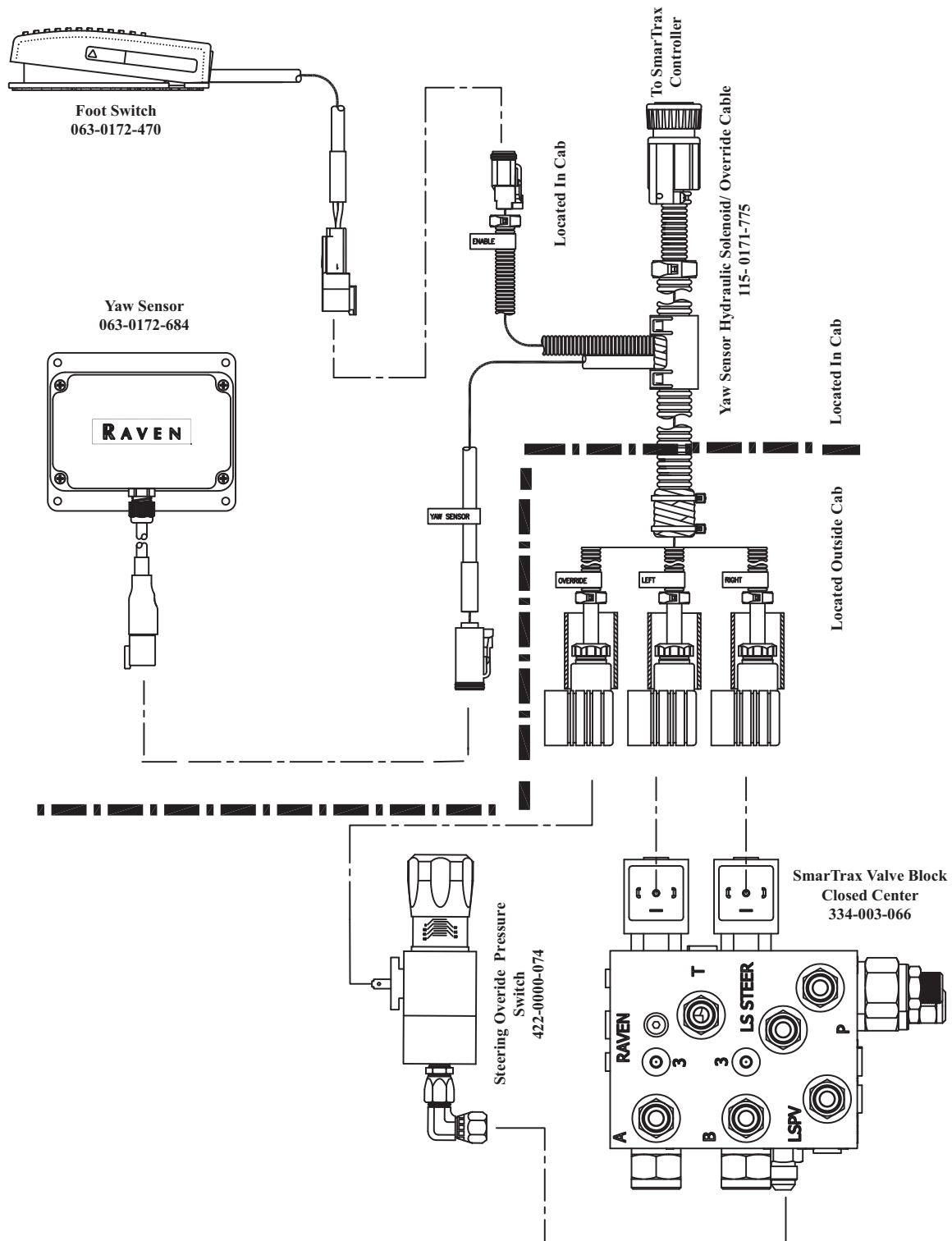


3. On the yaw sensor hydraulic solenoid/override cable (P/N 115-0171-775), identify the cable labeled YAW SENSOR.”
4. Connect this branch to the SmarTrax yaw sensor.
5. Identify the end of the yaw sensor hydraulic solenoid/override cable that has the connectors labelled, “RIGHT” and “LEFT.” This is the end of the cable that you will route to the SmarTrax hydraulic valve.

Mounting the SmarTrax Controller


1. In the cab, mount the SmarTrax controller in desired location where it is easy to access while driving.
2. Connect the yaw sensor hydraulic solenoid/override cable (P/N 115-0171-777) to the controller.

SmarTrax Yaw Sensor Hydraulic Solenoid/Override Cable Installation Schematic



Start- Up Procedures

After installing the SmarTrax system on your machine, always follow these start-up procedures.

	<p>⚠ WARNING</p> <p>Do not use hands to check for leaks. Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death.</p>
--	---

Remove Air from the Hydraulic System

Turn the wheels fully from side to side repeatedly to remove air from the hydraulic system.

Verify the SmarTrax Installation

1. Turn on the machine.
 2. With the machine running, double-check all connections to ensure that:
 - Hoses are not rubbing or interfering with other moving parts.
 - There are no leaks.
 3. If there are any problems, turn off your machine and correct the problems immediately.
- If you need additional assistance, contact your Raven Dealer.

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