

# SmarTrax™ Installation Manual for Kubota M7 Series

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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 or a safe working distance away from the booms 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 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, with the booms unfolded and supported, during installation or maintenance.

## CAUTION

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## HYDRAULIC

### GENERAL

- 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 hydraulic system. Objects or materials that are able to bypass the hydraulic filtration system will reduce performance and possibly damage the SmarTrax hydraulic valve.

### INSTRUCTIONS FOR HOSE ROUTING

The word "hose" is used to mean all flexible fluid carrying components. Follow existing hoses as much as possible and use these guidelines:

Hoses should not contact or be attached to:

- Components with high vibration forces
- Components carrying hot fluids beyond component specifications

Avoid contact with any sharp edge or abrading surfaces such as, but not limited to:

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads
- Ends of adjustable hose clamps

Routing should not allow hoses to:

- Hang below the unit
- Have the potential to become damaged due to exposure to the exterior environment. (i.e. tree limbs, debris, attachments)
- Be placed in areas of or in contact with machine components which develop temperatures higher than the temperature rating of hose components
- Hoses should be protected or shielded if it needs to route near hot temperatures beyond hose component specifications

Hoses should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in steering and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For hose sections that move during machine operation:

- Allow sufficient length for free movement without interference to prevent: pulling, pinching, catching or rubbing, especially in articulation and pivot points
- Clamp hoses securely to force controlled movement to occur in the desired hose section
- Avoid sharp twisting or flexing of hoses in short distances

Protect hoses from:

- Foreign objects such as rocks that may fall or be thrown by the unit
- Buildup of dirt, mud, snow, ice, submersion in water and oil
- Tree limbs, brush and debris
- Damage where service personnel or operators might step or use as a grab bar
- Damage when passing through metal structures
- High pressure wash

## ELECTRICAL

### GENERAL

- 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.
- A minimum of 12 VDC is required for system operation with a maximum of 15 VDC.

### INSTRUCTIONS FOR WIRE ROUTING

The word "harness" is used to mean all electrical leads and cables, bundled and unbundled. When installing harness, secure it at least every 30 cm (12in) to the frame. Follow existing harness as much as possible and use these guidelines:

Harness should not contact or be attached to:

- Lines and hoses with high vibration forces or pressure spikes
- Lines and hoses carrying hot fluids beyond harness component specifications

Avoid contact with any sharp edge or abrading surfaces such as, but not limited to:

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads

- Ends of adjustable hose clamps
- Wire exiting conduit without protection, either ends or side of conduit
- Hose and tube fittings

Routing should not allow harnesses to:

- Hang below the unit
- Have the potential to become damaged due to exposure to the exterior environment. (i.e. tree limbs, debris, attachments)
- Be placed in areas of or in contact with machine components which develop temperatures higher than the temperature rating of harness components
- Wiring should be protected or shielded if it needs to route near hot temperatures beyond harness component specifications

Harnessing should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in steering and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For harness sections that move during machine operation:

- Allow sufficient length for free movement without interference to prevent: pulling, pinching, catching or rubbing, especially in articulation and pivot points
- Clamp harnesses securely to force controlled movement to occur in the desired harness section
- Avoid sharp twisting or flexing of harnesses in short distances
- Connectors and splices should not be located in harness sections that move

Protect harnesses from:

- Foreign objects such as rocks that may fall or be thrown by the unit
- Buildup of dirt, mud, snow, ice, submersion in water and oil
- Tree limbs, brush and debris
- Damage where service personnel or operators might step or use as a grab bar
- Damage when passing through metal structures

### **IMPORTANT:**

- Avoid directly spraying electrical components and connections with high pressure water. High pressure water sprays can penetrate seals and cause electrical components to corrode or otherwise become damaged. When performing maintenance:
- Inspect all electrical components and connections for damage or corrosion. Repair or replace components, connections, or cable as necessary.
- Ensure connections are clean, dry, and not damaged. Repair or replace components, connections, or cable as necessary.
- Clean components or connections using low pressure water, pressurized air, or an aerosol electrical component cleaning agent.

- Remove visible surface water from components, connections, or seals using pressurized air or an aerosol electrical component cleaning agent. allow components to dry completely before reconnecting cables.



### INTRODUCTION

Congratulations on your purchase of the Raven 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: Kubota

MODEL: M7-131, M7-151, and M7-171

YEAR: 2015 & Newer

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### 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.

### RECOMMENDATIONS

Raven Industries recommends the following best practices before 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:

- Ensure the hydraulic filters have been recently changed and there are no issues with the hydraulic system (e.g., pump issues, faulty hydraulic motors, fine metal deposits in the hydraulic hoses, etc.).
- Operate each of the hydraulic functions on the machine (i.e., tilt, fold, center rack, tongue extension, turning the steering wheel to the left and right steering locks, or other hydraulic valve functions) three times to ensure the hydraulic valve 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.

### TOOLS NEEDED

The following tools are recommended for installation of the SmarTrax system:

- SAE and metric wrenches and sockets
- Cable ties
- Set of tools

### 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)

- SmarTrax™ Installation Manual for Kubota M7 Series
- 016-4001-150 Rev. B
- 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 UltraGlide SmarTrax kit. Before beginning the SmarTrax installation, compare the items in the SmarTrax kit with the components on this list. If you have questions about the kit, contact your local Raven dealer.

TABLE 1. SmarTrax Installation Kit (P/N 117-4001-150)

Picture	Item Description	Part Number	Qty.
Not Pictured	Manuals - SmarTrax Calibration & Operation	016-0171-277	1
Not Pictured	Manual - Kubota M7 Series SmarTrax Installation	016-4001-150	1
	Valve - SmarTrax Hydraulic	334-0003-088	1
	Node - SmarTrax RTK	063-0173-228	1
	Valve - Dual POCI Hydraulic	334-0003-099	1
	Bracket - Node Mounting	107-0172-055	1
	Bracket - Valve Base	107-0172-637	1
	Bracket - Valve Mounting	107-0172-514	1
	Cable - Node Harness	115-4001-109	1
	Cable - Valve Harness	115-4001-255	1

Picture	Item Description	Part Number	Qty.
	Assembly - Foot Switch	063-0172-470	1
	Transducer - 0-3000 PSI Pressure	422-0000-086	1
	Nut - Nyloc, Din 985, M10-1.5	312-6001-042K	3
	Bolt - Hex, Din 931, M8-1.25x25mm	311-4050-180K	4
	Nut - Nyloc, Din, 8-1.25	312-6001-027K	4
	Washer - M8	313-6000-013	8
	Bolt - 1/4"-20 x 1" Hex	311-0050-105	3
	Bolt - 5/16"-18 Hex	311-0052-104	4
	Bolt - 5/16"-18 x 2-1/2" Hex	311-0054-086	2
	Bolt - M10 x 1.5 x 35 mm Flanged Head Hex	311-0070-060	3
	Nut - 1/4"-20 Nylon Insert Lock	312-4000-057	3

Picture	Item Description	Part Number	Qty.
	Nut - 5/16"-18 Nylon Insert Lock	312-4000-059	2
	Nut - 3/8"-16 Nylon Insert Lock	312-4001-109	5
	Washer - 1/4" Flat	313-2300-310	5

TABLE 2. Hydraulic Kit (P/N 117-0199-153)

Picture	Item Description	Part Number	Qty.
	Fitting - -4 ORFS M/F 90° Swivel Elbow	333-0012-023	1
	Fitting - -4 SAE O-Ring Plug	333-0012-051	2
	Fitting - -8 ORFS M/F 90° Elbow	333-0012-067	4
	Fitting - -8 ORFS M/F 45° Elbow	333-0012-102	2
	Fitting - -6 SAE O-Ring Plug	333-0012-104	1
	Fitting - -8 ORB (M) to -8 ORFS (M) Straight Adapter	333-0012-168	4
	Fitting - -6 ORB (M) to -4 ORFS (M) Straight Adapter	333-0012-195	2

Picture	Item Description	Part Number	Qty.
	Fitting - -6 ORFS (M) to -8 SAE O-Ring (M) Straight Adapter	333-0012-199	2
	Fitting - -8 ORFS (M) to -8 SAE O-Ring (M) 90° Elbow	333-0012-229	2
	Fitting - -10 ORB (M) to -6 ORFS (M) Straight Adapter	333-0012-233	2
	Fitting - 15L M/M/F Swivel Run Tee Adapter	333-0012-361	2
	Fitting - 8L M/F 90° Swivel	333-0012-367	1
	Fitting - -6 ORFS 90 M/F	333-0012-065	2
	Fitting - -8 ORFS Swivel Run Tee, M/M/F	333-0012-028	1
	Fitting - -6 ORFS M/F Elbow	333-0012-359	1
	Fitting - -4 SAE O-Ring (M) to -6 ORFS (M)	333-0012-114	1
	Hydraulic Hose - 15L 45° (F) to -8 ORFS (F) - 102"	214-1001-161	2
	Hydraulic Hose - -6 ORFS (F) to -6 ORFS (F) 90° - 18"	214-1001-162	2

Picture	Item Description	Part Number	Qty.
	Hydraulic Hose - 15L (M) to -8 ORFS (F) 45° - 120"	214-1001-199	2
	Hydraulic Hose - 8L (F) to -4 ORFS (F) 45° - 62"	214-1001-200	1
	Hydraulic Hose - 8L (M) to -4 ORFS (F) - 68"	214-1001-201	1
	Hydraulic Hose - 15L (F) 90° to -8 ORFS (F) - 68"	214-1001-202	2
	Hydraulic Hose - -6 ORFS (F) 90° to -8 ORFS (F) - 30"	214-1001-203	1





**⚠ 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 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 hydraulic system.

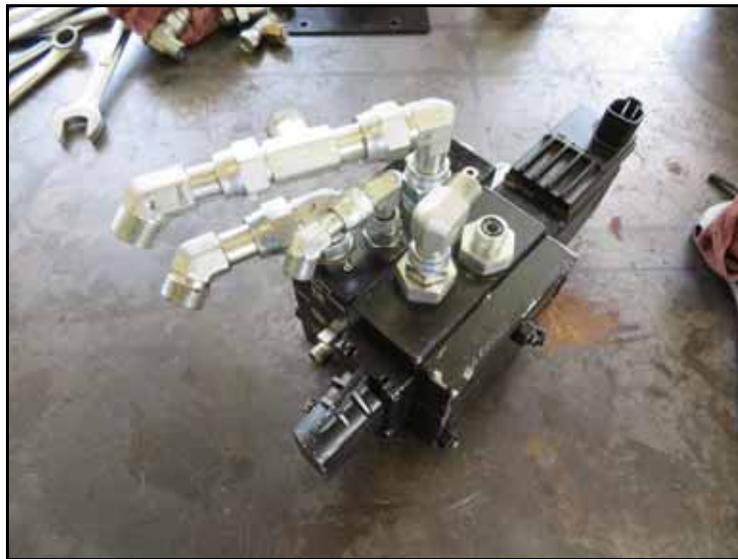
Objects or materials that are able to bypass the hydraulic filtration system will reduce performance and possibly damage the SmarTrax hydraulic valve.

	<b>NOTICE</b>
<p>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.</p>	

## 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. Refer to the following table to install the fittings in the appropriate ports of the SmarTrax valve.

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



Fitting	Part Number	Port
Fitting - -4 ORFS M/F 45° Swivel Elbow	333-0012-359	LSPV
Fitting - -4 ORFS (M) to -6 SAE O-Ring (M) Straight Adapter	333-0012-195	LSPV, LS STEER
Fitting - -4 ORFS M/F 90° Swivel Elbow	333-0012-023	LSPV
Fitting - -6 ORFS (M) to -10 SAE O-Ring (M) Straight Adapter	333-0012-233	A, B
Fitting - -8 ORFS (M) to -8 SAE O-Ring (M) 90° Elbow	333-0012-229	P

Fitting	Part Number	Port
Fitting - -8 ORFS M/F 45° Swivel Elbow	333-0012-102	P, T
Fitting - -8 ORFS (M) to -8 SAE O-Ring (M) Straight Adapter	333-0012-168	T
Fitting - -8 ORFS Run Tee	333-0012-028	T
Fitting - -8 ORFS M/F 90° Swivel Elbow	333-0012-067	T
Fitting - -6 SAE O-Ring Plug	333-0012-104	PS
Fitting - -6 ORFS M/F 90° Swivel Elbow	333-0012-065	A

**INSTALL FITTINGS IN THE DUAL POCI VALVE**

Before mounting the dual POCI valve (P/N 334-0003-099) 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. Refer to Figure 2 and the table below to install fittings on the dual POCI valve.



FIGURE 2. Fittings Installed on Dual POCI Valve



Fitting	Part Number	Port
Fitting - -8 SAE O-Ring (M) to -6 ORFS (M) Straight Adapter	333-0012-199	A1, B1
Fitting - -8 SAE O-Ring (M) to -8 ORFS (M) Straight Adapter	333-0012-168	A2, B, B2
Fitting - -8 ORFS M/F 90° Elbow	333-0012-067	A2, B, B2
Fitting - -4 SAE O-Ring Plug	333-0012-051	P1, T1
Fitting - -4 SAE O-Ring to -6 ORFS (M)	333-0012-114	T2
Fitting - -8 ORFS (M) to -8 SAE O-Ring (M) 90° Elbow	333-0012-229	A
Transducer - 0-3000 PSI Pressure	422-0000-086	PS

## MOUNT THE SMARTRAX AND DUAL POCI VALVES

1. Locate the steering valve mounting location at the rear of the machine.

**FIGURE 3. Steering Valve Assembly Mounting Location**



2. Mount the valve assembly base bracket (P/N 107-0172-637) to the machine using the supplied M8-1.25 x 25mm bolts (P/N 311-4050-180), M8 washers (P/N 313-6000-013) and M8-1.25 locknuts (P/N 312-6001-027).

**FIGURE 4. Valve Mounting Base Bracket Installed**



- Secure the valve bracket (P/N 107-0172-514) onto bracket (P/N 107-0172-637) with the supplied M10-1.5 x 35mm flanged head bolts (PN 311-0070-060) and M10-1.5 locknuts (P/N 312-6001-042K).

**NOTE:** Install the M10 bolts from the bottom side to allow clearance below the base bracket.

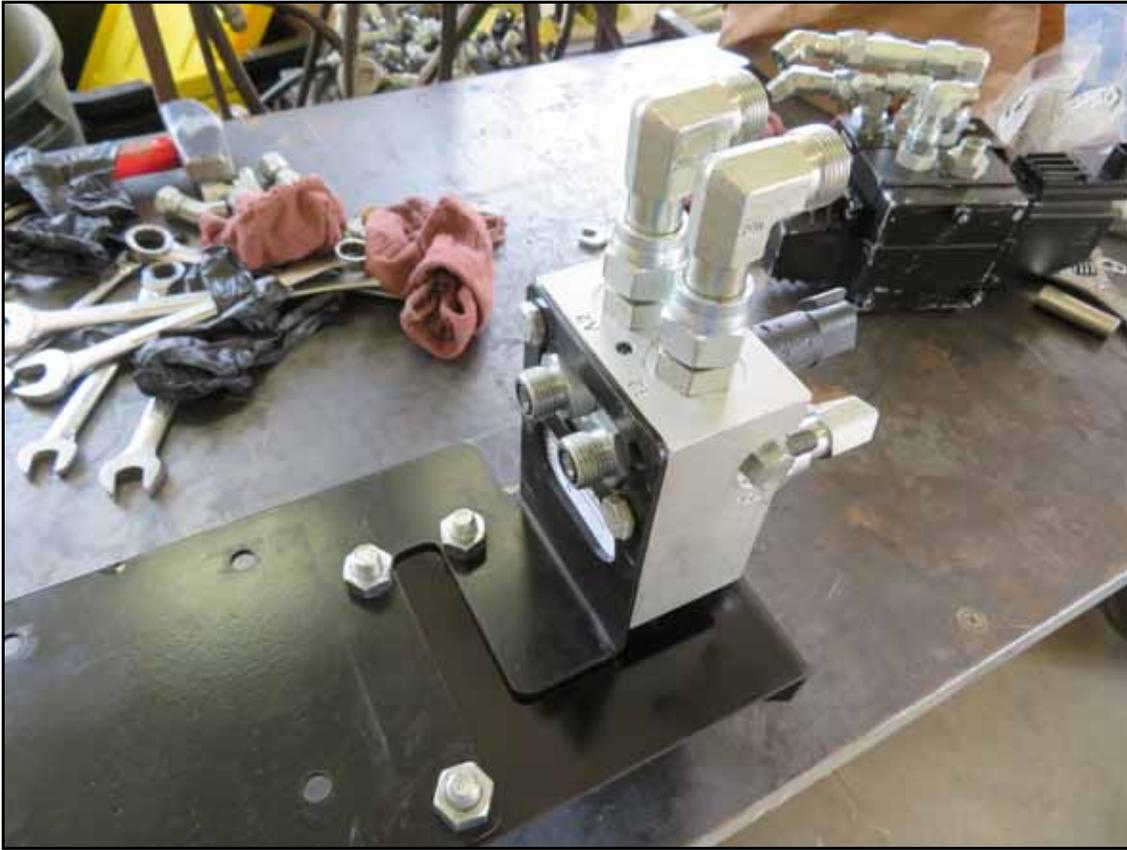
**FIGURE 5. Valve Bracket Installed on Base Bracket**

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- Install the dual POCl valve (P/N 334-0003-099) on the valve mounting bracket using two 5/16"-18 x 2-1/2" hex bolts (P/N 311-0054-086) and two 5/16"-18 nylon insert lock nuts (P/N 312-4000-059).

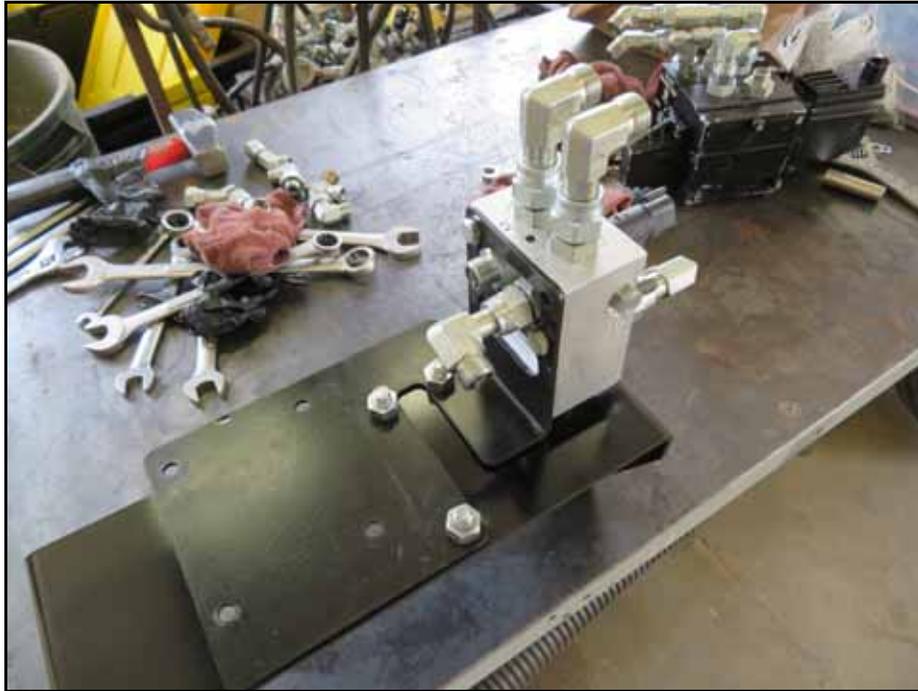
FIGURE 6. POCI Valve Mounted on Bracket



5. Install -6 ORFS swivel elbow (P/N 333-0012-065) onto port B1 of the dual POCI valve.

**FIGURE 7. Elbow Fitting Installed in POCI Valve**

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6. Install and secure steering valve (P/N 334-0003-088) on the valve mounting bracket (P/N 107-0172-514) using four 5/16"-18 hex bolts (P/N 311-0052-104),

**FIGURE 8. Steering Valve Mounted to Valve Mounting Bracket**

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## INSTALL THE LEFT AND RIGHT STEERING HOSES

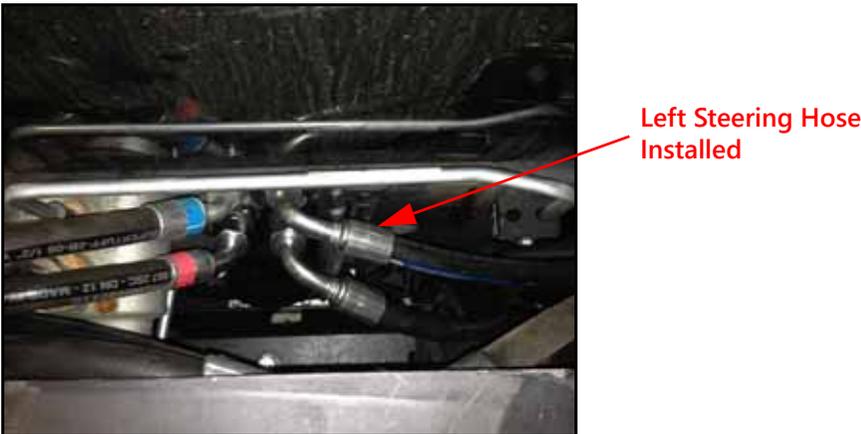
1. Locate the machine steering orbital under the hood.
2. Ensure that the labels on the hydraulic hoses are legible. Relabel the hoses if necessary.

**FIGURE 9. Machine Hoses**



3. Disconnect the left and right steering hoses from the steering orbital.

**FIGURE 10. Left Hose Installed on Steering Orbital**



4. Install the 45° end of the supplied hydraulic hose (P/N 214-1001-161) on the open left steering port of the steering orbital.

FIGURE 11. Hydraulic Hose Installed on Port A of the Dual POCI Valve



5. Connect the straight end of the installed hydraulic hose to the fitting installed in Port A of the dual POCI valve (P/N 334-0003-099).

FIGURE 12. Hydraulic Hose Installed on Left Steering Hose



6. Install the -15L male end of the supplied hydraulic hose (P/N 214-1001-199) on the left steering hose that was disconnected from the steering orbital.
7. Connect the 45° end of the installed hydraulic hose to the fitting installed in Port A2 of the dual POCI valve.

FIGURE 13. Dual POCI Valve Port A2 Connection



45° Swivel Hose  
Connected to  
Port A2

FIGURE 14. Left Steering Hose Installed on SmarTrax and Dual POCI Valve



- 8. Install the 90° end of the supplied hydraulic hose (P/N 214-1001-162) on the fitting installed in Port A1 of the dual POCI valve.
- 9. Connect the straight end of the installed hydraulic hose to the fitting installed in Port A of the SmarTrax valve (P/N 334-0003-088).

**FIGURE 15. Right Steering Hoses Installed on Steering Orbital**



10. Install the 45° end of the supplied hydraulic hose {P/N 214-1001-161} on the open right steering port of the steering orbital.

**FIGURE 16. Hydraulic Hose Installed on Dual POCI Valve Port B**



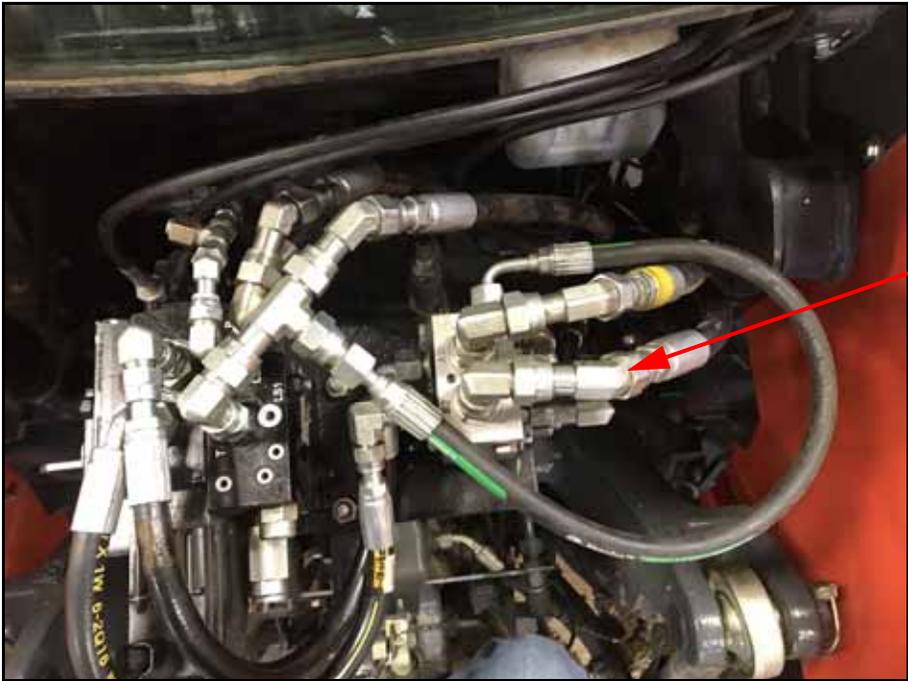
11. Connect the straight end of the installed hydraulic hose to the fitting installed in Port B of the dual POCI valve.

FIGURE 17. Hydraulic Hose Installed on Right Steering Hose



- 12. Install the -15L male end of the supplied hydraulic hose (P/N 214-1001-199) on the right steering hose that was disconnected from the steering orbital.
- 13. Connect the 45° end of the installed hydraulic hose to the fitting installed in Port B2 of the dual POCI valve.

FIGURE 18. Dual POCI Valve Port B2 Connection



45° Swivel Hose  
Connected to  
Port B2

FIGURE 19. Right Steering Hose Installed on SmarTrax and Dual POCI Valve



14. Install the 90° end of the supplied hydraulic hose (P/N 214-1001-162) on Port B of the SmarTrax valve.
15. Connect the straight end of the installed hydraulic hose to the fitting installed in Port B1 of the dual POCI valve.
16. Secure the left and right steering hoses away from sharp edges, pinch points, and heat sources.

## INSTALL THE LOAD SENSE HOSES

**NOTE:** The pressure and tank hoses disconnected in this section will be connected later in the installation procedure.

FIGURE 20. Pressure and Tank Hose Location



- 1. Locate the pressure and tank hoses below the right side of the cab.

FIGURE 21. Pressure and Tank Hoses



- 2. Label and disconnect the pressure and tank hoses from their steel lines.

FIGURE 22. Load Sense Connection on Hydraulic Valve



- 3. Locate the load sense connection behind the steel pressure and tank lines.
- 4. Disconnect the load sense hose from the steel load sense line.

**FIGURE 23. Hydraulic Hose Installed on Load Sense Hose**

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5. Install the straight end of the supplied hydraulic hose (P/N 214-1001-200) on the load sense hose.

**FIGURE 24. LS STEER Hose Installed on SmarTrax Valve**

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6. Connect the 45° end of the installed hydraulic hose to the fitting installed in Port LS STEER of the SmarTrax valve (P/N 334-0003-088).

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**FIGURE 25. Hydraulic Hose Installed on Steel Load Sense Line**

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7. Install a 8L M/F 90° elbow fitting (P/N 333-0012-367) on the steel load sense line.
8. Install the male end of the supplied hydraulic hose (P/N 214-1001-201) on the installed elbow fitting.

**NOTE:** It may be necessary to install additional 8L M/F 90° elbow fittings to achieve the connection.

---

**FIGURE 26. LSPV Hose Installed on SmarTrax Valve**

---



9. Connect the other end of the installed hydraulic hose to the fitting installed in Port LSPV of the SmarTrax valve.
10. Secure the load sense hoses away from sharp edges, pinch points, and heat sources.

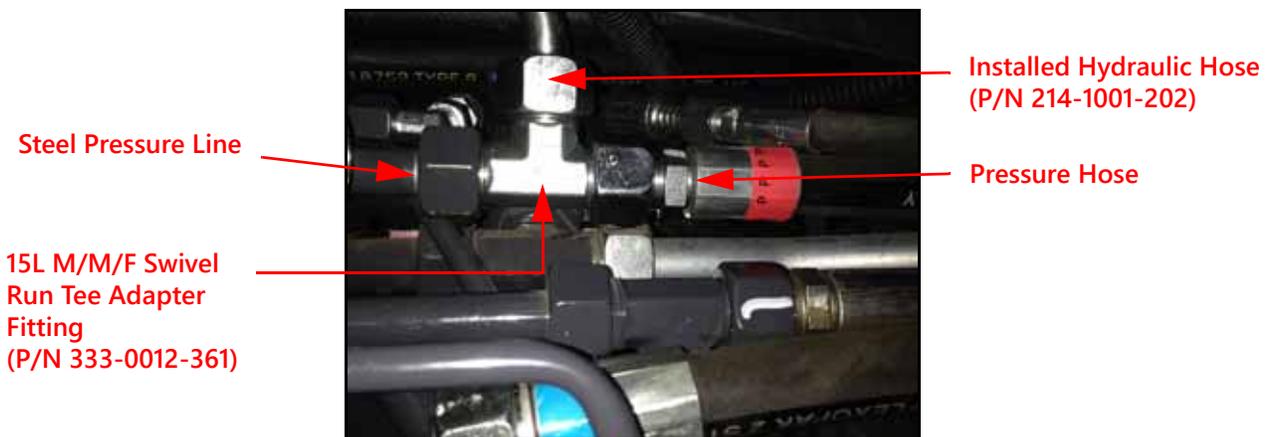
## INSTALL THE PRESSURE AND TANK HOSE

FIGURE 27. Pressure Connection on Hydraulic Valve



1. Locate the steel pressure line below the right side of the cab.

FIGURE 28. Pressure Hoses Installed on Steel Pressure Line



2. Install a 15L M/M/F swivel run tee adapter fitting (P/N 333-0012-361) on the steel pressure line.
3. Connect the pressure hose to the opposite end of the installed tee fitting.
4. Install the 90° end of the supplied hydraulic hose (P/N 214-1001-202) on the 90° end of the installed tee fitting.

FIGURE 29. Pressure Hose Installed on SmarTrax Valve

Installed Hydraulic Hose (P/N 214-1001-202)



- 5. Connect the straight end of the installed hydraulic hose to the fitting installed in Port P of the SmarTrax valve.
- 6. Secure the installed pressure hoses away from sharp edges, pinch points, moving parts, and heat sources.

FIGURE 30. Pressure Connection on Hydraulic Valve

Steel Tank Line



- 7. Locate the steel tank line below the right side of the cab.

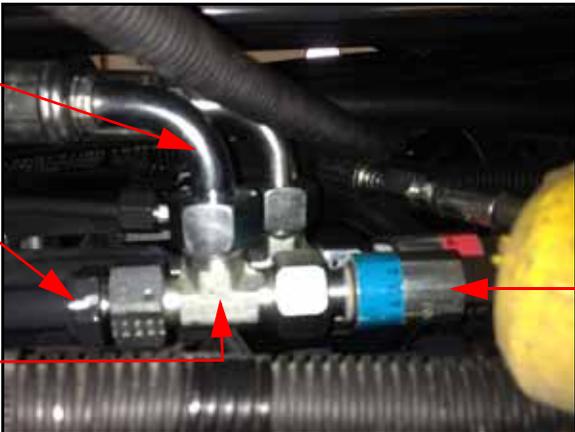
FIGURE 31. Tank Hoses Installed on Steel Tank Line

Installed Hydraulic Hose (P/N 214-1001-202)

Steel Tank Line

15L M/M/F Swivel Run Tee Adapter Fitting (P/N 333-0012-361)

Tank Hose



8. Install a 15L M/M/F swivel run tee adapter fitting (P/N 333-0012-361) on the steel tank line.
9. Connect the tank hose to the opposite end of the installed tee fitting.
10. Install the 90° end of the supplied hydraulic hose (P/N 214-1001-202) on the 90° end of the installed tee fitting.

**FIGURE 32. Tank Hose Installed on SmarTrax Valve**

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Installed Hydraulic Hose  
(P/N 214-1001-202)

11. Connect the straight end of the installed hydraulic hose to the fitting installed in Port T of the SmarTrax valve (P/N 334-0003-088).
12. Route the installed tank hoses away from sharp edges, pinch points, moving parts, and heat sources.

## INSTALL TANK RELIEF HOSE

1. Install the -8 ORFS (F) end of hose (P/N 214-0001-203) to the open port of the tank tee fitting.

**FIGURE 33. Tank Relief Hose Installed**



2. Install the -6 ORFS (F) end of hose to the T2 port of the dual POCI valve.



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## CHAPTER

# 4

## CAB COMPONENT INSTALLATION

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### INSTALL THE VALVE HARNESS

FIGURE 1. Plug to be Removed from Cab Wall



1. Remove the plug from the cab wall.

FIGURE 2. Valve Harness Routed Through Wall of the Cab



2. Route the 12-pin connector of the valve harness from outside the cab through the hole in the cab wall.
3. Connect the 12-pin connectors of the valve harness (P/N 115-4001-255) into the mating connector of the node harness (P/N 115-4001-109).

**FIGURE 3. Pressure Transducer Connection**

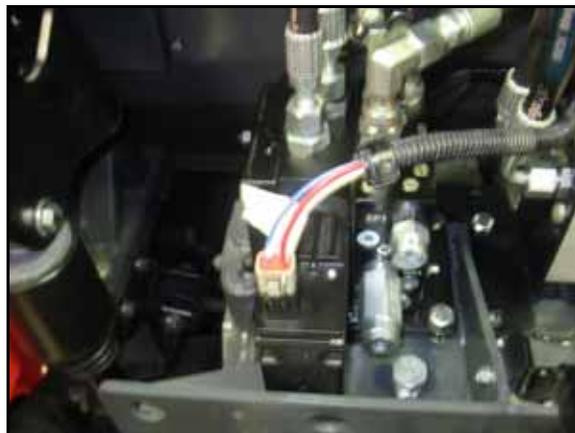
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4. From outside of the cab, connect the 3-pin Deutsch connector from the valve harness into the 0-3000 PSI pressure transducer (P/N 422-0000-086) installed in the dual POCI valve.

**FIGURE 4. Valve Harness Connected to SmarTrax Valve**

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5. Connect the 4-pin Deutsch connector of the valve harness to the open port of the SmarTrax valve.

**FIGURE 5. Wheel Angle Sensor Connection**

6. Trace the cable coming out of the axle housing.

**NOTE:** This cable is the factory wheel angle sensor (WAS) cable connection.

7. Disconnect the 6-pin WAS connection on the left side of the machine, behind the front axle.

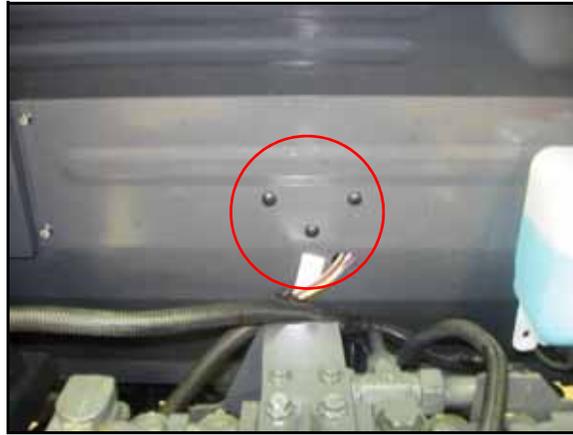
**FIGURE 6. WAS Connection Connected to Valve Harness**

8. Install the remaining ends of the valve harness (P/N 115-4001-255) between the WAS connections.
9. Route the WAS cables away from moving parts and heat sources, securing them with plastic cable ties as necessary.

## INSTALL THE SMARTRAX NODE

### MOUNT THE SMARTRAX NODE

**FIGURE 7. Node Mounting Location**



1. Remove the three plugs from the back wall of the cab.

**FIGURE 8. Node Mounting Bracket Installed**



2. Insert three 1/4"-20 x 1" hex bolts (P/N 311-0050-105) through the holes in the node mounting bracket (P/N 107-0172-055) so that the ends of the bolts point in the opposite direction as the mounting bracket's studs.
3. Install 1/4" flat washers (P/N 313-2300-310) on the ends of the top two installed hex bolts to fill the gap between the mounting bracket and the cab wall.
4. Secure the node mounting bracket to the back cab wall as shown in Figure 2 using three 1/4"-20 zinc flanged lock nuts (P/N 312-4000-057).

FIGURE 9. Node Installed

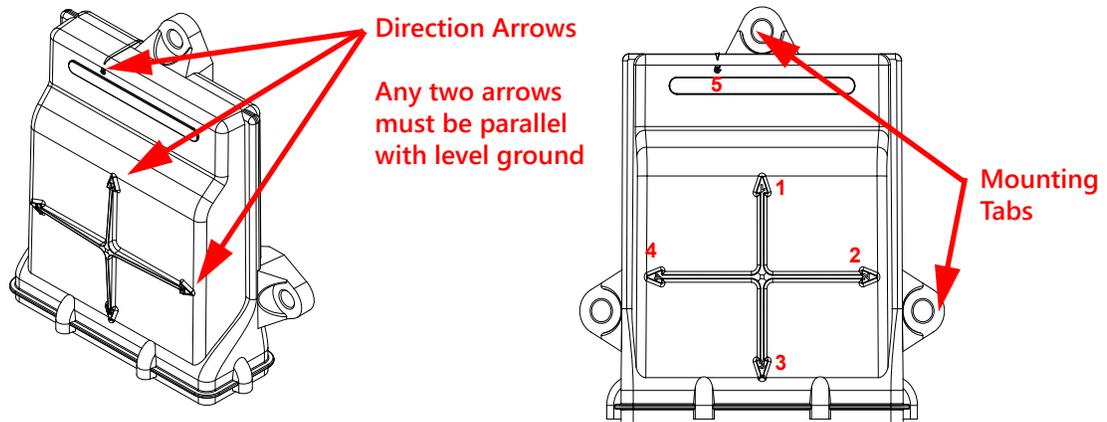


**NOTE:** Forward arrow direction is number 5 in Figure 3.

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

## NODE MOUNTING LOCATIONS

FIGURE 10. Node Mounting



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

- Mount the SmarTrax node inside the 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 11. Foot Switch Installed

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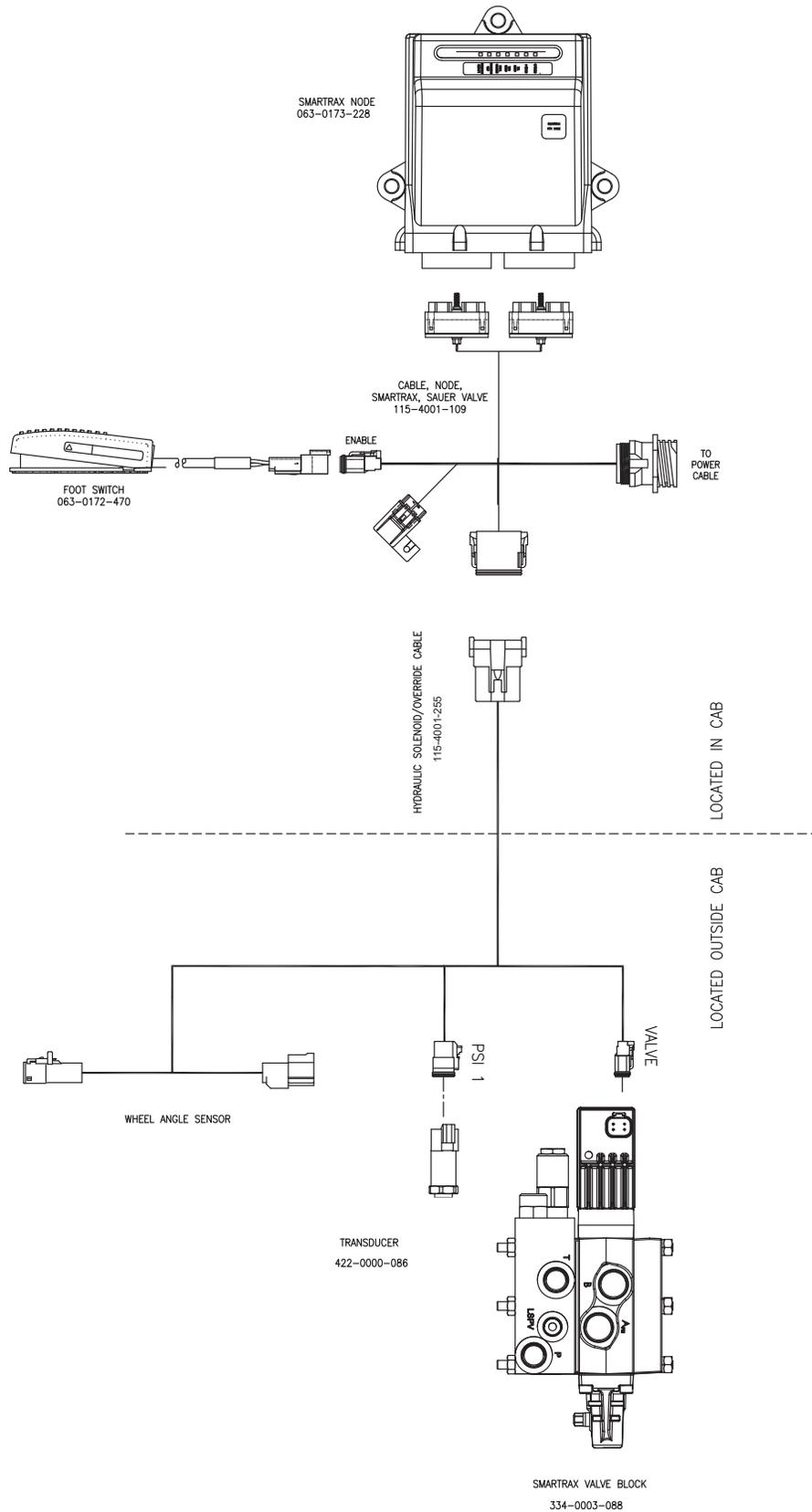


1. Select a suitable location for the foot switch (P/N 063-0172-470) to be installed.

**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 ENABLE connector on the node harness (P/N 115-4001-109) and connect it to the foot switch cable connector.

FIGURE 12. Valve Harness Wiring Diagram



## 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 115-4001-109).
3. Connect the TO CONSOLE CABLE connector to the Raven console.
4. Install a terminator (P/N 063-0172-369) on the CAN cable connector.
5. Loop and tie-off the REMOVE 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 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 cable (P/N 151-4001-109) to the remaining SmarTrax interface tee.











**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.

## VERIFY THE SMARTRAX SYSTEM INSTALLATION

1. Turn on the machine.
2. Double-check all fitting and hose connections to ensure that:
  - Hoses are not rubbing on or interfering with moving parts.
  - Hydraulic fluid is not leaking from the system.
3. Turn the 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 to 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.

## CALIBRATE THE SMARTRAX SYSTEM

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

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# 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 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.**