

R A V E N

SmarTrax™ Installation Manual



**Case IH Patriot 4420 (2009 & Newer)
SPX 4410/4420 (2008 & Older)
SPX 4260 (S/N JFG003537 & Newer)**

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CHAPTER

1

Important Safety Information

NOTICE

Read this manual and the operation and safety instructions included with your implement and/or controller carefully before installing the SmarTrax™ system.

- Follow all safety information presented within this manual.
- If you require assistance with any portion of the installation or service of your Raven equipment, contact your local Raven dealer for support.
- Follow all safety labels affixed to the SmarTrax system components. Be sure to keep safety labels in good condition and replace any missing or damaged labels. To obtain replacements for missing or damaged safety labels, contact your local Raven dealer.

When operating the machine after installing SmarTrax, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate SmarTrax or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Remain in the operator's position in the machine at all times when SmarTrax is engaged.
- Disable SmarTrax when exiting the operator's seat and machine.
- Do not drive the machine with SmarTrax enabled on any public road.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling SmarTrax when the safe working distance has diminished.
- Ensure SmarTrax is disabled prior to starting any maintenance work on SmarTrax or the machine.

WARNING

- When starting the machine for the first time after installing SmarTrax, be sure that all persons stand clear in case a hose has not been properly tightened.
- The machine must remain stationary and switched off during SmarTrax installation or maintenance.



Hydraulic Safety

- Raven Industries recommends that appropriate protective equipment be worn at all times when working on the hydraulic system.
- Never attempt to open or work on a hydraulic system with the equipment running. Care should always be taken when opening a system that has been previously pressurized.
- When disconnecting the hydraulic hoses or purging is required, be aware that the hydraulic fluid may be extremely hot and under high pressure. Caution must be exercised.
- Any work performed on the hydraulic system must be done in accordance with the machine manufacturer's approved maintenance instructions.
- When installing SmarTrax hydraulics or performing diagnostics, maintenance, or routine service, ensure that precautions are taken to prevent any foreign material or contaminants from being introduced into the machine's hydraulic system. Objects or materials that are able to bypass the machine's hydraulic filtration system will reduce performance and possibly damage the SmarTrax valve.

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 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: Case IH

MODEL: Patriot 4420 (2009 & Newer)

SPX 4410/4420(2008 & Older)

SPX 4260 (S/N JFG003537 & Newer)

FIGURE 1. Case IH SPX 4410



Preparing for Installation

Before installing the SmarTrax system, park the machine where the ground is level, clean, and dry. Turn off the machine and leave it turned off for the duration of the installation process. Bleed pressure from the hydraulic system by loosening the hydraulic fittings slowly, where applicable.

During the installation process, follow good safety practices. Be sure to carefully read the instructions in this manual as you complete the installation process.

Recommendations

Raven Industries recommends the following best practices when installing or operating the SmarTrax system for the first time, at the start of the season, or when moving the SmarTrax system to another machine:

- Install the GPS antenna on the front center of the machine's cab.
- Ensure the machine's hydraulic filters have been recently changed and there are no issues with the machine's hydraulic system (e.g., pump issues, faulty hydraulic motors, fine metal deposits in the hydraulic hoses, etc.).
- Ensure the machine's hydraulic system is using fresh oil and debris is flushed from the hydraulic hoses, valves, and filters.

Raven Industries recommends the following best practices when installing the SmarTrax system:

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

Point of Reference

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

Updates

Software and manual updates are available on the Raven Applied Technology website:

<http://www.ravenhelp.com>

At Raven Industries, we strive to make your experience with our products as rewarding as possible. One way to improve this experience is to provide us with feedback on this manual.

Your feedback will help shape the future of our product documentation and the overall service we provide. We appreciate the opportunity to see ourselves as our customers see us and are eager to gather ideas on how we have been helping or how we can do better.

To serve you best, please send an email with the following information to

techwriting@ravenind.com

-Case IH Patriot 4420 (2009 & Newer), SPX 4410/4420 (2008 & Older), SPX 4260 (S/N JFG003537 & Newer) SmarTrax™ Installation Manual

-Manual No. 016-5032-017 Rev. A

-Any comments or feedback (include chapter or page numbers if applicable).

-Let us know how long have you been using this or other Raven products.

We will not share your email or any information you provide with anyone else. Your feedback is valued and extremely important to us.

Thank you for your time.

Kit Contents

This section contains a list of the components that are included in the SmarTrax kit. Before beginning the SmarTrax installation, compare the items in the kit with the components on this list. If you have questions about the kit, contact your Raven dealer.

Note: The SmarTrax node (P/N 063-0173-228) is sold separately. Contact your local Raven dealer for ordering information.

TABLE 1. SmarTrax Installation Kit (P/N 117-5032-017 or 117-5032-018)

Picture	Item Description	Part Number	Qty.
Not Pictured	Manual - Case IH Patriot 4420 (Model Year 2009-2011), SPX 4410/4420 (2009 & Older), SPX 4260 (S/N JFG003537 & Newer) SmarTrax Installation	016-5032-017	1
Not Pictured	Manual - SmarTrax and SmartSteer Calibration & Operation	016-0171-277	1
	Valve - SmarTrax Hydraulic	334-0003-088	1
	Switch - Flow	334-0003-085	1
	Bracket - Hydraulic Valve Mounting	107-0171-705	1
	Bracket - Node Mounting	107-0172-084	1
	Cable - Node Harness	115-4001-110	1
	Cable - Valve Harness	115-4001-111	1

TABLE 1. SmarTrax Installation Kit (P/N 117-5032-017 or 117-5032-018)

Picture	Item Description	Part Number	Qty.
	Cable - CAN Extension	115-4001-150 or 115-4001-151	1
	Assembly - Enable Foot Switch	063-0172-470	1
	Bolt - 5/16"-18 x 7/8" Hex	311-0052-104	9
	Bolt - M6 x 1.0 x 20 mm Hex	311-0070-010	4
	Screw - 1/4"-20 x 2" Socket Head Cap	311-0050-109	2
	Nut - 1/4"-20 Hex	312-1001-074	2
	Nut - 3/8"-16 Zinc Flanged Lock	312-1001-164	3
	Nut - 5/16"-18 Flanged Lock	312-1001-169	5
	Nut - M6 Lock	312-4000-207	4
	Washer - 1/4" Split Lock	313-1000-016	2

TABLE 1. SmarTrax Installation Kit (P/N 117-5032-017 or 117-5032-018)






Picture	Item Description	Part Number	Qty.
	Washer - 5/16" Split Lock	313-1000-019	4
	Washer - 0.25" ID x 0.562" OD	313-2300-009	6

TABLE 2. Hydraulic Kit (P/N 117-0199-017)

Picture	Item Description	Part Number	Qty.
	Fitting - -8 ORFS M/M/F Swivel Run Tee Adapter	333-0012-028	1
	Fitting - -4 O-Ring Internal Hex Plug	333-0012-051	1
	Fitting - -6 ORFS M/M/F Swivel Run Tee Adapter	333-0012-069	3
	Fitting - -6 ORFS (M) to -6 SAE O-Ring (M) Straight Adapter	333-0012-084	2
	Fitting - -6 O-Ring Internal Hex Plug	333-0012-104	2
	Fitting - -6 ORFS (M) to -8 SAE O-Ring (M) Straight Adapter	333-0012-199	2
	Fitting - -6 ORFS (M) to -10 SAE O-Ring (M) Straight Adapter	333-0012-233	2
	Hydraulic Hose - -6 ORFS (F) 90° to -6 ORFS (F) - 84"	214-1000-318	2

TABLE 2. Hydraulic Kit (P/N 117-0199-017)

Picture	Item Description	Part Number	Qty.
	Hydraulic Hose - -6 ORFS (F) 90° to -6 ORFS (F) - 60"	214-1000-657	1
	Hydraulic Hose - -8 ORFS (F) to -6 ORFS (F) - 60"	214-1000-658	1
	Hydraulic Hose - -6 ORFS (F) 90° to -6 ORFS (F) - 108"	214-1000-659	1

CHAPTER

3

Hydraulic System Installation



WARNING

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

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

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

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


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



CAUTION

When installing SmarTrax hydraulics or performing diagnostics, maintenance, or routine service, ensure precautions are taken to prevent any foreign material from being introduced into the machine's hydraulic system.

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



NOTICE

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

Install Fittings in the SmarTrax Valve

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

FIGURE 1. Fittings Installed in the SmarTrax Valve



Fitting	Part Number	Port
Fitting - -4 O-Ring Internal Hex Plug	333-0012-051	PS
Fitting - -6 O-Ring Internal Hex Plug	333-0012-104	LSPV, LS STEER
Fitting - -6 ORFS (M) to -8 SAE O-Ring (M) Straight Adapter	333-0012-199	P, T
Fitting - -6 ORFS (M) to -10 SAE O-Ring (M) Straight Adapter	333-0012-233	A, B

Install Fittings in the Flow Switch

FIGURE 2. Fittings Installed in the Flow Switch



1. Install -6 ORFS (M) to -6 SAE O-ring (M) straight adapter fittings (P/N 333-0012-084) in Ports A2 and B3 of the flow switch (P/N 334-0003-085).
2. Install the pressure transducers in Ports A1 and B1 of the flow switch.

Install the SmarTrax Valve and Flow Switch

FIGURE 3. SmarTrax Valve and Flow Switch Installed on Mounting Bracket



1. Install the SmarTrax valve (P/N 334-0003-088) on the valve mounting bracket (P/N 107-0171-705) using four 5/16"-18 x 7/8" hex bolts (P/N 311-0052-104) and four 5/16" split lock washers (P/N 313-1000-019).

2. Install the flow switch (P/N 334-0003-085) on the valve mounting bracket using two 1/4" x 2" socket head cap screws (P/N 311-0050-109), two 1/4" flat washers (P/N 313-2300-009), two 1/4" split lock washers (P/N 313-1000-016), and two 1/4"-20 hex nuts (P/N 312-1001-074).

FIGURE 4. Machine's Radar Bracket Bolts



3. Remove the bolts used to secure the machine's radar bracket.

Note: The radar bracket is located beneath the cab.

FIGURE 5. Valve Mounting Bracket Installed



Machine's Radar Bracket
Mounting Bolts Installed
(Not Visible Behind
Radar in this Picture)

4. Align the holes in the valve mounting bracket with the holes in the machine's radar bracket.
5. Using the machine's bolts, secure the valve mounting bracket to the radar bracket.

Install the Left and Right Steering Hoses

FIGURE 6. Machine's Left Steering Hose



1. Locate and disconnect the machine's left steering hose from the left steering cylinder.

Note: The left steering hose is connected to the fitting located closest to the center of the machine.

FIGURE 7. Machine's Left Steering Hose Installed on Flow Switch



2. Route and connect the left steering hose to the fitting installed in Port A2 of the installed flow switch (P/N 334-0003-085).

FIGURE 8. Left Steering Hose Installed



3. Install a -6 ORFS M/M/F swivel run tee adapter fitting (P/N 333-0012-069) on the open left steering cylinder port.
4. Install the straight end of the supplied hydraulic hose (P/N 214-1000-318) on the opposite end of the installed tee fitting.
5. Connect the 90° end of the installed hydraulic hose to the fitting in Port B3 of the installed flow switch.

FIGURE 9. Second Left Steering Hose Installed



6. Install the 90° end of the supplied hydraulic hose (P/N 214-1000-884) on the 90° end of the installed tee fitting.
7. Install the straight end of the installed hydraulic hose to the fitting installed in Port A of the SmarTrax valve (P/N 334-0003-088).
8. Locate and disconnect the machine's right steering hose from the right steering cylinder.

FIGURE 10. Right Steering Hose Installed



9. Install a -6 ORFS M/M/F swivel run tee adapter fitting (P/N 333-0012-069) in the open right steering cylinder port.
10. Connect the machine's right steering hose to the opposite end of the installed tee fitting.
11. Install the 90° end of the supplied hydraulic hose (P/N 214-1000-659) on the 90° end of the installed tee fitting.
12. Connect the straight end of the installed hydraulic hose the fitting installed in Port B of the SmarTrax valve.

Install the Pressure Hose

FIGURE 11. Pressure Hose Installed



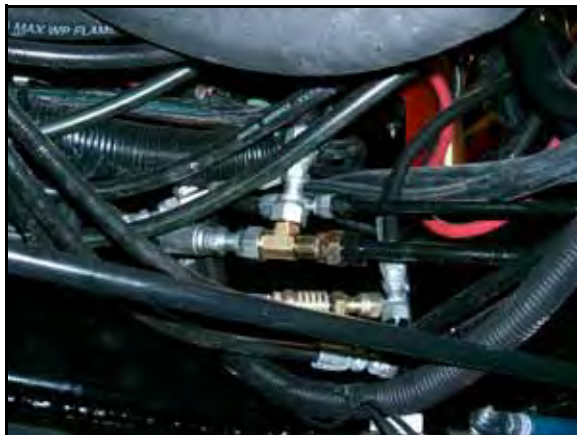
1. Locate and disconnect the hose connected to the end of the machine's steel pressure line.

Note: *The steel pressure line runs on the left inside of the frame from the rear of the machine. The line bends 45° just before the hydraulic hose connection. Trace the pressure line from the pressure port of the steering orbital if necessary.*

2. Install a -6 ORFS M/M/F swivel run tee adapter fitting (P/N 333-0012-069) on the steel pressure line.
3. Install the machine's pressure hose on the opposite end of the installed tee fitting.
4. Connect the 90° end of the supplied hydraulic hose (P/N 214-1000-657) on the 90° end of the installed tee fitting.
5. Connect the straight end of the installed hydraulic hose to the fitting installed in Port P of the SmarTrax valve (P/N 334-0003-088).

Install the Tank Hose

FIGURE 12. Tank Hose Installed



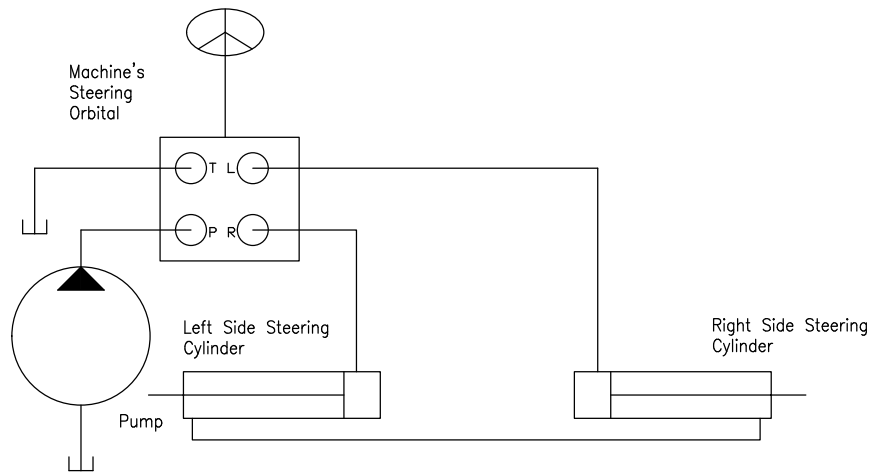
1. Locate and disconnect the machine's tank hose from the steel tank line.

Note: *The steel tank line runs on the right inside of the frame from the rear of the machine. Trace the tank line from the tank port of the steering orbital if necessary.*

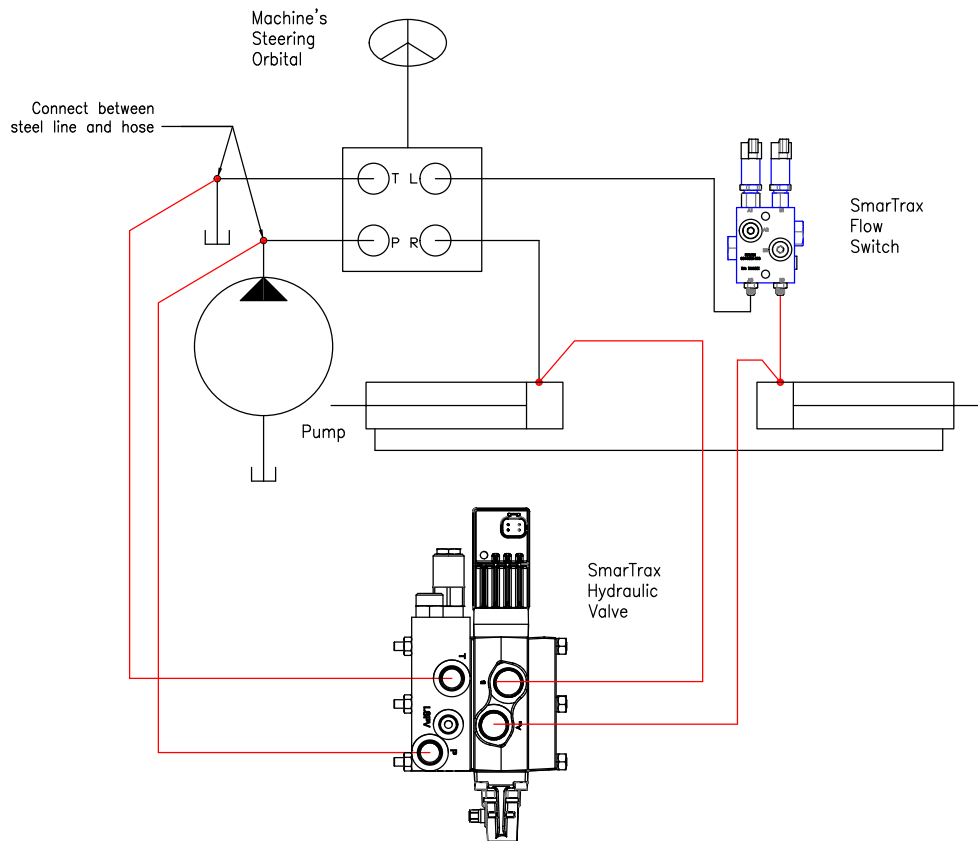
2. Install a -8 ORFS M/M/F swivel run tee adapter fitting (P/N 333-0012-028) on the steel tank line.
3. Connect the machine's tank hose to the opposite end of the installed tee fitting.
4. Install the -8 end of the supplied hydraulic hose (P/N 214-1000-658) on the 90° end of the installed tee fitting.
5. Connect the -6 end of the installed hydraulic hose to the fitting installed in Port T of the SmarTrax valve (P/N 334-0003-088).

Hydraulic Diagram

Before SmarTrax Installation



After SmarTrax Installation



CHAPTER

4

Cab Component Installation

Install the SmarTrax Node

Note: The SmarTrax node (P/N 063-0173-228) is sold separately. Contact your local Raven dealer for ordering information.

Mount the SmarTrax Node

FIGURE 1. SmarTrax Node Mounting Location



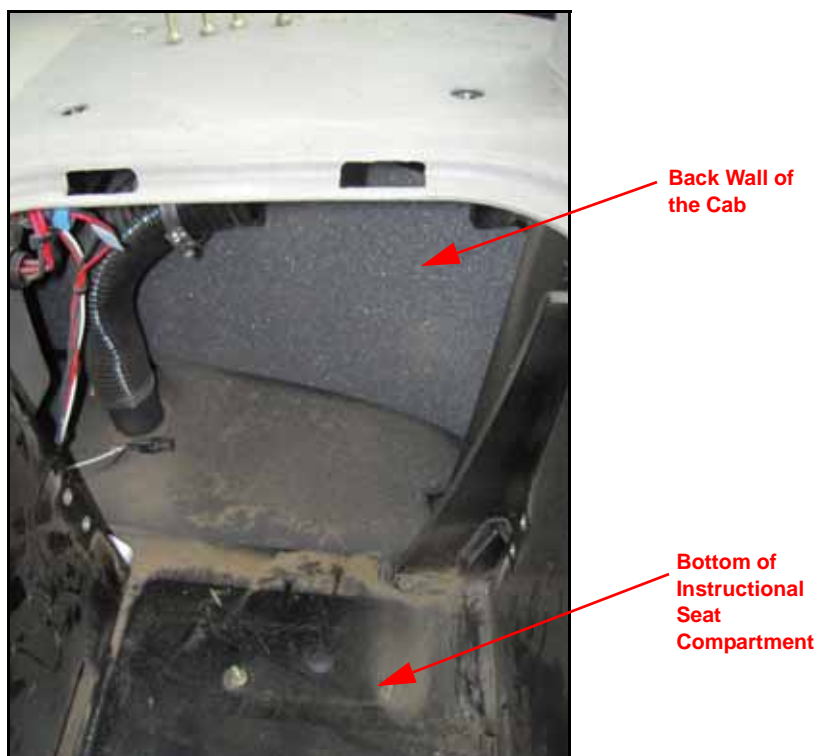
1. Identify the SmarTrax node mounting location under the instructional seat.
2. Flip up the seat cushion of the instructional seat.

FIGURE 2. Bolts to be Removed



3. Remove the eight bolts used to secure the back panel.

FIGURE 3. Back Panel Removed



4. Remove the back panel.

FIGURE 4. SmarTrax Node Installed



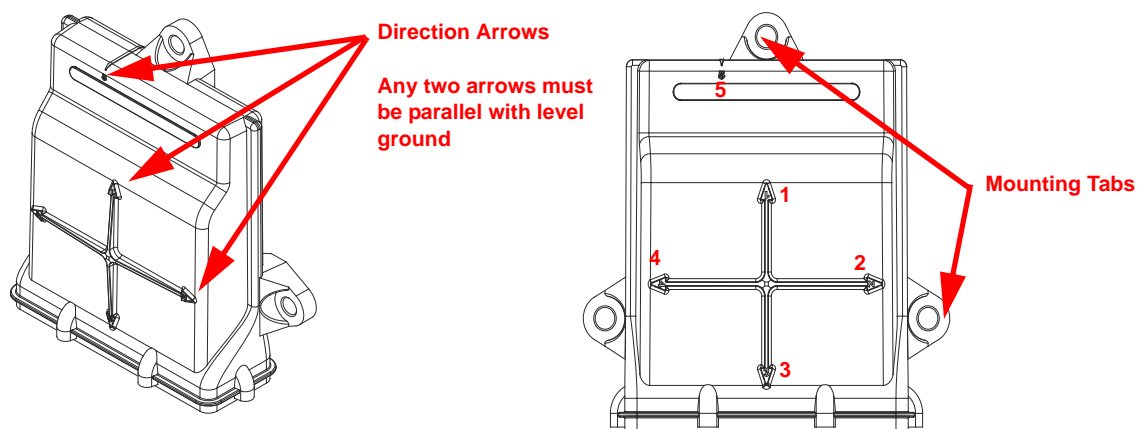
5. Mount the SmarTrax node to the node mounting bracket (P/N 107-0172-084) using three 3/8"-16 nylon insert lock nuts (P/N 312-4000-061).
6. Install the two large, rectangular connectors of the node harness (P/N 115-4001-127) into the correct ports of the node.
7. Tighten the bolts on the harness connectors to secure the connections.
8. Place the node mounting bracket in the instructional seat, compartment aligning the holes in the mounting bracket with the existing mounting studs.

Note: The node connectors should be pointing toward the operator's seat.

9. Secure the node mounting bracket to the floor using four 1/4" flat washers (P/N 313-2300-009) and four M6 lock nuts (P/N 312-4000-207).

Node Mounting Locations

FIGURE 5. Node Mounting



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

- Mount the SmarTrax node inside the machine's cab on a flat, level surface for proper performance and cable connection.

- One of the six numbered direction arrows on the node must be oriented in the direction of forward vehicle travel, one arrow pointing straight up, and two of the arrows parallel to the ground.

Note: *Make a note of the number of the arrow that is oriented in the direction of forward vehicle travel. This number will be needed during the SmarTrax calibration process.*

- The node mounting location must not create tripping hazards.
- Mount the node in a location where it will not be kicked or jarred during normal equipment operation.
- The location must allow cable routing to avoid crimping or damaging the cables or the node connections.
- Securely fasten the node using bolts or screws through at least two of the three mounting holes. When mounted properly, the node should not become loose or rotate.

Install the Foot Switch

FIGURE 6. Foot Switch Installed



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

Note: *The foot switch should be installed in a location where the operator has easy access to it and is able to fully press the pedal.*

2. Using the holes in the foot switch as a template, drill holes in the floor of the cab.
3. Secure the foot switch to the floor by installing the supplied screws in each of the mounting holes.
4. Route the foot switch cable connector behind the operator's seat toward the rear of the cab.

Install the Node Harness

1. Install the two large, rectangular connectors of the node harness (P/N 115-4001-110) into the correct ports of the node.
2. Tighten the bolts on the harness connectors to secure the connections.
3. Route the remainder of the node harness (P/N 115-4001-110) through the opening in the side of the instructional seat and behind the operator's seat.

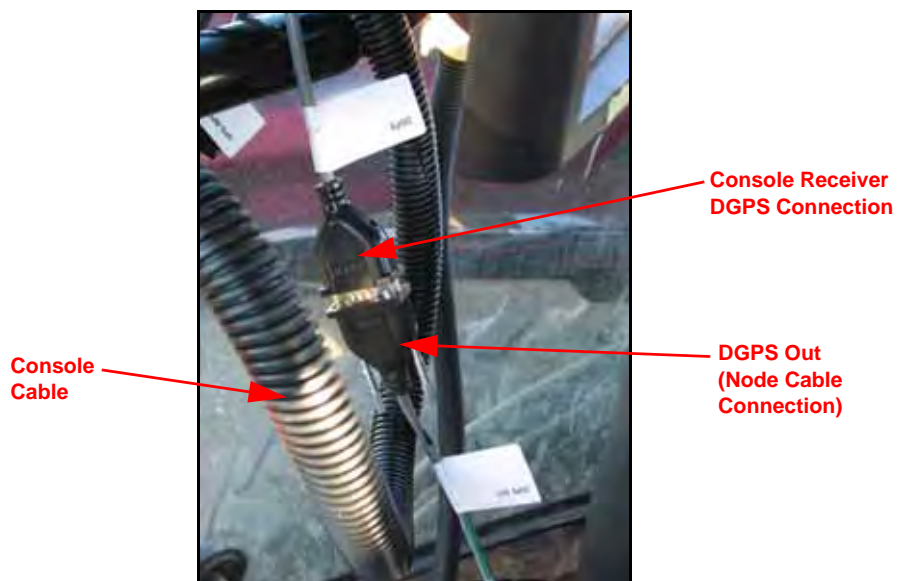
4. Locate the opening in the plastic shroud behind the operator's seat.
5. Locate the ENABLE connector on the node harness (P/N 115-4001-110) and connect it to the foot switch cable connector.

FIGURE 7. DGPS OUT Connector Routed Under Operator's Seat



6. Route the DGPS OUT connector out the right corner of the operator's seat base and under the right arm rest.

FIGURE 8. DGPS OUT Connected to Console Receiver Connection



7. Route and connect the DGPS OUT connector to the console's DGPS connector.
8. Connect the DGPS connector to the GPS receiver cable.

FIGURE 9. Power Connection



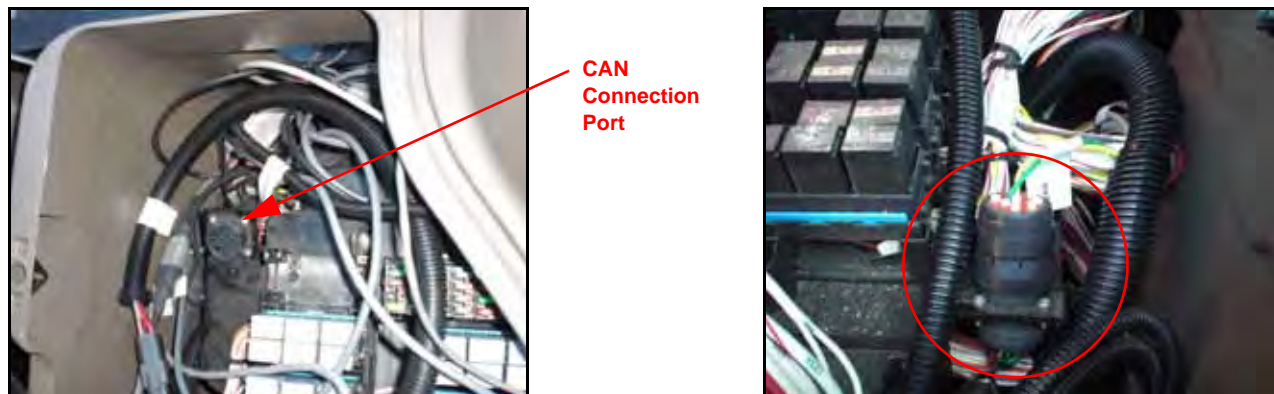
9. Connect the round 3-pin power connector into the convenience power port in the left-rear corner of the cab.

Note: The seat may interfere with the connection if installed in the right power port.

10. Refer to the appropriate section below for additional steps to install CAN communication to the node harness.

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FIGURE 10. CAN Connector Installed on Machine's CAN System



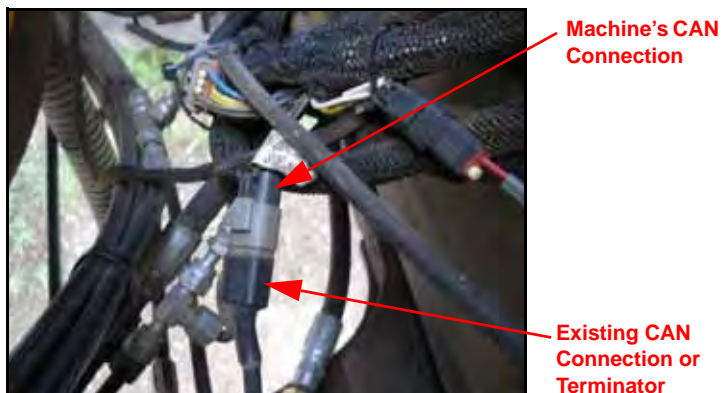
1. Connect the CAN extension cable (P/N 115-4001-150) to the machine's existing CAN system.

Note: The CAN system is located in the fuse panel in the right-rear corner of the cab.

2. Route the opposite end of the cable out the fuse panel and around the back of the operator's seat to the instructional seat compartment.
3. Connect the CAN connector to the CAN connection on the node harness.

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FIGURE 11. Machine's Existing CAN Connection

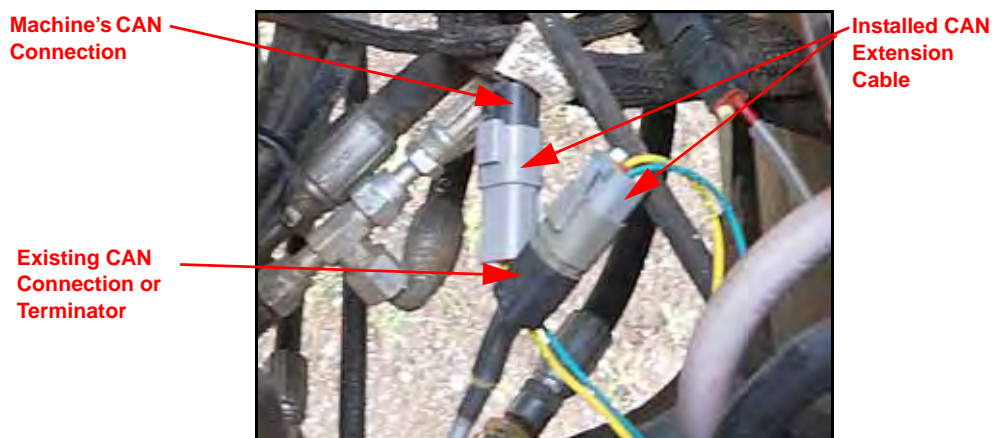


1. Locate the CAN connector outside the right-rear corner of the cab.

Note: The connector will be labeled CAN Terminator.

2. Disconnect the CAN connection or remove the terminator from the machine's CAN connection.

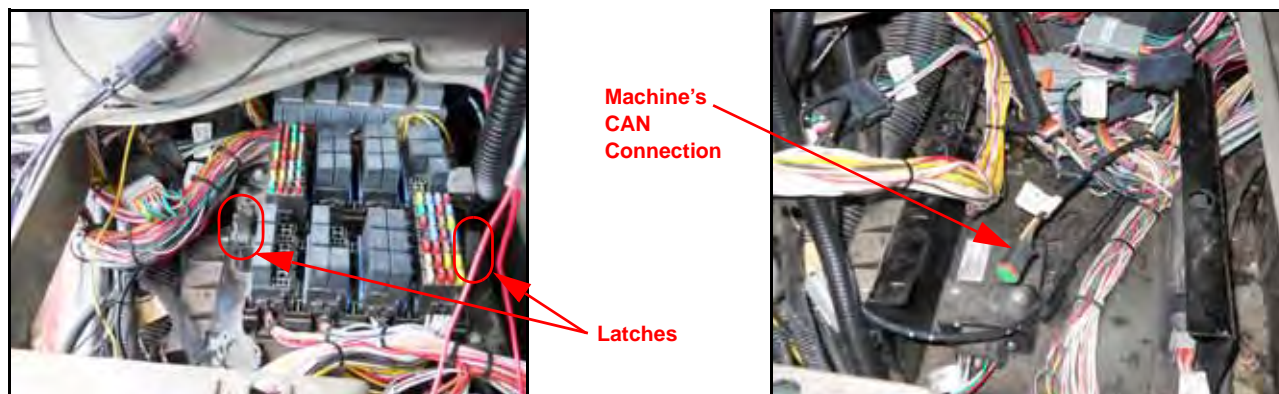
FIGURE 12. CAN Connector Installed on Machine's CAN System



3. Install the CAN extension cable (P/N 115-4001-151) on the machine's 4-pin CAN connector.
4. Install the CAN connector or terminator that was disconnected in step 2 on the remaining 4-pin connector on the CAN extension cable.
5. Route the 9-pin connector of the CAN extension cable into the cab through the foam strip in the right-rear corner of the cab.
6. Route the end of the cable out the fuse panel and around the back of the operator's seat to the instructional seat compartment.
7. Connect the 9-pin connector to the CAN connection on the node harness.

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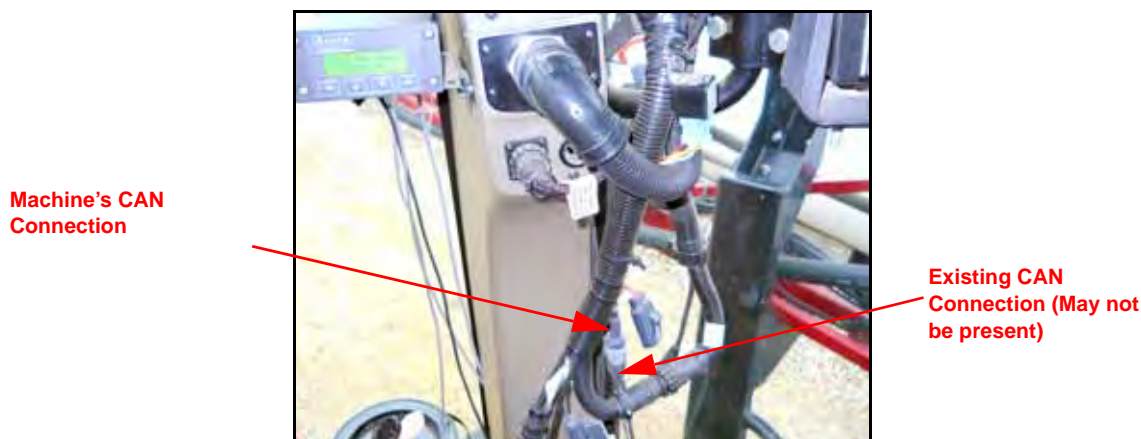
FIGURE 13. CAN Connector Installed on Machine's CAN System



1. Remove the fuse panel by lifting the latches on each side panel.
2. Locate the machine's CAN connector labeled "Gateway Interface."
3. Install the CAN extension cable (P/N 115-4001-151) on the Gateway Interface connection.
 - If the Gateway Interface connector is connected to a another cable:
 - a. Disconnect the existing connection.
 - b. Install the CAN extension cable (P/N 115-4001-151) on the machine's 4-pin CAN connector.
 - c. Connect the CAN connector that was previously disconnected to the remaining 4-pin connector on the CAN extension cable.
 - If the Gateway Interface connector is not connected to anything:
 - a. Connect the Gateway Interface connector to the mating 4-pin connector on the CAN extension cable.
 - b. Leave the remaining 4-pin connector disconnected. This connection is not used in the SmarTrax system.
4. Route the 9-pin end of the cable out the fuse panel and around the back of the operator's seat to the instructional seat compartment.
5. Connect the 9-pin connector to the CAN connection on the node harness.

SPX 4260

FIGURE 14. CAN Connector Installed on Machine's CAN System



1. Locate the machine's CAN connector on the console cable.
2. Install the CAN extension cable (P/N 115-4001-151) on the machine's CAN connection.
 - If the CAN connector is connected to a another cable:
 - a. Disconnect the existing connection.
 - b. Install the CAN extension cable (P/N 115-4001-151) on the machine's 4-pin CAN connector.
 - c. Connect the CAN connector that was previously disconnected to the remaining 4-pin connector on the CAN extension cable.
 - If the CAN connector is not connected to anything:
 - a. Connect the CAN connector to the mating 4-pin connector on the CAN extension cable.
 - b. Leave the remaining 4-pin connector disconnected. This connection is not used in the SmarTrax system.
3. Route the 9-pin end of the cable out the fuse panel and around the back of the operator's seat to the instructional seat compartment.
4. Connect the 9-pin connector to the CAN connection on the node harness.

Install the Valve Harness

1. Connect the 12-pin connector of the valve harness to the mating connector of the node harness (P/N 115-4001-110).

FIGURE 15. Valve Harness Routed into Cab



2. Route the valve harness out of the cab through the access panel in the right-rear corner of the cab.

FIGURE 16. VALVE Harness Connection



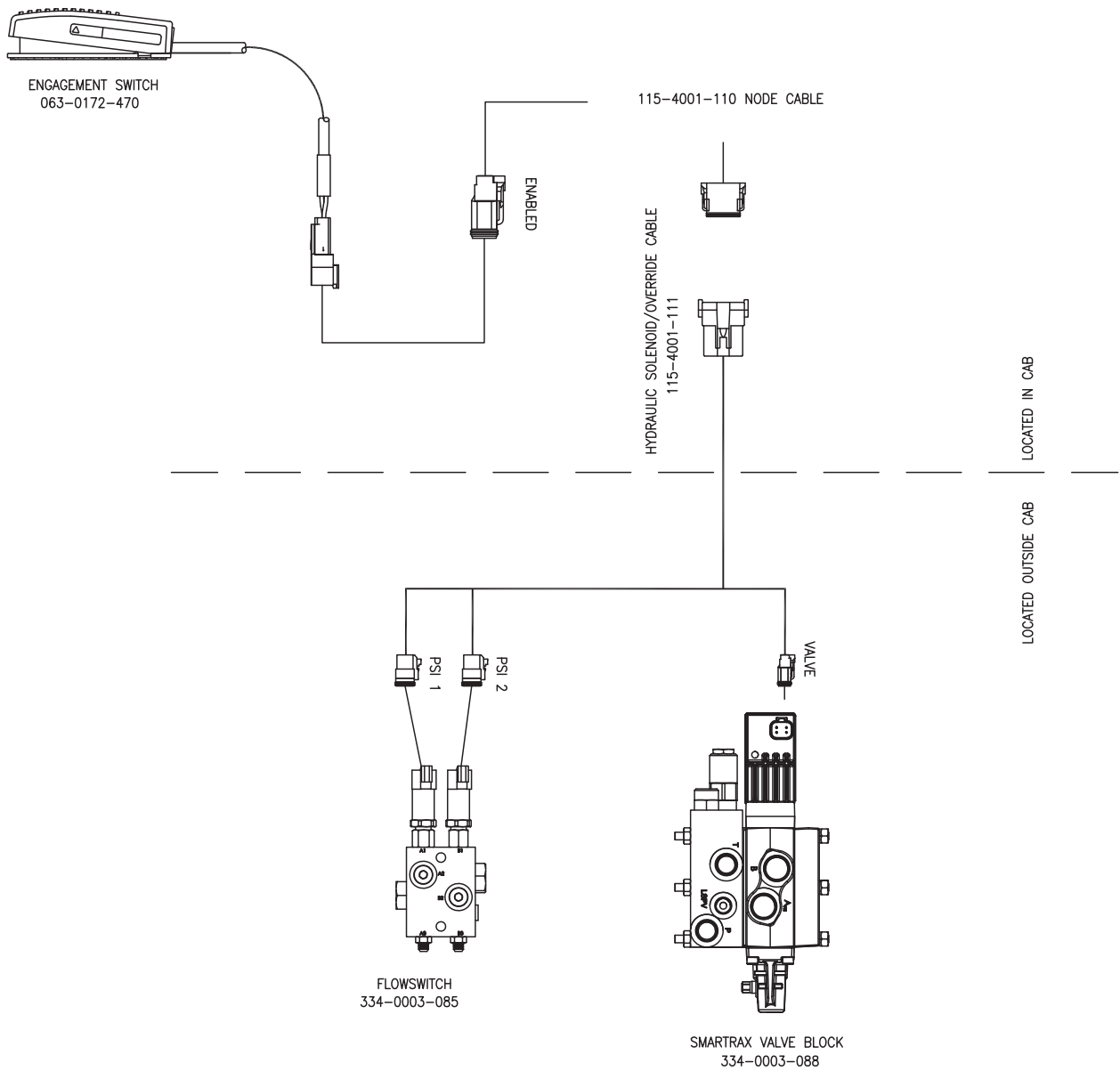
3. Connect the VALVE connector to the open PVE port of the SmarTrax valve (P/N 334-0003-088).

FIGURE 17. Valve Harness Connected to Flow Switch



4. Plug the PS1 and PS2 connectors from the valve harness into the pressure transducers on the flow switch (P/N 334-0003-085).

FIGURE 18. Valve Harness Wiring Diagram



Calibrate the SmarTrax System

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

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Limited Warranty

What Does this Warranty Cover?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service.

How Long is the Coverage Period?

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

How Can I Get Service?

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

What Will Raven Industries Do?

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

What is not Covered by this Warranty?

Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit or other special damages. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.

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Case IH Patriot 4420 (2009 & Newer), SPX 4410/4420
(2008 & Older), SPX 4260 (S/N JFG003537 & Newer)
SmarTrax™ Installation Manual
(P/N 016-5032-017 Rev A 05/12 E19402)



Raven Industries

Applied Technology Division
P.O. Box 5107
Sioux Falls, SD 57117-5107
www.ravenprecision.com

Toll Free (U.S. and Canada): (800)-243-5435
or Outside the U.S.: 605-575-0722
Fax: 605-331-0426
www.ravenhelp.com

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