

RAVEN

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

# SmarTrax™ Installation Manual



**John Deere 8x20 Series Wheel Tractors**

## ***Disclaimer***

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While every effort has been made to ensure the accuracy of this document, Raven Industries assumes no responsibility for omissions and errors. Nor is any liability assumed for damages resulting from the use of information contained herein.

Raven Industries shall not be held responsible or liable for the effects of atmospheric conditions and sunspot activity on the performance of our products.

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Raven Industries accepts no responsibility for the use of the signal for other than the stated purpose. Raven Industries shall not be responsible or liable for incidental or consequential damages or a loss of anticipated benefits or profits, work stoppage or loss or impairment of data arising out of the use, or inability to use, the SmarTrax or any of its components.

## CHAPTER

# 1

## INTRODUCTION

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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 coordinates.



## Basic Kit Contents

Below you will see the kit contents that you should have received with this SmarTrax Kit.

### John Deere 8x20 Series SmarTrax Kit Contents

Quantity	Item Description	Part Number
1	YAW SENSOR	063-0172-684C
1	CABLE, HYDRAULIC SOLENOID/OVERRIDE, YAW SENSOR	115-0171-777
1	WELD BRACKET, HYDRAULIC, JD JX20 SERIES	116-0159-495
1	KIT, HYD., SMARTRAX, JOHN DEERE 8020	117-0194-005
1	MANIFOLD, HYD., JD 8xx0, OVERRIDE. W/ FITTINGS	334-0003-024
2	SCREW, SOCKET HEAD CAP 1/4"-20 x 2" LONG	311-0050-009
4	BOLT, 5/16-18 x 7/8" HEX HEAD	311-0052-104
2	BOLT, HEX HEAD, M20 x 2.5 x 40 mm	311-0070-012
2	NUT, LOCK, NYLON INSERT, 1/4"-20 UNC	312-4000-057
4	WASHER, LOCK, SPLIT, 5/16"	313-1000-019
2	WASHER, FLAT, 3/8"	313-2300-013
2	WASHER, FLAT, 812 I.D. x 1.469 O.D. x .134 THK	313-2300-023
1	VALVE, HYD., CLOSED CENTER LS COMMAND	334-0003-066
1	MANUAL INSTALLATION	016-0190-005
1	MANUAL, INSTALLATION, SMARTRAX	016-9001-021
2	FTG, ADAPTER, SWIVEL RUN TEE, -8 ORFS M/M/F	333-0012-028
1	FTG, ADAPTER, SWIVEL RUN TEE, -10 ORFS M/M/F	333-0012-031
3	FTG, ELBOW, 90° SWIVEL, -6 JIC M/F	333-0012-042
1	FTG, ADAPTER, SWIVEL RUN TEE, -6 JIC M/M/F	333-0012-043
1	FTG, PLUG, -4 SAE O-RING (M)	333-0012-051
3	FTG, ELBOW, 90° SWIVEL, -8 ORFS M/F	333-0012-067
1	FTG, REDUCER, -10 ORFS (F) TO -6 ORFS (M) W/ NUT	333-0012-068
1	FTG, ADAPTER, SWIVEL BRANCH TEE, -6 ORFS M/F/M	333-0012-075
1	FTG, TEST COUPLING, -6 ORFS	333-0012-076
1	FTG, ADAPTER, STRT, M14x1.5 (M) TO -6 ORFS (M)	333-0012-077
2	FTG, ADAPTER, -8 ORFS (M) TO -6 SAE O-RING (M)	333-0012-082
1	FTG, PLUG, -6 SAE O-RING (M)	333-0012-104

Quantity	Item Description	Part Number
1	HOSE, HYD., -8 ORFS, (F) TO -6 JIC (F), 36"	214-1000-066
1	HOSE, HYD., -8 ORFS, (F) 90° TO -6 JIC (F), 23"	214-1000-067
1	HOSE, HYD., -6 JIC (F) 90° TO -8 ORFS (F), 36"	214-1000-068
1	HOSE, HYD., -8 ORFS (F) 45° TO -6 ORFS (F), 30"	214-1000-070
1	HOSE, HYD., -6 JIC (F) 90° TO -6 ORFS (F), 30"	214-1000-071
1	HOSE, HYD., -6 JIC (F) 90° TO -6 JIC (F), 30"	214-1000-072
1	HOSE, HYD., -6 JIC (F) 90° TO -6JIC (F), 14"	214-1000-072

**Notes:**

## CHAPTER

## 2

SAFETY

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## Hydraulic Safety Requirements



**Important:** Hydraulics are 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 was previously pressurized.

When disconnecting the hydraulic hoses or when purging is required, be aware that the hydraulic oil within the machine system 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 when working on the hydraulic system. Objects or materials that are able to bypass the machine's hydraulic filtration system will adversely reduce performance and possibly damage the hydraulic valves.

## Electrical Safety Requirements

Do not reverse the power leads. Doing so will cause severe damage to the equipment. Always check to make sure that the power leads are connected to the right polarity as marked. Ensure that the power cable is the last cable to be connected.

## **Contacting Raven Industries**

We welcome your feedback about this manual. If you have any comments or suggestions for improvement, please let us know by contacting our Customer Support Center by any of the following methods:

- **Via phone:** 1-800-243-5435
- **Via mail:**  
Raven Industries  
Flow Control Division  
205 E. 6th St.  
Sioux Falls, SD 57104
- **Via email:** [fcinfo@ravenind.com](mailto:fcinfo@ravenind.com)



## CHAPTER

## 3

## MOUNTING THE SUPPLIED MOUNTING BRACKET AND VALVE

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### Installing the Steering Assist Manifold

1. The Steering Assist Manifold is mounted to Supplied Mounting Bracket. The Steering Override Manifold is installed in series with one of the steering cylinder lines upstream of the connections from the Steering Assist Manifold.
2. The mounting point for the Supplied Mounting Bracket is located within the battery box on the LHS of the tractor.
3. Remove the Battery Box cover shown below and then remove the toolbox from the battery box.



**Note:** The toolbox will not fit in the battery box once the Steering Assist Manifold is installed.

4. The Supplied Mounting bracket is bolted to the mounting points on the chassis. An additional bracket or modification to the bracket may be required.
5. Mount the Steering Assist Manifold to the bracket using the supplied bolts and washers. Supplied Bracket.



6. Mount manifold and bracket similar to one shown below. Be sure to allow for access to the battery.



**Notes:**

CHAPTER

4

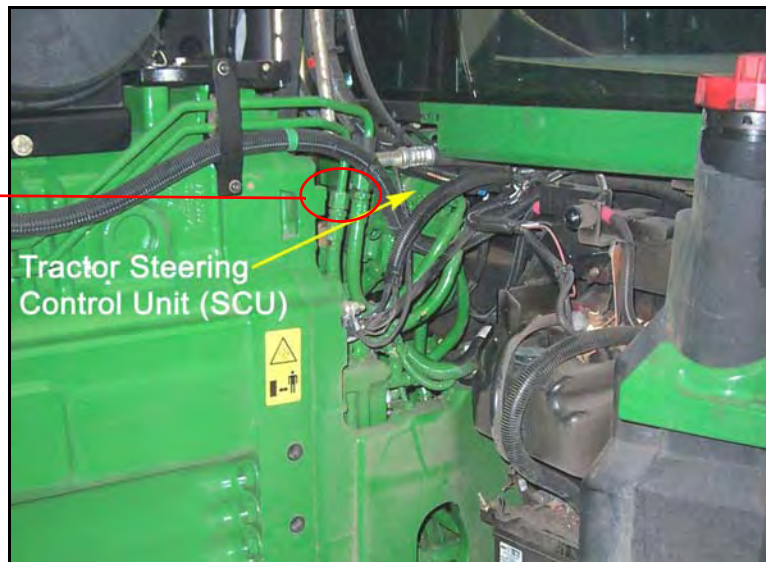
HYDRAULICS

**Installing the  
Left Steer Hose**

1. Remove the LHS Guard to gain access to the Steering Control Unit (SCU).

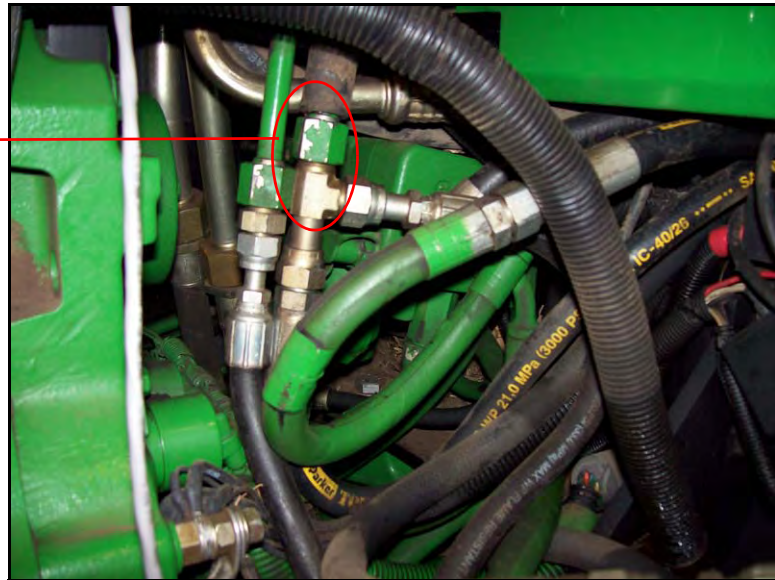


Left & Right  
Steer Connections



2. Locate the left and right steering lines coming from the steering control unit.
3. Disconnect the left steer line. Install a tee fitting and reconnect the original hose.
4. Install the provided left steer hose (P/N 214-1000-066), by connecting the 90° fitting of the hose to the 90° portion of the tee fitting.
5. Run the left steer hose to the 'A' port on the SmarTrax Valve.

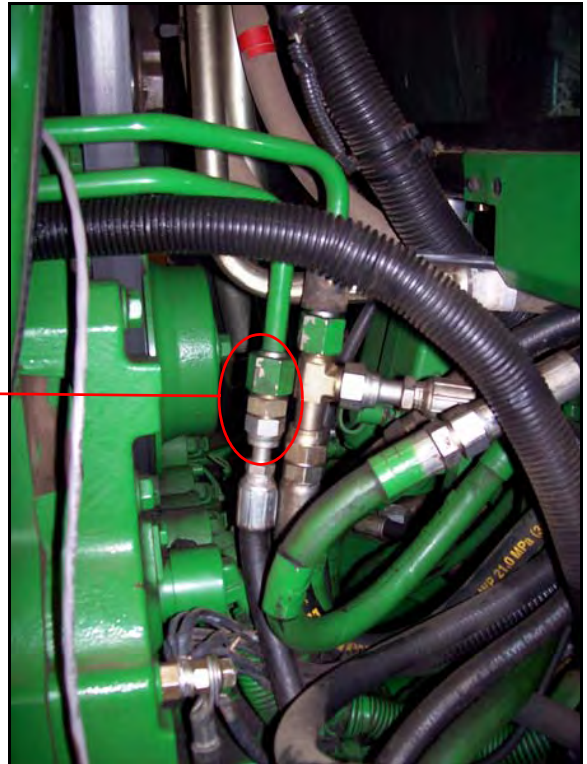
Left Steer  
Connection



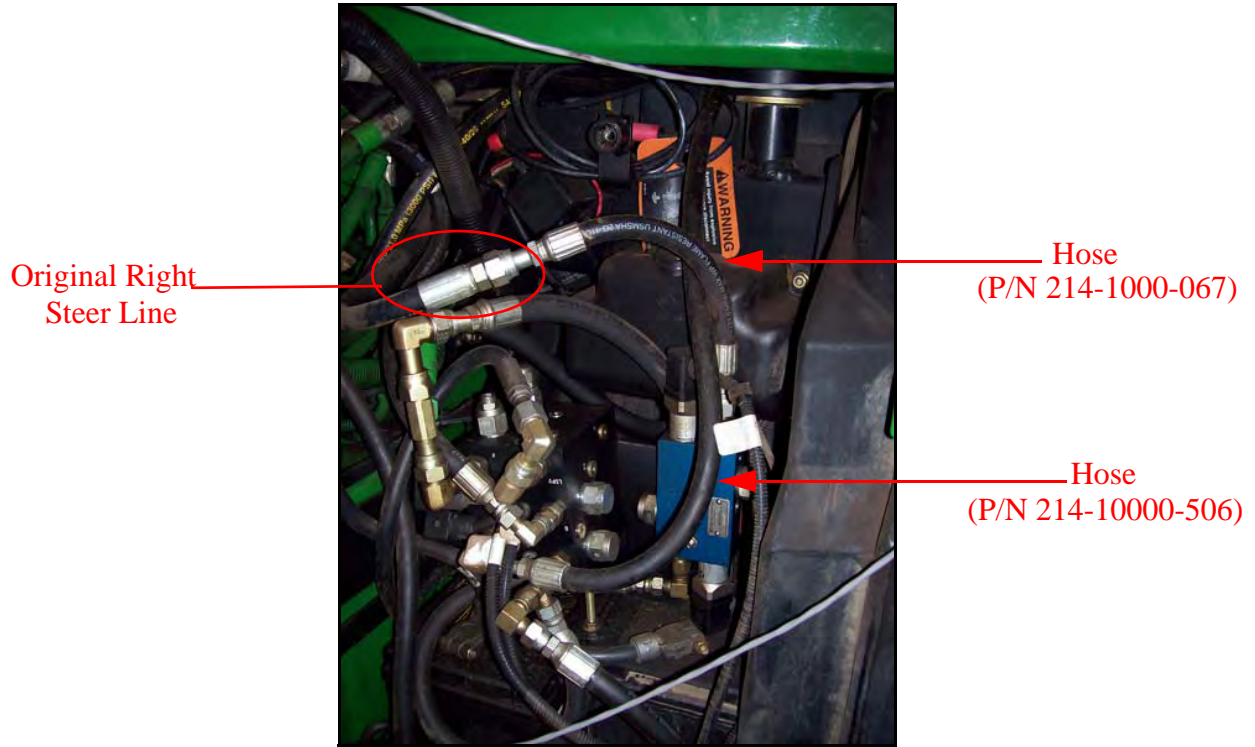
## Installing the Right Steer Hose

1. Attach a tee fitting to the 'B' port on the SmarTrax Valve.
2. Connect the supplied right steer hose(P/N 214-1000-068) to the tee fitting on the 'B' port of the SmarTrax Valve.
3. Disconnect the original right steer hose from the steering orbital and from the steel line running to the steering cylinders.
4. Take the new right steer hose that is connected to the tee on the 'B' port and attach it to the steel line going to the right steer cylinders.

Right Steer Connection



5. Attach hose(P/N 214-1000-067) to the right steer hose, previously removed from the steel right steer line and then to the 'A' port in the steering override switch.
6. Attach hose(P/N 214-1000-506) to the 'B' port on the override switch and the remaining open port on the tee fitting attached to the 'B' port in the Smartrax Valve.





## Installing the Pressure Hose

1. Remove the fitting from the 'P' port on the SmarTrax Valve and install the supplied O- Ring to O-Ring face seal fitting. Attach a tee fitting to this fitting.
2. By looking through the access hole on the bottom of the tractor, locate the large steel pressure line directly below the steering orbital next to the drive shaft on the left side of the frame.



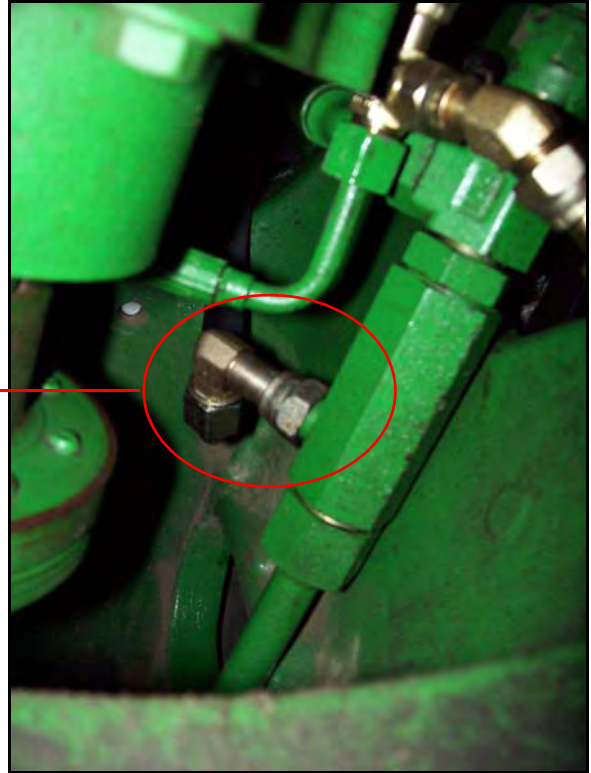
Pressure  
Connection  
Point



**Note:** The cover may need to be removed to access the steel pressure line.

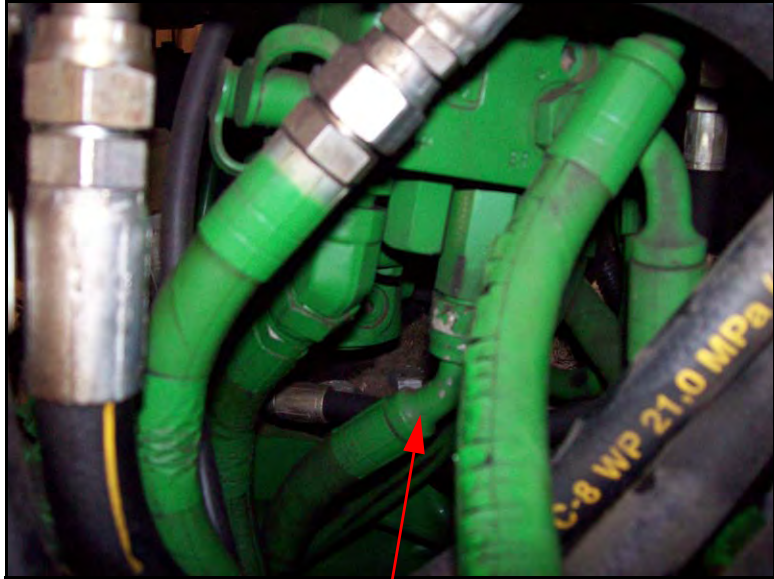
3. Disconnect pressure line and route it to the 'P' port on the SmarTrax Valve. Connect it to the installed tee fitting using a 90° fitting, if necessary.
4. Attach the hose (P/N 214-1000-070) to the remaining branch of the tee fitting on the 'P' port and then to the steel pressure line, where the previous hose was removed.

Pressure Hose  
(P/N 214-1000-070)



## Installing the Tank Hose

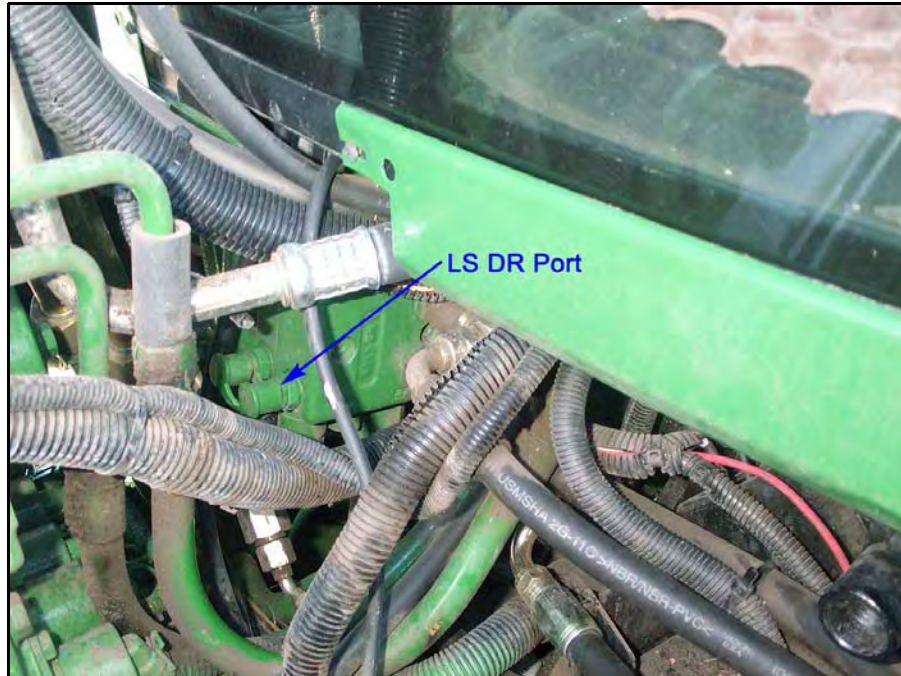
1. The supplied hose (P/N 214-1000-071) connects to the 'T' port of the SmarTrax Valve.
2. Route the supplied Tank hose towards the steering orbital where it will connect to the EF port of the orbital using the supplied tee connector and reducer fitting.



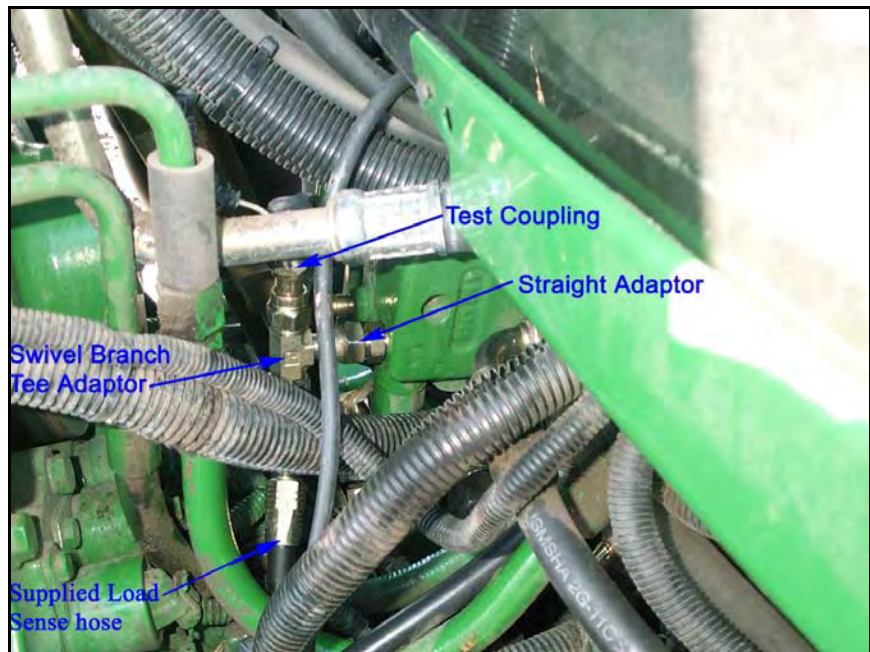
EF Hose

## Installing the Load Sense Hose

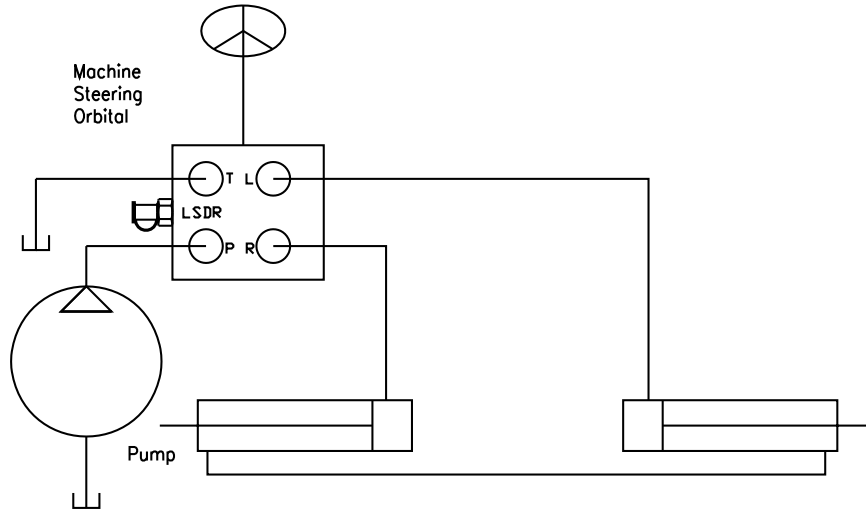
1. Connect the supplied hose(P/N 214-1000-072) to the LS PV port of the SmarTrax Valve and then route the hose up to the LS DR (Diagnostic Receptacle) port on the steering orbital.
2. Remove the test fitting from the original LS DR port and discard.



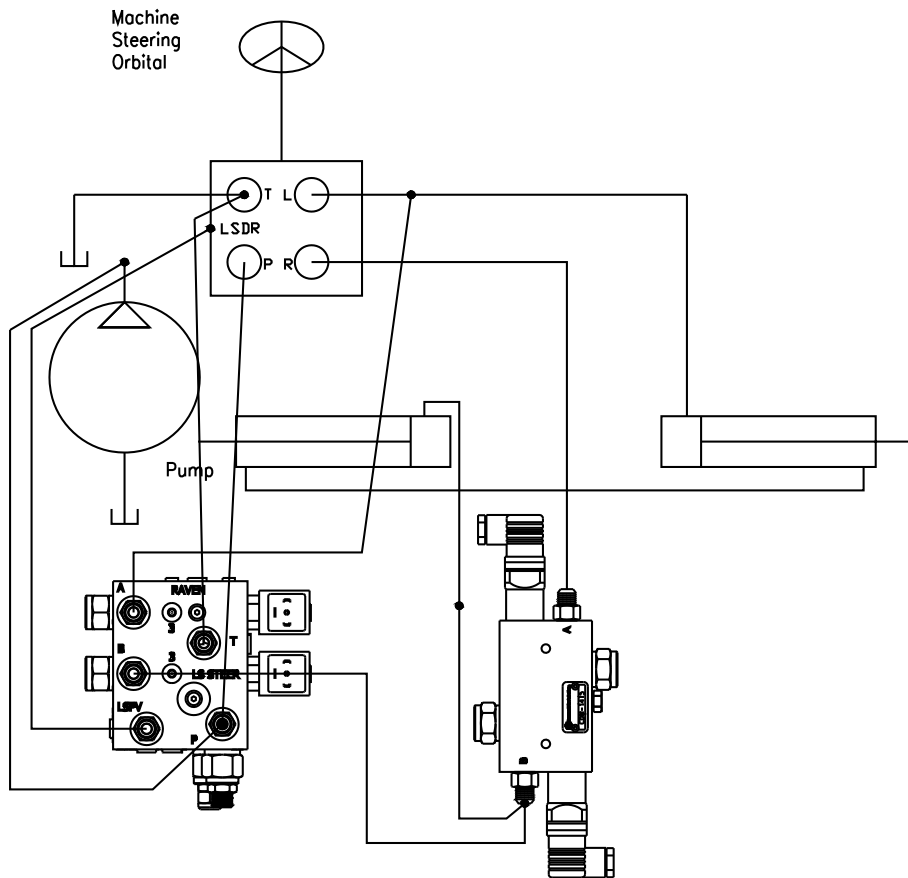
3. Insert the supplied straight 11/16" ORFS adaptor in the original LS DR port.
4. Connect the supplied tee connector to the straight adaptor and connect the supplied test coupling to the top leg of the branch tee.
5. Attach the supplied LS hose to the remaining connector of the tee fitting.
6. Remove the fittings from the LS-steer and PS ports on the SmarTrax Valve and install the supplied plug.



Before Smartrax Installation



After Smartrax Installation



## CHAPTER

## 5

**SENSOR MOUNTING**

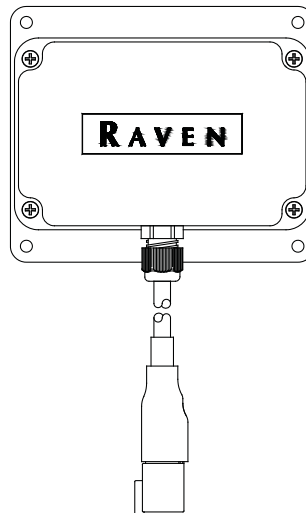
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**Yaw Sensor  
Installation**

## Mounting the Yaw Sensor

Installing the Raven Yaw Sensor is quick and easy. Raven recommends that you keep the following points in mind while installing the sensor:

- The sensor is not weatherproof. Mount the sensor inside of the machine's cab or drivers compartment.
- Mount the sensor to a flat surface parallel to the ground with the Raven logo facing up. The floor of the cab is generally ideal.
- Once mounted, the sensor should remain fixed in relation to the vehicle. The sensor should not become loose or rotate due to machine vibration or movement.
- The sensor should also be mounted in a location where it will not be kicked or jarred during normal equipment operation.
- The cable does not need to be oriented in any way to the direction of travel of the vehicle. Mount the sensor to with the cable routed to avoid tripping hazards or damaging the cable or yaw sensor.



## **Installation**

- Mount the Yaw Sensor to the floor inside of the vehicle's cab using the double sided tape on the sensor or steel bolts or screws through the mounting plate. See the Mounting the Yaw Sensor section on the previous page for mounting location considerations.
- Connect the supplied sensor cable to the Yaw Sensor and to the Yaw Sensor connector on the SmarTrax Interface cable.



## CHAPTER

# 6

## START-UP PROCEDURES

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Prior to using the SmarTrax system:

- Turn the wheels fully from side to side numerous times to remove air from the hydraulic system.



**Important:** Time the wheels for a full left to right and right to left time of approximately 6 seconds. Refer to the Universal Kit Manual for additional instructions.

- Adjust the Pressure Switch to the most responsive setting. Refer to the Universal Kit Manual for instructions.

**Notes:**

**RAVEN**

# **RAVEN INDUSTRIES**

## **Limited Warranty**

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### ***What Does this Warranty Cover?***

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

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

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

### ***How Can I Get Service?***

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

### ***What Will Raven Industries Do?***

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

### ***What is not Covered by this Warranty?***

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

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

**R A V E N**

John Deere 8x20 Series Wheel Tractors  
SmarTrax™ Installation Manual  
(P/N 016-0190-005 Rev C 2/09)

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