

RAVEN

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

# SmarTrax™ Installation Manual



**Nitro N4 Series**

## ***Disclaimer***

---

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.

Raven Industries cannot guarantee the accuracy, integrity, continuity, or availability of the GPS signal from the U.S. Department of Defense/NAVSTAR GPS satellites, the OmniSTAR correction service or the WAAS correction service.

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

---

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.

## Nitro N4 Series SmarTrax Kit Contents

Quantity	Item Description	Part Number
1	SENSOR ASSEMBLY, ROTARY WHEEL, ANGLE 100°	063-0181-013
1	BRACKET, ROTARY, SENSOR, MILLER, N4, PART A	107-0171-820
1	BRACKET, ROTARY, SENSOR, MILLER, N4, PART B	107-0171-821
1	WELDMENT, ARM, SPS, CASE IH FLX	116-0159-668
1	HOSE, HYD., -4 ORFS (F) TO -6 JIC (F), 29" LONG	214-1000-393
4	HOSE, HYD., -8 ORFS (F) 90° TO -6 JIC (F), 30" LONG	214-1000-496
1	SWITCH, PRESSURE, MICRO, HD, 15-100 BAR ADJ. W. FTG.	422-0000-074
4	FITTING, ADAPTER, SWIVEL RUN TEE, -8 ORFS M/M/F	333-0012-028
1	FITTING, ADAPTER, -4 ORFS (M) TO -4 SAE O-RING (M)	333-0012-209
4	BOLT, 5/16"-18 x 7/8" HEX HEAD	311-0052-104
4	BOLT, HEX, 5/16"-18 x 1" HEX HEAD	311-0052-105
1	BOLT, 3/8"-16 x 3" HEX HEAD	311-0054-113
2	NUT, FLANGED LOCK, 3/8"-16	312-1001-164
4	NUT, FLANGED LOCK, 5/16"-16	312-1001-169
4	WASHER, LOCK, 5/16"	313-1000-009
1	VALVE, HYD., CLOSED CENTER, LOAD SENSE	334-0003-062
1	MANUAL, INSTALLATION	016-0190-087
1	MANUAL, INSTALLATION, SMARTRAX	016-9001-021
1	LABEL, WARNING, DO NOT STEP	041-0159-688
1	LABEL, WARNING, TAMPERING	041-0159-689
1	CABLE, HYDRAULIC SOLENOID / OVERRIDE	115-0171-466

## CHAPTER

## 2

## SAFETY

## 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 manufacturer'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:** [fcdinfo@ravenind.com](mailto:fcdinfo@ravenind.com)

## CHAPTER

# 3

### MOUNTING THE UNIVERSAL BRACKET AND VALVE

Mount the SmarTrax valve to the mounting plate already on the machine. The plate is located on the backside of the front cross member just to the right of the steering orbital.



**Notes:**



**CHAPTER****4****HYDRAULICS**

---

**Installing the  
Steering  
Control Valve  
Hoses****Left Steer Hose**

1. Identify the left steer port on the steering orbital. Hoses may need to be traced to the hydraulic cylinders for proper identification. Once the port has been identified, remove the hose from the steering orbital and install on the appropriate tee fitting, found in the Raven adapter kit, to the steering orbital. Once the tee fitting is installed, reattach the original hose.
2. Attach hose (P/N 214-1000-496) to the A-Port on the Raven steering control valve, route to and attach to the open branch on the installed tee fitting.

**Right Steer Hose**

1. Identify the right steer port on the steering orbital. Hoses may need to be traced to the hydraulic cylinders for proper identification. Once the port has been identified, remove the hose from the steering orbital and install an appropriate tee fitting, found in the Raven adapter kit, to the steering orbital. Once the tee fitting is installed, reattach the original hose.
2. Attach hose (P/N 214-1000-496) to the B-Port on the Raven steering control valve, route to and attach to the open branch on the installed tee fitting.

## Pressure Hose

1. Identify the pressure port on the steering orbital. Hoses may need to be traced to the priority valve for proper identification. Once the port has been identified, remove the hose from the steering orbital and install on the appropriate tee fitting, found in the Raven adapter kit, to the steering orbital. Once the tee fitting is installed, reattach the original hose.
2. Attach hose (P/N 214-1000-496) to the P-Port on the Raven steering control valve, route to and attach to the open branch on the installed tee fitting.



### **LS-PV Hose**

1. Remove fitting from the LS-PV port on the SmarTrax valve. Insert the supplied SAE O-Ring to o-ring face seal adapter fitting.
2. Remove the load sense hose from the side of the steering orbital and connect the hose directly to the port labeled “LS-PV” on the Raven steering control valve. To identify the load sense port on the valve, a general rule of thumb is that the smallest hose on the orbital is the load sense hose. Once the hose is identified, follow the hose to its origin and verify that the hose is running from the machine’s priority valve.

### **Tank Hose**

1. Identify the tank port on the tractor steering orbital. Hose may need to be traced to the hydraulic reservoir for proper identification. Once the port has been identified, remove the hose from the steering orbital and install an appropriate tee fitting, found in the Raven adapter kit, to the steering orbital. Once the tee fitting is installed, reattach the original hose.
2. Attach hose (P/N 214-1000-496) to the T-Port on the Raven steering control valve, route to and attach to the open branch on the installed tee fittings.

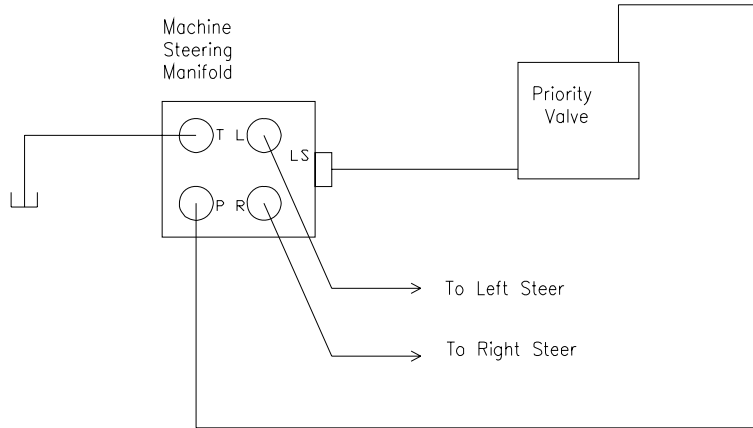
### **LS-Steer Hose**

1. Attach hose (P/N 214-1000-393) to the LS-Steer port on the SmarTrax valve, then to the load sense port on the steering orbital. This port should be open since the original hose was removed and run to the LS-PV port in the previous step.

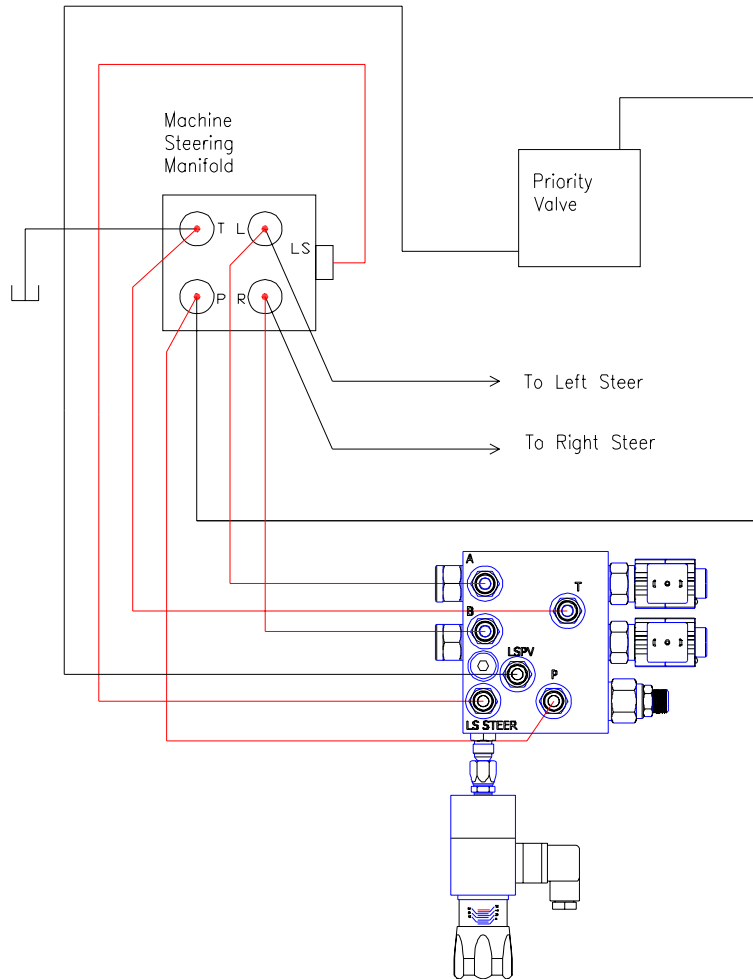
Connect the Pressure Switch directly to the PS port on the SmarTrax valve.

# Hydraulic Schematic

Before Smartrax Installation



After Smartrax Installation



## CHAPTER

# 5

### STEERING POSITION SENSOR

---

Remove the plastic cover from over the top of the front left wheel to gain access to the steering cylinder area.

#### Installing the Steering Position Sensor (SPS)



Remove Cover

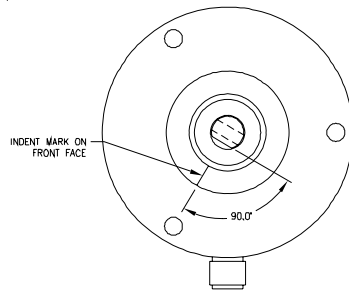
With wheels pointed straight ahead, attach brackets to the machine as shown using the supplied hardware.



Attach the sensor to the bracket so the shaft is directly over the top of the king pin.



With wheels pointing straight forward, align flatside of sensor shaft so it is perpendicular to the notch in the sensor.



With wheels straight, sensor shaft should be in this position.

With 3/8" bolt in the slot in the sensor arm, and mounted in the bracket using 2 nuts, attach the arm to the shaft sensor using the supplied set screws. Be sure to keep the shaft flat aligned with the notch on the face when tightening the arm.

Tighten bracket holding sensor keeping arm and shaft aligned as shown above.

## CHAPTER

# 6

### START-UP PROCEDURES

---

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

- ◆ 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 5 seconds. Refer to the Universal Kit Manual for additional instructions on this.

- ◆ Adjust the pressure switch to the most responsive setting. Refer to the Universal Kit Manual for instructions on this.

**Notes:**







**RAVEN**

# **RAVEN INDUSTRIES**

## **Limited Warranty**

---

### ***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**

Nitro N4 Series  
SmarTrax™ Installation Manual  
(P/N 016-0190-087 Rev A 2/09)

*Simply improving your position.™*



Raven Industries  
Applied Technology Division  
P.O. Box 5107  
Sioux Falls, SD 57117-5107

Toll Free (U.S. and Canada): (800)-243-5435  
or Outside the U.S. :1 605-575-0722

Fax: 605-331-0426

[www.ravenprecision.com](http://www.ravenprecision.com)  
[atdinfo@ravenind.com](mailto:atdinfo@ravenind.com)

Notice: This document and the information provided are the property of Raven Industries, Inc. and may only be used as authorized by Raven Industries, Inc. All rights reserved under copyright laws.