

**RAVEN**

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

# SmarTrax™ Installation Manual



**Case MX 180-270 Series Wheel Tractors**

## ***Disclaimer***

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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

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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.



The instructions in this document are to be used to install the Smartrax Steering Kit for the following models of CASE Wheel Tractors:

MX180, MX200, MX220, MX240, and MX270

# Basic Kit Contents

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

## Case MX 180-270 Series Wheel Tractors SmarTrax Kit Contents

Quantity	Item Description	Part Number
1	Kit, SPS	063-0181-001
1	Weldment, Bracket, Hyd., Manifold, Case MX270	116-0159-510
1	Cable, Hydraulic, Solenoid/Override	115-0171-466
1	Switch, Pressure, Micro, HD, 15-100 Bar Adj W/Ftgs	422-0000-074
1	Valve, Hyd., Closed Center LS W/Relief	334-0003-066
4	Bolt, 5/16-18 x 7/8" Hex Head	311-0052-104
1	Bolt, Hex Metric 16mm x 25mm Long	311-0070-009
4	Washer, Lock, 5/16"	313-1000-019
1	Manual, Installation	016-0190-006
1	Manual, Installation, Smartrax	016-9001-021
1	Label, Warning, Do Not Step	041-0159-688
1	Label, Warning, Tampering	041-0159-689
3	Ftg., Elbow, 45° Swivel, -6 JIC M/F	333-0012-027
4	Ftg., Adapter, Swivel Run Tee, -8 ORFS M/M/F	333-0012-028
4	Ftg., Elbow, 90° Swivel, -6 JIC M/F	333-0012-042
4	Hose, Hyd, 8FF90S -6 83" 6JF	214-1000-029
1	Hose, Hyd., 6FF90S -4 80" 6JF	214-1000-030
1	Hose, Hyd., 6FM -6 80" 6JF	214-1000-031

## 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 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 BRACKET AND VALVE

## **Installing Steering Assist Valve Bank & Steering Override Pressure Switch**

1. The Smartrax Valve and Pressure Switch are both mounted on the supplied mounting bracket.
2. The Steering Override Pressure Switch is connected directly to the PS Port on the Smartrax Valve.
3. The mounting point for the Steering Assist Valve Bank and Steering Override Pressure Switch is located on the front of the transmission housing, above and in front of the RHS rear axle in the wheel arch, and behind the hydraulic pump.



Steering Assist Valve Bank mounting location





Steering Assist Valve Bank & Pressure Switch  
(NOTE: Valve in picture differs from one currently used.)

4. Mount the Smartrax Valve w/Pressure Switch attached on the mounting bracket using the supplied bolts.



Bracket mounting area



Steering Assist Valve Bank mounted



## CHAPTER

# 4

## HYDRAULICS

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### Steering Assist Valve Bank Hose Routing



Location of tractor SCU - Close-up View

2. Attach the tee connectors supplied to the **L**, **R**, **P**, and **T** ports of the SCU.

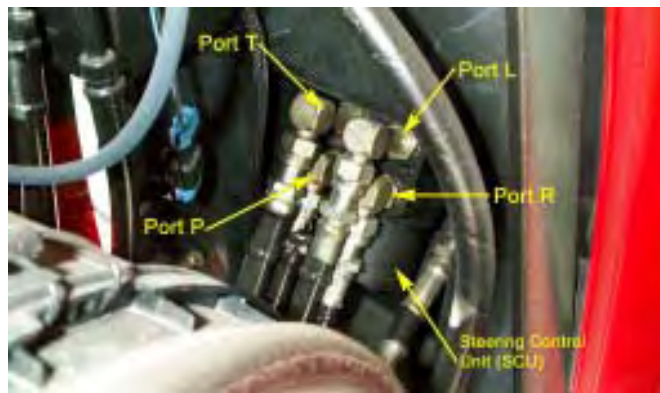
The figure below shows the tractor SCU ports before installation.



**Important:** Take precautions to prevent any contaminants being introduced into the tractors hydraulic system.



**Helpful Hint:** The **L** & **R** tee connectors should be positioned towards the LHS of the tractor while the **P** & **T** connectors should be positioned to the RHS of the tractor to provide easy installation of the hydraulic hoses.

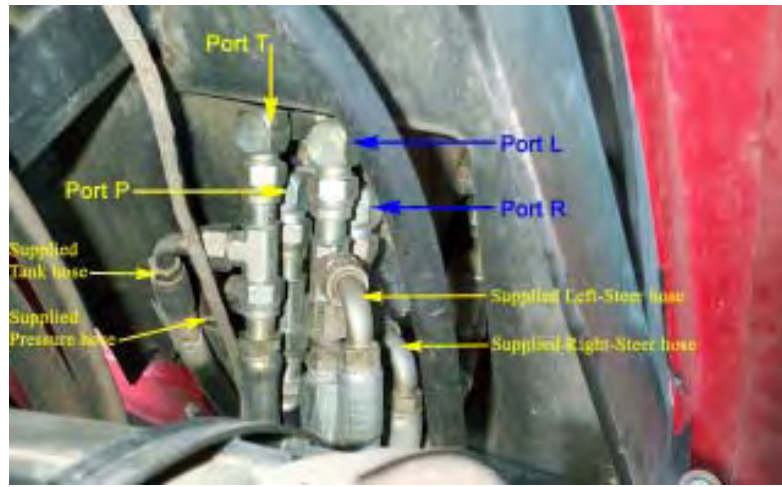


Ports T, P, A, and B connections on SCU before install



T, P, A, and B tee connections on SCU after install

3. The **Tank, Pressure, Left-Steer, and Right-Steer** hoses (P/N 219-1000-029) supplied are to connect to their corresponding ports, **T, P, L, and R** ports on the tractor SCU using the tee connectors supplied.



Supplied Tank, Pressure, Left-Steer, & Right-Steer connections to SCU

4. Pass all hoses under the SCU between the bottom of the cab and top of the transmission housing.
5. Route the hoses rearward parallel to the existing steel hydraulic pipes to the Smartrax Valve.

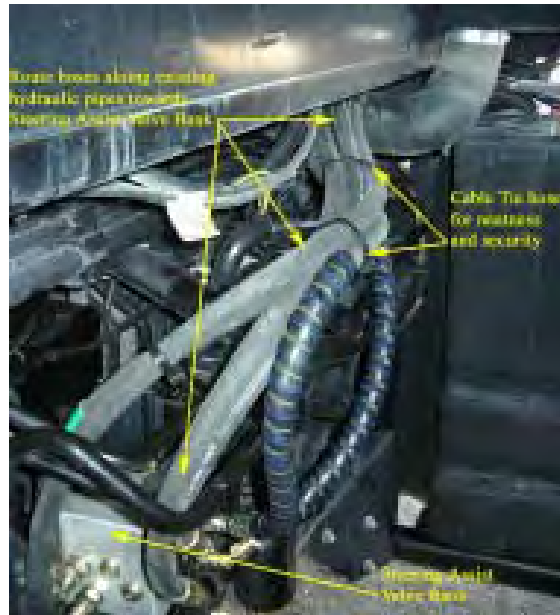


Hose routing from SCU



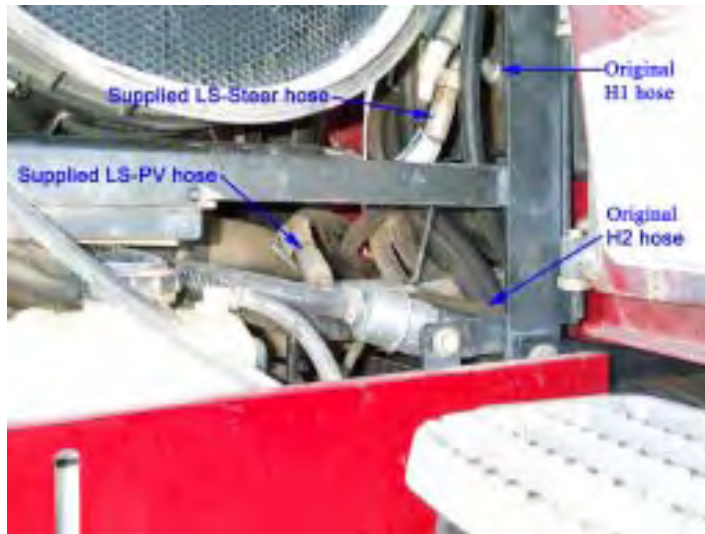
Hose routing under cab

7. The hoses are then routed along the existing steel hydraulic pipes, secure with cable ties.
8. The hoses are then connected to the appropriate ports on the Steering Assist Valve Bank. Pressure - "P" port; Tank - "T" port; Left - "A" port; Right - "B" port.



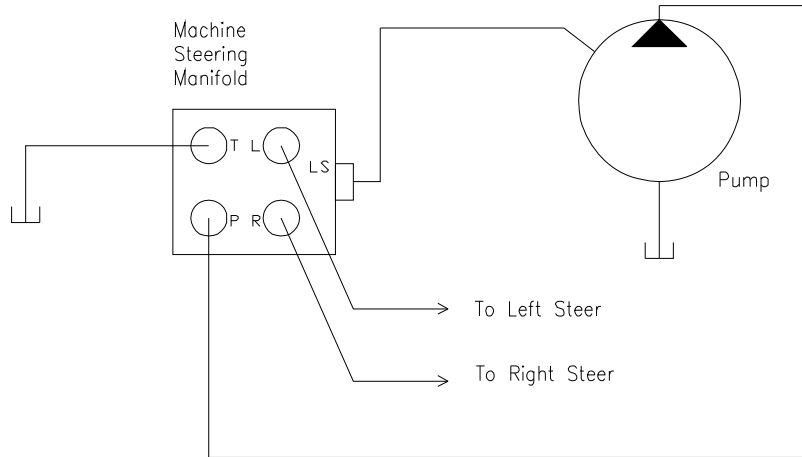
Hose routing along existing pipes

9. Separate the original **H1** hose and the **H2** hose coming from the orbital load sense which are located under and to the left of the SCU.
10. The **LS-Steer** hose (P/N 214-1000-031) supplied connects to the original **H1** hose, which goes to the steering orbital, while the supplied **LS-PV** hose (P/N 214-1000-030) connects to the original **H2** hose.
11. Once the hoses are connected, they are to be routed the same way as the Tank, Pressure, Left-Steer, and Right-Steer.
12. The **LS-Steer** hose and **LS-PV** hose connect to their appropriate ports, LS-Steer and LS-PV, respectively on the Steering Assist Valve Bank.

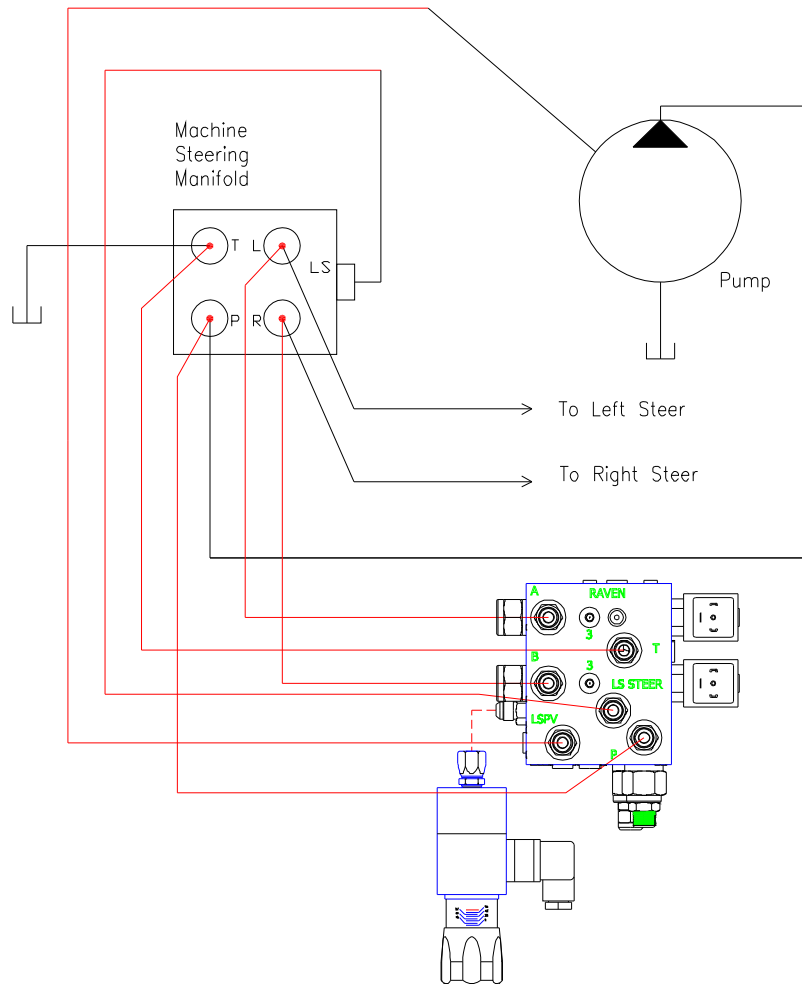


Supplied LS-Steer and LS-PV hose connections to original H1 and H2 hoses

Before Smartrax Installation



After Smartrax Installation



## CHAPTER

# 5

### STEERING POSITION SENSOR INSTALLATION AND CABLE CONNECTIONS

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

- The SPS mounts on either side of the front axle.
- One end of the SPS mounts to the outer end of the steering tie rod by the ball joint using the supplied hose clamps and mounting tab.
- The opposite end of the SPS mounts to the bolt on the top of the differential housing.
- Part of the supplied bracket can be used to make a small mounting tab for the SPS.
- **Be sure not to over extend or over compress the sensor upon initial startup!**







## Cable Connections

- Connect labeled ends of the cable to the valve, pressure switch, and SPS.
- Route Cable into the cab.
- Secure cable away from moving parts and heat sources.

## CHAPTER

# 6

### START-UP PROCEDURES

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

- ◆ Make sure the Steering Position Sensor does not over-extend or over-compress when turning the wheels.
- ◆ 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**

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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**

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SmarTrax™ Installation Manual  
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