

R A V E N

SmarTrax™ Installation Manual



John Deere T 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 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, this system or any of its components. Raven Industries shall not be held responsible for any modifications or repairs made outside our facilities, nor damages resulting from inadequate maintenance of this system.

As with all wireless and satellite signals, several factors may affect the availability and accuracy of wireless and satellite navigation and correction services (e.g. GPS, GNSS, SBAS, etc.). Therefore, Raven Industries cannot guarantee the accuracy, integrity, continuity, or availability of these services and cannot guarantee the ability to use Raven systems, or products used as components of systems, which rely upon the reception of these signals or availability of these services. Raven Industries accepts no responsibility for the use of any of these signals or services for other than the stated purpose.

| | | |
|---|--|----------|
| Chapter 1 | <i>Important Safety Information</i> | 1 |
| Chapter 2 | <i>Introduction</i> | 3 |
| Preparing for Installation | | 3 |
| Recommendations | | 4 |
| Point of Reference | | 4 |
| Updates | | 5 |
| Kit Contents | | 5 |
| Chapter 3 | <i>Cab Component Installation</i> | 7 |
| Install the SmarTrax Node | | 7 |
| Mount the SmarTrax Node | | 7 |
| Node Mounting Locations | | 9 |
| Install the Foot Switch | | 10 |
| Install the Road Switch | | 10 |
| Connect the Node Harness to the Machine's Steering ECU | | 11 |
| Install the Valve Harness and Interface Box | | 12 |
| Install the Chassis Cable - SmarTrax-Only Systems (If Applicable) | | 16 |
| Connect SmarTrax to an Existing Chassis Cable (If Applicable) | | 16 |
| Calibrate the SmarTrax System | | 16 |
| System Diagrams | | 17 |

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.
- 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.
- If you require assistance with any portion of the installation or service of your Raven equipment, contact your local Raven dealer for support.

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

- Be alert and aware of surroundings.
- Do not operate the SmarTrax system 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 the SmarTrax system is engaged.
- Disable the SmarTrax system when exiting the operator’s seat and machine.
- Do not drive the machine with the SmarTrax system enabled on any public road.
- Place the master switch in “Road Mode” before driving the machine on a public road.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling the SmarTrax system when the safe working distance has been diminished.
- Ensure the SmarTrax system is disabled prior to beginning any maintenance work on the SmarTrax system or the machine.

WARNING

- When starting the machine for the first time after installing the SmarTrax system, be sure that all persons are standing clear of the machine in case a wheel moves unexpectedly.
- Read all safety requirements and precautions in the machine's operation manual prior to operating a machine equipped with the SmarTrax system feature. Failure to follow safety precautions may lead to damage to the equipment, personal injury, or death.
- To prevent accidental engagement of steering and loss of vehicle control, turn the road switch on when driving down the road.

CAUTION

- The GPS steering system does not detect obstacles in the vehicle's path. The operator must observe the path being driven to avoid obstacles.
- When engaged, the GPS steering system controls only the steering of the vehicle. The operator must control the speed of the vehicle.

CHAPTER

2

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 Global Positioning System (GPS) coordinates.

This manual applies to the following machines:

MAKE: John Deere

MODEL: 9X00T - 9300T and 9400T

9X20T - 9320T, 9420T, 9520T, and 9620T

9X30T - 9430T, 9530T, and 9630T

FIGURE 1. John Deere 9520T



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 in the recommended location. Refer to the following table for the machine-specific antenna mounting location.

Note: *If your machine is not listed, install the antenna on the front-center of the cab.*

| Machine Preset | Antenna X Position (left to right) | Antenna Y Position (from the of the track to the antenna position on the cab) | Antenna Z Position (ground to top of antenna) |
|------------------------------|---------------------------------------|--|--|
| John Deere 9X00T/9X20T/9X30T | Centered | 2.9 ft./0.89 m | 12.0 ft./3.66 m |

- 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

-John Deere T Series SmarTrax™ Installation Manual

-Manual No. 016-5034-018 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 installation, compare the items in the kit with the components on this list. If you have questions about the kit, contact your local Raven dealer.

TABLE 1. John Deere T-Series SmarTrax Installation Kit (P/N 117-5034-018)

| Picture | Item Description | Part Number | Qty. |
|---|--|--------------|------|
| Not Pictured | Manual - SmarTrax and SmartSteer Calibration & Operation | 016-0171-277 | 1 |
| Not Pictured | Manual - John Deere T-Series SmarTrax Installation | 016-5034-018 | 1 |
|  | Node - SmarTrax RTK | 063-0173-228 | 1 |

TABLE 1. John Deere T-Series SmarTrax Installation Kit (P/N 117-5034-018)

| Picture | Item Description | Part Number | Qty. |
|---|--|--------------|------|
|  | Bracket - Node Mounting | 107-0171-947 | 1 |
|  | Cable - Node Harness | 115-4001-187 | 1 |
|  | Cable - Valve Harness | 115-4001-188 | 1 |
|  | Box - John Deere Interface | 063-0173-506 | 1 |
|  | Assembly - SmarTrax Enable Foot Switch | 063-0172-470 | 1 |
|  | Switch - Master | 412-2011-104 | 1 |
|  | Nut - 3/8"-16 Zinc Flanged Lock | 312-1001-164 | 3 |
|  | Tape - 3.5" Double-Sided | 332-0000-019 | 6 |

CHAPTER

3

*Cab Component
Installation*

Install the SmarTrax Node

Mount the SmarTrax Node

FIGURE 1. SmarTrax Node Mounting Location



1. Lift the floor mat from the left side of the operator's seat to expose the floor.
2. Remove the floor plate from the left-rear corner of the cab.

Note: *Keep the floor plate for future use. The screws will be used later in the installation procedure.*

FIGURE 2. SmarTrax Node Installed on Mounting Bracket



3. Mount the SmarTrax node (P/N 063-0173-228) on the node mounting bracket (P/N 107-0171-947) using three 3/8"-16 zinc flanged lock nuts (P/N 312-1001-164).

FIGURE 3. SmarTrax Node Installed



4. Position the node mounting bracket over the hole in the floor.
5. Secure the node mounting bracket to the floor using the screws that were removed in step 2.

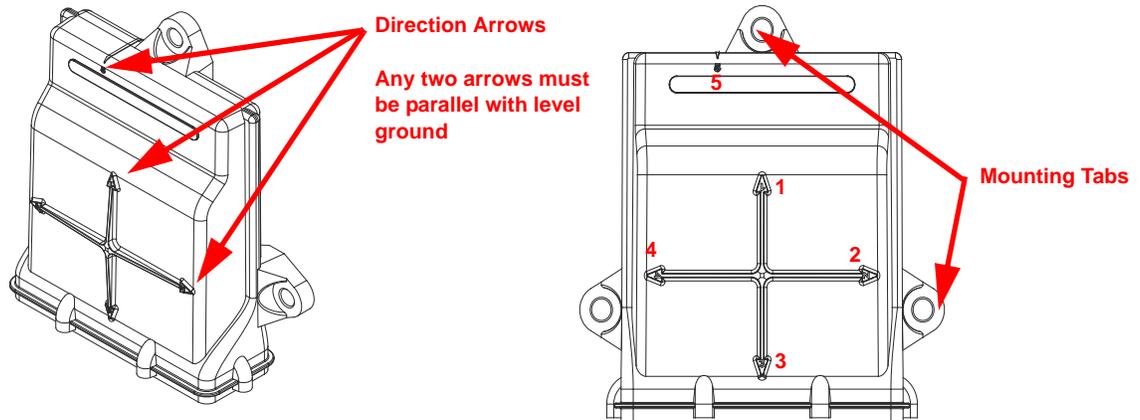
FIGURE 4. Node Harness Installed on Node



6. Install the two large, rectangular connectors of the node harness (P/N 115-4001-187) into the correct ports of the node.
7. Tighten the bolts on the harness connectors to secure the connections.

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.

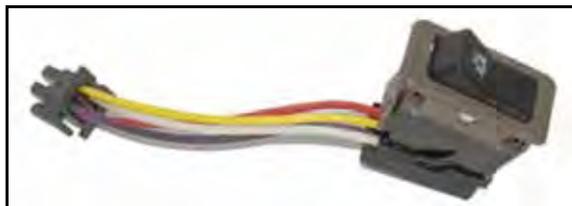
Note: *The foot switch should be installed in a location where the operator has easy access to it and is able to fully press the pedal.*

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. Locate the ENABLE connector on the node harness (P/N 115-4001-187) and connect it to the foot switch cable connector.

Install the Road Switch

1. Locate an unused switch port in the armrest console.
2. Use a flat-head screwdriver to gently remove the cover of the unused switch port.
3. Route the ROAD SWITCH connector of the node harness (P/N 115-4001-187) into the machine's console and through the open port.

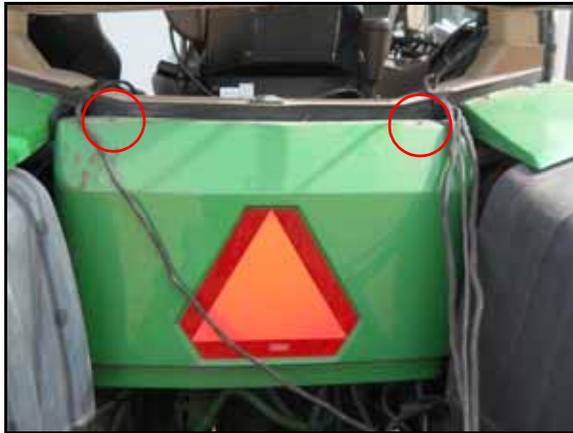
FIGURE 7. Road Switch



4. Connect the ROAD SWITCH connector to the road switch (P/N 412-2011-104).
5. Feed the wires back into the console.
6. Press on the switch casing to ensure the switch is securely installed.

Connect the Node Harness to the Machine's Steering ECU

FIGURE 8. Screws to be Removed



1. Remove the screws from the shield located outside the rear cab window.

FIGURE 9. Machine's Steering ECU

9X20 Series



9X30 Series



2. Locate the John Deere steering ECU.
3. Locate the ring terminal labeled TO ECU GND SCREW on the node harness (P/N 115-4001-187).

FIGURE 10. Node Harness Installed on Steering ECU

9X20 Series



9X30 Series



4. Route the connector out of the cab toward the steering ECU.
5. Install the TO ECU GND SCREW ring terminal on the machine's steering ECU.
 - 9X20 Series Models - Remove one of the existing mounting screws from the steering ECU, align the TO ECU GND SCREW ring terminal over the hole, and reinstall the mounting screw.
 - 9X30 Series Models - Remove the ground screw from the steering ECU, align the TO ECU GND SCREW ring terminal over the hole, and reinstall the ground screw.
6. Reinstall the shield.

Install the Valve Harness and Interface Box

FIGURE 11. Node and Valve Harness Connected to Interface Box



1. Connect the 12-pin mini Deutsch connector of the node harness (P/N 115-4001-187) into the mating connector of the interface box (P/N 063-0173-506).
2. Connect the 12-pin mini Deutsch connector of the valve harness (P/N 115-4001-188) into the mating connector of the interface box.

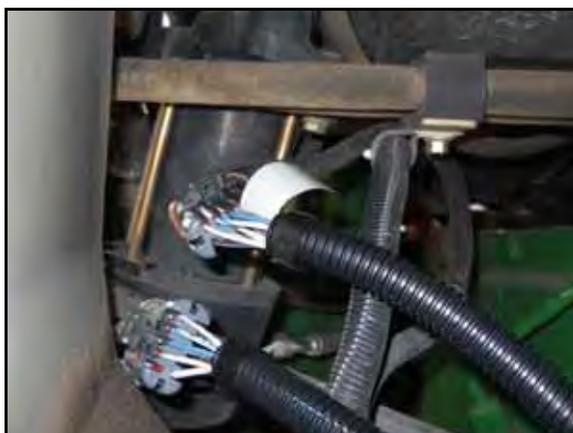
FIGURE 12. Interface Box Installed

3. Place four double-sided tape strips (P/N 332-0000-019) to the bottom of the interface box.
4. Remove the backing from the double-sided tape and adhere the interface box in a location close to the installed SmarTrax node (P/N 063-0173-228).
5. Route the valve harness outside and under the cab through the access hole in the node mounting plate (P/N 107-0171-947) toward the machine's steering control unit under the front of the cab.

FIGURE 13. Machine's Steering Control Unit Connection.

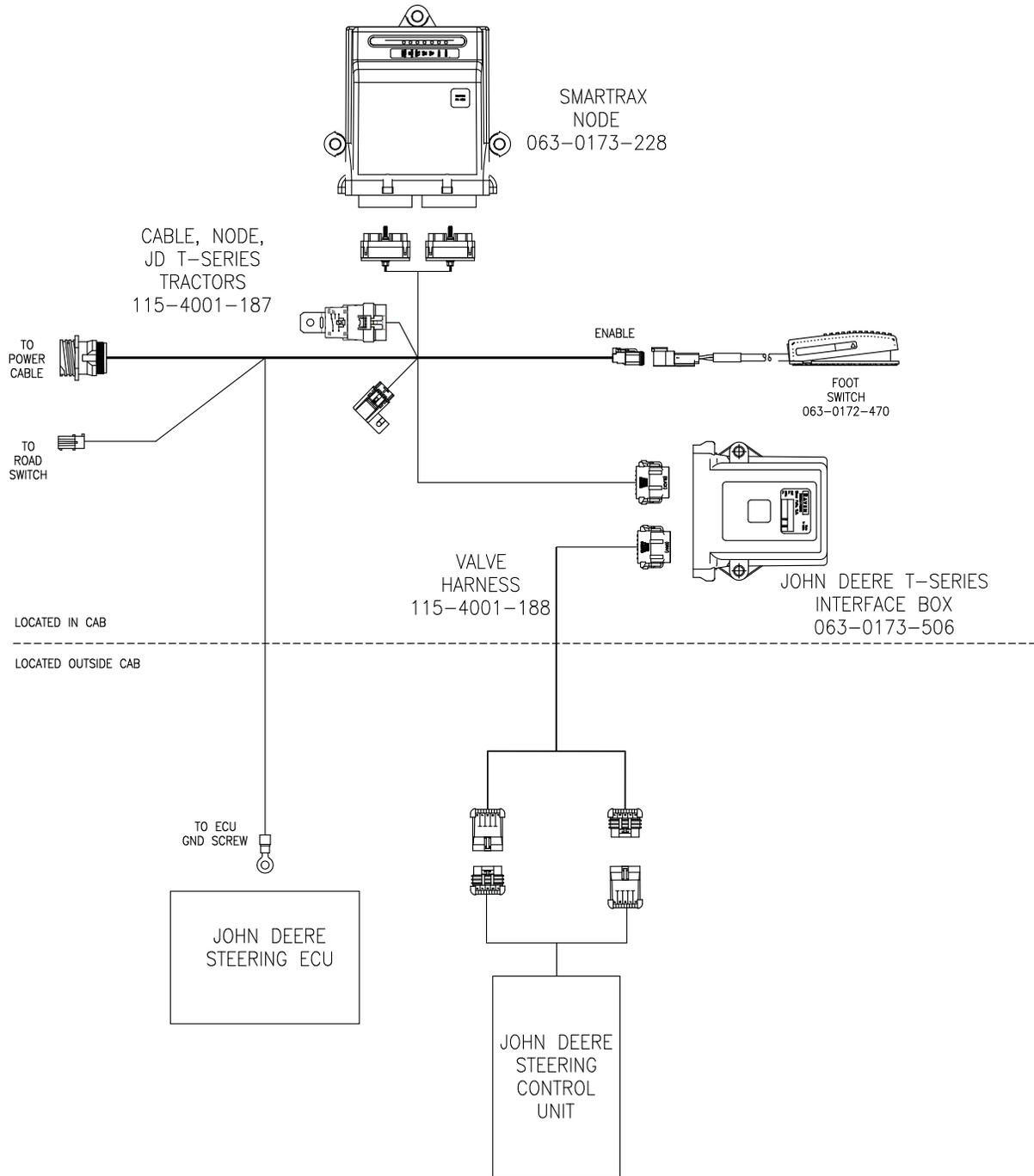
6. Locate and disconnect the machine's steering control unit connection.

FIGURE 14. Valve Harness Connected to Steering Control Unit



7. Connect the STEER IN and STEER OUT connectors from the valve harness to the mating steering control unit connectors.

FIGURE 15. 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 the 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 115-4001-187).
3. Connect the TO CONSOLE CABLE connector to the Raven field computer.
4. Install a terminator (P/N 063-0172-369) on the CAN cable connector.
5. Loop and tie-off the REMOTE 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 machine's existing CAN system.
2. Install the SmarTrax interface tee cable (P/N 115-4001-070 or 115-4001-071) between the chassis and Raven field computer harness.
3. Connect the SmarTrax node harness (P/N 115-4001-187) to the remaining SmarTrax interface tee.

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.

System Diagrams

C**Cab Component Installation**

- Calibrating the SmarTrax System 16
- Connecting SmarTrax to an Existing Chassis Cable 16
- Connecting the Node Harness to the Machine's Steering ECU 11
- Installing the Chassis Cable - SmarTrax-Only Systems 16
- Installing the Foot Switch 10
- Installing the Road Switch 10
- Installing the SmarTrax Node 7
 - Mounting the SmarTrax Node 7
 - Node Mounting Locations 9
- Installing the Valve Harness and Interface Box 12
- System Diagrams 17

I**Important Safety Information 1****Introduction 3**

- Kit Contents 5
- Preparing for Installation 3
 - Point of Reference 4
 - Recommendations 4
- Updates 5

K**Kit Contents 5**

RAVEN

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 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.

RAVEN

John Deere T Series
SmarTrax™ Installation Manual
(P/N 016-5034-018 Rev A 04/13 E20808)



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. :1 605-575-0722
Fax: 605-331-0426
www.ravenhelp.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.

©Raven Industries, Inc. 2013