John Deere 4X40, 4X50, 4X55, and 4X60 Raven RS1™ MD Guidance and Steering Installation Manual

P/N 016-5030-204 Rev. A *05/17* *E29523*

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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 RS1™ MD 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 RS1 MD 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 RS1 MD, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate RS1 MD or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Remain in the operator's position or a safe working distance away from the booms at all times when RS1 MD is engaged.
- Disable RS1 MD when exiting from the operator's seat and machine.
- Do not drive the machine with RS1 MD enabled on any public road.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling RS1 MD when the safe working distance has diminished.
- Ensure RS1 MD is disabled prior to starting any maintenance work on RS1 MD or the machine.

⚠ WARNING

- When starting the machine for the first time after installing RS1 MD, be sure that all persons stand clear in case a hose has not been properly tightened.
- The machine must remain stationary and switched off, with the booms unfolded and supported, during installation or maintenance.

⚠ CAUTION

GENERAL

- 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.
- A minimum of 12 VDC is required for system operation with a maximum of 15 VDC.

INSTRUCTIONS FOR WIRE ROUTING

The word "harness" is used to mean all electrical leads and cables, bundled and unbundled. When installing harness, secure it at least every 30 cm (12in) to the frame. Follow existing harness as much as possible and use these guidelines:

Harness should not contact or be attached to:

- Lines and hoses with high vibration forces or pressure spikes
- Lines and hoses carrying hot fluids beyond harness component specifications

Avoid contact with any sharp edge or abrading surfaces such as, but not limited to:

- Sheared or flame cut edges
- Edges of machined surfaces
- Fastener threads or cap screw heads
- Ends of adjustable hose clamps
- Wire exiting conduit without protection, either ends or side of conduit
- Hose and tube fittings

Routing should not allow harnesses to:

- Hang below the unit
- Have the potential to become damaged due to exposure to the exterior environment. (i.e. tree limbs, debris, attachments)
- Be placed in areas of or in contact with machine components which develop temperatures higher than the temperature rating of harness components
- Wiring should be protected or shielded if it needs to route near hot temperatures beyond harness component specifications

Harnessing should not have sharp bends

Allow sufficient clearance from machine component operational zones such as:

- Drive shafts, universal joints and hitches (i.e. 3-point hitch)
- Pulleys, gears, sprockets
- Deflection and backlash of belts and chains
- Adjustment zones of adjustable brackets
- Changes of position in RS1 MD and suspension systems
- Moving linkages, cylinders, articulation joints, attachments
- Ground engaging components

For harness sections that move during machine operation:

- Allow sufficient length for free movement without interference to prevent: pulling, pinching, catching or rubbing, especially in articulation and pivot points

- Clamp harnesses securely to force controlled movement to occur in the desired harness section
- Avoid sharp twisting or flexing of harnesses in short distances
- Connectors and splices should not be located in harness sections that move

Protect harnesses from:

- Foreign objects such as rocks that may fall or be thrown by the unit
- Buildup of dirt, mud, snow, ice, submersion in water and oil
- Tree limbs, brush and debris
- Damage where service personnel or operators might step or use as a grab bar
- Damage when passing through metal structures

IMPORTANT:

- Avoid directly spraying electrical components and connections with high pressure water. High pressure water sprays can penetrate seals and cause electrical components to corrode or otherwise become damaged. When performing maintenance:
- Inspect all electrical components and connections for damage or corrosion. Repair or replace components, connections, or cable as necessary.
- Ensure connections are clean, dry, and not damaged. Repair or replace components, connections, or cable as necessary.
- Clean components or connections using low pressure water, pressurized air, or an aerosol electrical component cleaning agent.
- Remove visible surface water from components, connections, or seals using pressurized air or an aerosol electrical component cleaning agent. allow components to dry completely before reconnecting cables.

CHAPTER 2 INTRODUCTION

Congratulations on your purchase of the RS1™ MD system!

The following instructions are designed to assist with the proper installation of the RS1 MD system. Refer to the RS1 Calibration & Operation Manual (P/N 016-4010-001) for assistance with calibrating the software and using the RS1 MD system.

This manual applies to the following machines:

MAKE: John Deere
MODEL: 4X40 - 4040, 4240, 4400, 4640, and 4840
4X50 - 4050, 4250, 4450, 4650, and 4850
4X55 - 4055, 4255, 4455, 4555, 4755, and 4955
4X60 - 4560, 4760, and 4960

FIGURE 1. John Deere 4955

PREPARING FOR INSTALLATION

Before installing the RS1 MD 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.

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 RS1 MD system for the first time, at the start of the season, or when moving the RS1 MD system to another machine:

- 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 4X40, 4X50, 4X55, and 4X60 Raven RS1™ MD Guidance and Steering Installation Manual
-P/N 016-5030-204 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 RS1 MD kit. Before beginning the system installation, compare the items in the kit with the components on this list. If you have questions about the kit, contact your Raven dealer..

TABLE 1. RS1 MD Installation Kit (P/N 117-5030-204)

Item Description	Part Number	Qty.
Manual - John Deere 4X40, 4X50, 4X55, and 4X60 RS1 MD Installation	016-5030-204	1
Assembly - Ring Gear	063-4001-011	1
Assembly - Spline Adapter	063-4001-024	1
Trim - Ring Gear Protective	019-0159-590	1
Assembly - Telescope Adapter	063-4001-027	1
Bracket - Collar	116-0159-732	1
Bearing - 1/2" Plastic Flanged	325-0000-036	1
Bolt - #10-24 x 3/4" UNC Zinc Carriage	311-0069-082	2
Nut - 3/8"-16 Zinc Flanged Lock	312-1001-167	3
Nut - #10-24 Wing	312-3000-013	2

TABLE 2. RS1 Roof Kit (P/N 117-5001-050)

Item Description	Part Number	Qty.
Bracket - RS1 Crossbar	107-4001-070	1
Bracket RS1 Fixed Mounting	107-0172-531	1
Bracket - RS1 Latch	116-0159-802	1
Spacer - 50 mm x 21.5 mm x 28 mm Steel	305-1001-004	4

TABLE 2. RS1 Roof Kit (P/N 117-5001-050)

Item Description	Part Number	Qty.
Screw - 1/4"-20 x 1/2" UNC Countersink Machine	311-0003-041	2
Bolt - 5/16"-18 x 1-1/4" Hex	311-0052-106	2
Bolt - 5/8"-11 x 5-1/2" Grade 5 Hex	311-0060-100	2
Nut - 5/816"-18 Nylon Insert Lock	312-4000-059	2
Washer - 5/16" Flat	313-2300-312	2
Washer - 5/8" Flat	313-2300-321	2

TABLE 3. RS1 MD Controller Kit (P/N 117-5030-197)

Item Description	Part Number	Qty.
Assembly - Mechanical Drive (MD) Unit	063-4001-010	1
Cable - RS1 MD 15' Tee Adapter	115-4010-004	1
Cable - RS1 MDU Harness	115-4010-008	1
Pin - Anti-Rotation	107-4001-004	1
Switch - Foot	063-0172-470	1

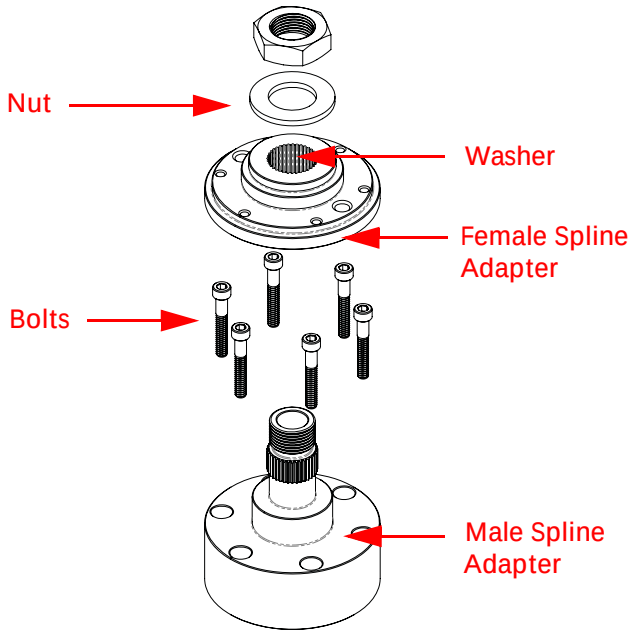
TABLE 4. RS1 Unit Kit

Item Description	Part Number	Qty.
Manual - RS1 Operation	016-4010-001	1
Unit - RS1	063-0173-820, 063-0173-921, or 063-0173-922	1

CHAPTER 3 MECHANICAL DRIVE INSTALLATION

DISASSEMBLE THE MECHANICAL DRIVE SPLINE ASSEMBLY

FIGURE 1. Spline Assembly Disassembled



1. Locate the 7/8" 36 tooth spline adapter assembly (P/N 063-4001-024).
2. Disassemble the spline adapter assembly as shown in Figure 1 above.

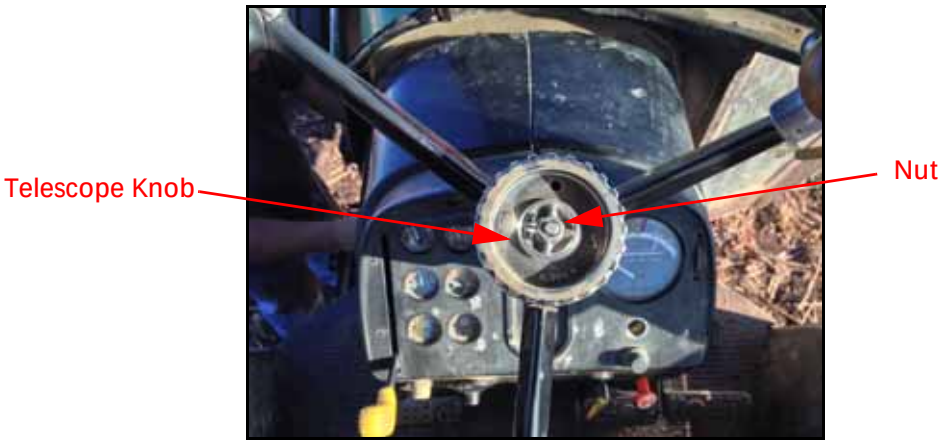
REMOVE THE STEERING WHEEL

NOTE: The steps in this section require use of a steering wheel puller (not supplied). For questions on the proper procedure for removing the steering wheel, contact your local equipment dealer.

FIGURE 2. Steering Wheel Cap

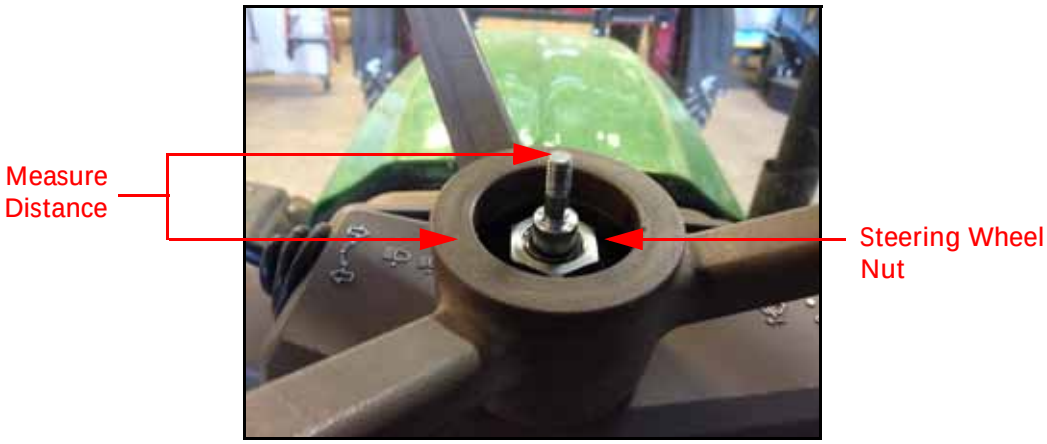
1. Remove the cap from the center of the steering wheel.

FIGURE 3. Telescope Knob and Nut to be Removed



2. Remove the nut used to secure the telescope knob.
3. Remove the telescope knob.

FIGURE 4. Machine's Telescope Knob Removed



4. Measure the distance from the top of the telescope stem to the top of the steering wheel hub.

NOTE: The measurement will be used later in the installation procedure.

FIGURE 5. Steering Wheel Removed

5. Remove the nut used to secure the steering wheel to the steering column.
6. Using the steering wheel puller, remove the steering wheel from the steering column.

FIGURE 6. Steering Column Collar Removed

7. Remove the snap ring used to secure the steering column collar.
8. Remove the collar.

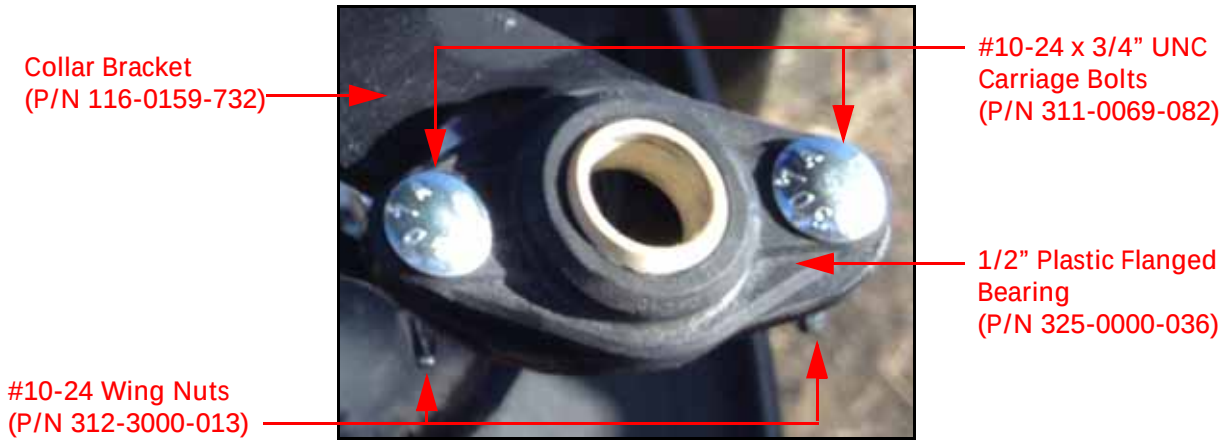
INSTALL THE ANTI-ROTATION BRACKETS

1. Identify the anti-rotation bracket mounting location on the lower portion of the steering column that does not move.

FIGURE 7. Anti-Rotation Bracket Installed

2. Clamp the collar bracket (P/N 116-0159-732) around the steering column and secure it with the supplied bolts.

FIGURE 8. Bearing Installed



3. Install the 1/2" plastic flanged bearing (P/N 325-0000-036) on the short leg of the collard bracket (P/N 116-0159-732) using two #10-24 x 3/4" carriage bolts (P/N 311-0069-082) and two #10-24 wing nuts (P/N 312-3000-013).

INSTALL THE SPLINE AND RING GEAR ASSEMBLIES

FIGURE 9. Female Spline Adapter Installed on Steering Column

1. Install the female spline adapter on the machine's telescope stem.

FIGURE 10. Telescope Adapter Installed

2. Install the machine's steering wheel nut that was removed during the steering wheel removal.
3. Install the telescope adapter assembly (P/N 063-4001-023) on the machine's telescope rod, aligning the set screws with the flat part of the stem.
4. Tighten the set screws in the telescope adapter assembly.

FIGURE 11. Ring Gear Installed

5. Place the ring gear assembly (P/N 063-4001-024) over the female spline adapter with the black ring facing down and the holes in the ring gear aligned with the holes in the female spline adapter.

FIGURE 12. Male Spline Assembly Installed

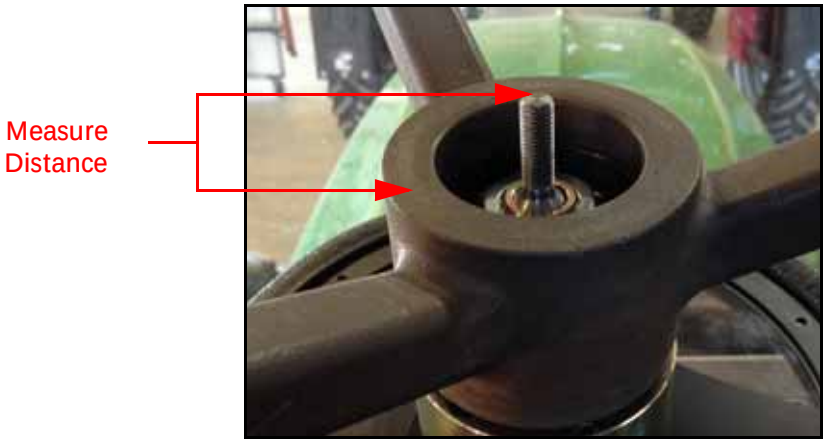
6. Align the bolt holes in the male spline assembly with the holes in the ring gear assembly.
7. Install and tighten the bolts to secure the male spline adapter to the ring gear and female spline adapter.

REINSTALL THE STEERING WHEEL

FIGURE 13. Steering Wheel Placement

1. Align the spokes of the machine's steering wheel with the spokes on the installed ring gear assembly.
2. Install the steering wheel on the male spline adapter.
3. Install the washer and nut on the protruding male spline adapter.

FIGURE 14. Distance Measurement

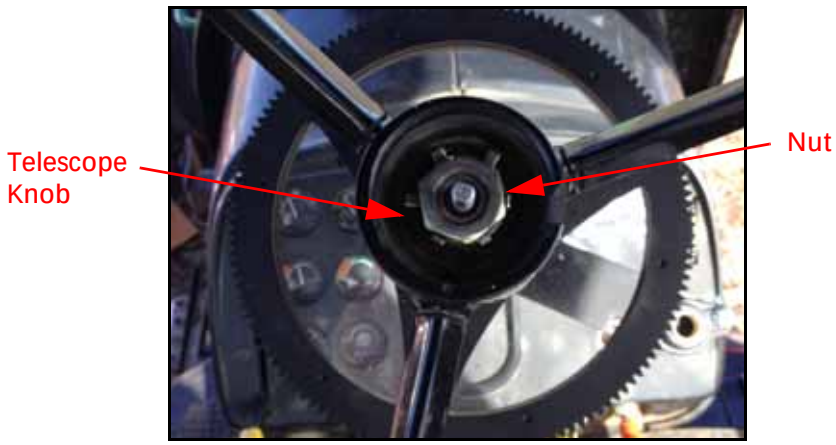


4. Measure the distance from the top of the telescope stem to the top of the steering wheel hub to verify the distance is close to the measurement taken when the steering wheel was removed.

NOTE: If the distance is not close to the first measurement:

1. Remove the spline nut, washer, and assembly bolts.
2. Remove the male spline adapter.
3. Loosen the set screws used to secure the installed telescope adapter.
4. Adjust the placement of the telescope adapter on the machine's telescope rod, relative to the distance between the two measurements.
5. Tighten the set screws and reinstall the male adapter and assembly bolts.
6. Reinstall the spline washer and nut.

FIGURE 15. Telescope Knob and Nut Reinstalled



5. Reinstall the machine's steering wheel telescope knob.
6. Reinstall the nut that was removed during the steering wheel removal on the protruding telescope adapter (P/N 063-4001-023).

FIGURE 16. Steering Wheel Cap Reinstalled

7. Replace the steering wheel cap.

INSTALL THE MECHANICAL DRIVE

NOTE: Depending on the machine's configuration, it may be necessary to install the anti-rotation pin in the mechanical drive's casing after the mechanical drive is installed instead of before as indicated in the instructions below.

FIGURE 17. Anti-Rotation Pin Installation Locations

1. Determine the anti-rotation pin (P/N 107-4001-004) installation location on the mechanical drive (P/N 063-4001-010) based on the anti-rotation bracket installation location.
2. Screw the anti-rotation pin into the mechanical drive's casing.

FIGURE 18. Anti-Rotation Pin Installed in Bracket Assembly

3. Insert the anti-rotation pin into the installed flanged bearing (P/N 325-0000-036) on the anti-rotation bracket assembly.

FIGURE 19. Mechanical Drive Installed

4. Install the mechanical drive around the installed ring gear assembly, closing it firmly until the latch on the casing is securely locked.
5. Tighten all nuts to ensure the anti-rotation bracket assembly is installed securely.

CHAPTER 4 CAB COMPONENT INSTALLATION

INSTALL THE RS1 UNIT

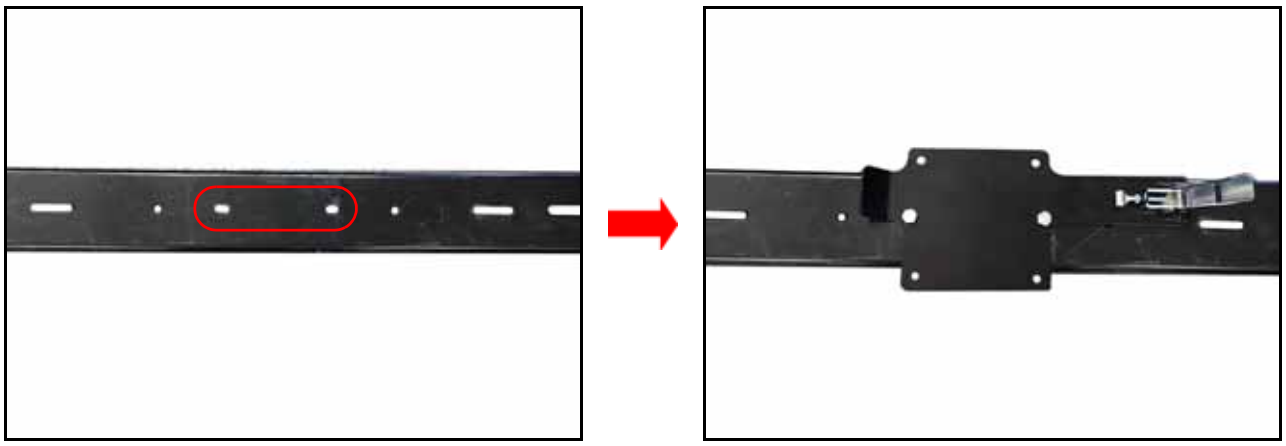
1. Identify the RS1 unit mounting location in the center of the cab roof.

FIGURE 1. Machine's Bolts and Washers to be Removed

2. Remove the machine's existing bolts from the cab roof.

NOTE: Leave the machine's existing washers in place.

FIGURE 2. RS1 Crossbar Assembly



3. Install the RS1 latch bracket (P/N 116-0159-802) on the RS1 crossbar bracket (P/N 107-4001-070) using two 5/16"-18 x 1-1/4" hex bolts (P/N 311-0052-106), two 5/16"-18 flat washers (P/N 313-2300-312), and two 5/16"-18 nylon insert lock nuts (P/N 312-4000-059).

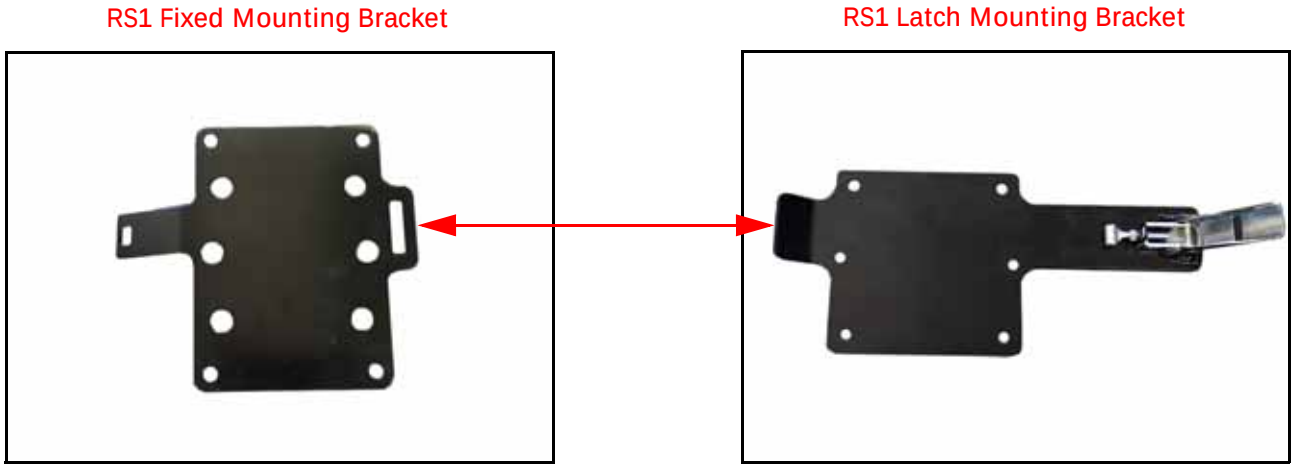
FIGURE 3. RS1 Crossbar Assembly Installed

4. Position two 50 mm x 21.5 mm x 28 mm steel spacers (P/N 305-1001-004) over each hole in the cab roof from which the bolts were removed.
5. Align the holes in the RS1 crossbar assembly with the holes in the steel spacers.
6. Secure the RS1 crossbar assembly to the cab roof using two 5/8″-11 x 5-1/2″ grade 5 hex bolts (P/N 311-0060-100) and two 5/8″ flat washers (P/N 313-2300-321).

FIGURE 4. RS1 MD Fixed Mounting Bracket Installed

7. Install the RS1 fixed mounting bracket (P/N 107-0172-531) on the bottom of the RS1 unit using four 1/4″-20 x 1/2″ UNC countersink machine screws (P/N 311-0003-041).

FIGURE 5. RS1 Latch Bracket and Fixed Mounting Bracket



8. Insert the tab of the RS1 latch mounting bracket into the slotted tab of the RS1 fixed mounting bracket to interlock the brackets.

FIGURE 6. RS1 MD Unit Installed

9. Secure the RS1 fixed mounting bracket to the latch mounting bracket by securing the latch.

NOTE: It may be necessary to adjust the latch in order to secure the RS1 unit.

INSTALL THE FOOT SWITCH

FIGURE 7. 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 suing the supplied screws in each of the mounting holes.

INSTALL THE RS1 CABLES

INSTALL THE RS1 TEE CABLE

FIGURE 8. RS1 Cable Connection

1. Connect the black 12-pin connector of the RS1 tee cable (P/N 115-4010-004) to the back of the RS1 unit.
2. Route the cable into the cab.

FIGURE 9. 15' RS1 Tee Cable Connected to Machine's Power Cable

3. Connect the round 21-pin connector of the RS1 tee cable to the mating 21-pin connector of the chassis power cable.

INSTALL THE RS1 CABLE

FIGURE 10. RS1 Tee Cable Connected to RS1 MD Cable

1. Connect the gray 12-pin connector of the RS1 tee cable (P/N 115-4010-004) to the mating 12-pin connector of the RS1 MD cable (P/N 115-4010-008).
2. Connect the ENABLE connector of the RS1 MD cable (P/N 115-4010-008) to the cable of the installed foot switch (P/N 063-0172-470).

FIGURE 11. **Mechanical Drive Connection**

3. Connect the 8-pin Deutsch connector from the RS1 MD cable into the 8-pin port of the mechanical drive (P/N 063-4001-010).

INSTALL THE CONSOLE CABLE

FIGURE 12. RS1 MD Connected to Console Cable

1. Connect the round 21-pin connector of the RS1 MD cable (P/N 115-4010-008) to the mating 21-pin console cable (P/N 115-7300-136 or 115-7300-107).

FIGURE 13. Console Cable Connected to Console

2. Connect the cable connectors to the back of the console.

INSTALL THE CHASSIS CABLE - RS1 MD-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 RS1 MD system. If a CAN system already exists on the machine, refer to Connect RS1 MD to an Existing Chassis Cable (If Applicable) below to connect power to the RS1 MD system.

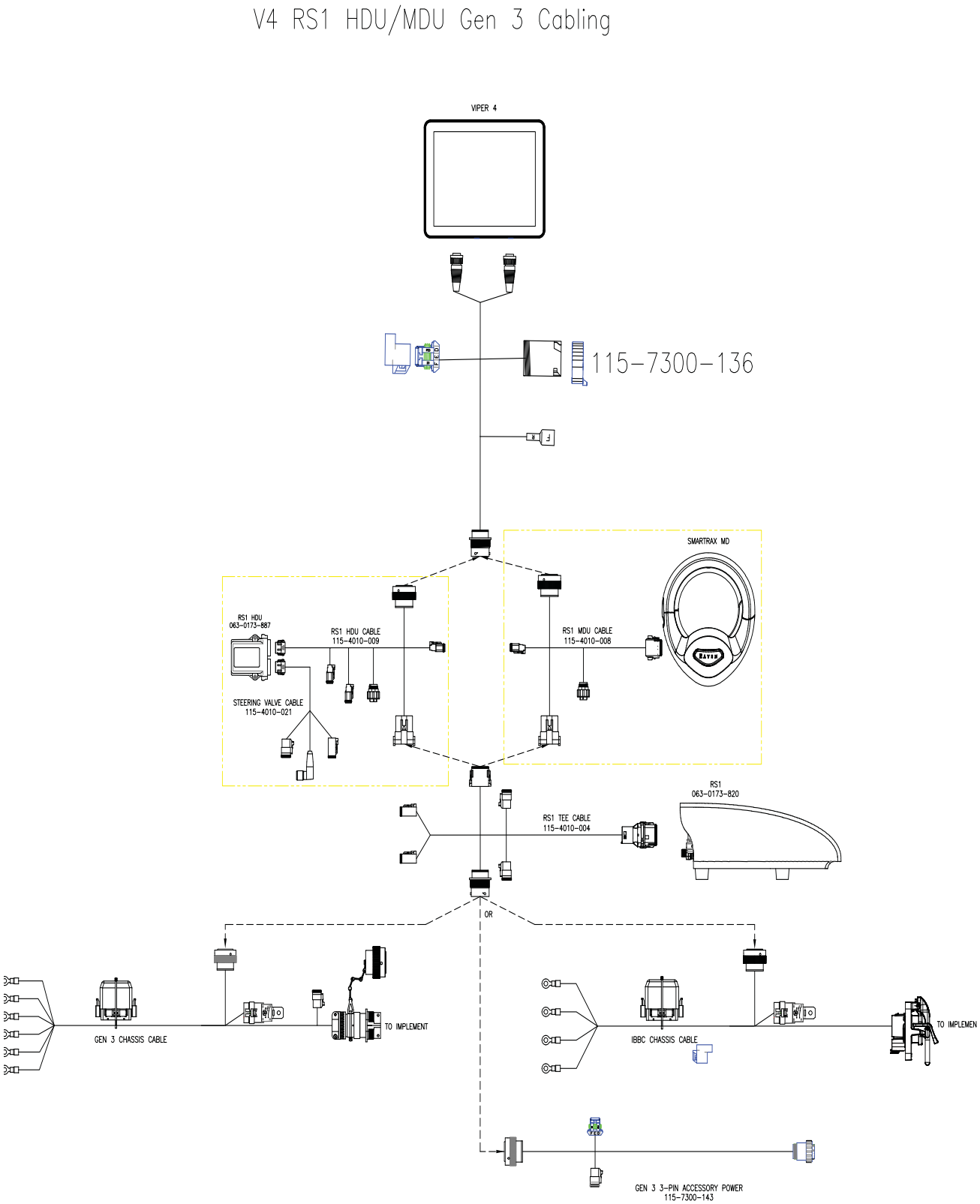
NOTE: The chassis cable is sold separately. Contact your local Raven dealer for ordering information.

1. Locate the RS1 chassis cable (P/N 115-7300-141).
2. Connect the TO CAB CABLE connector to the 21-pin connector of the RS1 tee cable (P/N 115-4010-004).
3. Connect the ring terminals to the battery.

CONNECT RS1 MD TO AN EXISTING CHASSIS CABLE (IF APPLICABLE)

1. Disconnect the 21-pin connector of the chassis harness from the 21-pin connector of the console cable.
2. Connect the 21-pin connector of the chassis harness to the 21-pin connector of the RS1 tee cable (P/N 115-4010-004).
3. Connect the 21-pin connector of the console cable to the 21-pin connector of the RS1 MD tee cable (P/N 115-4010-008).

SYSTEM DIAGRAMS



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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 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.

016-0171-537 Rev. A, E19889

RAVEN

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.