

Case IH Patriot 4440 -
Steering Ready, Model
Year 2013-2016 Raven SC1
HDU Guidance and
Steering Installation

016-5032-144 Rev. C

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SAFETY

NOTICE

Follow the operation and safety instructions included with the implement and/or controller and read this manual carefully before installing or operating this Raven system.

- Follow all safety information presented within this manual. Review implement operation with your local dealer.
- Contact a local Raven dealer for assistance with any portion of the installation, service, or operation of Raven equipment.
- Follow all safety labels affixed to system components. Be sure to keep safety labels in good condition and replace any missing or damaged labels. Contact a local Raven dealer to obtain replacements for safety labels.

Observe the following safety measures when operating the implement after installing this Raven system:

- Do not operate this Raven system or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Be alert and aware of surroundings and remain in the operator seat at all times when operating this Raven system.
 - Do not operate the implement on any public road with this Raven system enabled.
 - Disable this Raven system before exiting the operator seat.
 - Determine and remain a safe working distance from obstacles and bystanders. The operator is responsible for disabling the system when a safe working distance has diminished.
 - Disable this Raven system prior to starting any maintenance work on the implement or components of this Raven system.
- Do not attempt to modify or lengthen any of the system control cables. Extension cables are available from a local Raven dealer.

DISPLAYS AND CONTROL CONSOLES

- If the display will not be used for an extended period, it is best to remove the display from the machine and store it in a climate controlled environment. This may help to extend the service life of electronic components.
- To prevent theft, secure the display and GPS antenna when leaving the machine unattended.

 **CAUTION**

ELECTRICAL SAFETY

- Always verify that power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the Raven system or other components.
- To prevent personal injury or fire, replace defective or blown fuses with only fuses of the same type and amperage.
- Do not connect the power leads to the battery until all system components are mounted and all electrical connections are completed.
- Always start the machine before initializing this Raven system to prevent power surges or peak voltage.
- To avoid tripping and entanglement hazards, route cables and harnesses away from walkways, steps, grab bars, and other areas used by the operator or service personnel when operating or servicing the equipment.

RECOMMENDATIONS AND BEST PRACTICES

HARNESS ROUTING

The word “harness” is used to describe any electrical cables and leads, both bundled and unbundled. Use the following guidelines and recommendations when connecting and routing harnesses while installing or maintaining this Raven system:

- Leave protective caps/covers over harness connectors until needed to avoid dirt and moisture from contaminating electrical circuits.
- Secure the harness to the frame or solid structural members at least every 12 in [30 cm].
- Follow existing harness runs already routed on the implement as much as possible. Proper harness routing should:
 - Secure harnessing and prevent the harness from hanging below the implement.
 - Provide sufficient clearance from moving components and operational zones around shafts; universal joints and suspension components; pulleys, gears, belts, and chains; moving linkages, cylinders, articulation joints, etc.
 - Protect harnessing from field debris and surrounding hazards (e.g. tree limbs, fence posts, crop stubble, dirt clumps or rocks that may fall or be thrown by the implement).
 - Protect harnessing from sharp bends, twisting, or flexing over short distances and normal implement operation.
 - Connectors and splices should not be located at bending points or in harness sections that move.
 - Ensure sufficient length for free movement of the implement during normal operation and prevent pulling, pinching, catching, or rubbing, especially in articulation and pivot points. Clamp harnessing securely to force controlled movement of the harness.
 - Avoid abrasive surfaces and sharp edges such as sheared or flame cut corners, fastener threads or cap screw heads, hose clamp ends, etc.
- Do not connect, affix, or allow harnessing to come into contact with components with high vibration forces, hot surfaces, or components carrying hot fluids beyond the temperature rating of harness components.
 - Harnessing should be protected or shielded if routing requires the hose to be exposed to conditions beyond harnessing component specifications.

- Avoid routing harnesses in areas where damage may occur due to build up of material (e.g. dirt, mud, snow, ice, etc.).
- Avoid routing harnesses in areas where the operator or service personnel might step or use as a grab bar.

IMPORTANT: Avoid applying direct spray or pressure washing of electrical components and connections. High pressure streams and sprays can penetrate seals, cause corrosion, or otherwise damage electrical components.
When performing maintenance:

- Inspect electrical components and connectors for corrosion, damaged pins or housings, etc. Repair or replace components or harnessing as necessary.
- Ensure connectors are kept clean and dry. Apply dielectric grease to the sealing surfaces of all connections exposed to moisture, dirt, debris, and other contaminants. Repair or replace harnessing as necessary.
- Clean electrical components with pressurized air, aerosol electrical cleaning agent, or low pressure rinse.
- Remove visible surface water from electrical components and connections using pressurized air or an aerosol cleaning agent. Allow components to dry thoroughly before reconnecting cables.

CHAPTER

INTRODUCTION

2

Congratulations on your purchase of the SC1 HDU system!

The following instructions are designed to assist with the proper installation of the SC1 HDU system. Refer to the SC1 Calibration & Operation Manual (P/N 016-4010-001) for assistance with calibrating the software and using the SC1 HDU system.

PREPARING FOR INSTALLATION

Before installing the SC1 HDU 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 SC1 HDU system for the first time, at the start of the season, or when moving the SC1 HDU system to another machine:

- Install the SC1 unit in the recommended location.
- 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

Updates for Raven manuals as well as software updates for Raven consoles, and product controllers are available at the Applied Technology Division web site:

<https://portal.ravenprecision.com>

Sign up for e-mail alerts to receive notifications when updates for your Raven products are available on the Raven web site.

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

- Case IH Patriot 4440 - Steering Ready, Model Year 2013-2016 Raven SC1 HDU Guidance and Steering Installation Manual
- 016-5032-144 Rev. C
- 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 SC1 HDU 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.

FIGURE 1. SC1/HDU Installation Kit (P/N 117-5032-144 Rev. B1)

QTY	PART #	DESCRIPTION
1	053-0159-087	BOX, SHIPPING
1	063-0173-887	ECU HYDRAULIC DRIVER UNIT
1	063-0173-990	ECU, ISO, SC1, STANDARD
1	115-4010-101	CABLE, SC1, CNH PATRIOT 4XXX, MY 13-16
1	107-0172-543	BRACKET, NODE MOUNTING, HDU GENERIC
1	115-4010-032	CABLE, WAS ADAPTER, 4P DTM TO M12
1	115-0172-458	CABLE, 4 PIN CAN BRIDGE
1	107-0172-578	BRACKET, HDU/BOOM SENSE, GENERIC
1	016-0171-649	SHEET, WARRANTY/HELP
1	115-4010-105	CABLE, GPS, TRIMBLE 372 TO SC1
1	016-4010-005	MANUAL, OPERATION, SC1
1	053-0159-074	ENVELOPE, PLASTIC
2	311-4055-137K	BOLT, M6 X 25 X 1.0, HEX HEAD
6	313-1000-046	WASHER, LOCK, M6
4	312-1001-168	NUT, FLANGED LOCK, 1/4"-20
4	312-1001-183	NUT, HEX M6 1MM PITCH DIN 934, CLEAR PLATED ZINC
1	117-0192-049	(BOX LABELED 2 OF 2) KIT, WAS, CIH PATRIOT



FIGURE 2. Wheel Angle Sensor Kit (P/N 117-0192-049 Rev. E)

QTY	PART #	DESCRIPTION
1	053-0159-118	BOX, SHIPPING
1	107-0172-649	BRACKET, WAS, CIH PATRIOT, BASE END, STRAIGHT
1	416-0001-052	SENSOR, LINEAR NON-CONTACT, 300MM
1	116-0159-840	WELDMENT, WAS, CIH PATRIOT, BASE END, L SHAPE
1	053-0159-074	ENVELOPE, PLASTIC
2	103-0001-029	MOUNT, UNIVERSAL, M10 BALL
1	107-0172-030	BRACKET, WAS ROD MOUNTING
2	107-0172-037	SPACER, STEEL .406" ID X .750" OD X .75" LONG
2	312-1002-035	NUT, JAM, M10 X 1.5 PITCH X 5MM THICK
2	312-4000-059	NUT, 5/16"-18, LOCK NYLON INSERT
1	311-4050-226K	BOLT, HEX, METRIC, M10-1.5 X 40mm, CLASS 8.8
2	312-6001-042K	NUT, M10 X 1.5 LOCK NYL INSERT
1	311-0070-060	BOLT, FLANGED HEX, METRIC, M10-1.5 X 35mm, CLASS 8.8
4	313-2301-005	WASHER, FLAT, 5/16" SS
1	435-3003-056	CLAMP, U-BOLT, 1.25" X 5/16"-18
2	311-4070-140L	SCREW, SHCS, M6-1x40, 8.8, CLASS III
2	312-6000-017L	HEX NUT, M6-1, CLASS 8 STEEL, CLASS III COATING
2	313-1000-046	WASHER, HELICAL LOCK, 6MM
2	313-2300-129	WASHER, FLAT, 6MM, STEEL
2	107-0172-103	SPACER, STEEL .406" ID X .750" OD X .375" LONG

CHAPTER

3

WHEEL ANGLE SENSOR INSTALLATION

ASSEMBLE THE WHEEL ANGLE SENSOR (WAS)

FIGURE 1. WAS

Base-End
of Sensor



Rod-End of
Sensor

1. Install the M10 universal ball mounts (P/N 103-0001-029) and M10 jam nuts on both ends of the linear WAS (P/N 416-0001-052).
2. Leave the nuts and ball mounts loose until the sensor is installed later in the procedure.

INSTALL THE WAS

1. Park the machine on a level surface with the wheels pointing to the left.
2. Install the WAS base end mounting brackets on the right steering cylinder clevis using the provided M8 flat-head machine screws, flat washers, lock washers, and nuts.

FIGURE 2. WAS Base End Mounting Brackets Installed

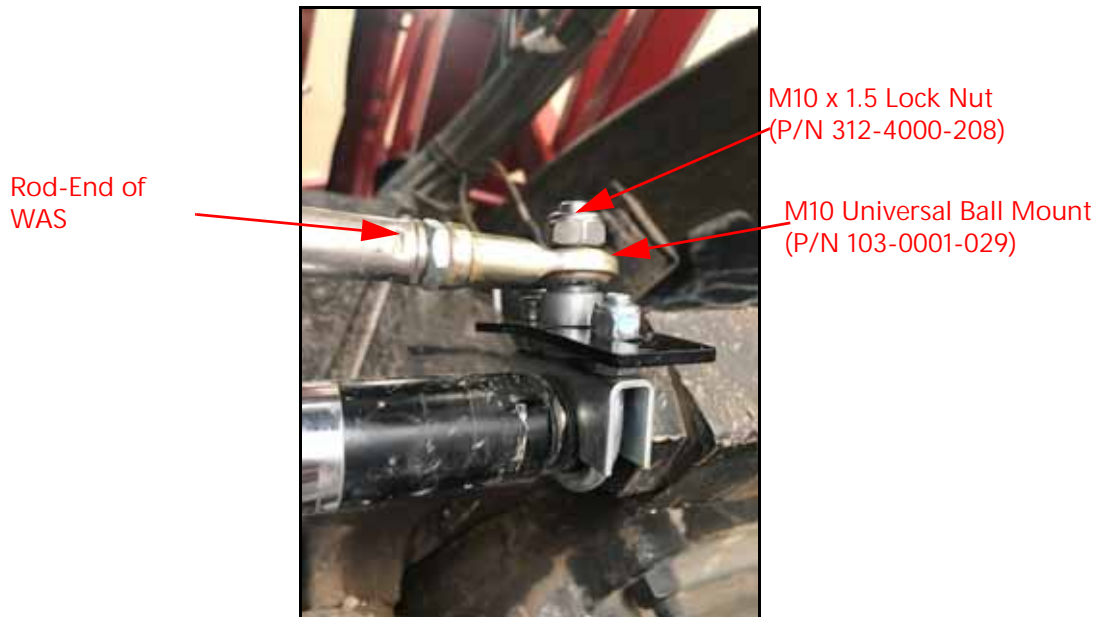


FIGURE 3. Small WAS Mounting Bracket Installed on Rod-End of Steering Cylinder



3. Remove the nuts and clamp from the 1-1/4" U-bolt clamp (P/N 435-3003-056).
4. Install the U-bolt clamp on the threaded rod-end of the right steering cylinder adjacent to the existing jam nut, positioning the U-bolt so that the threaded ends point upward.
5. Tighten the nuts to secure the U-bolt clamp in place.
6. Install 5/16" washers on the ends of the U-bolt clamp.
7. Insert one of the M10 x 1.5 x 40 metric hex bolts through the center hole of the small WAS mounting bracket (P/N 107-0172-030).
8. Install the small WAS mounting bracket on the ends of the U-bolt clamp so that the installed hex bolt points upward.
9. Install one 5/16" flat washer and one 5/16"-18 nylon insert lock nut on the each end of the U-bolt clamp to secure the small WAS mounting bracket.
10. Tighten the nuts to ensure the small WAS mounting bracket is installed securely.
11. Install a 0.406" ID x 0.750" OD x 0.375" long spacer (P/N 107-0172-037) on the end of the protruding hex bolt.

FIGURE 4. Rod-End of WAS Installed on Rod-End of Steering Cylinder



12. Install the ball mount on the rod-end of the WAS assembly on the installed hex bolt and secure it using an M10 x 1.5 lock nut.

FIGURE 5. Base-End of WAS Installed on Base-End of Steering Cylinder



13. Insert an M10 x 1.5 x 35 hex bolt (P/N 311-0070-025) through the back of the WAS base end mounting bracket.
14. Install the base-end of the WAS assembly on the hex bolt and secure it using an M10 x 1.5 nylon insert lock nut.
15. Orient the WAS so the cable plug is oriented as shown in Figure 5 on page 11.

FIGURE 6. WAS Installed



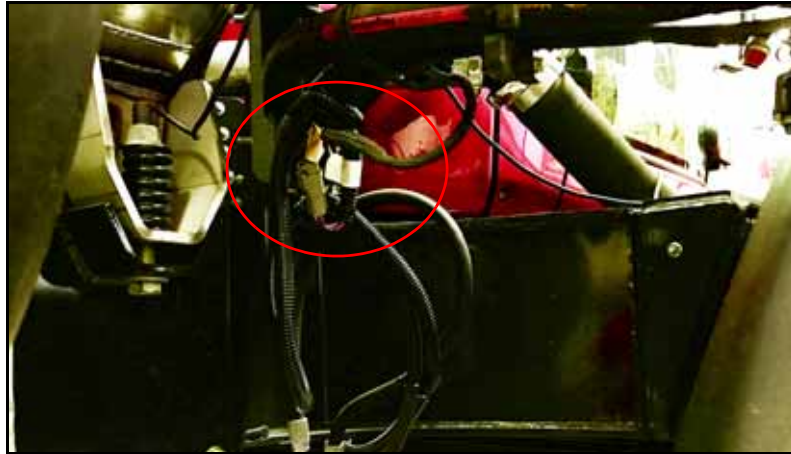
16. Tighten the M10 universal ball mounts and M10 jam nuts to each other on the WAS assembly to ensure they are installed securely.
17. Install the WAS adapter cable (P/N 115-4010-032) on the base-end of the WAS.

FIGURE 7. Machine's AUTO Yaw Connection



18. Disconnect the machine's existing X-716 connector located near the AutoSense Sensor and plug in the mating connector on the WAS adapter cable.

FIGURE 8. WAS Connection



CHAPTER

4

CAB COMPONENT INSTALLATION

INSTALL THE SC1 UNIT

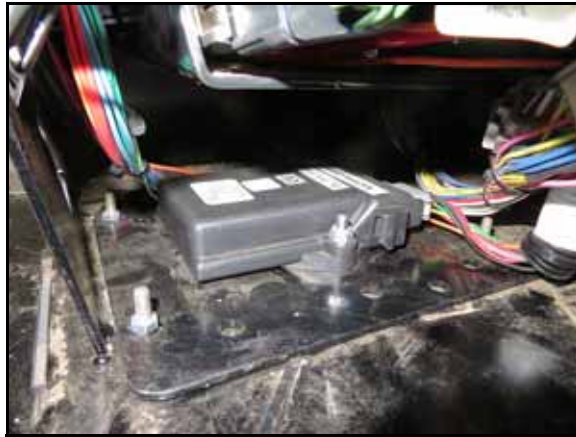
1. Locate the instruction seat in the cab.

FIGURE 1. Instruction Seat



2. Remove the instruction seat and compartment wall to access the SC1 mounting location.
3. Mount the SC1 node (P/N 063-0173-990) to the mounting studs on the node mounting bracket and secure using the supplied 1/4" - 20 flanged lock nuts (P/N 312-1001-168).
4. Mount the node and bracket assembly to the floor studs and secure to the floor using the supplied M6 x 1.0mm nuts (P/N 312-1001-183).

FIGURE 2. Node and Bracket Secured to Floor Studs



5. Route and connect the two rectangular connectors of the cable (P/N 115-4010-101) to the mating ports of the SC1 node).

INSTALL THE HYDRAULIC DRIVE UNIT (HDU)

FIGURE 3. SC1/HDU Harness Cable Installed on HDU



1. Install the two rectangular connectors of the SC1/HDU harness cable (P/N 115-4010-101) into the mating ports of the HDU (P/N 063-0173-887).

FIGURE 4. HDU Installed



2. Align the holes of the HDU with the holes in the instructional seat compartment wall closest to the operator's seat.
3. Secure the HDU to the instructional seat compartment wall using two M6 x 25 mm x 1.0 pitch hex bolts (P/N 311-0070-059).

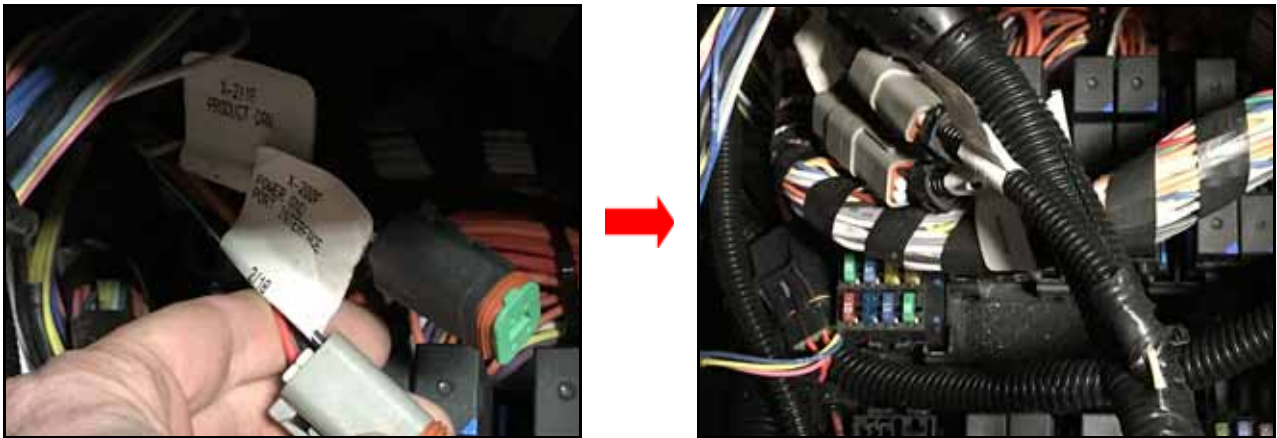
INSTALL THE SC1/HDU HARNESS CABLE

FIGURE 5. Vent Cover to be Removed



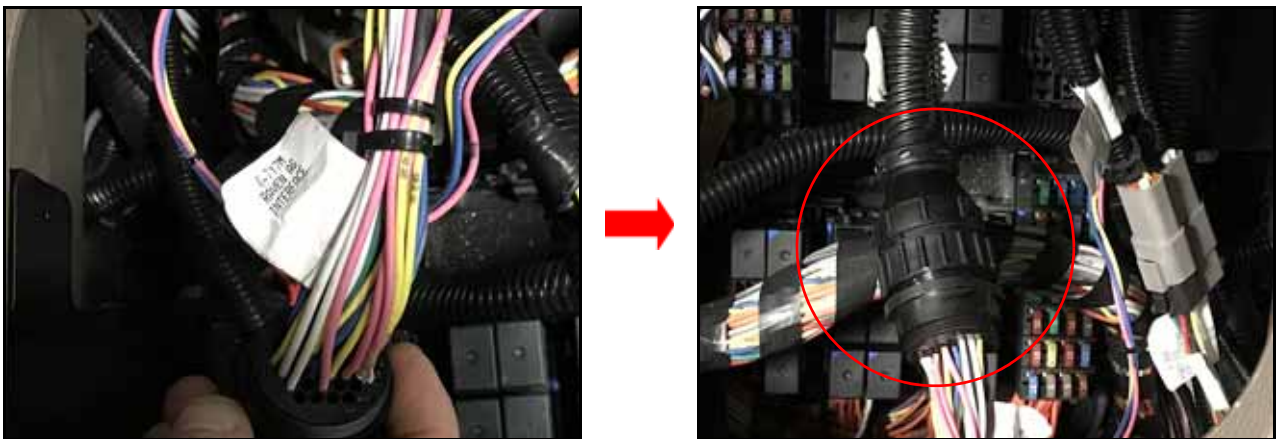
1. Remove the vent cover on the back wall of the cab, behind the operator's seat.

FIGURE 6. POWER and CAN Cable Connections



2. Locate the machine's X-200 POWER GND PORT INTERFACE connections on the machine's harness, stored in the vent compartment.
3. Connect the POWER connector of the SC1/HDU harness cable to the machine's X-200 POWER GND PORT INTERFACE.
4. Connect the 37-pin connector of the SC1/HDU harness cable to the machine's X-717 RAVEN AG INTERFACE connection, located on the floor of the instructional seat compartment.

FIGURE 7. 16-Pin Interface Connection



5. Route the 7-pin connector of the SC1/HDU harness out the back of the instructional seat, through the vent compartment, and along the cab door.

FIGURE 8. Viper 4 Cable Connection



6. Connect the round 7-pin connector to the back of the Viper 4 field computer.
7. Connect the ENABLE connector of the HDU switch harness cable to the installed foot switch's cable connector.

INSTALL THE CAN BRIDGE CABLE - IF APPLICABLE

1. Remove the terminator from the 4-pin connector next to the Viper 4 connection of the SC1/HDU harness cable (P/N 115-4010-026).

FIGURE 9. CAN Bridge Cable Connected to SC1/HDU Harness Cable



2. Install one end of the CAN bridge cable (P/N 107-0172-548) on the 4-pin connector.
3. Connect the other end of the CAN bridge cable to the mating connector of the Hawkeye harness cable.

INSTALL THE GPS RECEIVER CABLE

FIGURE 10. GPS Receiver Adapter Cable Connection



1. Locate and remove the existing cabling connecting the GPS receiver and the bulkhead connector to the roof.
2. Connect the two rectangular connectors of the cable (P/N 115-4010-105) to the GPS receiver.
3. Connect the remaining rectangular connector to the roof bulkhead connector.

IMPORTANT: If utilizing a 600S or 700S, complete the following steps:

NOTE: Ensure that all pin changes are made on the SC1 gray connector, NOT the HDU gray connector.

If serial 3D GPS OUT from the SC1 is NOT needed, complete these steps:

1. Identify the 600S/700S installation cable (P/N 115-0172-285), not included in kit.
2. Connect one end of the installation cable into the 600S/700.
3. Connect the other end of the installation cable into the roof bulkhead connector.
4. On the SC1 harness, remove pin #12 from the gray SC1 connector and populate it in pin #9 of the gray SC1 connector.

If serial 3D GPS OUT from the SC1 is needed, complete these steps:

1. Identify the 600S/700S installation cable (P/N 115-0172-285), not included in kit.
2. Connect one end of the installation cable to the 600S/700S.
3. On the other end of the installation cable, remove the black wire from pin #10 and remove the white wire from pin #7 on the 12-pin Deutsch connector.
4. Populate the black wire in pin #7, and populate the white wire in pin #10 of the 12-pin Deutsch connector.
5. Connect the 600S/700S into the roof bulkhead.
6. On the SC1 harness, remove pin #1 from the gray SC1 connector and populate it in pin #9 of the gray SC1 connector.

ROUTINE OPERATION

FIGURE 11. Master and Resume Switch Locations

Master Switch



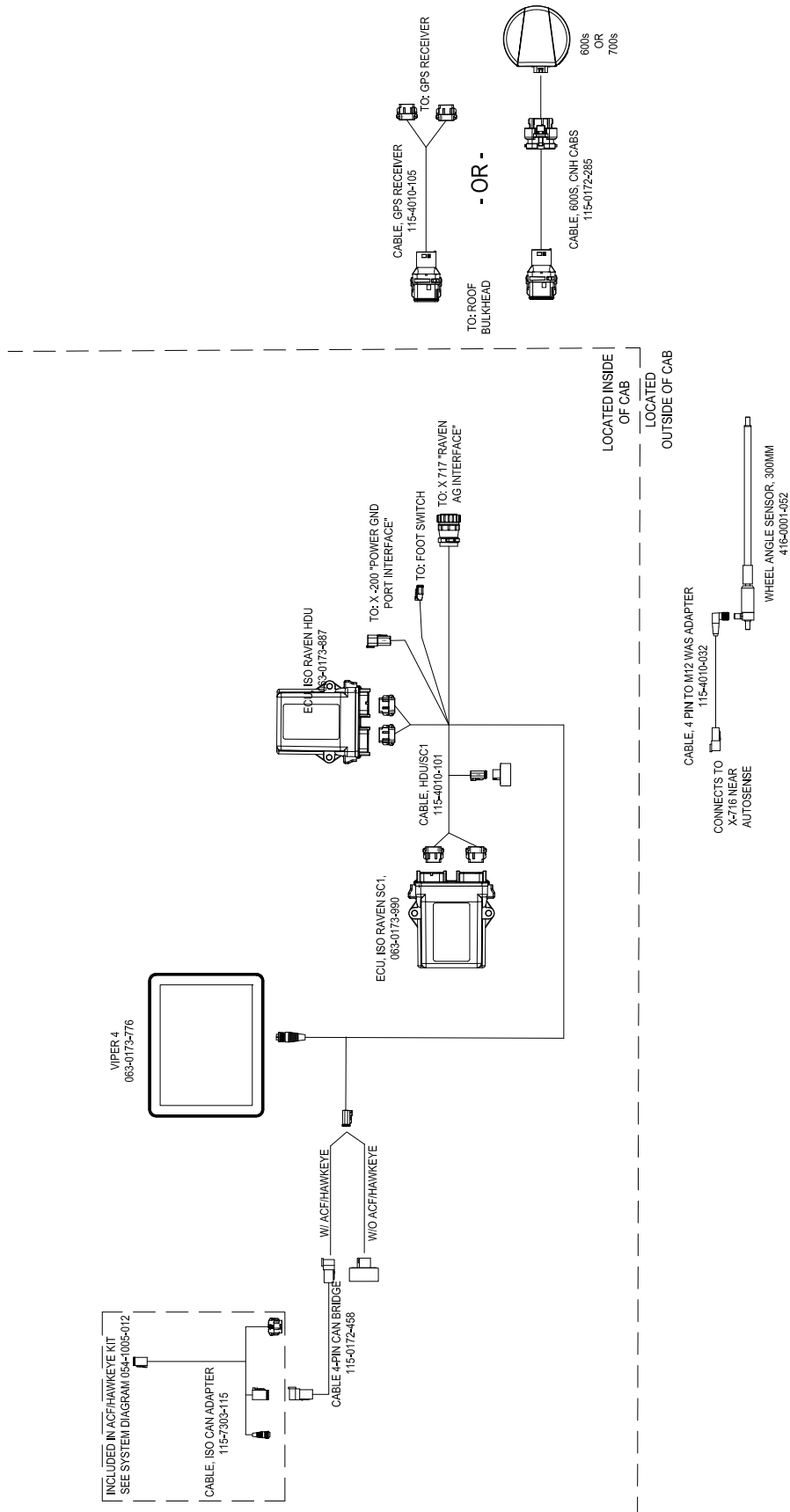
Resume Switch



Locate and identify the machine's master switch on the control panel and the resume switch on the joystick as they are required for SC1 system operation.

Refer to the Raven SC1 Guidance and Steering Calibration & Operation Manual (P/N 016-4010-001) for instructions on Calibrating the SC1 system, adjusting system settings, and system operation.

SYSTEM DIAGRAM



C

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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.

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.