

VSN Installation Manual
for CNH Magnum Non-
AFS Connect MY 14-20 &
MY 21+

016-2022-020 Rev. A

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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 VSN 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 VSN 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 VSN, observe the following safety measures:

- Be alert and aware of surroundings.
- Do not operate VSN 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 VSN is engaged.
- Disable VSN when exiting from the operator's seat and machine.
- Do not drive the machine with VSN enabled on any public road.
- Determine and remain a safe working distance from other individuals. The operator is responsible for disabling VSN when the safe working distance has diminished.
- Ensure VSN is disabled prior to starting any maintenance work on VSN or the machine.

WARNING

- 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 HD 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.

Congratulations on your purchase of the VSN system!

The following instructions are designed to assist with the proper installation of the VSN system. Refer to the VSN Calibration & Operation Manual (P/N 016-2020-001) for assistance with calibrating and using the VSN system.

PREPARING FOR INSTALLATION

Before installing the VSN 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 to complete the installation process.

PREREQUISITES

The following components must be installed with the VSN system.

- VSN version 21.2 or newer
- RS1™
- Viper® 4 with ROS version 3.4 or newer

Follow the installation instructions provided with these components before installing VSN.

RECOMMENDATIONS

Raven Industries recommends the following best practices when installing or operating the VSN system for the first time or at the start of the season:

- Install the VSN unit in the recommended location.
- Use part numbers to help identify parts.
- Do not remove the plastic wrap 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.ravenprecision.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

- VSN Installation Manual for CNH Magnum Non-AFS Connect MY 14-20 & MY 21+
-016-2022-020 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 VSN 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. VSN CNH Magnum/T8, Weight Bracket, Non-AFS Connect/PLM Intelligence MY 14-20 & MY 21 Kit (P/N 117-2022-020 Rev. B)

QTY	PART #	DESCRIPTION
1	053-0159-245	BOX, SHIPPING
1	115-2020-038	CABLE, VSN, GENERIC IBBC, 25'
1	116-0159-866	WELDMENT, VSN, CNH MAGNUM/T8 WEIGHT MOUNT
1	107-0172-734	BRACKET, VSN, CNH MAGNUM/T8 WEIGHT MOUNT TUBE
1	107-0172-733	BRACKET, VSN, CNH MAGNUM/T8 WEIGHT MOUNT
1	116-0159-835	WELDMENT, VSN MOUNT, GENERIC
1	116-0159-837	WELDMENT, VSN MOUNT
1	107-0172-642	SHIELD, DEBRIS, VSN
2	311-8000-009	THREADED ROD, 5/8"-11X44"
1	053-0159-074	ENVELOPE, PLASTIC
4	313-5001-007	GASKET, VITON, .29 I.D. X .688 O.D. X .062 THK
12	313-6000-013N	WASHER, M8, CLASS V COATING
4	313-6001-013N	WASHER, LOCK, M8, CLASS V COATING
4	312-1001-050	NUT, HEX, 5/8", UNC-2B
4	313-1000-057	WASHER, SPLIT LOCK, 5/8", CLASS V COATING
4	313-2300-021	WASHER, STEEL, FLAT, 5/8", CLASS V
4	312-6001-027N	M8 LOCK NUTS
4	311-0052-088	BOLT, HEX HEAD, 5/16-18 UNC-2A 3" L, CLASS V
8	313-2300-012	WASHER, STEEL, FLAT, CLASS V, 5/16"
4	312-4002-003N	HEX NUT, LOCK, STOVER, 5/16-18
4	312-1001-044	NUT, HEX, 1/2", UNC-2B, CLASS V
4	311-0058-073	BOLT, HEX HEAD, 1/2-13 UNC-2A, 1 1/4" L, CLASS V
8	311-4055-180N	BOLT, M8-1.25 X 25MM, CLASS V COATING



FIGURE 2. VSN CNH Magnum/T8, Side Bracket, Non-AFS Connect/PLM Intelligence MY 14-20 & MY 21 Kit (P/N 117-2022-023 Rev. A)

QTY	PART #	DESCRIPTION
1	053-0159-087	BOX, SHIPPING
1	115-2020-038	CABLE, VSN, GENERIC IBBC, 25'
1	116-0159-869	WELDMENT, VSN, MAGNUM TRACTOR LEFT SIDE
1	107-0172-642	SHIELD, DEBRIS, VSN
1	053-0159-074	ENVELOPE, PLASTIC
4	313-5001-007	GASKET, VITON, .29 ID X .688 OD X .062 THK
4	313-6000-013N	WASHER, M8, CLASS V COATING
4	311-4055-180N	BOLT, M8-1.25 X 25MM, CLASS V COATING
2	311-0070-076	BOLT, FLANGE HEAD, M12-1.75 X 30MM LG
2	311-0058-073	BOLT, HEX HEAD, 1/2-13 UNC-2A, 1 1/4"L, CLASS V
4	313-2300-018	WASHER, FLAT, STEEL, 1/2", CLASS V
2	312-4000-050	NUT, LOCK, NYLON INSERT 1/2-13

INSTALL VSN WEIGHT BRACKET

1. Remove the bolt securing the weights together.

FIGURE 1. Weight Bolts



2. Using a flat screwdriver or other leverage tool, pry each weight outward from the center to allow the VSN bracket to straddle two of the weights, located as close to the center of the machine as possible.

FIGURE 2. VSN Bracket Mounted



3. Align the bottom two bolts with the holes in the weights.
4. Once aligned, slide the threaded rods up through the weights and holes in the bracket.
5. Thread on the washers, lock washer, and nuts on both sides of the weights, but do not tighten any.
6. Insert the square tubing into the bracket previously installed and secure the bracket using the provided 1/2" bolts and nuts.

NOTE: The square tube should be flush with the bottom of the bracket.

7. Install the 116-0159-835 bracket to the post using the flat bracket and the 5/16" hardware as seen in Figure 3, "Bracket Installed," below.

FIGURE 3. Bracket Installed

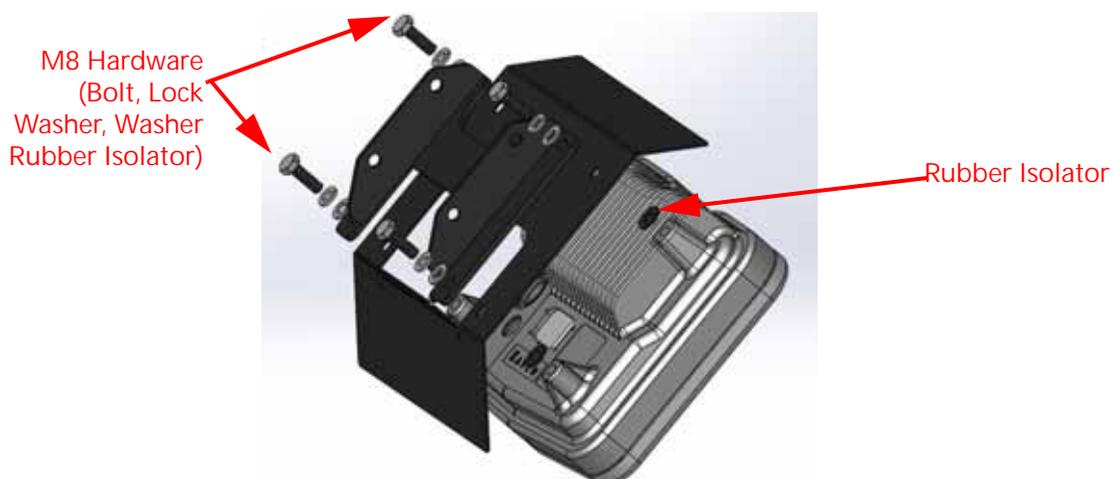


8. Once connected, ensure the hood can still clear the bracket and the VSN mount is as plumb as possible.
9. Tighten the threaded rod through the weights.

NOTE: If desired, the rod can be cut to length and the exposed ends can be painted over to avoid corrosion.

10. Assemble the VSN subassembly as pictured in Figure 4, "VSN Subassembly," below.

FIGURE 4. VSN Subassembly



11. Secure the VSN subassembly to the machine brackets with the included M8 hardware.

FIGURE 5. Installed VSN



INSTALL VSN SIDE BRACKET

1. Open the toolbox and remove the linch pin to remove the toolbox from its bracket.

FIGURE 6. Toolbox and Linch Pin



2. Remove the rest of the bracketry holding the toolbox and remove the two bolts on the surface under the hood.

FIGURE 7. Bolts to be Removed



3. Using the existing large bolts, spacers, and the provided flange bolts, mount the VSN mount to the tractor.

FIGURE 8. Installed VSN Mount



4. Mount the VSN to the bracket using the provided M8 bolts, washers, lock washers, rubber isolators, and dust shield.

FIGURE 9. VSN Subassembly



5. Remount the toolbox bracket to the VSN bracket using the 1/2" hardware as seen in Figure 10, "Mounted Toolbox Bracket," below.

FIGURE 10. Mounted Toolbox Bracket



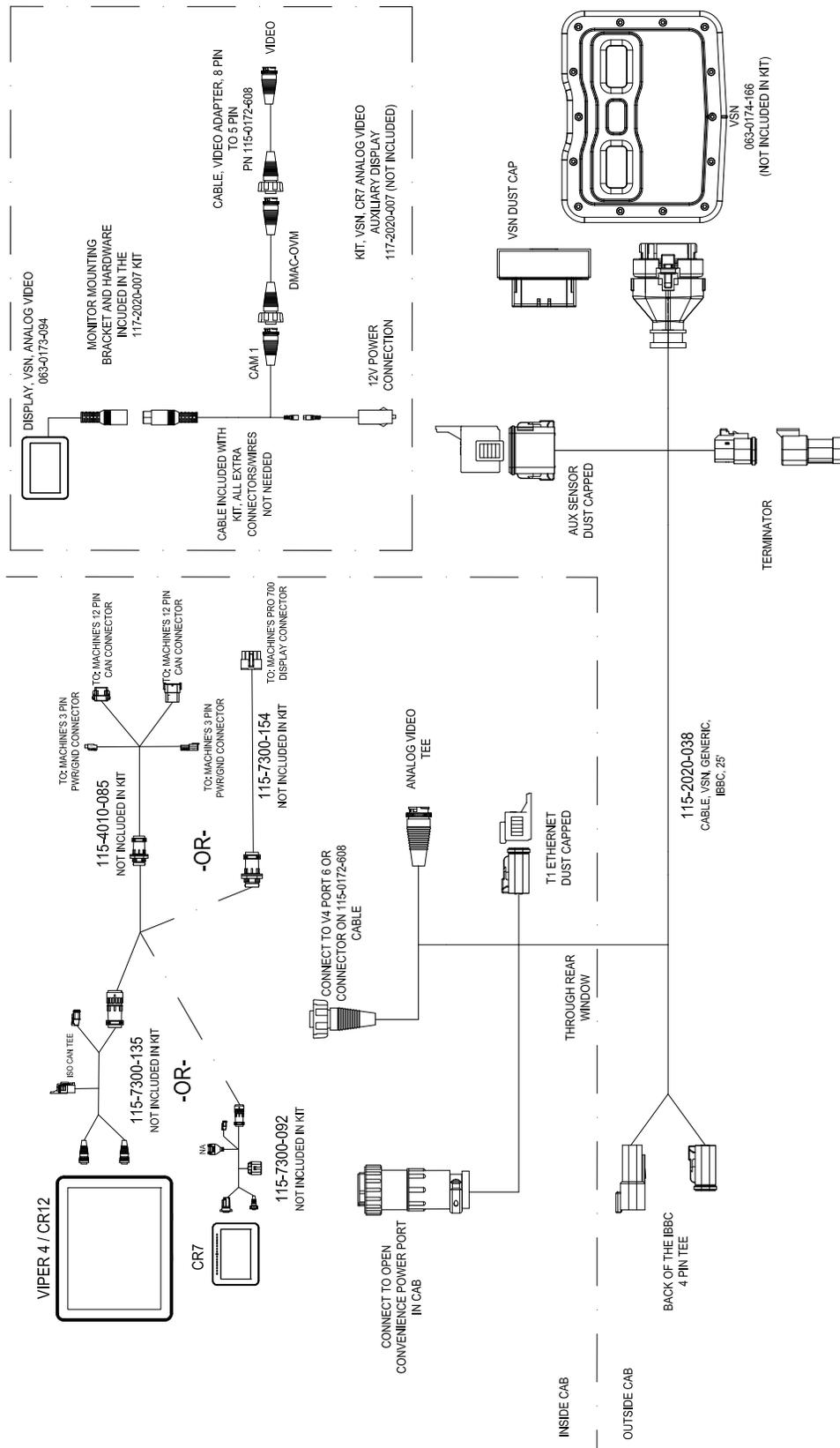
6. Reinstall the toolbox to the bracket.

FIGURE 11. Reinstalled Toolbox



SYSTEM DIAGRAM

FIGURE 12. VSN CIH Magnum MY 14-18 System Diagram (P/N 054-2022-020 Rev. A)



ROUTE THE CABLES

1. Route the VSN connector on the 115-2020-038 cable from the rear of the machine under the cab on the left hand side and follow lines under the hood to the front.
2. Plug the VSN connector into the VSN from below.

FIGURE 13. VSN Connection



3. Route the cable through the cutout on the plastic trim.

FIGURE 14. Cutout on Trim



NOTE: Any excess cabling can be secured either under the cab or at the rear of the machine.

4. Connect the two 4-pin ISO connectors will at the back of the IBBC connector on the rear of the machine.

FIGURE 15. ISO Connectors



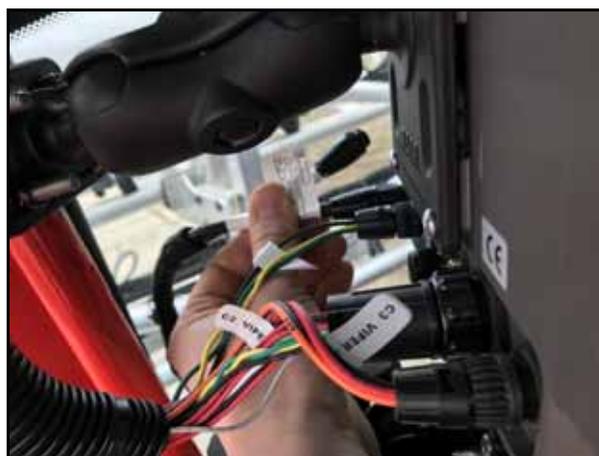
5. Route the remaining connections on the cable up into the cab through the access point in the rear window.

FIGURE 16. Access Point in Rear Window



6. Locate an open convenience port and plug in the connector.
7. Route the analog video cable up to the V4, port 6, or connect on the 115-0172-608 cable on the optional analog video display.

FIGURE 17. Viper 4 Connection



INSTALL THE (OPTIONAL) ANALOG VIDEO KIT

If a CR7 is used in the machine, the analog video kit (P/N 117-2020-007) may be useful for viewing the video feed from VSN. The CR7 does not have an analog video input, so this auxiliary display is used.

FIGURE 18. Standalone Height Sensor



MOUNT THE ANALOG DISPLAY TO CR7

1. Remove the screws securing the RAM mount on the rear of the CR7.
2. Using the washers provided, place a washer between the CR7 and the bracket.
3. Place a washer on the back of the bracket and use the existing screws that held the RAM mount in place.

IMPORTANT: Two washers are used on each of the CR7 screws to ensure proper length. Torque between 9 and 11 in-lbs.

4. Using the additional hardware, mount the RAM mount to the bracket.
5. Mount the auxiliary display bracket to the bracket as seen in

FIGURE 19. Mounted to Bracket



NOTE: Larger RAM connectors and mounts are provided to account for the extra weight.

CABLING

1. Using the power adapter provided, connect to the provided cabling for the display.
2. Plug the cabling into an open 12V power connection.
3. Plug in the display.
4. Use the CAM 1 connection and the DMAC-OWM cable (P/N 115-2020-041) to adapt the 115-0172-608 cable.
5. Connect the analog video feed from the VSN.

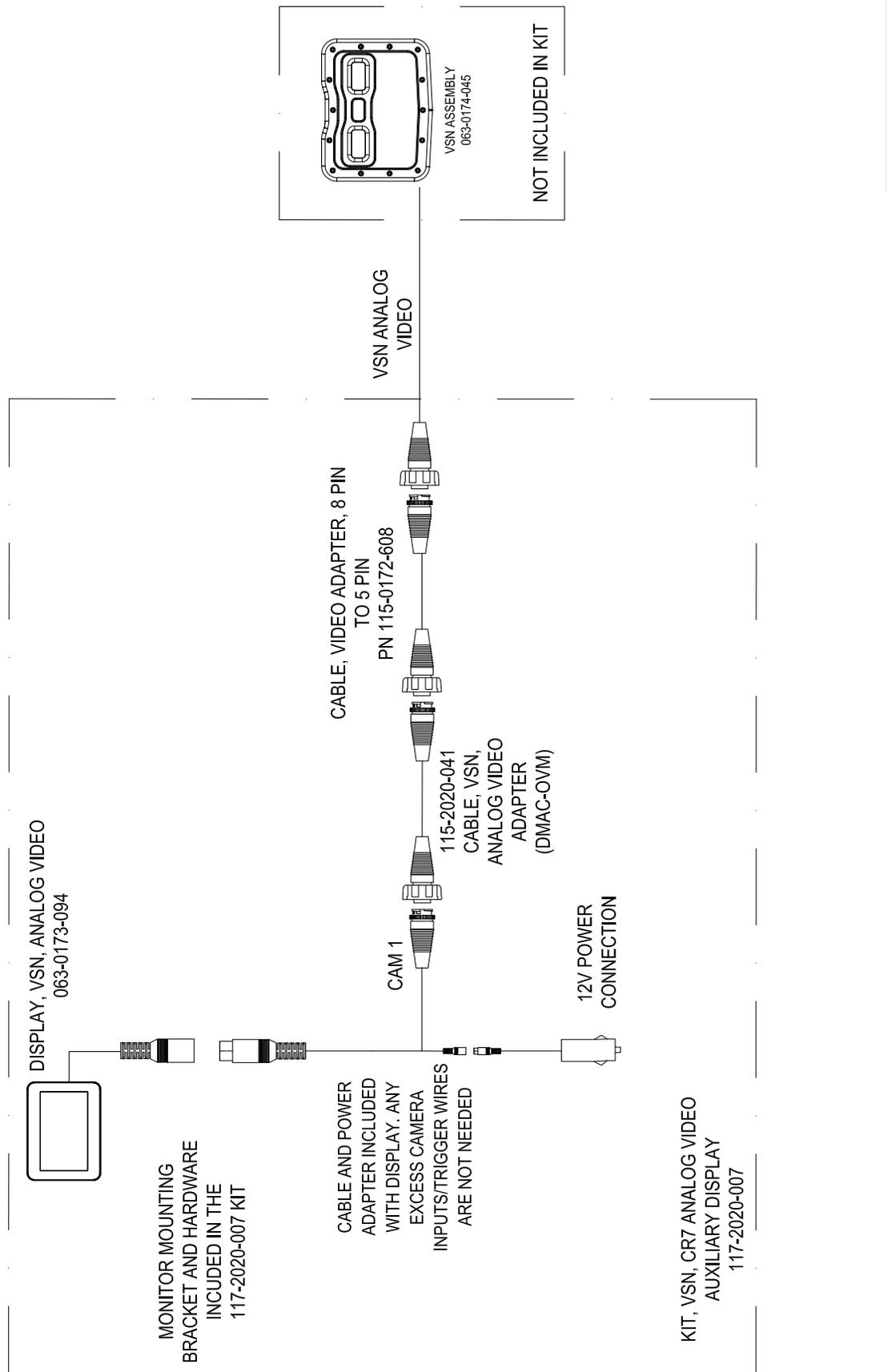
NOTE: The trigger wires and other camera inputs will not be used.

If desired, more cameras may be purchased and plugged into the other camera inputs on this display.

SYSTEM DIAGRAM

The system diagram for the VSN Analog Video System can be found on the next page.

FIGURE 20. (Optional) VSN Analog Video System Diagram (P/N 054-2020-003 Rev. A)



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.