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Installation & Reference Manual



Switch Pro™

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CHAPTER

1

Introduction

System Overview

Congratulations on the purchase of the Raven Switch Pro system!



The Raven Switch Pro system is designed to replace existing Raven SCS (Spray Control System) consoles and update a product control system with the latest CANbus and guidance technology from Raven Industries.

Installation of the Switch Pro system consists of removing the existing SCS 440, 450, or 4400 console while keeping the existing product control hardware and console cables. These cables will be connected to the Switch Pro switch box which then allows the Raven Envizio Pro or Viper Pro field computer to replace the SCS console as the product controller.

Note: *Before removing the existing SCS console, be sure to write down any calibration values programmed into the console. These values are stored on the SCS console and must be programmed into the new console with the Switch Pro system. See the Preparation section on page 5 for details.*

To ensure proper operation of the Switch Pro system, make sure that the field computer has the latest version of software. Switch Pro requires Viper Pro version 2.52 or higher or Envizio Pro version 1.00C or higher.

Refer to the field computer Installation & Operation Manual for more information on software updates.

Switch Pro Features

The Switch Pro switch box compliments the Envizio Pro or Viper Pro CAN Control system with the following features:

- Built-in AccuBoom capability adds AccuBoom, automatic boom section control, features to the Envizio Pro, Envizio Pro II or Viper Pro field computer.
- 3-Way Section Switches put manual and AccuBoom section control right at the operator's finger tips for up to 10 sections. Each section switch offers ON, ACCU, and OFF selections.
- Built-in single product and boom sense/speed nodes.
- Master ON/OFF switch
- Increase/Decrease flow switch
- Logic power LED

Switch Pro Kit Contents

		Switch Pro Kits					
		Switch Pro Kit for SCS 440/450 Systems	Switch Pro Kit for SCS 4400 Systems	Combo Cable Kit w/ Patch Antenna for SCS 440/450	Combo Cable Kit w/ Helix Antenna for SCS 440/450	Combo Cable Kit w/ Patch Antenna for SCS 4400	Combo Cable Kit w/ Helix Antenna for SCS 4400
Components	P/N	117-0171-167	117-0171-168	117-0171-169	117-0171-170	117-0171-171	117-0171-172
Switch Pro Switch Box	063-0172-983	1	1	1	1	1	1
Envizio Pro Console	063-0172-865			1	1	1	1
E.Pro/Switch Pro Mounting Bracket	107-0171-841	1	1	1	1	1	1
Power Ext. Cable	115-0171-810	1	1				
Switch Pro Console Cable	115-0171-803	1					
Switch Pro Combo Cable for SCS 440/450 Systems	115-0171-820			1	1		
Switch Pro Combo Cable for SCS 4400 Systems	115-0171-821					1	1
CAN Adapt. Tee w/ Power	115-0171-368	1	1				
6' CAN Adapt. Tee	115-0171-326	1	1				
CAN Passive Terminator	063-0172-369	2	2	2	2	2	2
Patch Antenna	063-0172-480			1		1	
Helix Antenna	063-0172-480				1		1
Antenna Cable	115-0171-787				1		1

Optional Mounting Components	Part Number
Viper Pro Mounting Bracket Kit	115-0171-181
Optional RAM Mount Components Required for Remote Mounting Switch Pro switch box:	
RAM Mount Socket Arm	103-0001-014
RAM Ball Mount Base, Circular	103-0001-015
RAM Ball Mount Base, Diamond Shaped	103-0001-016

CHAPTER

2

Installation

Preparation

1. Test the existing SCS control system to ensure all product control hardware is operating properly. Repair or replace any faulty components of the product control system before proceeding.
2. Copy the calibration values from the existing SCS console.

Note: *Calibration Values are stored on the existing SCS console and must be programmed into the new product control console before the Switch Pro system is ready to operate. The following values are required for Switch Pro operation:*

- Speed cal
- Boom cals for each configured boom section on the existing SCS control system

*The following are **required** for each product:*

- Meter cal or product density
- Valve type
- Valve cal
- Rate cal(s)
- Spreader constant (granular systems)

3. Verify that the existing SCS console cable has been installed properly. Refer to the *Best Wiring Practices* section on page 8 section later in this chapter for more information.

If an existing Raven SCS 440, 450, 4400 system has not previously been installed prior to purchase of the Switch Pro system, additional cabling and hardware will be required when installing the Switch Pro system. Please contact a local Raven dealer for specific flow control components required and installation assistance.

4. Disconnect the SCS console from the console cable and remove from cab.
5. Remove any existing auxiliary section switches.

Note: *If existing section switch hardware cannot be removed, the auxiliary section switches must be in the Off position to allow Switch Pro to operate properly.*

If a Remote Master Switch will be used with the Switch Pro, both master switches must be in the Off position to turn off booms. Toggling either the Switch Pro master or the remote master will enable boom sections.

6. Remove any mounting hardware or brackets for the existing SCS control console. The machine is now ready for installation of the Switch Pro system.

Mounting Tips

Use the supplied mounting hardware and bracket to mount the Switch Pro inside the vehicle cab.

Note: *Refer to the Switch Pro Kit Contents section on page 2 for optional mounting bracket and hardware components. Optional hardware components must be ordered separately.*

Refer to the following tips when selecting a mounting location for the Switch Pro switch box:

- The switch box is not weatherproof. Mount Switch Pro inside of the machine's cab or driver's compartment within easy reach of the driver or operator.
- Switch Pro should be mounted in a location where it will not be jarred during normal equipment operation. Keep the console clear of moving elements within the machine's cab.
- All cables connected to the Switch Pro switch box should be routed to avoid kinks in the cables and tripping hazards.

If the Switch Pro will be mounted together with an Envizio Pro or Viper Pro field computer:

- Securely fasten the RAM mounting arm (Envizio Pro) to a suitable, flat surface. Once mounted, the RAM mounting arm must provide a stable base for the console and should not move due to normal machine operation.
- The Envizio Pro or Viper Pro field computer should be mounted in a location where it will not be jarred during normal equipment operation. Keep the field computer clear of moving elements within the machine cab.
- All cables connected to the Switch Pro system should be routed to avoid kinks in the cables and tripping hazards.

Switch Pro/Envizio Pro Mounting Bracket

The Switch Pro/Envizio Pro mounting bracket (P/N 107-0171-841) mounts the Switch Pro switch box below the Envizio Pro field computer.

1. Match up mounting posts on the Envizio Pro with the pre-drilled holes in the mounting bracket and the square flange on the RAM socket arm.
 - a. The mounting bracket should not interfere with any cable connections or ports on the Envizio Pro field computer.
 - b. When assembled, the lower flange of the mounting bracket should be approximately centered below the console and slightly forward of the upper flange.



Note: When mounting the Switch Pro unit with a Viper Pro field computer, the optional Viper Pro mounting bracket (P/N 115-0171-181) can be used to mount the Switch Pro either above or below the field computer.

Optional RAM Mount components are also available for remote mounting of the Switch Pro unit. See the Switch Pro Kit Contents section on page 2 for component part numbers for the remote RAM mounting arm.

2. Use the supplied hardware to fasten the mounting bracket and RAM mounting arm to the Envizio Pro field computer.

3. Use the supplied hardware to mount the Switch Pro switch box to the lower flange of the mounting bracket.



Cables and Wiring

Wiring power to the Envizio Pro or Viper Pro field computer, Switch Pro switch box, and the CAN nodes is especially important for proper operation of the system. Many issues can be corrected by diagnosing and fixing problems related to improper wiring of the power and ground.

Best Wiring Practices

- Console power should be wired to a controlled clean power source.
- All ground wires must be connected directly to the battery ground. DO NOT use a chassis ground.

High current power is supplied to the Switch Pro through the existing SCS console cable.

- Make sure the red power lead is connected to the machine's positive battery terminal.
- Make sure the white ground lead is connected to the machine's negative battery terminal.

Note: *If an existing Raven SCS 440, 450, 4400 system has not previously been installed prior to purchase of the Switch Pro system, additional cabling and hardware will be required when installing the Switch Pro system. Please contact a local dealer for specific flow control components required and installation assistance.*

Connecting the Switch Pro

Note: For kits including a combo cable (P/N 115-0171-820 or 821), refer to Appendix A, *Switch Pro Combo Cable*, for installation instructions.

Refer to Appendix B, *System Diagrams*, for detailed system connection diagrams. These drawings may be helpful for understanding the Switch Pro system and connections.

1. Refer to the Envizio Pro or Viper Pro Installation & Operation Manual when installing the Envizio Pro or Viper Pro interface cables (P/N 115-0171-745 or 746). These cables are included in the core Envizio Pro or Viper Pro systems and detailed installation procedures are detailed in the installation section for the Envizio Pro or Viper Pro field computer.
2. Once the Envizio Pro/Viper Pro interface cables are installed, connect the auxiliary power output connector to the back of the Switch Pro.



3. Connect the Switch Pro to the existing SCS console cable.
 - a. For Switch Pro systems replacing SCS 4400 consoles, connect the existing console cable directly to the cable port on the back of the Switch Pro switch box.
 - b. Switch Pro systems replacing SCS 440/450 consoles require the the Switch Pro console cable (P/N 115-0171-803) to connect with the existing SCS 440/450 console cable. Connect the large round connector to the back of the Switch Pro. The existing SCS 440/450 console cable will connect to the smaller male connector on the Switch Pro console cable (P/N 115-0171-803).

CHAPTER 3

Using the Switch Pro System

Switch Pro Nodes

The Switch Pro built-in AccuBoom, boom/speed, and single product nodes are automatically recognized by the Envizio Pro or Viper Pro field computer.

The built-in single product node will always be detected as product or control channel 1 on the field computer. If additional product control nodes are connected to the system, make sure to re-address these nodes on the Envizio Pro or Viper Pro field computer.

Refer to the Envizio Pro or Viper Pro Installation & Operation Manual for information on addressing the CAN nodes connected to a CANbus system.

Note: *To ensure proper operation of the Switch Pro system, make sure the field computer has the latest version of software. Switch Pro requires Viper Pro version 2.52 or higher or Envizio Pro version 1.00C or higher.*

Refer to the field computer Installation & Operation Manual for more information on software updates.

Using Switch Pro

Logic Power LED

The logic power LED displays the status of logic power. This LED is switched by the Envizio Pro or Viper Pro power and illuminate green when logic power is On.

Increase/Decrease Flow Switch

For products in automatic control mode, the Increase/Decrease flow switch is used to increase or decrease the target rate of products selected and actively displayed on the Envizio Pro or Viper Pro field computer. In order for this switch to work properly, a 'Rate Bump' (Rate +/-) value must be programmed for each product or control channel. See the Envizio Pro or Viper Pro operation manual for details on programming this feature.

For products in manual mode, holding the Increase/Decrease flow switch will open or close the control valve, increasing or decreasing the flow of product. See the Envizio Pro or Viper Pro Installation & Operation Manual for instructions on programming products or switching a product to manual mode.

Master Switch

The Switch Pro master switch toggles all section switches on or off. When the master switch is in the ON position, each section will function according to the corresponding section switch (see below for details). Toggle the master switch to OFF to turn off all boom sections manually.

Note: *If a remote master switch will be used with the Switch Pro, both master switches must be in the Off position to turn off booms. Toggling either the Switch Pro master or the remote Master will enable boom sections.*

3-Way Selectable Section Switches

Each of the 10 section switches can be toggled individually to one of three possible positions:

- ON - Manually control the section On. AccuBoom is disabled for this section and will not automatically turn this section Off based on AccuBoom or coverage maps.
- ACCU - AccuBoom control over this section is enabled. AccuBoom will automatically control this section based on AccuBoom and coverage maps. Refer to the Envizio Pro or Viper Pro Installation & Operation Manual for more information on setting up and using AccuBoom features.
- OFF - Manually control the section Off. This section will remain Off regardless of AccuBoom and coverage maps.

For sections not used by the Switch Pro, leave the corresponding section switch in the OFF position.

Note: *If auxiliary section switch hardware cannot be removed as described in the Preparation section on page 5, the auxiliary section switches must be in the Off position to allow Switch Pro to control boom functions properly.*

Using AccuBoom Override

Switch Pro provides simple operation of the AccuBoom feature on the Envizio Pro or Viper Pro field computer.

- AccuBoom control for each section is right at the operator's finger tips.
- AccuBoom Override can be enabled for individual sections using the 3-way selectable section switches.

Note: *To override AccuBoom across all sections, use the AccuBoom override feature on the field computer. Refer to the AccuBoom sections of the Envizio Pro or Viper Pro Installation & Operation Manual for more information on using AccuBoom and the AccuBoom override feature.*

APPENDIX

A

Switch Pro Combo Cable

The combo cable can be used in place of the Envizio Pro or Viper Pro main and auxiliary interface cables (P/N 115-0171-745 and 746), CAN tee cables (P/N 115-0171-326 and 368) and Switch Pro console cable (P/N 115-0171-803).

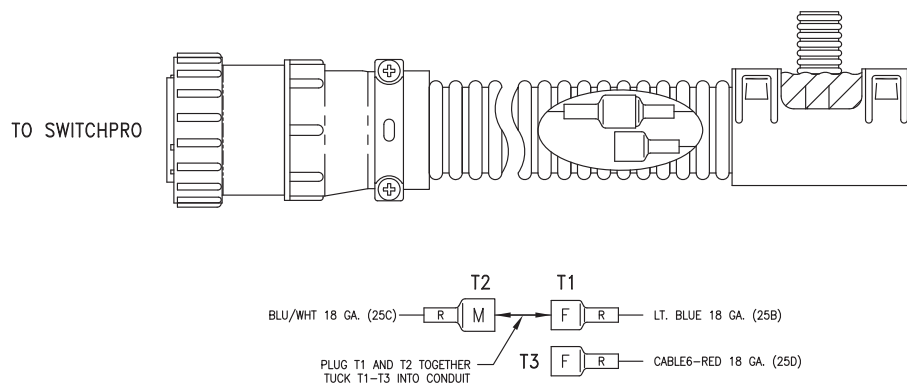
Note: Be sure to follow the instructions in the Preparation section on page 5 and Best Wiring Practices section on page 8 when installing the Switch Pro combo cable.

Combo Cable Installation

Speed Input Terminal Configuration

Note: When using either Switch Pro combo cable (P/N 115-0171-820 or 821), make sure the cable is configured for the speed source being used with the Switch Pro system.

- When using the Envizio Pro internal DGPS Receiver as the speed source, make sure the T2 and T1 terminals are connected. This is the factory setting for the Switch Pro combo cables.
- When using any other speed input, connect the T2 and T3 terminals.



Tuck all three terminals into the cable sleeve or conduit.

Note: Refer to Appendix B, System Diagrams, for detailed system connection diagrams. These drawings may be helpful for understanding the Switch Pro system and connections.

Power Connections

1. Connect both of the red power leads to a controlled clean power source.
2. Connect both of the white ground leads directly to the battery's ground terminal. DO NOT use a chassis ground.

Switch Pro Combo Cable Connections

1. Connect the main and auxiliary interface connectors (conduit with a pair of connectors) to the back of the Envizio Pro or Viper Pro field computer.
2. Connect the large round 37-pin connector (conduit with speed input terminals) to the back of the Switch Pro.
3. Connect the existing SCS console cable to the combo cable included with the kit:
 - a. For kits with combo cable (P/N 115-0171-820) connecting to SCS 440/450 cabling, connect the 16-pin connectors on the existing console cable and combo cable. If the speed and pressure sensors will be used, reconnect the existing sensor cables to the Speed (14-pin) and pressure (3-pin) connectors on the combo cable.
 - b. For kits with combo cable (P/N 115-0171-821) to SCS 4400 cabling, connect the 37-pin connectors on the existing console cable and combo cable.
4. Insert the Switch Pro logic power connector to the power port on the back of the Switch Pro unit.



5. Install the supplied CAN passive terminators as shown in Appendix B, *System Diagrams*, for the Switch Pro system. Use the appropriate diagram to verify hook-up.

APPENDIX

B

System Diagrams

The following system diagrams may be helpful during installation or to troubleshoot the Switch Pro system. Be sure to locate the appropriate system diagram for the Switch Pro system currently installed.

Switch Pro for SCS 440/450 Cabled Systems

The following diagrams illustrate connections for the Switch Pro interface cable (P/N 115-0171-803) included with the 117-0171-167 kits.

FIGURE 1. Envizio Pro with Switch Pro for SCS 440/450 Cabled Systems

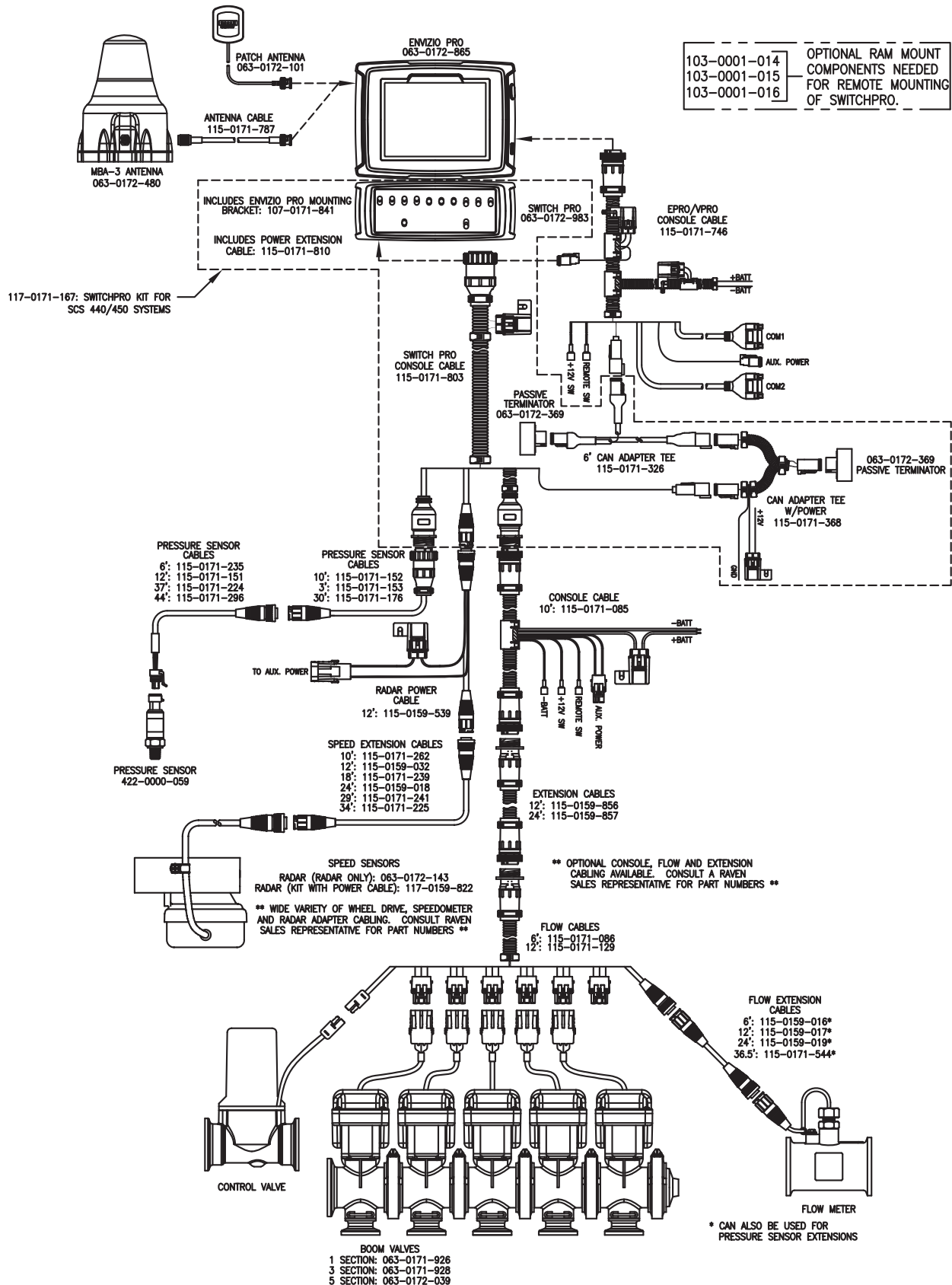
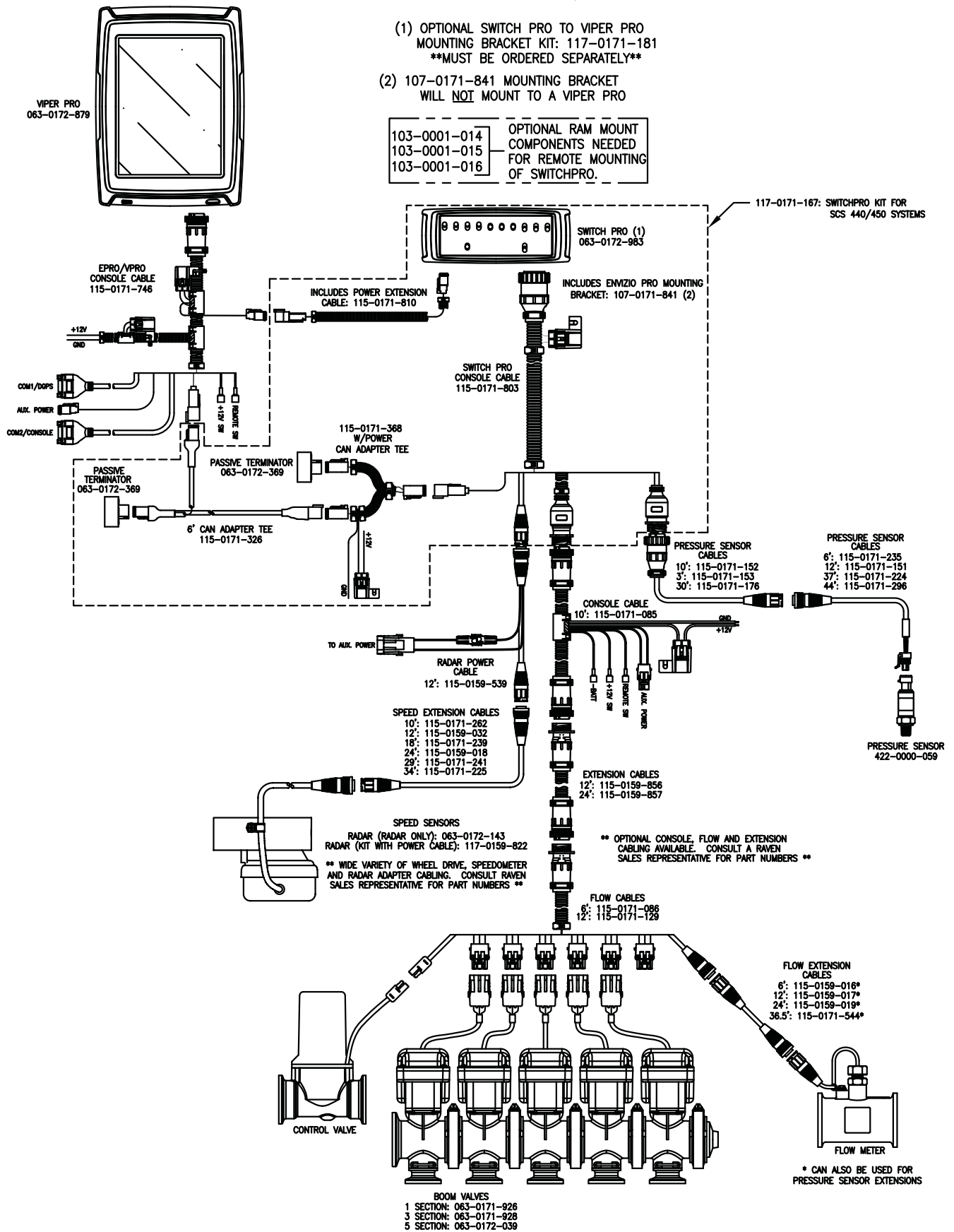


FIGURE 2. Viper Pro with Switch Pro for SCS 440/450 Cabled Systems



Switch Pro for SCS 4400 Cabled Systems

Refer to the following diagrams in reference to Switch Pro systems replacing an SCS 4400 console with the 117-0171-168 kits.

FIGURE 3. Envizio Pro with Switch Pro for SCS 4400 Cabled Systems

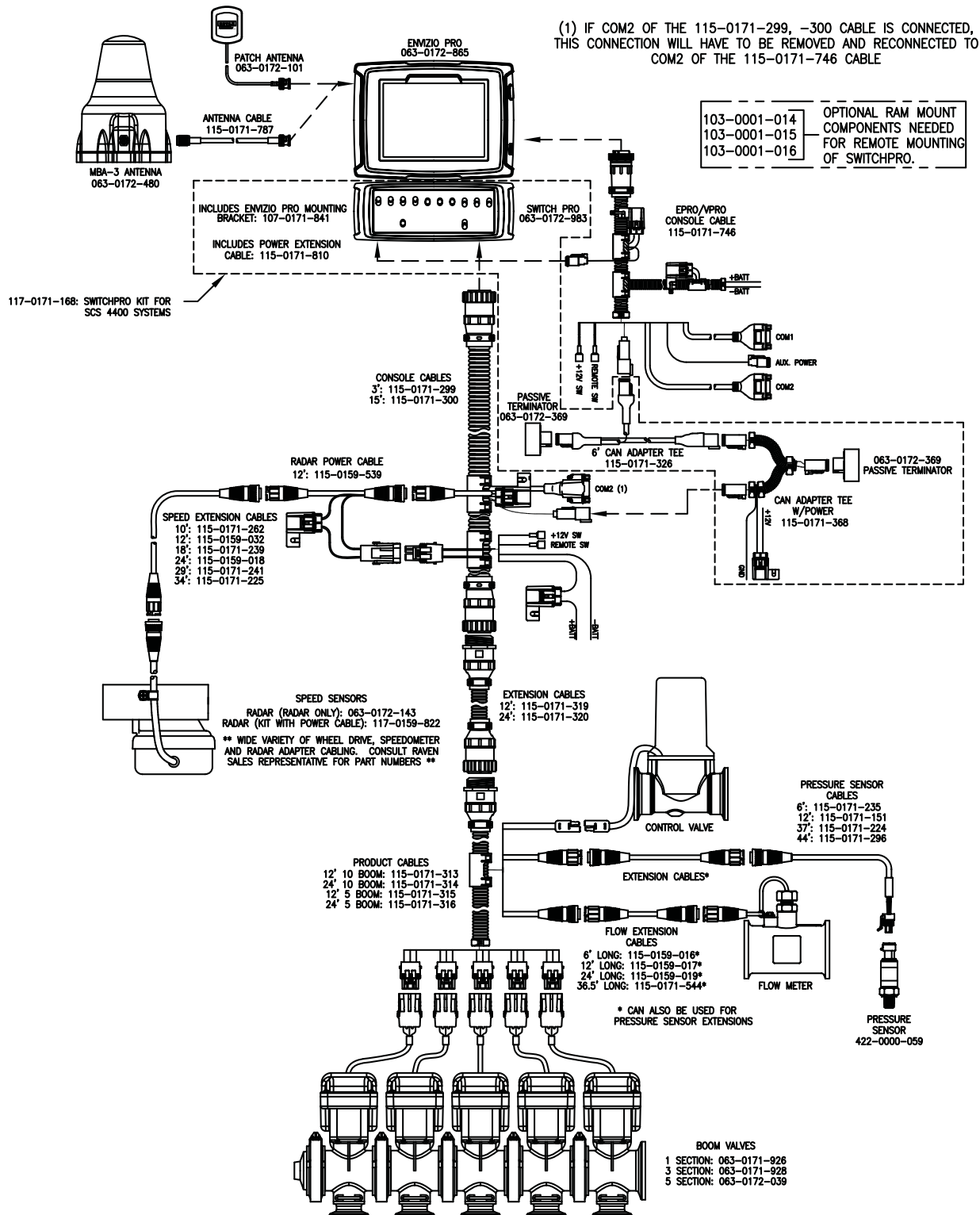
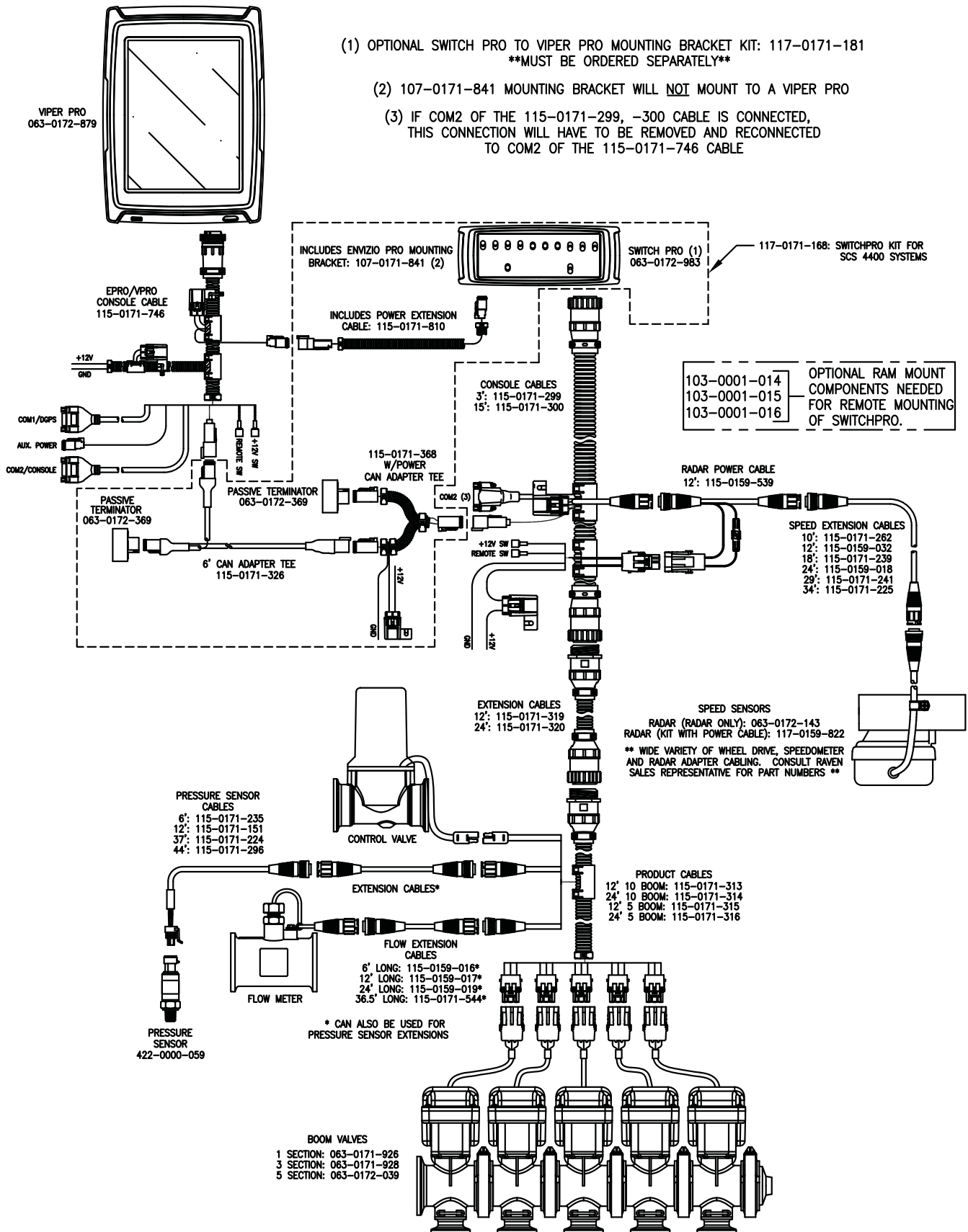


FIGURE 4. Viper Pro with Switch Pro for SCS 4400 Cabled Systems



Switch Pro Combo Cable to SCS 440/450 Systems

Refer to the following diagram when using the combo cable (P/N 115-0171-820) for SCS 440/450 Systems (Kits 117-0171-169 or 170).

FIGURE 5. Envizio Pro with Switch Pro Combo Cable for SCS 440/450 Cabled Systems

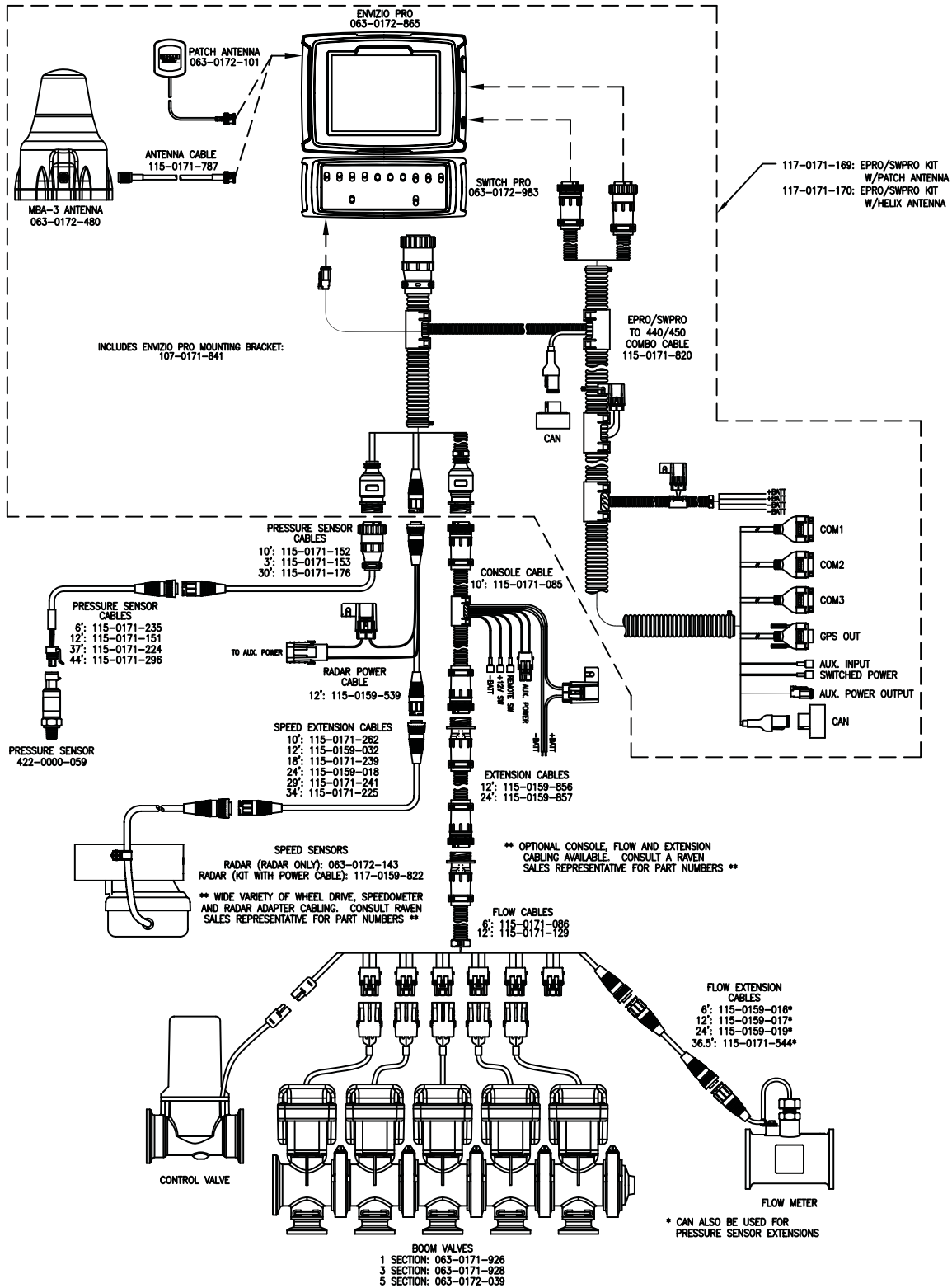
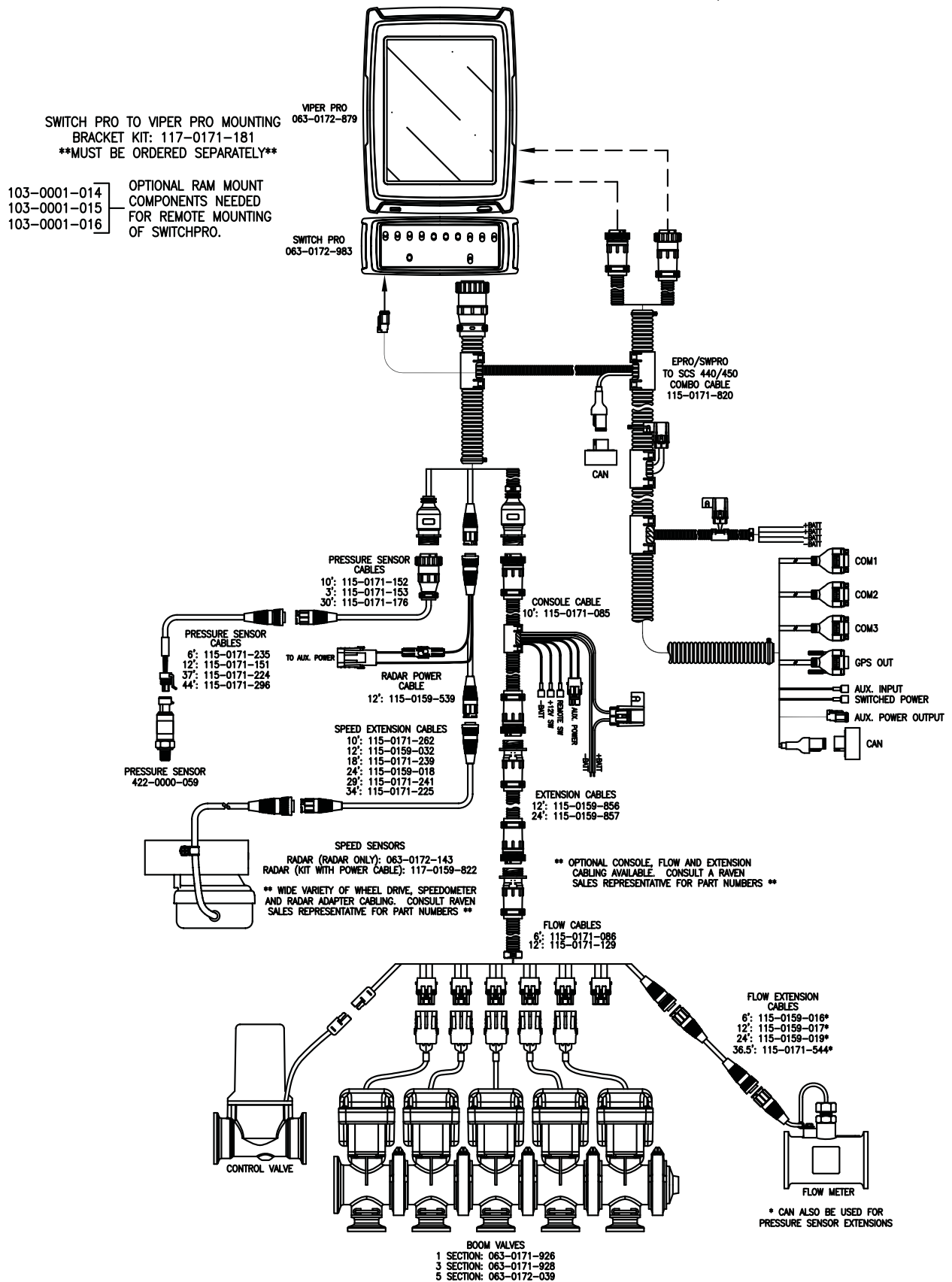


FIGURE 6. Viper Pro with Switch Pro Combo Cable for SCS 440/450 Cabled Systems



Switch Pro Combo Cable to SCS 4400 Systems

Refer to the following diagram when using the combo cable (P/N 115-0171-821) for SCS 4400 Systems (Kits 117-0171-171 or 172).

FIGURE 7. Envizio Pro with Switch Pro Combo Cable for SCS 4400 Cabled Systems

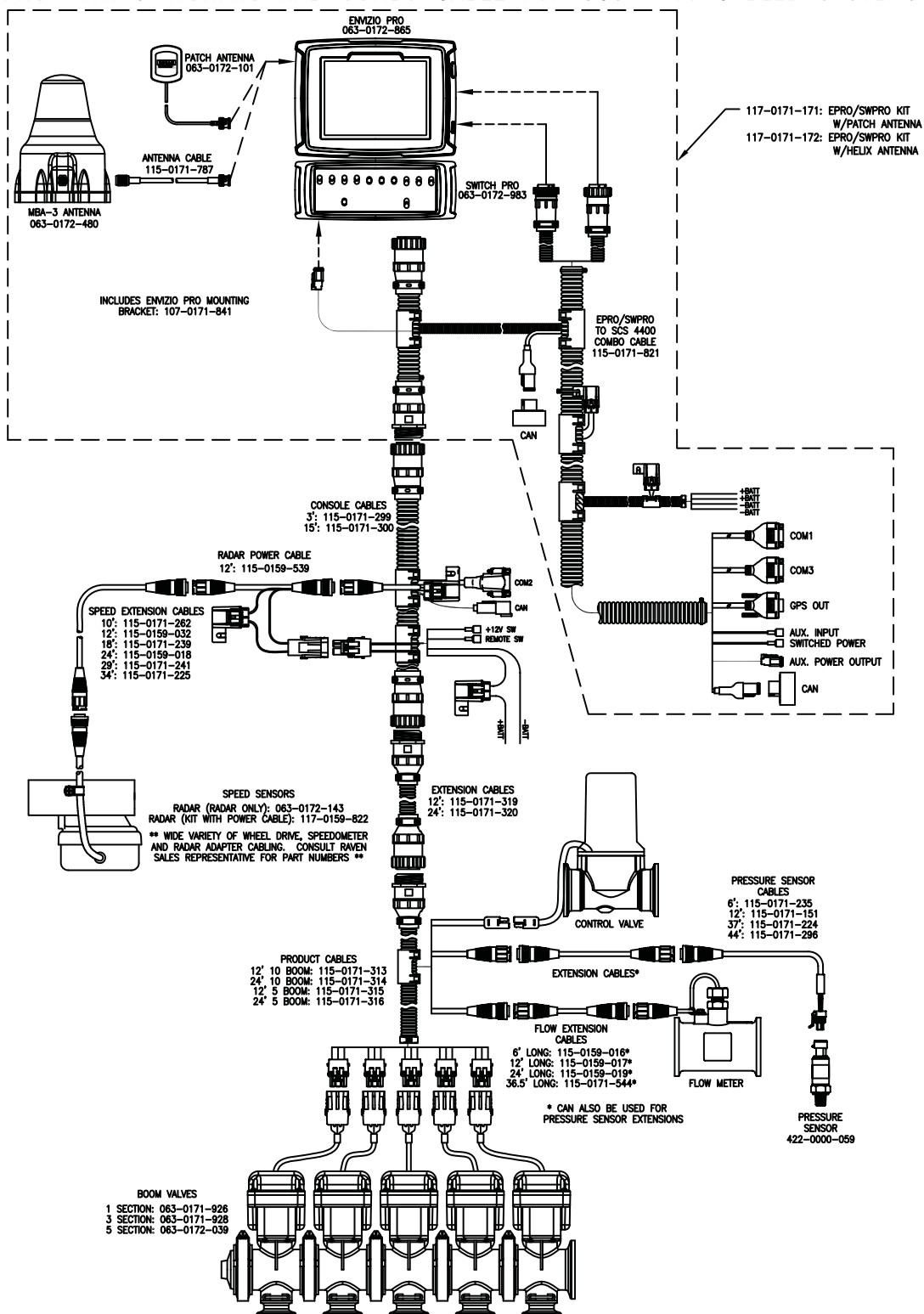
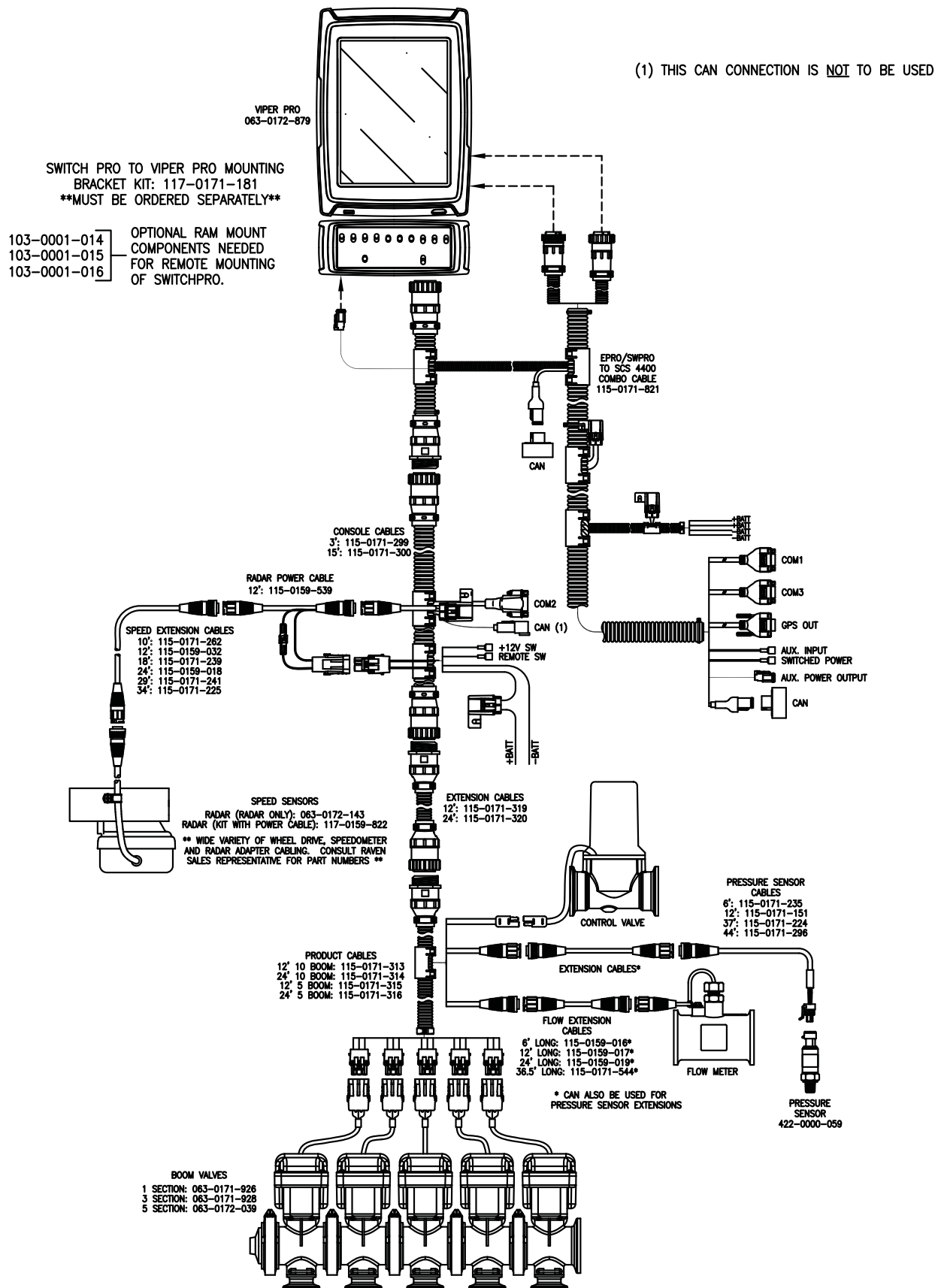


FIGURE 8. Viper Pro with Switch Pro Combo Cable for SCS 4400 Cabled Systems



APPENDIX

C

Troubleshooting

General Issues

Issue	Possible Cause	Solution
Envizio/Viper Pro does not power up.	No power to console	Refer to the field computer Installation & Operation Manual for troubleshooting information. Check fuse
Logic Power LED not lit.	No power to Switch Pro	Check Switch Pro auxiliary power connection. Ensure field computer is powered on. Check field computer power and ground lead connections. Refer to the field computer Installation & Operation Manual for further power troubleshooting. Check fuse
Envizio/Viper Pro not detecting nodes.	Switch Pro not connected to CANbus	Check CAN connections. Check CAN cabling (if applicable). Check CAN terminators. Check for +12 volts on Switch Pro power connector. Verify Envizio/Viper Pro product control Configuration. Product control must be set to CAN.
Boom valves do not turn on.	Faulty CAN high current power connection	Verify CAN high current power is connected. Use a volt meter to test between pins 1 and 37 on the cable connected to the interface cable port on the back of the Switch Pro.
Vehicle battery discharges overnight	Switch Pro wired directly to the battery.	Connect the Switch Pro switch box to the auxiliary power output on the interface or combo cable to switch power with the field computer power switch.
Boom sections do not turn off.	Remote section switches in the incorrect position.	Remote section switches must be in the OFF position to allow the Switch Pro system to control boom sections.

Setup Issues

Issue	Possible Cause	Solution
Previous settings have been lost	Settings deleted from console's memory Calibration required after removing the previous SCS Console Poor CAN connections	Refer to the field computer Installation & Operation Manual for troubleshooting information. Ensure all of the calibration values from previous SCS control system have been re-programmed into the new CAN console. See the CAN Troubleshooting section.

Job Issues

Issue	Possible Cause	Solution
Section status numbers display as inactive	Switch Pro section switches are in the Off position AccuBoom enabled but machine is not moving CAN is disconnected	Toggle the section and master switches to the On position. Move the machine out of the applied zone. Enable AccuBoom Override on the field computer. See the CAN Troubleshooting section.
Section status number does not turn green when section turned on	Boom sections not setup properly Nodes not completely programmed The boom is disconnected	Check the boom setup on the console. Check node calibration and ensure all calibration values are entered and correct Check the connection and wiring to the boom.
Switch Pro CAN AccuBoom will not turn on.	Section or master switches in the Off position.	Toggle the section switches to the Accu or On positions. On overrides AccuBoom automatic section control and the section will remain on at all times.
Product function keys do not work	Product application is turned off	Switch product application to either auto or manual mode.
Product spread in zero rate zones.	Bed creep	Adjust hydraulic valve to stop the bed creep.
	Wrong valve type on vehicle	Must use either a fast close or PWM close valve.
	Incorrect valve setting	Check valve or PWM setting.
	Switch Pro section switches in the On position	Toggle section switches to the Accu or Off position.
Envizio/Viper Pro not painting but boom sections are on	Remote section switches left in the ON position	Toggle all remote section switches to the OFF position. Remote switches will override Switch Pro section switches and AccuBoom, automatic section control, features.

Coverage Map Issues

Issue	Possible Cause	Solution
Gaps displayed in coverage map	Section widths not configured correctly Guidance and section widths not the same	Check boom widths and boom center values Set the guidance width and overall section widths to the same value.
Product coverage displayed in zero rate zones.	Vibration chatter in encoder. Valve or motor is not set to close completely	Make sure that the encoder is firmly mounted. Increase value in "Zero Rate Tolerance." Adjust valve or motor to close or stop completely with no rate applied.
Cannot achieve target rate	Driving too fast for vehicle Calibration numbers incorrect Speed calibration incorrect	Speed may exceed capabilities of vehicle to deliver product. Slow the vehicle down during application or configure product control hardware to supply a higher amount of product. Check and adjust meter calibration, density, and other calibration values. Check and adjust speed calibration setting.

CAN Troubleshooting

Although the control algorithm is located within the CAN node, all of the same troubleshooting techniques used in a traditional hard-wired system still apply to a CAN system. CAN allows for modularization of the control system, but the behavior of the system remains the same. Flow and speed sensors, as well as the control valve and boom valves, are used in the same manner.

The following issues are some common causes for communication failures:

Issue	Possible Cause	Solution
Console or CANbus cannot read the Switch Pro nodes	Switch Pro is not properly connected	Check Switch Pro auxiliary power connection. Check the CANbus connection to the Switch Pro and re-initialize the console to read the Switch Pro nodes. Ensure console is powered on.
	No Power to Switch Pro	Check console power and ground lead connections. Refer to the console's Installation & Operation Manual for further console power troubleshooting.
	Weak or dirty power to the CAN nodes	Verify at least +10V DC is present on the auxiliary power output connector.
	Corrosion in CAN connections	Disconnect and clean the CAN connections.
	CANbus not terminated properly	Check the CAN terminators. Make sure that both ends of the CANbus systems are properly terminated.

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RAVEN

RAVEN INDUSTRIES

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.

How Long is the Coverage Period?

Raven Applied Technology Division products are covered by this warranty for 12 months after the date of purchase. This warranty coverage applies only to the original owner and is nontransferable.

How Can I Get Service?

Bring the defective part and proof of purchase to your Raven dealer. If your dealer agrees with the warranty claim, the dealer will send the part and proof of purchase to their distributor or to Raven Industries for final approval.

What Will Raven Industries Do?

Upon confirmation of the warranty claim, Raven Industries will, at our discretion, repair or replace the defective part and pay for return freight.

What is not Covered by this Warranty?

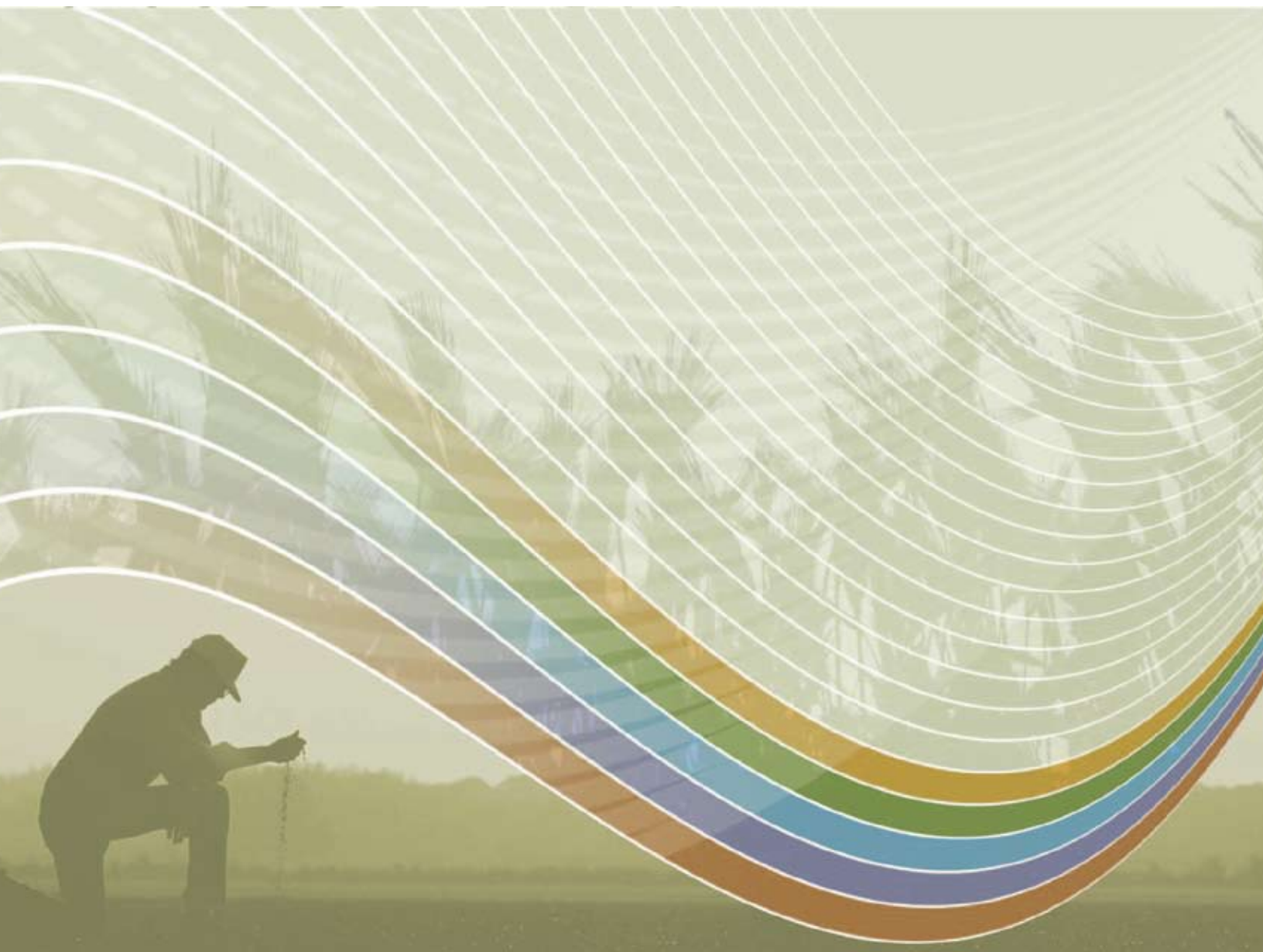
Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit or other special damages. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.

R A V E N

Switch Pro™
Installation & Reference Manual
(P/N 016-0171-219 Rev C 03/11 E17395)

Simply improving your position.™



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