CapstanAG™

EVO™

Upgrade Kit

Compatible with:
Synchro™
AIM* Command

Installation Instructions

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Thank you for your business!

At CapstanAG, our goal is to redefine the way people do their chemical application. Our PWM control systems have been setting the bar for maximum productivity for more than 20 years. Our focus on performance, support, and education have dramatically changed the landscape of agricultural chemical application.

CapstanAG specializes in creating proprietary systems for the agricultural industry, primarily focusing on chemical and fertilizer applications. Our inventive process involves research, engineering, design, and lab and field testing.

Service Contact Information

If a problem occurs with your system that cannot be corrected with the information in this manual, please contact your dealer for service and technical assistance. If further assistance is needed, contact CapstanAG.

System Purchased: _____

Dealer: _____

Contact: _____

Phone: _____

Address: _____

City,State/Province, Zip: _____

Factory Service/Repairs

CapstanAG
4225 S.W. Kirklawn Ave. | Topeka, KS 66609

Hours: 8:00 a.m. to 4:00 p.m. CST

Toll-free number: (855) 628-7722 | Fax: (785) 232-7799

CapstanAG.com | CapstanAG.ca

prodsupport@capstanag.com

Chapter 1: Before System Installation

The EVO™ Upgrade kit is compatible with existing Synchro™ and AIM[1] Command systems.

Before assembly and installation, read the installation information carefully. Make sure that you have all of the parts in the kits. Read all of the instructions in this document, the system operator manual, and the machine manuals. The system operator manual includes information on operation, adjustments, troubleshooting, and maintenance.

Attention: The correct function of the EVO™ system cannot be guaranteed if the current PWM system is not functioning correctly. Do the following procedures BEFORE installation to verify the correct function of the existing system.

No warranty or returns of the system will be honored if the existing system is not verified to function correctly before installation of the EVO™ system.

For further assistance, contact your CapstanAG representative.

Before installation of a new system, you must make sure that the existing AIM Command system is operating correctly. Do these procedures:

- Clean the nozzle valves and inspect the plunger seals
- Do a Check of the Conventional Spray System
- Do a Check of the System Flow Control
- Do a Check of the System Pressure Control

Clean the Nozzle Valve(s)

Warning: Chemical residues may be present in the agricultural equipment. Always use proper personal equipment to avoid personal injury.

1. Release pressure from the system before servicing.
2. Clean the system before installation or service of the fittings, hoses, valves, or nozzles.
3. Remove the valve body.
4. Remove the plunger.
5. Inspect the O-rings.
6. Wash the nozzle valve components to remove any debris.
7. Inspect the plunger for wear or damage.
8. If there is wear or damage to the plunger, replace the plunger.
9. Inspect the valve body.

   Make sure that the orifice is not plugged with debris, worn, or damaged.
10. If there is wear or damage to the orifice, replace the valve body.
11. Wash the nozzle body components to remove any debris.

    Important: Do not use brake cleaner. Brake cleaner can damage the seal.

    Important: During installation, apply 40 lbf in of torque to the coil when it threads into the valve body to properly seat the O-ring.

[1] AIM is a trademark of CNH Industrial LLC, and is not affiliated with Capstan Ag Systems, Inc.

Plunger Seal Inspection

Figure 1:

After extended use, the plunger seal will wear a groove *(1)* where the seal impacts the hard orifice seat. Replace the plunger if worn or damaged.

As the groove deepens, the pressure capacity of the valve will decrease until the pressure capacity interferes with the operating pressure of the system.

The result is erratic pulsing, often described as “flickering.” The system will operate normally at lower pressures until replacement parts can be installed. High operating pressures and abrasive chemicals will accelerate the wear of the plunger seal material.

Do a Check of the Conventional Spray System

Before installation of the EVO™ Upgrade Kit, make sure that the existing system operates in the conventional spray mode correctly.

1. Open the intermediate bodies (through bodies) on the spray booms and move existing tips to those bodies if no other tips are installed.
2. Move the Auto/Off/Manual switch to the O position.
3. Turn on the key switch for the machine.
4. Power on the rate controller.
5. On the rate controller, change the control valve type to **PWM** or **PWM/AIM Command PRO**.
6. On the rate controller, set a test speed.
7. On the rate controller, enter a target rate.
8. Turn on the master switch and the boom switches.

   If the system sprays and maintains the target rate, continue to the installation.

   If the system does not operate correctly, find and correct the problem(s) before continuing with the EVO™ upgrade installation.

Do a Check of the Existing System Flow Control

1. Make sure that the intermediate valve bodies are closed and nozzles are placed on the bodies with blended pulse solenoids in place.
2. Turn on the key switch for the machine.
3. Power on the rate controller.
4. Change the control valve type to:
   - AIM Command
   - Inline servo
5. Set a test speed in rate controller.
6. Disable any automatic section control feature in the rate controller.
7. Set the rate controller to manual rate mode.
8. Move the Auto/Off/Manual switch to A position.
9. Turn on the boom section switches and master switch.
10. Press the manual rate increase button on the rate controller to a maximum flow.

    You should see no pulsing of the system.
11. Press the manual rate decrease button on the rate controller to a minim flow.

    You should see a very distinct pulsing of the system.

If these steps are completed successfully continue to the next procedure: Do a Check of the Existing System Pressure Control.

Do a Check of the Existing System Pressure Control

1. Turn on the key switch for the machine.
2. Move the Auto/Off/Manual switch to the O position and start the machine.
3. Idle the machine and move the Auto/Off/Manual switch to the A position.
4. Move the throttle to half-open.

   The pressure should move to the pressure setpoint and hold that pressure.
5. Move the pressure control switch to the + position.

   The pressure should increase.
6. Move the pressure control switch to the – position.

   The pressure should drop.
7. Use the pressure control switch to set the pressure near 50 psi.
8. If the pressure will not reach 50 psi, bump the throttle up.
9. Move the P1/P2 switch to the other position.

   The pressure should move to the second set point pressure.
10. Use the pressure control switch to set the second pressure at 20 psi.
11. Toggle between the P1 and P2 positions.

    The system pressure should move back and forth between 20 and 50 psi. The transition should take a second or so, and the pressure may go past but should come right back to the target pressure.
12. If the pressure seems unstable, a PWM cartridge test should be performed.

    Contact CapstanAG for the tuning procedure.

Chapter 2: Kit Parts List

Part Number	Description	Parts Description	Qty
116200-014	3-pin Extension Harness-4 ft	Extension 3-Conductor x 4ft, 14 ga	4
116200-045	2-Pin Tower Dust Plug	HN Dust Plug 2 Pin Tower WP	4
116200-046	3-Pin Tower Dust Plug	HN Dust Plug 3 Pin Tower WP	2
116200-048	3-Pin Shroud Dust Plug	HN Dust Cap 3 Pin Shroud WP	7
116200-051	2-Pin Shroud Dust Plug	Dust Plug, 2 Pin WP Shroud	2
116200-078	4-Pin Tower Dust Plug	HN Dust Plug 4 Pin Tower WP	4
120140-016	DB9 Serial Cable	Cable Serial DB9 MTOF 15'	1
120140-028	8-32 Male/Female Hex Standoff	Hex Standoff, M/F 8-32 SS	4
150003-005	CAN Terminator	CAN Terminator	2
150006-010	Cab Box Display	Cab Box Display Assy EVO	1
150150-010	Pressure Transmitter Module	Assembly, Pressure Transmitter, EVO	1
150200-010	Boom Transmitter Module	Assembly, Boom Transmitter A, EVO	1
709031-505	8-32 x 5/16 Screw	Screw #8-32 X 5/16" SSPAN SS	4
713501-508	Split Lock Washer	Washer #8 Split Lock, SS	4
715040-178	Cable Ties	Tie Cable 12" Black	68
150005-008	PSI Adapter Harness	Harness, Adapter PSI EVO-AC Upgrade	1
150300-001	Mounting Plate	Module Mount Plate, EVO AC Retro	1
150100-010	Smart Driver Module	Assembly, Controller, Smart Driver, EVO	7
150003-006	Power to CAN X Harness	Power to Can X for AC Retro	1
118606-601	Shutoff Harness	Harness, Shutoff, Aim-Evo at Aim Module	1
150004-040	CAN-Bus Extension Harness-40 ft	Harness, Ext, CAN-BUS, 40FT Plug to Plug	1
150003-004	Display Harness with GPS Drop	Harness, Display w/GPS Drop	1
116200-077	4-Pin Tower Square Dust Plug	HN Dust Plug 4 Pin Tower SQWP	1
118603-111	RAM Mount	RAM Mount 2 7/16" Rnd Base 1"UBolt base w/1.5" Ball	1
620303-023	Plug-to-Plug Adapter Harness	Harn, Adapter, Plg-Plg 6"	5
150005-010	Servo Adapter Harness	Harness, Adapter, Servo, for AC	1
150250-050	Servo Transmitter Module	Assembly, Controller Servo, EVO	1
705725-141	20 A Fuse	Fuse 20 Amp Type ATO/ATC YL	3

Part Number	Description	Parts Description	Qty
705725-150	20 A Mini Fuse	Fuse, 20 Amp, Mini ATC	3
706530-356	12-pin D Dust Plug	HN Dust Plug 12-Pin Deutsch DT A Key	1
Machine Specific	GPS Adapter Cable	See Technical Bulletin TB19-04 for more information about which cable is needed for your system.	1

System Layout

Seven-section Schematic

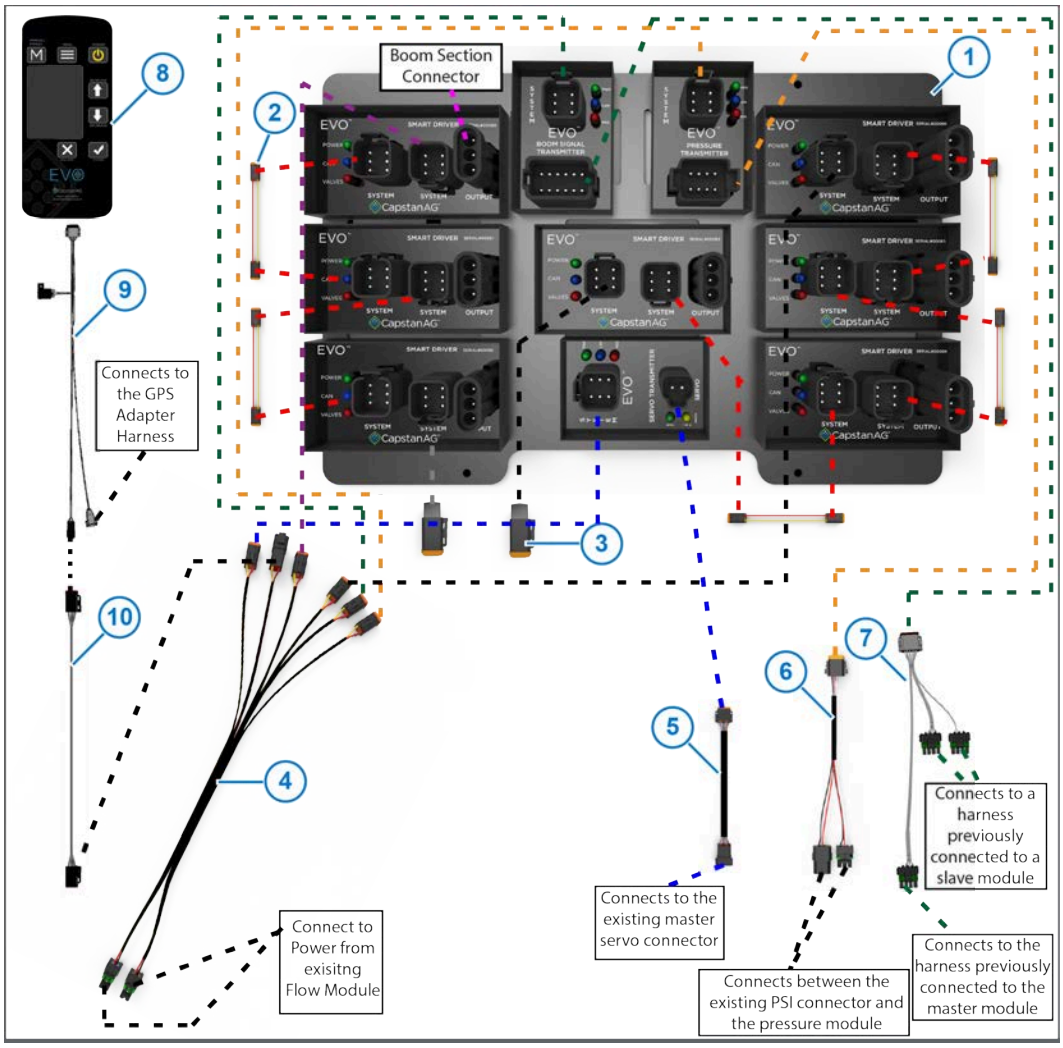

Figure 2:

Callout	Description		Callout	Description
(1)	Mounting Plate		*(6)*	PSI Adapter Harness
(2)	Plug-to-Plug Adapter Harness-6 in		*(7)*	Shutoff Harness
(3)	CAN Terminator		*(8)*	Cab Box Display
(4)	Power to CAN X Harness		*(9)*	Display Harness with GPS Drop
(5)	Servo Adapter Harness		*(10)*	CAN-Bus Extension Harness-40 ft

Six-section Schematic

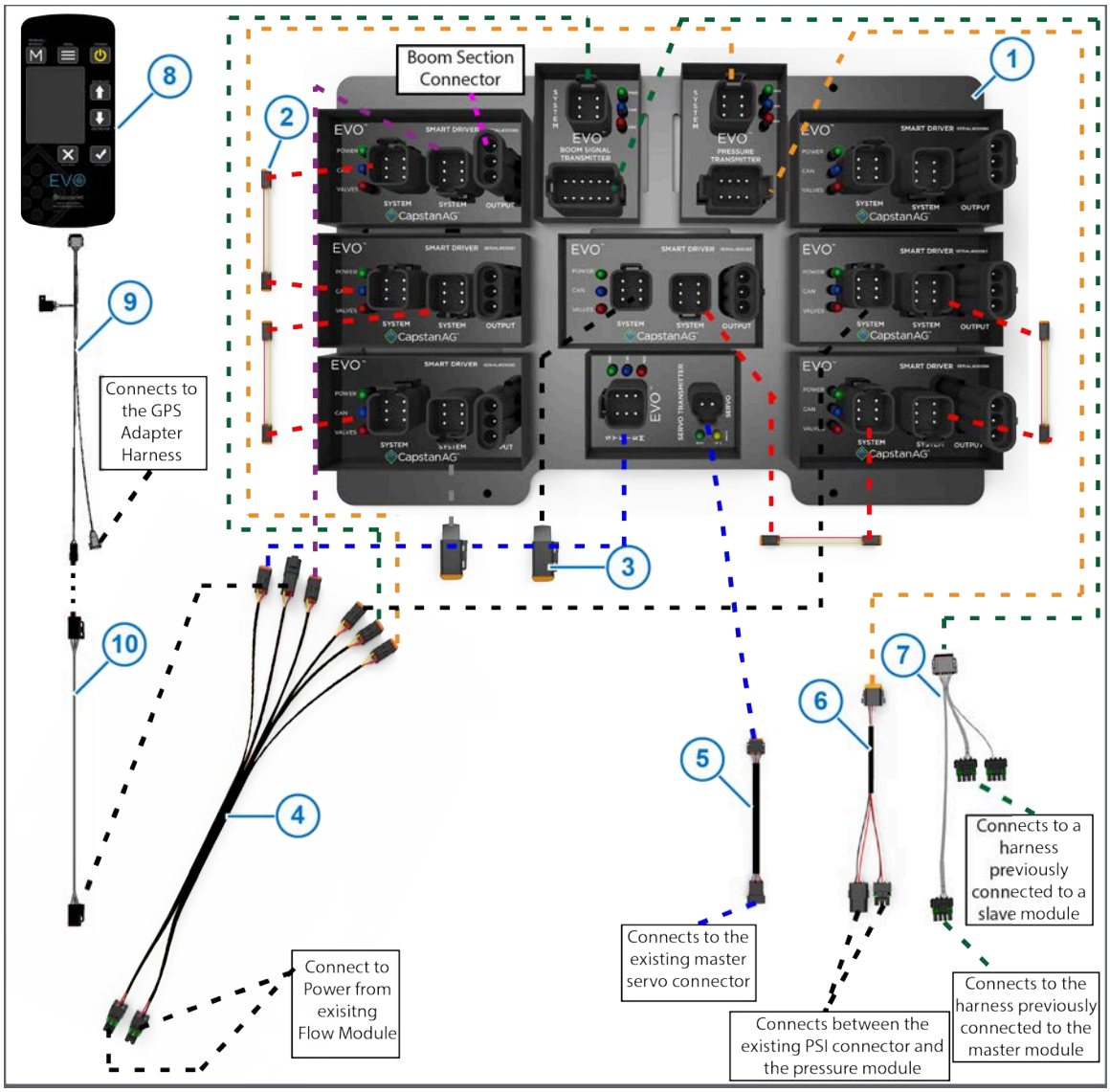

Figure 3:

Callout	Description		Callout	Description
(1)	Mounting Plate		*(6)*	PSI Adapter Harness
(2)	Plug-to-Plug Adapter Harness-6 in		*(7)*	Shutoff Harness
(3)	CAN Terminator		*(8)*	Cab Box Display
(4)	Power to CAN X Harness		*(9)*	Display Harness with GPS Drop
(5)	Servo Adapter Harness		*(10)*	CAN-Bus Extension Harness-40 ft

Five-section Schematic

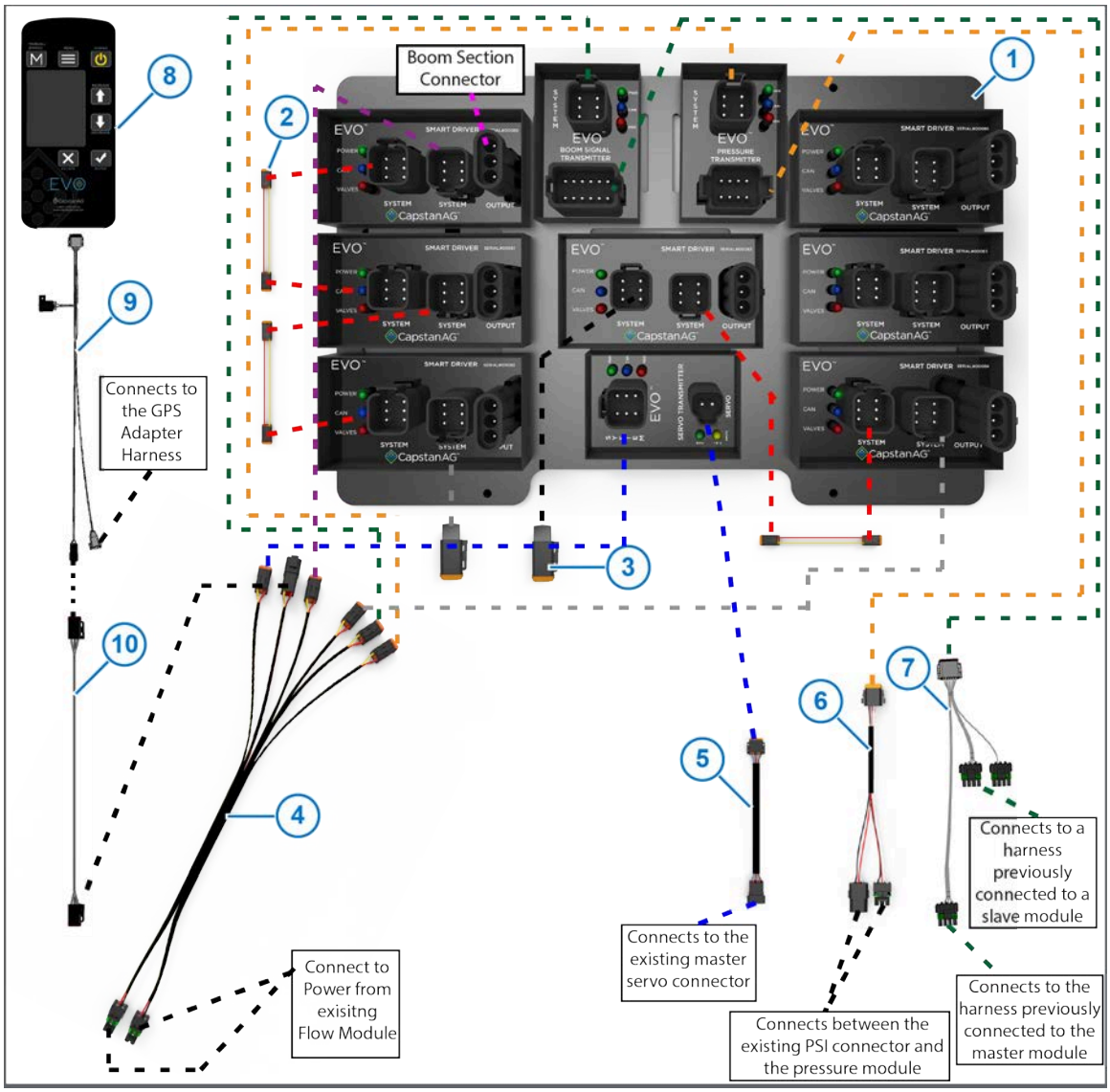

Figure 4:

Callout	Description		Callout	Description
(1)	Mounting Plate		*(6)*	PSI Adapter Harness
(2)	Plug-to-Plug Adapter Harness-6 in		*(7)*	Shutoff Harness
(3)	CAN Terminator		*(8)*	Cab Box Display
(4)	Power to CAN X Harness		*(9)*	Display Harness with GPS Drop
(5)	Servo Adapter Harness		*(10)*	CAN-Bus Extension Harness-40 ft

Chapter 3: Installation—EVO™ Upgrade Kit

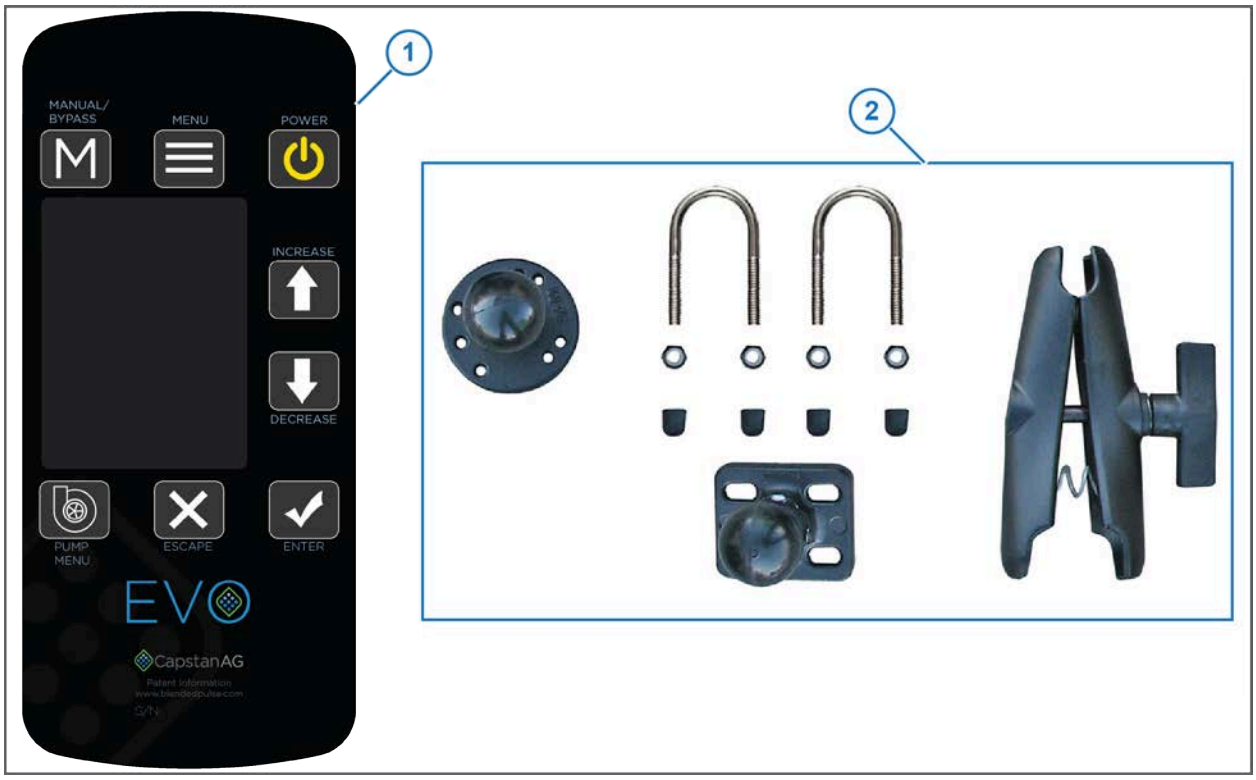

Figure 5:

1. Mount the cab display *(1)* in the cab of the machine with the hardware *(2)* supplied with the kit. Make sure that the cab display is within view and reach of the operator.

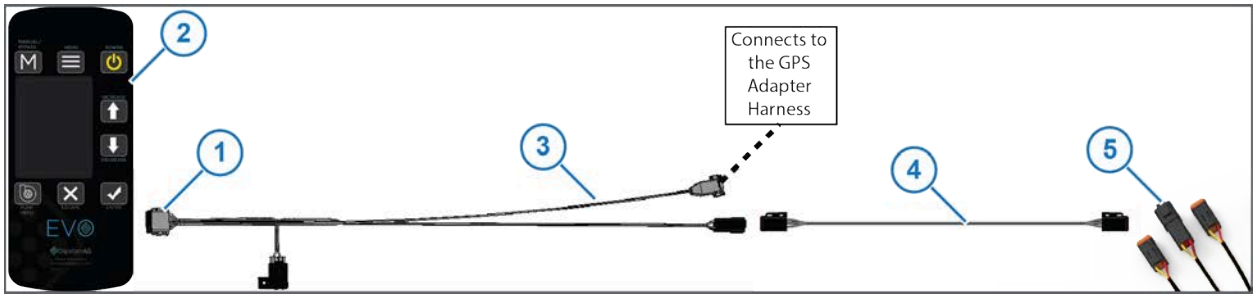

Figure 6:

2. Install one end of the display harness *(1)* into the connector at the back of the cab display *(2)*.
3. Route the display harness to the back of the cab of the machine.
4. Connect the GPS connector *(3)* to the machine-specific GPS Y-cable.
5. Connect the other end of the GPS Y-cable to the existing GPS source.
6. At the back of the cab, connect the display harness to the CAN Bus extension harness—40ft *(4)*.
7. Route the CAN Bus extension harness—40ft to the back of the machine.

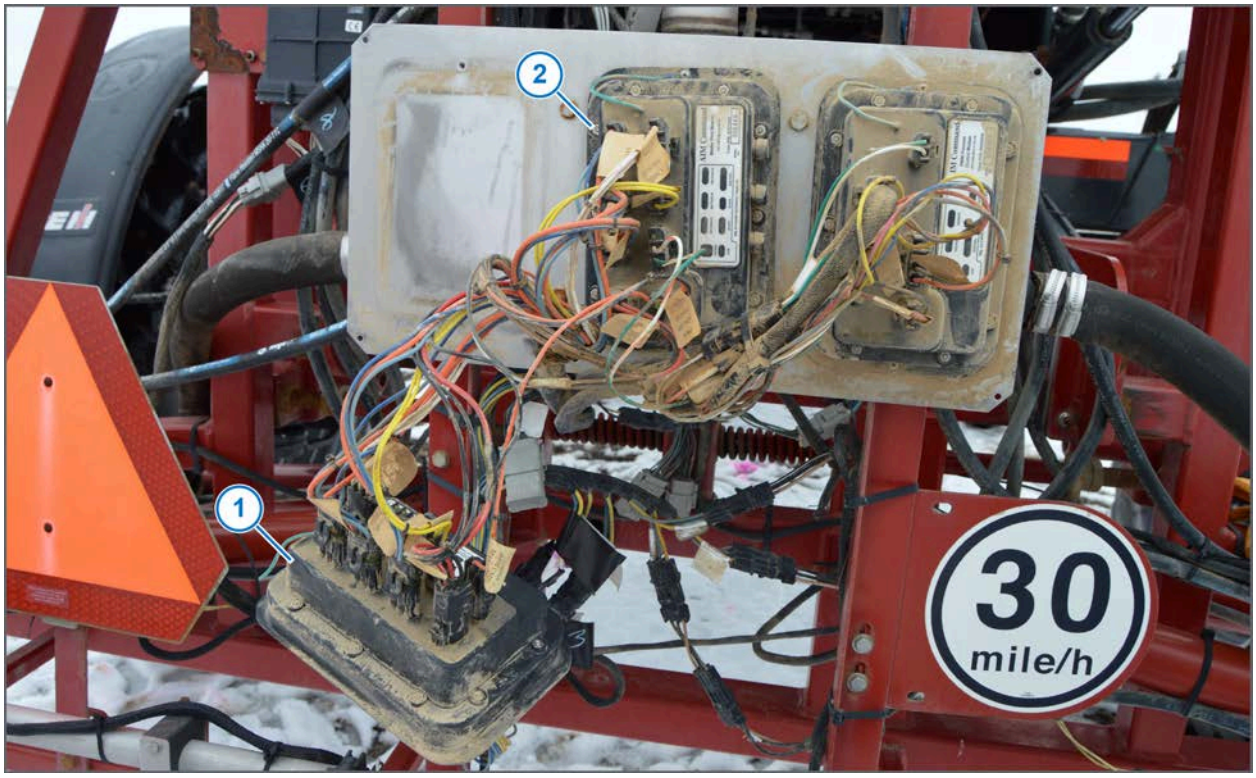

Figure 7:

8. Remove the module cover from the back from the sprayer.
9. Remove the master *(1)* and slave flow control modules *(2)* from the existing mounting plate(s). Do not disconnect the harness connectors at this time.

Figure 8:

10. Install the standoffs *(1)* to the existing mounting plate.

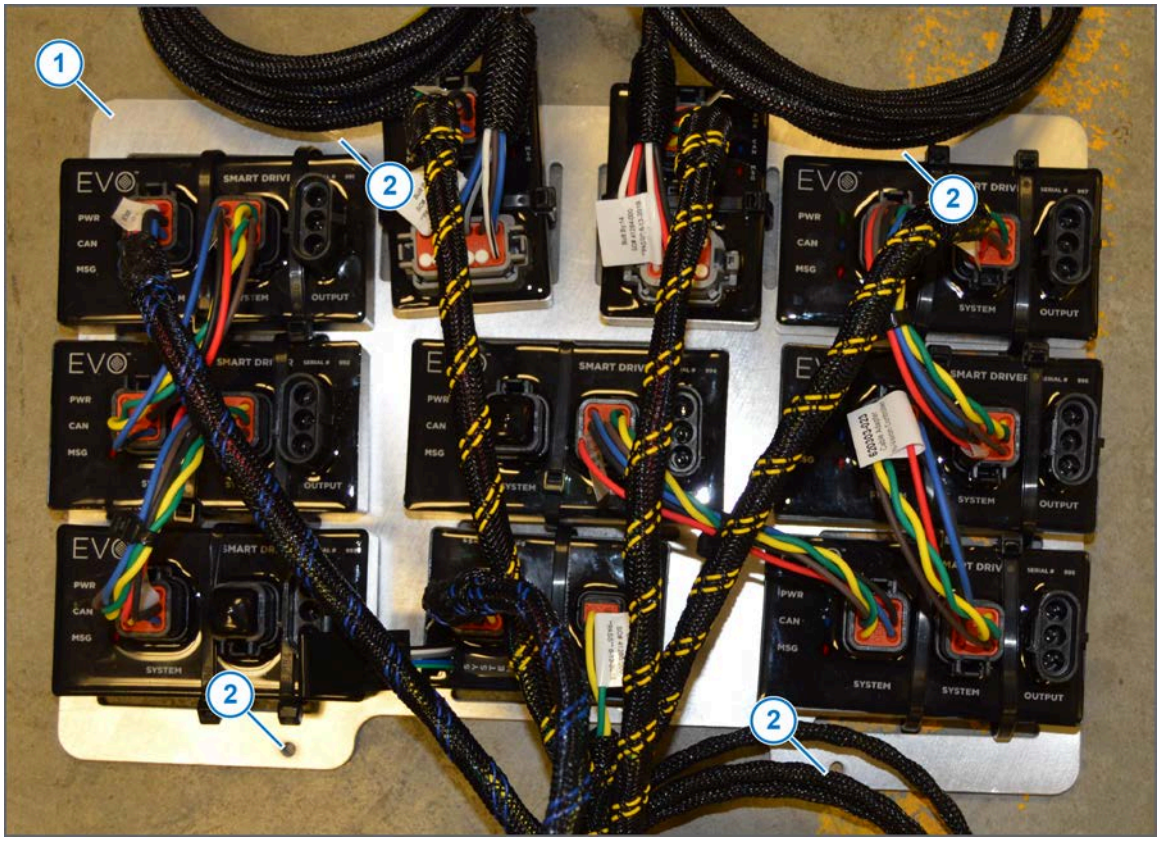

Figure 9:

11. Install the module mounting plate *(1)* to the standoffs with the screws *(2)* and lock washers. Make sure that all of the screws can be installed before tightening the screws all the way.

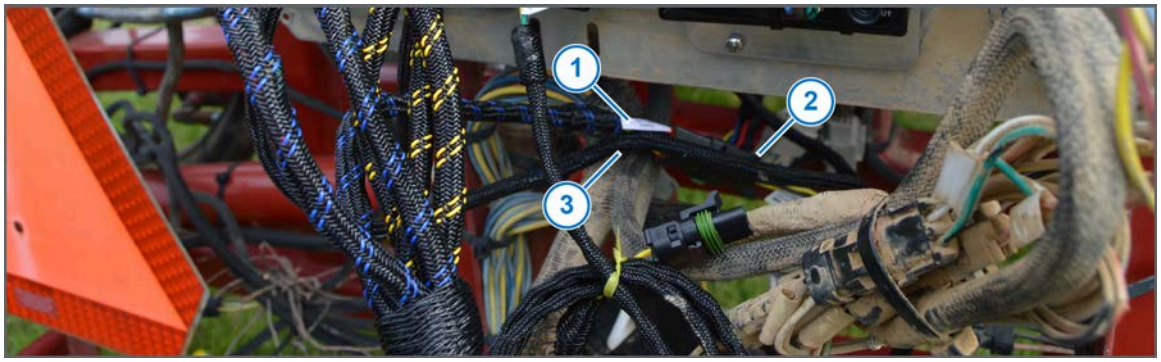

Figure 10:

12. Connect the Display, Left Trunk connector *(1)* of the power to CAN X harness to the end of the CAN Bus extension harness—40ft *(2)*.

13. Route the shutoff adapter harness *(3)* connected to the boom signal transmitter module to the back of the mounting plate.

Figure 11:

14. Disconnect the existing boom shutoff connectors *(1)*.

The existing boom shutoff connectors may be located behind the mounting plate and to the left of the center rack of the machine.

To verify the correct connectors follow the harness from the AIM Command modules along the existing AIM Command harnessing.

15. Connect the shutoff adapter harness connector *(2)* to the existing boom shutoff connector.

16. Install a dust plug to the other existing connector.

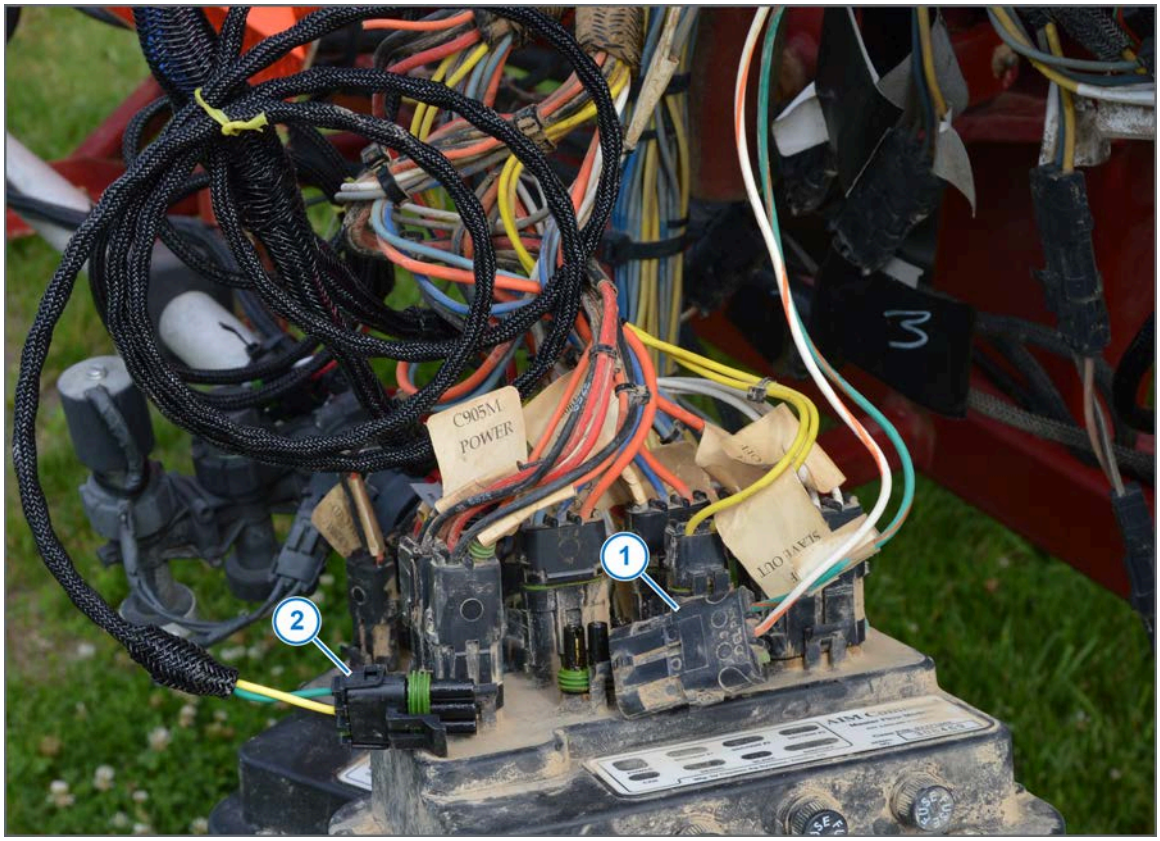

Figure 12:

17. Disconnect the connector *(1)* labeled **SERVO** from the master flow module.
18. Connect the servo adapter harness *(2)* connected to the servo transmitter module to the master servo connector.

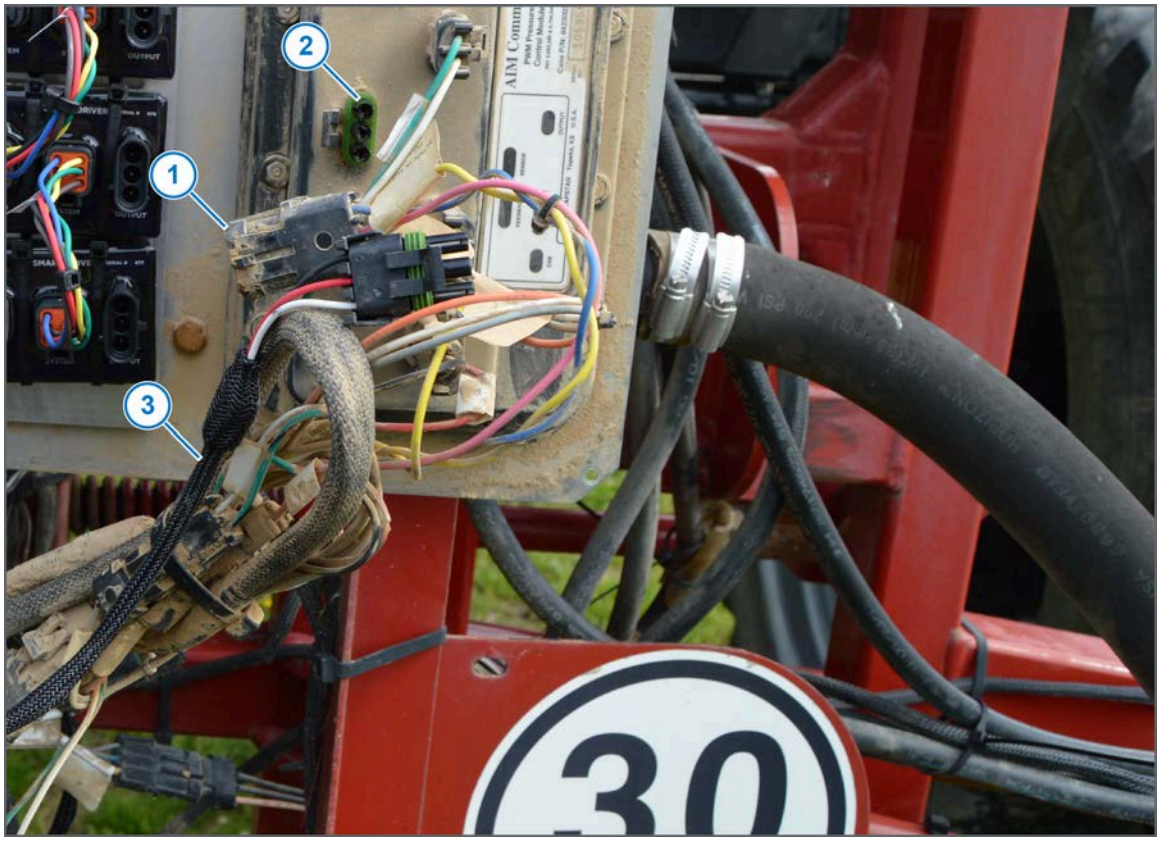

Figure 13:

19. Disconnect the connector *(1)* labeled **SENSOR** from the pressure module *(2)*.
20. Connect the pressure adapter harness *(3)* from the pressure transmitter module between the PSI connector and the pressure module as shown.

Figure 14:

The smart drivers have been assembled in serial number order from smallest to largest. The lowest serial number smart driver will drive the leftmost section of the system.

(1) Smart Driver #1—Section 1

(2) Smart Driver #2—Section 2

(3) Smart Driver #3—Section 3

(4) Smart Driver #4—Section 4

(5) Smart Driver #5—Section 5

(6) Smart Driver #6—Section 6

(7) Smart Driver #7—Section 7

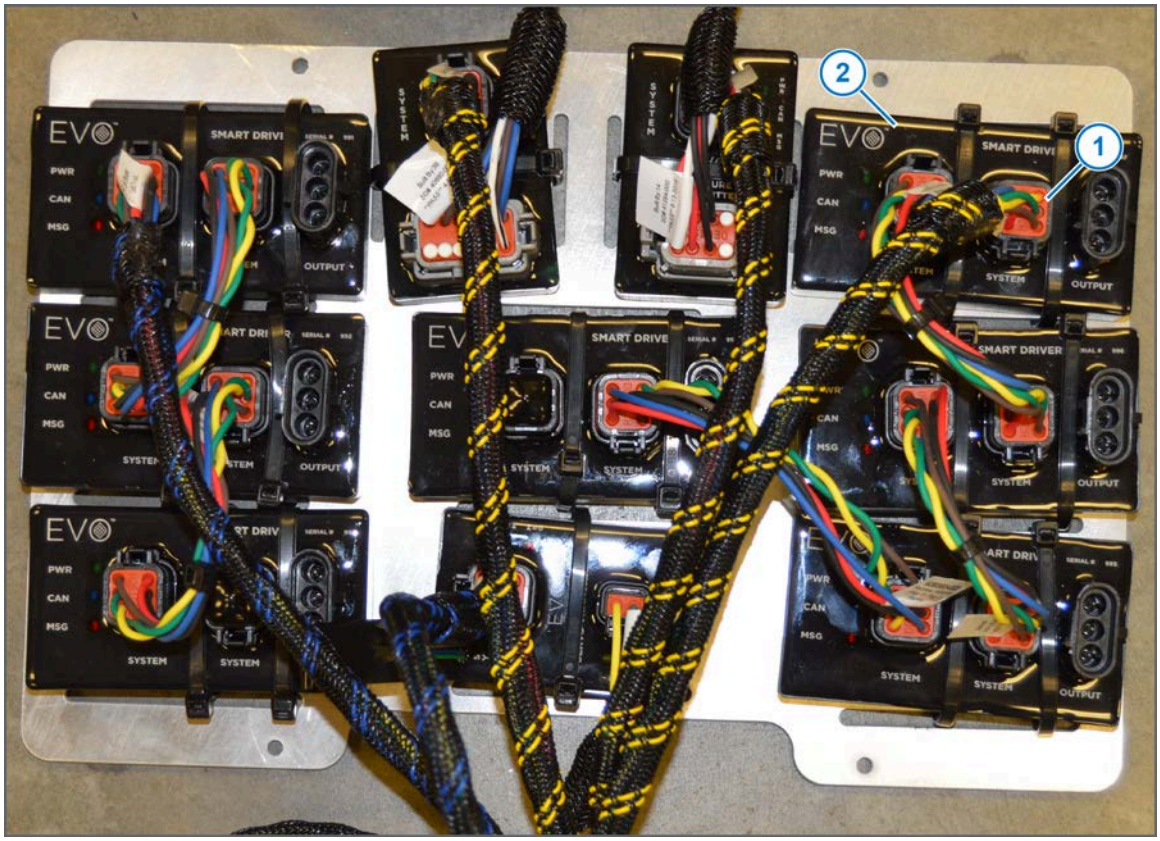

Figure 15:

21. If the system has 6 sections or less, disconnect right boom/right trunk connector on the power to CAN X harness *(1)* from smart driver #7 *(2)*.

Figure 16:

22. For six sections, remove one end of the plug-to-plug harness *(1)* between the smart driver #7 *(2)* and smart driver #6 and use the connectors as dust plugs on smart driver #7 as shown.

23. Connect the right boom/right trunk connector *(3)* on the power to CAN X harness to smart driver #6 as shown.

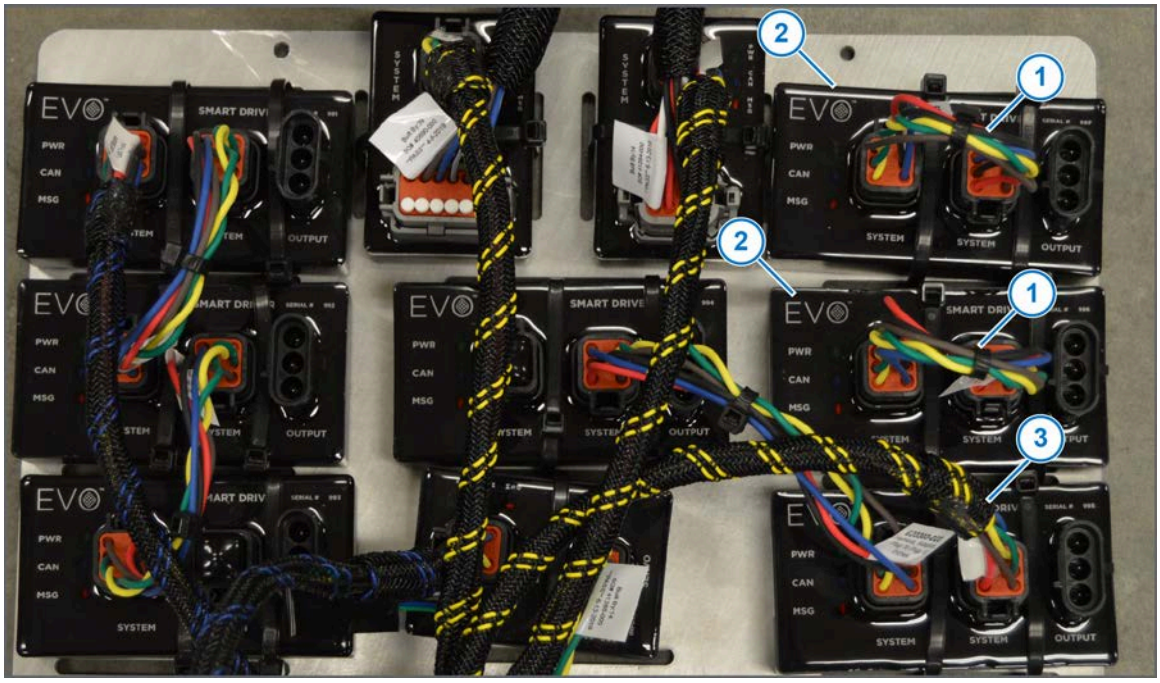

Figure 17:

24. For five sections, remove one end of the plug-to-plug harnesses *(1)* between the smart driver #7 and #6 *(2)* and use the connectors as dust plugs on the unused smart drivers as shown.

25. Connect the right boom/right trunk connector *(3)* on the power to CAN X harness to smart driver #5 as shown.

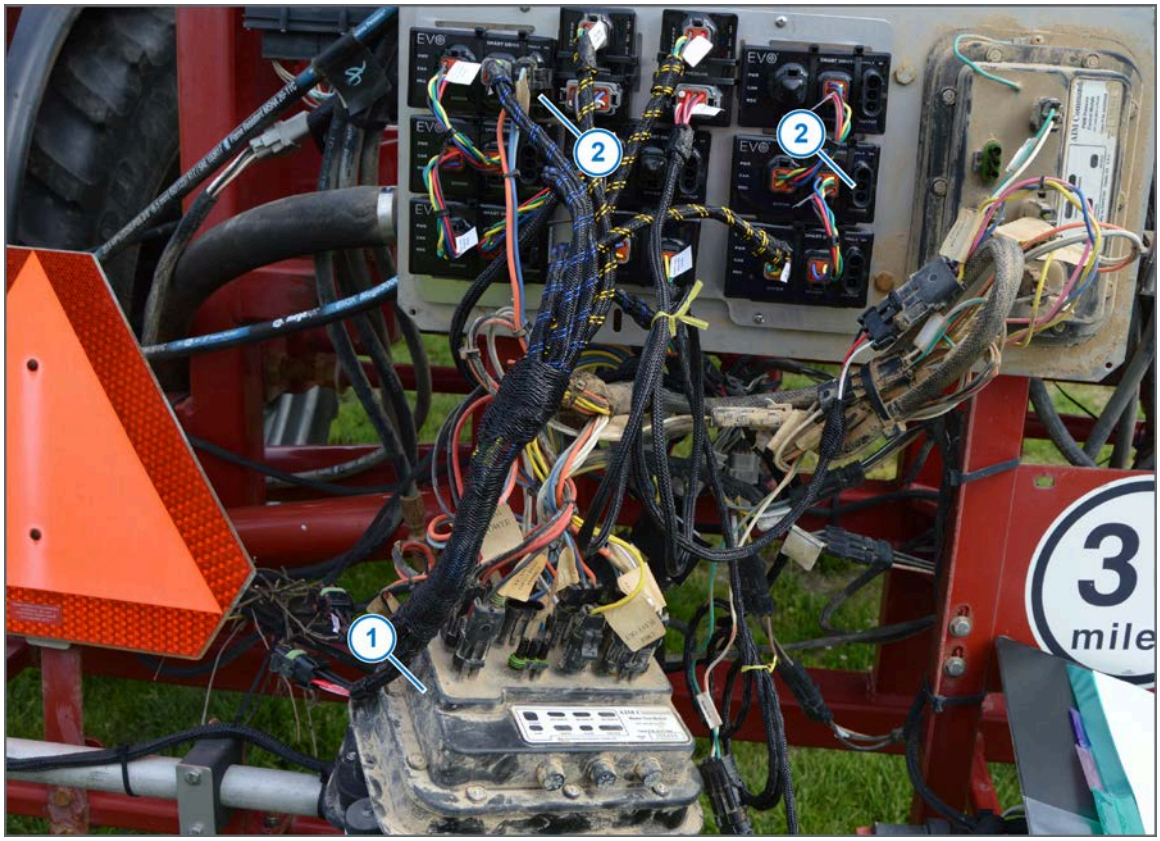

Figure 18:

26. For all systems, disconnect the section connectors from the master and slave modules *(1)*.

27. Connect the section connectors to the correct port *(2)* on each smart driver.

If necessary, use a 4-ft 3-pin extension harness between the smart drivers and the existing harnessing.

Section 1 will be connected to the smart driver with the lowest serial number that is being used. Five and six section systems will not use all of the smart drivers.

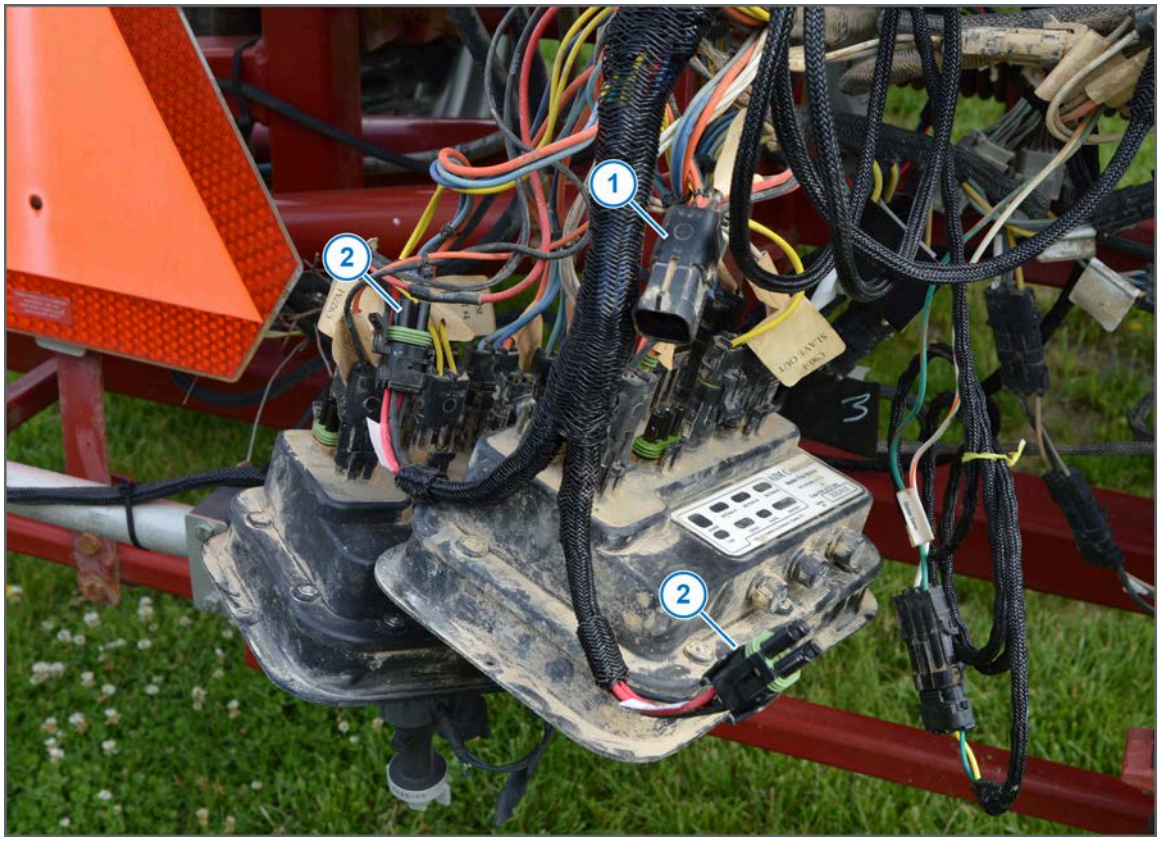

Figure 19:

28. Disconnect the existing power connectors *(1)* from the master and slave flow modules.
29. Connect the existing power connectors to the left and right trunk power connectors *(2)* of the power to CAN X harness.
30. Do not disconnect or remove the existing control bypass module.

    This module is required to bypass control back to the rate controller if conventional spray control is desired.

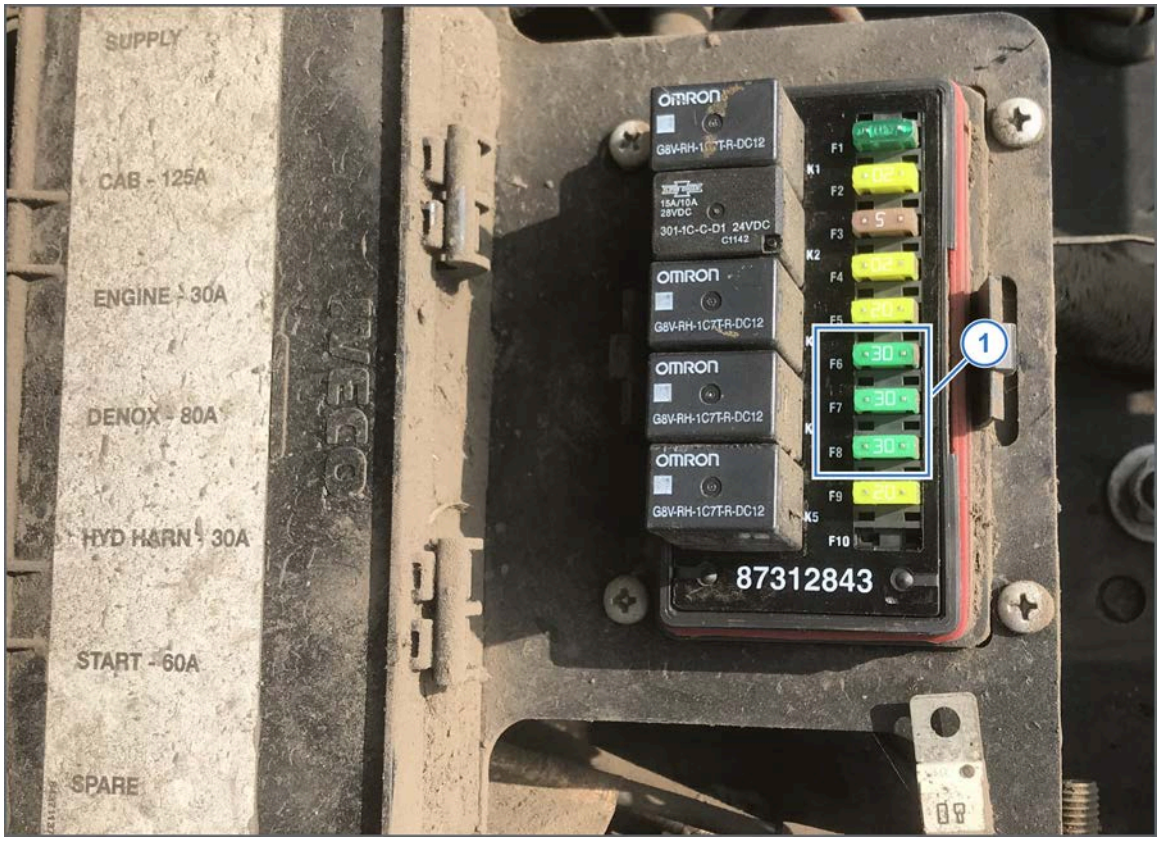

Figure 20:

31. Replace any existing fuses is the F6, F7, and F8 locations *(1)* with the correct type of 20 A fuses supplied in this kit.

The fuse panel shown is for reference only. The fuse panel shown may be different than your machine.

32. Install dust plugs as needed.

33. Install the module cover.

Chapter 4: System Setup

Before setting up the EVO upgrade system, make sure that you know how the sections are configured on the machine.

Common system configurations with 20-in spacing include:

Boom Width in ft	Number of Sections	Nozzles Per Section	Total Nozzles	Section Number						
				1	2	3	4	5	6	7
80	6	6-9-9-9-9-6	48	6	9	9	9	9	6	
90	5	9-15-6-15-9	54	9	15	6	15	9		
90	6	9-9-9-9-9-9	54	9	9	9	9	9	9	
100	6	12-9-9-9-9-12	60	12	9	9	9	9	12	
120	7	9-9-14-8-14-9-9	72	9	9	14	8	14	9	9

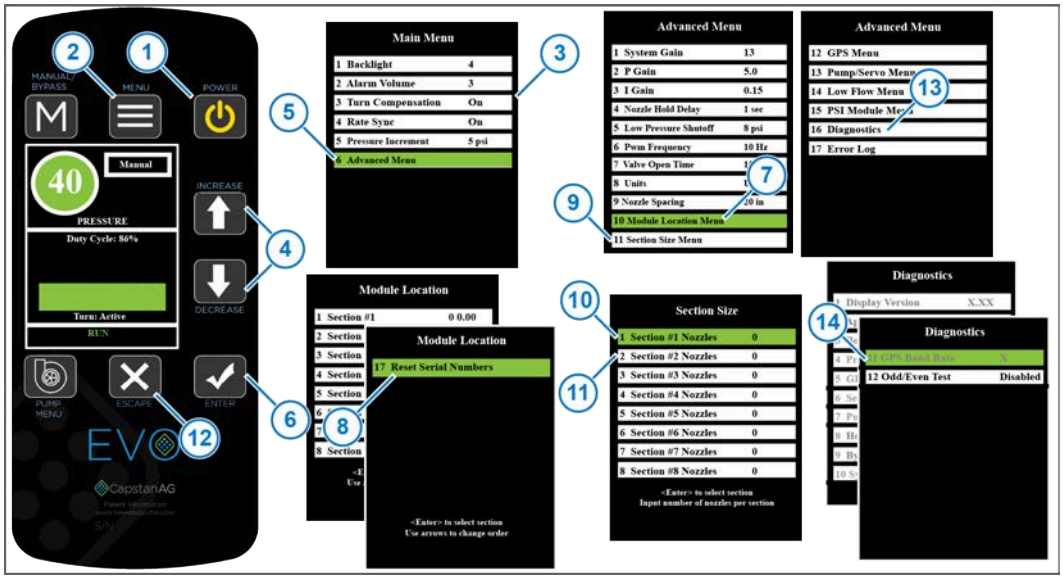

Figure 21:

1. Press the **POWER** button *(1)* on the cab box display to turn on the display.
2. Press the **MENU** button *(2)* to go to the ***Main Menu*** screen *(3)*.
3. Use the arrow buttons *(4)* to go to the **Advanced Menu** line *(5)*.
4. Press the **ENTER** button *(6)*.
5. Use the arrow buttons to go to the **Module Location Menu** line *(7)*.
6. Press the **ENTER** button.
7. Use the arrow buttons to scroll to the **Reset Serial Numbers** line *(8)* on the ***Module Location*** screen.
8. Make sure that the order of the smart drivers on the ***Module Location*** screen matches the physical boom layout. Change the order if necessary.

   The smart drivers should be in serial number order from left to right (lowest to highest number).

9. Use the arrow buttons to scroll to **Section #1** line.
10. Press the **ENTER** button.

    The nozzles on the selected section must pulse. If the nozzles do not pulse, the smart driver is in the wrong location.

    a) To change the location, press the **ENTER** button until the line is highlighted yellow.
    b) Use the arrow buttons to move the smart driver to the correct location.
    c) Press the **ENTER** button.
11. Use the arrow buttons to scroll to the next Section line.
12. Repeat Steps 11 and 12 to test the rest of the system sections.
13. Use the arrow buttons to go to the **Section Size** line *(9)* on the ***Advanced Menu*** screen.
14. Press the **ENTER** button.
15. On the Section Size screen, Section #1 Nozzles is selected *(10)*, press the **ENTER** button.
16. Enter the correct number of nozzles for that section.
17. Press the **ENTER** button.
18. Use the arrow buttons to go to the line for the next section *(11)*.
19. Press the **ENTER** button.
20. Enter the correct number of nozzles for that section.
21. Press the **ENTER** button.
22. Repeat steps 10 to 13 for each additional section of your machine.
23. When the correct number of nozzles for each section has been entered, press the **ESCAPE** button *(12)* to go to the ***Advanced Menu*** screen.
24. Press the **ESCAPE** button three times to go to the main operating screen on the display.
25. Power cycle the display.
26. Make sure that you have a GPS connection.

    A GPS error will show at the bottom of the main operating screen if the system is not receiving the correct GPS signal.

    Go to the ***Diagnostics*** line *(13)* that shows the GPS baud rate.

    If the baud rate is showing on the **Diagnostics** screen *(14)*, you have good a good GPS connection. Then verify that the correct NMEA information is being sent from the exported information from you GPS. The EVO™ system requires VTG and GGA with a minimum of 5 Hz and 10 Hz recommended.

    The EVO™ system requires a baud rate between 19200 to 115200.

    If no baud rate is present, do a check of all the GPS connection points.