Pilot's Operating Handbook and FAA Approved Airplane Flight Manual Supplement

SwathPRO™

For AirTractor

Model No. _____
Serial No. _____
Registration No. _____

This supplement must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual when the SwathPRO™ system has been installed in accordance with STC SA01995WI.

The information contained in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth herein. For limitations, procedures, performance, and loading information not contained in this supplement, consult the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

FAA Approved _____
                Kent S. Lund, Manager
                Central Flight Test Section, AIR-714
                Federal Aviation Administration
                Wichita, Kansas

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Change Log

Revision	Pages	Description	Date
A	All	Initial Release	08/18/2022

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Contents

Section 1: General

Topics:

- This Manual Supplement
- Modification for SwathPRO
- References
- Definitions for SwathPRO

This Supplement Manual

The information in this supplement is FAA approved material and must be attached to the POH and FAA Approved AFM when the aircraft has been modified by the installation of the SwathPRO™ system, in accordance with applicable approved data.

The information in this supplement supersedes or adds to the basic POH/AFM, only as detailed in this manual. Users of this manual are advised to always refer to this supplement for possibly superseding information and placarding applicable to the operation of the aircraft.

Modification for SwathPRO™

The SwathPRO™ system removes and replaces the factory spray booms.

The system added electronically controlled spray valves to control spray patterns.

The CapView display in the aircraft cockpit lets the pilot upload custom spray patterns and save preset pattern profiles for selection in-flight.

Spray on/off is controlled by the use of the existing spray handle (with no changes) or rate controller, as applicable.

The SwathPRO™ system is compatible with aftermarket rate controllers and spray nozzles.

References

For additional information, refer to:

Title	Part Number	Description
ProMaker User Guide	320700-002	Computer software manual to make profiles
Instructions for Continued Airworthiness for the SwathPRO™ System (ICA)	320700-005	Maintenance information for the system
SwathPRO™ Installation Guide	320700-007	System installation procedures

Definitions for SwathPRO™

Acronym List

Acronym	Description
POH	Pilot's Operating Handbook
AFM	Airplane Flight Manual
ICA	Instructions for Continued Airworthiness
FAA	Federal Aviation Administration
VCM	Valve Control Module
VMD	Volume Median Diameter
DTM	Deutsch Mini
PWM	Pulse Width Modulation
LED	Light Emitting Diode
CAN	Controller Area Network
CB	Circuit Breaker
GND	Ground
SWPWR	Switched Power

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Section 2: Limitations

Topics:

All limitations specified in the POH and associated supplements remain unchanged when the SwathPRO™ system is installed, with the exceptions of the limitations listed below.

Airspeed Limitations

SPEED	Model	Serial Number	KCAS	KIAS	IAS (MPH)	Remarks
Maneuver (V$_A$)	AT-802	802-0001 thru 802-0059	142	142	163	No full or abrupt control movements above this speed.
	AT-802	802-0064 & subsequent	140	140	161	
	AT-802A	802A-0003 thru 802A-0058	142	137	158	
	AT-802A	802A-0060 & subsequent	140	136	156	

System and Equipment Limits

Auto Pilot

Simultaneous operation of the SwathPRO system and the aircraft autopilot is prohibited.

Electrical System

Simultaneous operation of the SwathPRO system and the aircraft landing lights is prohibited on Air Tractor AT-402B models equipped with a 150-amp generator.

Placards

The following information on placards pertaining to flight and operating limitations must be displayed in full view of the pilot:

1. Air Tractor 802 Models; Serial Numbers: 802-0001 thru 802-0059

    • MANEUVERING SPEED 163 mph (142 kts) IAS WHEN SWATHPRO BOOMS INSTALLED

2. Air Tractor 802 Models; Serial Numbers: 802-0064 & subsequent

    • MANEUVERING SPEED 163 mph (142 kts) IAS WHEN SWATHPRO BOOMS INSTALLED

3. Air Tractor 802A Models; Serial Numbers: 802A-0003 thru 802A-0058

    • MANEUVERING SPEED 163 mph (142 kts) IAS WHEN SWATHPRO BOOMS INSTALLED

4. Air Tractor 802A Models; Serial Numbers: 802A-0060 & subsequent

    • MANEUVERING SPEED 163 mph (142 kts) IAS WHEN SWATHPRO BOOMS INSTALLED

Section 3: Emergency Procedures

Topics:

- Electrical Fire While Flying

All emergency procedures specified in the POH and associated supplements remain unchanged when the SwathPRO™ system is installed, with the exceptions of the additional SwathPRO™ system procedures listed in this section.

Electrical Fire While Flying

If the CapView shuts down, and electrical smoke or fire is seen or smelled, the SwathPRO™ system may be the issue.

1. Toggle the circuit breaker switch labeled **SWATHPRO MAIN** to off.
2. Open all cockpit air vents to ventilate any smoke as necessary.
3. Land as soon as it is safe and possible.

Section 3A: Abnormal Procedures

Topics:

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-
-
-
-

All abnormal procedures specified in the POH and associated supplements remain unchanged when the SwathPRO™ system is installed, with the exceptions of the SwathPRO™ system procedures listed in this section.

Alarm

Figure 1: Alarm Button

If the alarm on the CapView sounds, press the **ALARM** button (Figure 1, Item 1) to silence the alarm. Information about the item that caused the alarm will show on the bottom of the CapView screen.

Note: It is the responsibility of the pilot to stop using the system if the system is not applying product or operating correctly.

Note: The LED(s) (Figure 1, Item 2) will continue to blink. If the issue is not resolved after several minutes, the alarm will sound again.

The list on the following page details the steps that should be taken in the event any CapView alarm is set.

CapView Alarms

Coil Circuit Open
1. Determine if flight can be continued with number of functioning valves
2. Notify maintenance

Coil Circuit Short
1. Determine if flight can be continued with number of functioning valves
2. Notify maintenance

Key Fob Mode Active
1. System Setup .... PRESS
2. Down Arrow .... PRESS to reach **Nozzle Control (Key Fob)** line
3. Enter .... PRESS (line will highlight red)
4. Down Arrow .... PRESS until **12V Active** displays
5. Enter .... PRESS (line will highlight yellow)
6. Escape .... PRESS

Missing Hub
1. Capview POWER .... OFF
2. SwathPRO Main Circuit Breaker .... Cycle OFF-ON
3. Capview POWER .... ON
4. If error is still active, notify maintenance

Missing VCM
1. Capview POWER .... OFF
2. SwathPRO Main Circuit Breaker .... Cycle OFF-ON
3. Capview POWER .... ON
4. If error is still active, notify maintenance

No GPS Signal
1. System Setup .... PRESS
2. Down Arrow .... PRESS to reach **Rate Sync Mode** line
3. Enter .... PRESS (line will highlight red)
4. Down Arrow .... PRESS until **Disable** displays
5. Enter .... PRESS (line will highlight yellow)
6. Escape .... PRESS
7. Determine if flight can be continued
8. Notify maintenance

System Pressure Sensor
1. Enter .... PRESS (Circle around pressure readout will turn grey)
2. Determine if flight can be continued spraying in Manual Mode
3. Notify maintenance

Valves Not Found
1. Determine if flight can be continued with number of functioning valves
2. Notify maintenance

Valve Lodged
1. Determine if flight can be continued with number of functioning valves
2. Notify maintenance

Operate the SwathPRO Bypass Switch or Spray Without the Microswitch

If the microswitch stops working, use the switch labeled **SWATHPRO BYPASS** to turn the booms on and off manually. (Figure 3, Item 2).

1. If the microswitch is not operating correctly, put the **SWATHPRO BYPASS** switch in the (ON) bypass position.
2. Turn on the CapView to have the valves pulse at the duty cycle of the loaded profile.
3. Put the **SWATHPRO BYPASS** switch in the (OFF) normal position to shut off the valves at the end of the field.

Do a Forced Shutdown—Unresponsive CapView

If the CapView is unresponsive to button presses, do a forced shutdown of the CapView.

Figure 2: CapView Power Button

1. Press and hold the **POWER** button (Figure 2, Item 1) for 10 seconds.

   The CapView will turn off.
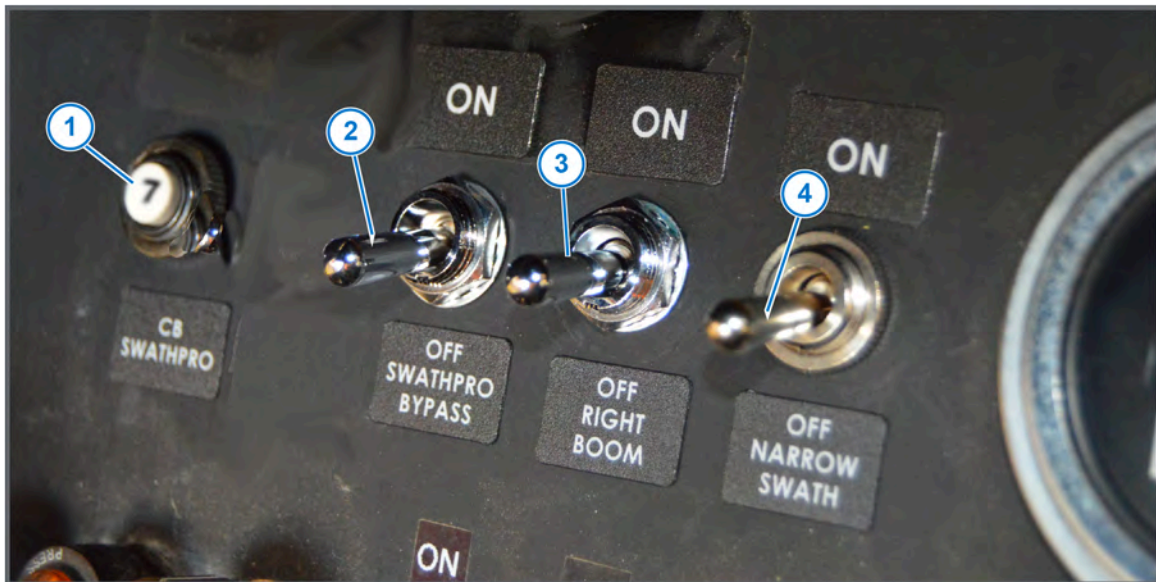
CapView Turns Off While Flying

Figure 3: SwathPRO Circuit Breaker

1. Make sure that the 7A circuit breaker labeled **CB SWATHPRO** (Figure 3, Item 1) on the instrument panel is not tripped.

2. If tripped, do not reset the circuit breaker without looking into the cause of the tripped circuit breaker.

Figure 4: CapView Power Button

3. If the 7A circuit breaker labeled **CB SWATHPRO** is not tripped, press the **POWER** button (Figure 4, Item 1) on CapView to verify if the display will turn back on.

4. If the CapView does not turn back on, operate the spray handle to verify that the system will spray.

   If the system will spray, all valves will open to 100% duty cycle, and the aircraft will adjust the pressure to get the product out.

   Note: Over application may occur if an external rate controller is not used.

5. If the system will not spray, land to diagnose the problem.

Product Will Not Spray

If the product will not spray when the spray handle is pushed:

1. If the Duty Cycle (DC) line on the CapView is showing off or 0%:
    a) Keep the spray handle in the down position.
    b) Use the **SWATHPRO BYPASS** switch to operate the valves.
        i) With the CapView on and profile selected, the valves will spray as usual.
        ii) With the CapView off, the valves will all open to 100% DC.
2. If the Duty Cycle (DC) line on the CapView is showing anything other than off or 0%:
    a) Verify there is product in the hopper.
    b) Verify the flow control valve is open.

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Section 4: Normal Procedures

Topics:

- [Ground Start](#)
- [After Landing](#)
- [Agricultural Flying](#)

All normal procedures specified in the POH and associated supplements remain the same when the SwathPRO™ system is installed, with the exceptions of the additional SwathPRO™ system procedures listed in this section.

Ground Start

These procedures will energize and prepare the SwathPRO™ system for operation.

These procedures must be done after the rate controller has been turned on.

1. Place the circuit breaker labeled **SWATHPRO MAIN** in the on position.

2. Start the CapView.

    For more information, see Start the CapView.

3. Upload a profile (if the needed profile(s) have not been uploaded).

    For more information, see Upload a Profile to the CapView.

4. Select a profile.

    For more information, see Select a Profile.

5. Use the *Wind Sensor Control* screen (optional).

    For more information, see Wind Sensor Control.

After Landing

These procedures will turn off the SwathPRO™ system after operation.

These procedures must be done after the rate controller has been turned off.

1. Shutdown the CapView.

2. Place the circuit breaker labeled **SWATHPRO MAIN** in the off position.

    For more information, see Shut down the CapView.

Agricultural Flying

Swath (Spraying)

Add these procedures to prepare the SwathPRO™ system to operate.

1. Operate in auto or manual mode.

    For more information, see Operate in Auto Mode or Operate in Manual Mode.

2. Operate the **RIGHT BOOM** switch (optional).

    For more information, see Operate the Right Boom Switch.

3. Operate the **NARROW SWATH** switch (optional).

    For more information, see Operate the Narrow Swath Switch.

Section 4A: Amplified Normal Procedures

Topics:

- Start the CapView
- Upload a Profile to the CapView
- Select a Profile
- Operate in Auto Mode
- Operate in Manual Mode
- Wind Sensor Control
- Operate the Right Boom Switch
- Operate the Narrow Swath Switch
- Shut down the CapView

Start the CapView

Before starting the aircraft engine, ensure that the circuit breaker labeled **SWATHPRO MAIN** is in the off position.

Figure 6: Power on the CapView

1. Start the aircraft engine and generator.
2. Allow amperage draw to normalize.
3. Place the circuit breaker labeled **SWATHPRO MAIN** in the on position.
4. Press the **POWER** button (Figure 6, Item 1) to turn on the CapView display.
5. Read the message (Figure 6, Item 2) on the CapView.
6. Press the **ENTER** button (Figure 6, Item 3) when the guidance controller is ready to operate.
7. Takeoff and fly the aircraft to the desired application location.
8. Operate the SwathPRO™ system.

   See the information on how to operate in auto or manual mode.

   • Operate in Auto Mode
   • Operate in Manual Mode

Upload a Profile to the CapView

You must first make a profile using ProMaker. Go to the ProMaker User Manual for more information.

Figure 7: Upload a Profile

1. Save the desired profile(s) from your computer to a USB memory device.
2. Insert the USB memory device into the port on the back of the CapView display.
    The ***USB Host Menu*** will show on the display screen.
3. Use the **UP** or **DOWN** arrow buttons (Figure 7, Item 1) to go to **Upload Profile** (Figure 7, Item 2).
4. Press the **ENTER** button (Figure 7, Item 3).
5. If at least one profile is on the USB memory device, an ***Upload Profile Menu*** screen will show.
    a) To upload a profile, use the up or down arrow buttons to select the desired profile name.
    b) Press the **ENTER** button.
    c) Select the profile number to save the profile.
        Choose from:

        •   Press any one of the preset buttons (Figure 7, Item 4) to select where to save the profile.

        OR

        •   Use the arrow buttons to select the desired preset number and then press the **ENTER** button.
    d) Repeat steps a to c to save profiles to all seven preset buttons.
6. When the uploads are complete, remove the USB memory device from the CapView.

Select a Profile

1. The profile(s) must be uploaded to the CapView display before you can select a profile for use while operating the system. For more information, see Upload a Profile to the CapView.

Figure 8: Select a Profile

2. Press and hold the desired preset button (Figure 8, Item 1).

    When the preset is selected, an LED (Figure 8, Item 2) will illuminate in the corner of the button. The profile name (Figure 8, Item 3) will show in the top center of the screen.

Operate in Auto Mode

Figure 9: Operation Screen—Auto Mode

1. Make sure that the circle at the top of the screen and the target pressure are green (Figure 9, Item 1).

   If the information is not in green, press the **ENTER** button (Figure 9, Item 2) until it shows green.

2. Select the desired profile.

   For more information, see Select a Profile.

3. Fly the aircraft over the desired application area.

4. If necessary, set the wind sensor information.

   For more information, see Wind Sensor Control.

5. Use the **UP** or **DOWN** arrow buttons (Figure 9, Item 3) to adjust the pressure set point, as necessary.

Operate in Manual Mode

Figure 10: Operation Screen—Manual Mode

1. Make sure that the circle at the top of the screen and the target pressure are grey (Figure 10, Item 1).

   If the information is not in grey, press the **ENTER** button (Figure 10, Item 2) until it shows grey.

2. Select the desired profile.

   For more information, see Select a Profile.

3. Fly the aircraft over the desired application area.

4. Use the **UP** or **DOWN** arrow buttons (Figure 10, Item 3) to change the duty cycle of the valves, as necessary.

Wind Sensor Control

Figure 11: Wind Sensor Control Screen

It is optional to use the ***Wind Sensor Control*** screen (Figure 11, Item 1).

1. Press the **ESCAPE** button (Figure 11, Item 2) while on the main operating screen to go to the ***Wind Sensor Control*** screen.
2. To start to use the wind sensor control, press the **UP** or **DOWN** arrow buttons (Figure 11, Item 3).
3. If you choose to use the screen, you need to set up the profiles for the wind patterns. For more information, see Change Wind Pattern Numbers System Settings.

Figure 12: Wind and Pattern Control Screen

4. After you have set the profiles for wind direction, the compass (Figure 12, Item 1) on the screen will show the corresponding numbers. The default profiles are shown on these graphics.

5. Use the arrow buttons (Figure 12, Item 2) to set the correct wind information.

6. The operator will have two choices for how to use the pattern control (Figure 12, Item 3) for selecting profiles:

    •   Manual—manually press the correct profile number as you change directions.
    •   Wind Vector—the system will automatically change profiles to match flight direction with wind direction.

Change Wind Pattern Numbers System Settings

Figure 13: System Setup 11-20

1. Press the **SYSTEM SETUP** button (Figure 13, Item 1).
2. Use the **UP** or **DOWN** arrow buttons (Figure 13, Item 2) to go to the **Headwind Pattern Number** line (Figure 13, Item 3).
3. To change the profile number, press the **ENTER** button (Figure 13, Item 4).
4. Use the **UP** or **DOWN** arrow buttons to change the profile number.
5. When the correct profile number shows, press the **ENTER** button.
6. Use the **UP** or **DOWN** arrow buttons to go to the **R to L Pattern Number** line (Figure 13, Item 5).
7. To change the profile number, press the **ENTER** button.
8. Use the **UP** or **DOWN** arrow buttons to change the profile number.
9. When the correct profile number shows, press the **ENTER** button.
10. Use the **UP** or **DOWN** arrow buttons to go to the **Tailwind Pattern Number** line (Figure 13, Item 6).
11. To change the profile number, press the **ENTER** button.
12. Use the **UP** or **DOWN** arrow buttons to change the profile number.
13. When the correct profile number shows, press the **ENTER** button.
14. Use the **UP** or **DOWN** arrow buttons to go to the **L to R Pattern Number** line (Figure 13, Item 7).
15. To change the profile number, press the **ENTER** button.
16. Use the **UP** or **DOWN** arrow buttons to change the profile number.
17. When the correct profile number shows, press the **ENTER** button.
18. To go to the main operating screen, press the **ESCAPE** button (Figure 13, Item 8).

Operate the Right Boom Switch

Use this switch to turn the right boom on and off manually. (Figure 3, Item 3).

1. While operating the system, if you desire to operate the right boom only, put the **RIGHT BOOM** switch into the on position.
2. When you want to use both booms again, put the **RIGHT BOOM** switch into the off position.

Operate the Narrow Swath Switch

Use this switch to manually turn off the outermost valves on each boom. (Figure 3, Item 4).

1. While operating the system, if you desire to use a narrow swath instead of the full width of the booms, put the **NARROW SWATH** switch in the on position.
2. When you want to use the full width swath again, put the **NARROW SWATH** switch in the off position.

Shut down the CapView

Figure 14: CapView

1. Press the **POWER** button (Figure 14, Item 1) to turn off the CapView.

2. Place the circuit breaker labeled **SWATHPRO MAIN** in the off position.

Section 5: Performance

All performance information specified in the POH and associated supplements remains unchanged when the SwathPRO™ system is installed.

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Section 6: Weight and Balance/Equipment List

Topics:

- Weight and Balance Record
- Equipment List

The weight range and center of gravity limits, aircraft loading, aircraft weighing procedure, and aircraft equipment list remain unchanged from the POH and associated supplements with the exception of:

Weight and Balance Record

Updated aircraft empty weight and balance records for the installation of the SwathPRO system.

Equipment List

Updated equipment list to reflect the installation of the SwathPRO™ system.

The total weight is the amount of weight that can be removed from the aircraft when changing from liquid application to dry application.

Air Tractor 402 Equipment List

Description	Part Number	Weight per piece (lb)	Qty	Total weight
Kit, Boom, 17ft, 4" Spacing	320150-017-4	81.24	2	162.48
Valve Assy w/ SS Bodies and Checks, Center	320015-108	0.49	6	2.94

Air Tractor 502 Equipment List

Description	Part Number	Weight per piece (lb)	Qty	Total weight
Kit, Boom, 17ft, 4" Spacing	320150-017-4	81.24	2	162.48
Valve Assy w/ SS Bodies and Checks, Center	320015-108	0.49	6	2.94

Air Tractor 602 Equipment List

Description	Part Number	Weight per piece (lb)	Qty	Total weight
Kit, Boom, 19ft, 4" Spacing	320150-019-4	91.00	2	182.00
Valve Assy w/ SS Bodies and Checks, Center	320015-108	0.49	6	2.94

Air Tractor 802 Equipment List

Description	Part Number	Weight per piece (lb)	Qty	Total weight
Kit, Boom, 19ft, 4" Spacing	320150-019-4	91.00	2	182.00
Valve Assy w/ SS Bodies and Checks, Center	320015-108	0.49	6	2.94

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Section 7: System Description

Topics:

This aircraft is equipped with a SwathPRO™ system, as described below. All other system descriptions and data in the POH and associated supplements remain unchanged.

SwathPRO™ is a networked control system in which each module contains a computer and communicates with other modules through a series of messages over a Control Area Network (CAN). System components include a CapView display unit, a power and control hub (Gateway hub), valve control modules (VCM), product delivery booms, and nozzle valves. The CapView display is an operator interface with a small color display and tactile buttons, allowing the pilot to make changes and monitor system operation. The Gateway hub is the power center, communication center, and the brain in the SwathPRO™ system, which executes most of the math involved in product control. The Gateway hub also distributes supply current and communication to a series of harnesses connected to the VCMs. The VCMs attach to, regulate, and monitor the operation of up to 15 individual nozzle control valves. The booms and valves distribute liquid product to the individually controlled spray nozzles allowing pattern control, rate control, and droplet size control.
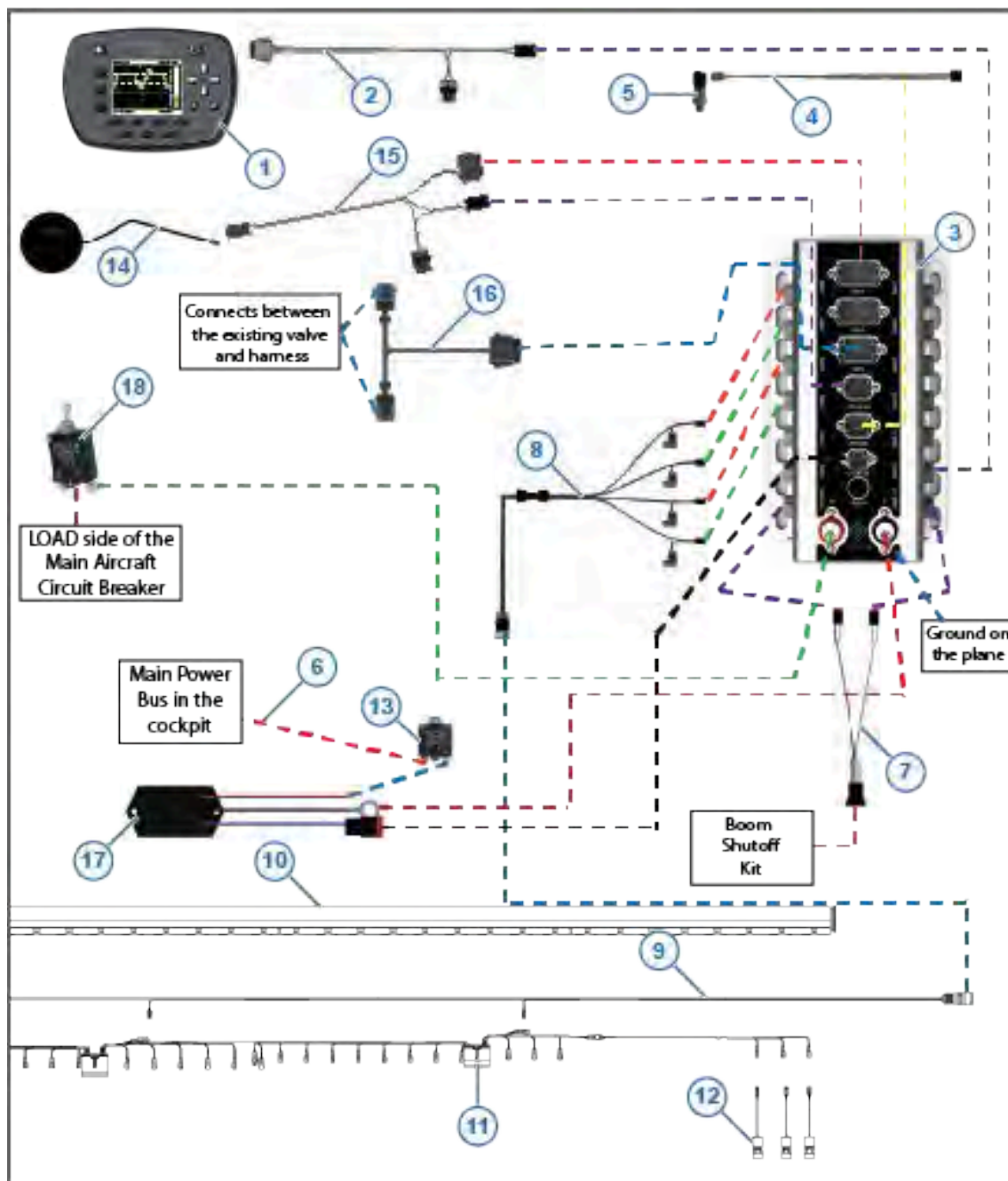
System Summary

Figure 18: System Summary

Figure 18 is an example of the system layout. Not all of the parts are shown in this graphic. The right boom is not shown in this graphic.

See the Parts List in the installation guide for more parts information.

Item	Name	Description
1	CapView	See CapView Description for additional information
2	CapView Harness	Connects the CapView to the Gateway hub
3	Gateway Hub	The Gateway hub is the operation center of the system. The Gateway hub also distributes supply current and communication to a series of harnesses connected to the VCMs
4	Pressure Sensor Extension Harness	Connects the pressure sensor to the Gateway hub
5	Pressure Sensor	A CapstanAG™ pressure sensor is installed inline with the existing pressure sensor. The additional pressure sensor allows the SwathPRO™ system to have the necessary information
6	Key Switch Power Harness	Helps provide power to the system
7	12-pin Shutoff Harness	The harness for the boom assemblies is routed to the Gateway hub
8	Boom Control Extension Harness	The harness for the boom assemblies is routed to the Gateway hub
9	Boom Control Harness	The harness for the boom assemblies is routed to the Gateway hub
10	Boom	The left and right boom assemblies connect to the existing center boom on the aircraft
11	VCM	The VCMs attach to, regulate, and monitor operation of up to 15 individual nozzle control valves.
12	Valve Assembly	The valves on each boom are what pulse the product through the tips
13	7A Circuit Breaker	See Switch and Circuit Breaker Descriptions for additional information
14	GPS Receiver	Installed behind the cockpit, as high as possible, used to determine the current speed for the Rate Sync™ feature to operate correctly
15	GPS-Hub Adapter Harness	Connects the GPS receiver to the Gateway hub
16	Servo/Flow Control Valve Harness	Connects the servo/flow control valve to the Gateway hub
17	Power Supply	Provides power to the Gateway hub
18	50 Amp Circuit Breaker Switch	Protects the circuit from damage from excessive current

CapView Description

The CapView display in the aircraft cockpit lets the pilot upload custom spray patterns and save preset pattern profiles for selection in-flight.

Figure 19: CapView Buttons

Table 3: CapView Button Descriptions

Item	Description	Function
1	ALARM	Press the button to silence an audible alarm
2	POWER	Press the button to start or shut down the CapView display
3	NOZZLE SETUP	Press the button to go to the **Nozzle Setup Menu**
4	SYSTEM SETUP	Press the button to go to the **System Setup Menu**
5	LOCATION SETUP	Press the button to go to the **Location Setup Menu** Press and hold the button for 10 seconds to edit the location setup information
6	Presets	Use the seven buttons to store and use the boom, tip size, and flow profiles
7	Navigation Arrows	Press the buttons to move through the menu items
8	ENTER	On the main operating screen, press the button to change between auto and manual operation mode In the system settings screens, press the button to open the selected menu screen or to accept the selected value
9	ESCAPE	On the main operating screen, press the button to enter the **Wind Sensor Control** screen On other screens, press the button to exit the current screen

Main Operation Screen

Figure 20: Operation Screen

The selected profile name (Figure 20, Item 1) shows at the top of the main operating screen.

The actual boom pressure (Figure 20, Item 2) shows inside the circle at the top center of the screen.

The target air speed and pressure set point (Figure 20, Item 3) shows on the top right side of the screen.

The actual air speed (Figure 20, Item 4) shows below the targeted information.

On the top left side of the screen, the circle with lines and an aircraft (Figure 20, Item 5) depicts the wind direction.

When the system is in auto mode, the circle around the boom pressure and the pressure set point change to green. When in auto mode, the **UP** and **DOWN** arrow buttons (Figure 20, Item 6) can change the pressure set point. In manual mode, the icon will be in white, and the **UP** and **DOWN** arrow buttons can change the duty cycle.

To change between auto and manual mode, press the ENTER button (Figure 20, Item 7).

The tip pressure (Figure 20, Item 8) is shown for both booms.

The graph Figure 20, Item 9) on the bottom portion of the screen represents each nozzle and actual duty cycle.

Each nozzle is represented by a blue mark (Figure 20, Item 10).

The text box on the lower right side (Figure 20, Item 11) on the screen shows the nozzle diagnostic information for the nozzle with the yellow mark (Figure 20, Item 12) on the nozzle line.

The text box on the lower left side (Figure 20, Item 13) shows system diagnostic information.

Operation Modes

Manual mode

- The duty cycle stays at the value set in the profile, no matter the speed or pressure of the aircraft.
- Profiles are built using ProMaker, and flow is set by the chosen duty cycle.
- The operator can manually change the duty cycle using the up or down arrow buttons on the CapView.
- Boost is available.

  — When the operator manually increases the duty cycle, and it hits 100%, the boost turns on if a boost profile is currently selected.

- This operation mode does not care about the servo/flow control valve signal.
- This operation mode does not care about the flowmeter signal.

Auto mode

- The duty cycle is adjusted while flying to keep the rate on target no matter if flying upwind, downwind, or at a variable rate.
- Profiles are built with ProMaker, but the flow changes with the changes to the duty cycle when flying.

  1. When building profiles, it is recommended to set the duty cycle at 60% to 80%, so the system starts pulsing at that duty cycle, then changes as necessary.
  2. Boost nozzles can be selected on each profile to allow more flow on a downwind or variable rate scenario.

- This operation mode works with the servo/flow control valve signal.

  1. The system tees into the servo/flow control valve harness and pulls the servo/flow control valve signal into the Gateway hub. Then the signal is used to adjust the duty cycle based on what is called for by the rate controller.
  2. The system adjusts the servo/flow control valve to adjust the pressure. The system can hold the pressure constant in the boom no-matter what the duty cycle does. This will keep the VMD constant across the field no matter the speed or rate changes.

- Boost is available.

  — When the rate controller is calling for more flow, and the duty cycle of the main nozzles all hit 100%, the boost nozzles that were selected in ProMaker will turn on at 20% duty cycle, and the main nozzles will drop down to 80% duty cycle, then all nozzles that are on will work their way up from there.

System Setup Menus

System Setup Menu Descriptions

Line Number	Line Title / Description	Action	Default Setting / Actual Setting
1	Operation Mode	Press **ENTER** to change	Auto
	The system can operate in two modes: **Auto** or **Manual**. In **Manual** mode, the rate controller adjusts the pressure, and the SwathPRO™ holds a constant duty cycle on the valves. In **Auto** mode, SwathPRO™ adjusts the servo (flow control valve) to hold the pressure constant and adjusts the duty cycle of the valves to vary the flow out of the tips.		
2	Controller Gallon Counter		0 Gallons
	Not used by the SwathPRO™ system		N/A
3	Actual Gallons Counter		0 Gallons
	Not used by the SwathPRO™ system		N/A
4	Controller Acre Counter		0.0 Acre
	Not used by the SwathPRO™ system		N/A
5	Actual Acre Counter		0.0 Acre
	Not used by the SwathPRO™ system		N/A
6	Controller Gallons per Minute		0 Gallons
	Not used by the SwathPRO™ system		N/A
7	Actual Gallons per Minute		0 Gallons
	Not used by the SwathPRO™ system		N/A
8	Nozzle Control (Key FOB)	Press **ENTER** to change	12V Active
	Default operation mode is **12V Active**. Use the **Key FOB Active** mode, during setup of the aircraft.		
9	Pressure 1		0 PSI
	The pressure 1 value is the boom spray pressure. This value is shown as the green bar on the main operating screen.		
10	Target Air Speed	Press **ENTER** to change	150 MPH
	The speed at which the aircraft will fly.		
11	System Voltage		24.0 V
	The system voltage is the voltage at the Gateway hub. This can be an indicator of system health.		

Line Number	Line Title	Action	Default Setting
	Description		Actual Setting
12	Display Backlight	Press **ENTER** to change	10
	Larger numbers make the CapView screen brighter for daytime use. Smaller numbers make the CapView screen dimmer for night-time use. Range: 1-10, if 5 or less, the keypad backlight will turn on.		
13	LED Brightness	Press **ENTER** to change	5
	Larger numbers make the LED lights brighter for daytime use. Smaller numbers dim the LED lights for night-time use. Range: 1-10.		
14	Beeper Volume	Press **ENTER** to change	5
	Larger numbers make the alarm louder for outdoor use. Smaller numbers soften the alarm for indoor use. Range: 0-5, 0 turns off the beeper completely.		
15	Specific Gravity	Press **ENTER** to change	1.00
	Specific gravity is used to calculate tip pressure.		
16	Valve Diagnostics Enable	Press **ENTER** to change	Enabled
	If the system is not using nozzles that use the CapstanAG nozzle diagnostics properly, the nozzle diagnostics can be disabled here. CapstanAG uses this feature on demonstration units and development units where lights are substituted for valves or reset to coil only. **Coil only** disables the plunger movement detection without disabling short or open data.		
17	Headwind Pattern Number	Press **ENTER** to change	1
	If using the wind sensor, this value should be the profile number that is set up for the headwind flight pattern.		
18	R to L Pattern Number	Press **ENTER** to change	2
	If using the wind sensor, this value should be the profile number that is set up for the right to left flight pattern.		
19	Tailwind Pattern Number	Press **ENTER** to change	3
	If using the wind sensor, this value should be the profile number that is set up for the tailwind flight pattern.		
20	L to R Pattern Number	Press **ENTER** to change	4
	If using the wind sensor, this value should be the profile number that is set up for the left to right flight pattern.		
21	Rate Sync Mode	Press **ENTER** to change	On
	Rate Sync™ changes the nozzle duty cycle based on the ground speed obtained from the GPS receiver.		

Line Number	Line Title	Action	Default Setting
	Description		Actual Setting
22	Rate Sync Average	Press **ENTER** to change	0.2
	The Rate Sync™ average represents how often the rate sync samples the speed from GPS. Higher values cause the system to react slower.		
23	Rate Sync Max Ground Speed	Press **ENTER** to change	180 MPH
	Enter the approximate speed that will allow the system to reach a 100% duty cycle based on the current spray tip size being used.		
24	Units	Press **ENTER** to change	US (PSI)
	Select the desired units of choice: US or SI units.		
25	Baud Rate		Searching
	This shows the GPS baud rate that is detected by the system. 19,200 to 115,200.		
26	Revision Information	Press **ENTER** to change and then **YES**	XX
	The revision information includes all hardware items stored by the CAN address. The current versions of all hardware and software items on the system are shown in this list, including the CapView, Gateway hub, and VCM software version.		
27	Language	Press **ENTER** to change	English
	Select the desired language.		
28	Previous Error List	Press **ENTER** to change	N/A
	This displays the 50 most recent errors.		N/A
29	Advanced Settings	Press **ENTER** to see the menu	N/A
	Additional settings menu		N/A

Advanced Settings—Auto Mode

Line Number	Line Title	Action	Default Settings
	Description		Actual Settings
1	Hour Meter		XX
	The hour meter shows the accumulated hours. The hour meter starts when at least one nozzle is on.		
2	Compass Heading	Press **ENTER** to and then **YES** to calibrate.	0 Degrees
	The 3-dimensional compass is generally not used.		
3	Compass Offset	Enter the offset to calibrate	0 Degrees
	This value is used after calibrating the 3-dimensional compass to correlate the aircraft with the Gateway hub.		
4	USB Mode		Thumb Drive
	Thumb drive or **Computer**. **Thumb drive** must be chosen to utilize a USB drive for different purposes.		
5	Deadband Pressure	Press **ENTER** to change.	2 PSI
	The deadband pressure is used to tune out instability by providing a pressure zone that is considered satisfactory, thus requiring no action by the control system. The higher the number, the less sensitive the control system. To stabilize an oscillating system, use a higher number. To speed up a sluggish system, use a lower number. Range 0 to 100.		
6	Gain - System	Press **ENTER** to change.	1.0
	The system gain is used to tune pressure control. The system gain changes the total gain of the system according to the same ratios of proportional/integral/differential gain established in those settings. The system gain number is the one most often used to tune sluggish or oscillating systems. The higher the number, the more sensitive the control system. To stabilize an oscillating system, use a lower number. To speed up a sluggish system, use a higher number.		
7	Gain - Proportional	Press **ENTER** to change.	5.0
	The proportional gain causes the control system to respond faster when the errors are greater. The higher the number, the more sensitive the control system. To stabilize an oscillating system, use a lower number. To speed up a sluggish system, use a higher number.		

Line Number	Line Title	Action	Default Settings
	Description		Actual Settings
8	Gain - Integral	Press **ENTER** to change.	0.15
	The integral gain causes the control system to accelerate faster when the errors are greater. The higher the number, the more sensitive the control system. To stabilize an oscillating system, use a lower number. To speed up a sluggish system, use a higher number. Integral gain is generally set at 1/10th of the proportional gain.		
9	Gain - Differential	Press **ENTER** to change.	0.0
	The differential gain causes the control system to accumulate errors faster when errors are small. The higher the number, the more sensitive the control system. To stabilize an oscillating system, use a lower number. To speed up a sluggish system, use a higher number. Differential gain is rarely used and is generally set at 1/10th of the integral gain or zero.		
10	Total Number Valve Expected	Press **ENTER** to change.	0 Valves
	The total number of valve expected value is the number of valves on the aircraft. At system power on, the system counts the number of valves reported by the VCMs. If the reported number matches the manually entered number for the value, then all is OK, and the system continues. If an error is detected, then an alarm is sounded and diagnostic readouts show. The system cannot detect valve issues that may have occurred when the system was not running. If the valve was damaged or corrosion sets in over the winter, this is the error you will get. The system cannot determine which nozzle is affected if the problem occurred when the system was powered off, so use the CapView location setup screen and look for a nozzle that is not connected.		
11	Scrolling Enable/Disable	Press **ENTER** to change.	Enabled
	For the nozzle diagnostics on the main operation screen, scroll from one nozzle to the next. To focus on a sign nozzle without the scrolling taking place, select Disable in this menu.		
12	GPS - Ant. Ahead of Rear Axle		0 Inches
	Not used by the SwathPRO™ system		N/A
13	GPS - Ant. Right of Center		0 Inches
	Not used by the SwathPRO™ system		N/A
14	GPS Antenna Above Ground		0 Inches
	Not used by the SwathPRO™ system		N/A
15	GPS Boom Ahead of Rear Axle		0 Inches
	Not used by the SwathPRO™ system		N/A

Line Number	Line Title	Action	Default Settings
	Description		Actual Settings
16	Forward/Reverse Detection		OFF=Fwd Rev Switch
	Not used by the SwathPRO™ system		N/A
17	Look Ahead Time	Press **ENTER** to change.	0.3 Seconds
	The look ahead time is based on the fastest field speed. The value is an indicator of how much time the GPS and the system take to react to coverage inputs. If the shutoff is too early, decrease the value. If the shutoff is too late, increase the value. Set the look ahead time value at the fastest travel speed expected. **Note:** When setting the overlap distance, set the Look Ahead Time value to 0.		
18	Zero Rate Shutoff	Press **ENTER** to change.	Shutoff
	When set to **Shutoff**, the zero rate shutoff is enabled, and the system allows the duty cycle to drive to 0% or off. To disable the zero rate shutoff, set this to **Minimum PWM%**. The recommended setting is **Minimum PWM%**, where it only allows the system to go to the low limit nozzle PWM set on the N**Nozzle PWM Minimum** line.		
19	Pressure Control Hold	Press **ENTER** to change.	1 Sec
	Auto mode operation pressure control hold must be set to 1.		
20	Pressure Sensor 1 Min. Volt	Press **ENTER** to change.	0.5 Volts
	Used to set up pressure sensor 1, which is the system spray pressure sensor.		
21	Pressure Sensor 1 Max. Volt	Press **ENTER** to change.	5.0 Volts
	Used to set up pressure sensor 1, which is the system spray pressure sensor.		
22	Pressure Sensor 1 Min. PSI	Press **ENTER** to change.	0 PSI
	Used to set up pressure sensor 1, which is the system spray pressure sensor.		
23	Pressure Sensor 1 Max. PSI	Press **ENTER** to change.	100 PSI
	Used to set up pressure sensor 1, which is the system spray pressure sensor.		
24	Pressure Sensor 1 Offset	Press **ENTER** to change.	0.0 PSI
	It is common to have 1 to 5 VDC sensors and 0.5 to 5 VDC sensors. The PSI sensor offset is used when the sensor does not match a gauge. Entering an offset value will scale the sensor up or down. The sensor offset allowable range is ±1-9.		
25	Servo Type	Press **ENTER** to change.	Inline Valve
	AirTractor airplanes will use **Inline Valve**.		

Line Number	Line Title	Action	Default Settings
	Description		Actual Settings
26	Manual Mode Servo Speed	Press **ENTER** to change.	50%
	The manual mode servo speed controls how fast the pressure changes in manual mode. If the valve operates too slowly in manual mode, increase this value. If the valve operates too quickly in manual mode, decrease this value.		
27	Servo Output Minimum DC%	Press **ENTER** to change.	0%
	Servo output minimum is a kick-start for the servo/flow control valve. Typically a servo duty of 5% will not make the servo/flow control valve move at all because of the static friction in the valve. The servo output minimum supplies a minimum duty at which the valve will move. A pressure dead-band is used to prevent constant cycling of the valve.		
28	Servo Output Maximum DC%	Press **ENTER** to change.	100%
	Servo output maximum limits the maximum speed of the pressure control servo/flow control valve. The inertia of the valve motor can cause the valve to overshoot when controlling pressure. Limiting the output maximum can assist the PID control algorithm to accurately regulate pressure. A typical value may be 75% in order to slow the maximum speed of the valve.		
29	Servo Input Minimum DC%		35%
	Servo input minimum is the minimum duty cycle from the rate controller, which will cause the nozzle duty cycle to move. Making this number larger will prevent small fluctuations in the servo duty cycle from changing the nozzle duty cycle.		
30	Pump Seal Shutdown		3.0 PSI
	Not used by the SwathPRO™ system.		N/A
31	Nozzle PWM% Cycle Time	Press **ENTER** to change.	2.5 Seconds
	The nozzle PWM% cycle time value only affects in-line or bypass valve servo types. The PWM% cycle time (4.0 seconds) is the time it takes for the pulsing nozzles to modulate from minimum to maximum duty cycle. To speed up a sluggish system reaction time, enter a lower number. To slow down the reaction time of an oscillating system, enter a higher number.		
32	Nozzle Pulse Frequency	Press **ENTER** to change.	20.0 Pulse/Sec.
	The SwathPRO™ spray systems run at 20 pulses per second pulse frequency. To run a faster pulse frequency, enter a larger number. CapstanAG does not recommend pulse frequencies slower than 10Hz in spray applications.		

Line Number	Line Title	Action	Default Settings
	Description		Actual Settings
33	Nozzle PWM Minimum	Press **ENTER** to change.	20%
	The nozzle PWM minimum value is the minimum pulse duty cycle for the nozzle valves. You may not change this value any less than the Nozzle Pulse Frequency value. If the Nozzle Pulse Frequency is set to 20 pulses, then the nozzle PWM minimum must be set to 20 or higher. If you are uncomfortable about running low duty cycles, then this value can be set higher.		
34	Nozzle PWM Maximum	Press **ENTER** to change.	100%
	It is unlikely that you would set the nozzle PWM maximum lower than 100%. This is where the limit to the maximum duty cycle would be set.		
35	Flowmeter Minimum GPM	Press **ENTER** to change.	10 GPM
	The flowmeter minimum gallons per minute value is the minimum flow at which the turbine flowmeter is no longer accurate. When in correction mode, the system will automatically calculate the flow below this value. This is especially important when the system is operating with only a few nozzles, like point rows, filling gaps, etc. The system calculation accurately measures flow through a single nozzle.		
36	Flowmeter Output Type	Press **ENTER** to change.	Correction
	In **Correction** mode, the flow reported to the rate controller automatically switches from the turbine flowmeter to a calculation whenever the flow falls below Flowmeter Minimum GPM and also when a partial boom section is pulsing. **Transparent** mode prohibits this switch and only uses the turbine value regardless of accuracy. **Calculate** mode uses only the calculation.		
37	Flowmeter Calibration	Press **ENTER** to change.	1400P/10 GAL
	It is important for the flow meter calibration value to match the tag on the turbine flowmeter so that the gallon counters will match the rate controller. The system uses "pulses per 10-gallons." If the flowmeter tag is in "pulses per gallon," multiply by 10. If the rate controller requires "pulses per gallon," divide by 10. You can check this by monitoring the gallons per minute shown in *System Setup* and comparing it to the rate controller.		
38	Flowmeter Error Limit	Press **ENTER** to change.	Disabled
	The flowmeter error limit ranges from Disabled to 50%. Flow % higher than the chosen % will cause a fault message and an alarm.		
39	Flowmeter Error	Press **ENTER** to change.	0%
	The flowmeter error shows the real-time % difference between the flowmeter and the calculated flow.		

Line Number	Line Title	Action	Default Settings
	Description		Actual Settings
40	Minimum Valves ON	Press **ENTER** to change.	1 Valve
	The minimum valves on default value is 1. This feature reduces the over application of chemical product with chemical injection. This feature is used for chemical injection systems.		
41	Factory Reset	Press **ENTER** and then **YES** to change.	N/A
	The factory reset will require all setups in the entire system to be reset to default. A factory reset is required when repairing the system. Make sure that you have recorded the setups you prefer before resetting. With a properly prepared "cheat sheet," a factory reset only takes a few minutes. If major components are changed, a factory reset may need to be performed.		N/A
42	Contact Information		N/A
	Selecting this line will open up a page with the CapstanAG toll-free phone number, website, and a QR code that will direct you to the website.		N/A

Advanced Settings—Manual Mode

Line Number	Line Title	Action	Default Setting
	Description		Actual Setting
1	Hour Meter		XX
	The hour meter shows the accumulated hours. The hour meter starts when at least one nozzle is on.		
2	Compass Heading	Press **ENTER** to and then **YES** to calibrate.	0 Degrees
	The 3-dimensional compass is generally not used.		
3	Compass Offset	Enter the offset to calibrate	0 Degrees
	This value is used after calibrating the 3-dimensional compass to correlate the wings with the Gateway Hub.		
4	USB Mode		Thumb Drive
	Thumb drive or **Computer**. **Thumb drive** must be chosen to utilize a USB drive for different purposes.		
5	Deadband Pressure	Press **ENTER** to change.	2 PSI
	The deadband pressure is used to tune out instability by providing a pressure zone that is considered satisfactory, thus requiring no action by the control system. The higher the number, the less sensitive the control system. To stabilize an oscillating system, use a higher number. To speed up a sluggish system, use a lower number. Range 0 to 100.		
6	Gain - System	Press **ENTER** to change.	1.0
	The system gain is used to tune pressure control. The system gain changes the total gain of the system according to the same ratios of proportional/integral/differential gain established in those settings. The system gain number is the one most often used to tune sluggish or oscillating systems. The higher the number, the more sensitive the control system. To stabilize an oscillating system, use a lower number. To speed up a sluggish system, use a higher number.		
7	Gain - Proportional	Press **ENTER** to change.	5.0
	The proportional gain causes the control system to respond faster when the errors are greater. The higher the number, the more sensitive the control system. To stabilize an oscillating system, use a lower number. To speed up a sluggish system, use a higher number.		
8	Gain - Integral	Press **ENTER** to change.	0.15
	The integral gain causes the control system to accelerate faster when the errors are greater. The higher the number, the more sensitive the control system. To stabilize an oscillating system, use a lower number. To speed up a sluggish system, use a higher number. Integral gain is generally set at 1/10th of the proportional gain.		

Line Number	Line Title	Action	Default Setting
	Description		Actual Setting
9	Gain - Differential	Press **ENTER** to change.	0.0
	The differential gain causes the control system to accumulate errors faster when errors are small. The higher the number, the more sensitive the control system. To stabilize an oscillating system, use a lower number. To speed up a sluggish system, use a higher number. Differential gain is rarely used and is generally set at 1/10th of the integral gain or zero.		
10	Total Number Valve Expected	Press **ENTER** to change.	0 Valves
	The total number of valve expected value is the number of valves on the aircraft. Upon system power on, the system counts the number of valves reported by the VCMs. If the reported number matches the manually entered number for the value, then all is OK, and the system continues. If an error is detected, then an alarm is sounded and diagnostic readouts show. The system cannot detect valve issues that may have occurred when the system was not running. If the valve was damaged or corrosion sets in over the winter, this is the error you will get. The system cannot determine which nozzle is affected if the problem occurred when the system was powered off, so use the CapView location setup screen and look for a nozzle that is not connected.		
11	Scrolling Enable/Disable	Press **ENTER** to change.	Enabled
	For the nozzle diagnostics on the main operation screen, scroll from one nozzle to the next. To focus on a sign nozzle without the scrolling taking place, select Disable in this menu.		
12	GPS - Ant. Ahead of Rear Axle		0 Inches
	Not used by the SwathPRO™ system		N/A
13	GPS - Ant. Right of Center		0 Inches
	Not used by the SwathPRO™ system		N/A
14	GPS Antenna Above Ground		0 Inches
	Not used by the SwathPRO™ system		N/A
15	GPS Boom Ahead of Rear Axle		0 Inches
	Not used by the SwathPRO™ system		N/A
16	Forward/Reverse Detection		OFF=Fwd Rev Switch
	Not used by the SwathPRO™ system		N/A
17	Look Ahead Time		0.3 Seconds
	Not used by the SwathPRO™ system		N/A

Line Number	Line Title	Action	Default Setting
	Description		Actual Setting
18	Zero Rate Shutoff	Press **ENTER** to change.	Shutoff
	When set to **Shutoff**, the zero rate shutoff is enabled, and the system allows the duty cycle to drive to 0% or off. To disable the zero rate shutoff, set this to **Minimum PWM%**. The recommended setting is **Minimum PWM%**, where it only allows the system to go to the low limit nozzle PWM set on the **Nozzle PWM Minimum** line.		
19	Low Pressure Shutoff	Press **ENTER** to change.	8.0 PSI
	When used, the low pressure shutoff causes the solenoid valves to shut off, like diaphragm drip checks at this value. When the low pressure shutoff value is 8 PSI, a readout shows when PSI drops below 8 PSI. At this point, nozzle valves close. Nozzle valves open, and the readout clears when the PSI increases to at least 12 PSI.		
20	Low Pressure Turn-On		10.0 PSI
	When used, the low pressure turn-on causes the solenoid valves to turn on after a low pressure shutoff, like diaphragm drip checks.		
21	Pressure Control Hold	Press **ENTER** to change.	1 Sec
	Manual mode operation pressure control hold must be set to 1.		
22	Pressure Sensor 1 Min. Volt	Press **ENTER** to change.	0.5 Volts
	Used to set up pressure sensor 1, which is the system spray pressure sensor.		
23	Pressure Sensor 1 Max. Volt	Press **ENTER** to change.	5.0 Volts
	Used to set up pressure sensor 1, which is the system spray pressure sensor.		
24	Pressure Sensor 1 Min. PSI	Press **ENTER** to change.	0 PSI
	Used to set up pressure sensor 1, which is the system spray pressure sensor.		
25	Pressure Sensor 1 Max. PSI	Press **ENTER** to change.	100 PSI
	Used to set up pressure sensor 1, which is the system spray pressure sensor.		
26	Pressure Sensor 1 Offset	Press **ENTER** to change.	0.0 PSI
	It is common to have 1 to 5 VDC sensors and 0.5 to 5 VDC sensors. The PSI sensor offset is used when the sensor does not match a gauge. Entering an offset value will scale the sensor up or down. The sensor offset allowable range is ±1-9.		

Line Number	Line Title	Action	Default Setting
	Description		Actual Setting
27	Nozzle Pulse Frequency	Press **ENTER** to change.	20.0 Pulse/Sec.
	The SwathPRO™ spray systems run at 20 pulses per second pulse frequency. To run a faster pulse frequency, enter a larger number. CapstanAG does not recommend pulse frequencies slower than 10Hz in spray applications.		
28	Nozzle PWM Minimum	Press **ENTER** to change.	20%
	The nozzle PWM minimum value is the minimum pulse duty cycle for the nozzle valves. You may not change this value any less than the Nozzle Pulse Frequency value. If the Nozzle Pulse Frequency is set to 20 pulses, then the nozzle PWM minimum must be set to 20 or higher. If you are uncomfortable about running low duty cycles, then this value can be set higher.		
29	Nozzle PWM Maximum	Press **ENTER** to change.	100%
	It is unlikely that you would set the nozzle PWM maximum lower than 100%. This is where to set the limit to the maximum duty cycle.		
30	Flowmeter Minimum GPM	Press **ENTER** to change.	10 GPM
	The flowmeter minimum gallons per minute value is the minimum flow at which the turbine flowmeter is no longer accurate. When in correction mode, the system will automatically calculate the flow below this value. This is important when the system is operating with only a few nozzles, like point rows, filling gaps, etc. The system calculation accurately measures flow through a single nozzle.		
31	Flowmeter Output Type	Press **ENTER** to change.	Correction
	In **Correction** mode, the flow reported to the rate controller automatically switches from the turbine flowmeter to a calculation whenever the flow falls below Flowmeter Minimum GPM and also when a partial boom section is pulsing. **Transparent** mode prohibits this switch and only uses the turbine value. **Calculate** mode uses only the calculation.		
32	Flowmeter Calibration	Press **ENTER** to change.	1400 P/10 GAL
	It is important for the flow meter calibration value to match the tag on the turbine flowmeter so the gallon counters will match the rate controller. The system uses "pulses per 10-gallons." If the flowmeter tag is in pulses per gallon, multiply by 10. If the rate controller requires pulses per gallon, divide by 10. Monitor the gallons per minute shown in *System Setup* and comparing it to the rate controller.		
33	Flowmeter Error Limit	Press **ENTER** to change.	Disabled
	The flowmeter error limit ranges from Disabled to 50%. Flow % higher than the chosen % will cause a fault message and an alarm.		

Line Number	Line Title	Action	Default Setting
	Description		Actual Setting
34	Flowmeter Error	Press **ENTER** to change.	0%
	The flowmeter error shows the real-time % difference between the flowmeter and the calculated flow.		
35	Low Flow Hold Flow Rate		Disabled
	The low flow hold flow rate is set to **Disabled**.		
36	Rate Sync Test Speed	Press **ENTER** to change.	Disabled
	The Rate Sync™ test speed is not used at this time.		N/A
37	Minimum Valves ON	Press **ENTER** to change.	1 Valve
	The minimum valves on default value is 1. This feature reduces the over application of chemical product with chemical injection. This feature is used for chemical injection systems.		
38	Factory Reset	Press **ENTER** and then **YES** to change.	N/A
	The factory reset will reset all setups in the entire system to the default settings. A factory reset is required when repairing or replacing parts of the system. Make sure that you have recorded the setups you prefer before resetting. With a properly prepared "cheat sheet," a factory reset only takes a few minutes.		N/A
39	Contact Information		N/A
	Selecting this line will open up a page with the CapstanAG toll-free phone number, website, and a QR code that will direct you to the website.		N/A

Switch and Circuit Breaker Descriptions

Figure 21: SwathPRO Cockpit Switches

Note: Each aircraft is set up differently. Mounting locations can vary with each installation.

Table 4: SwathPRO Circuit Breaker and Switches

Item	Name	Description
1	**CB SWATHPRO** Circuit Breaker	The 7A circuit breaker protects the system and is shown in the correct operating position. If the circuit breaker is ever tripped, after finding and addressing the problem, press the trigger back into the operating position. A tripped circuit breaker is an indicator of a short or overload condition. Do not reset the circuit breaker without looking into the cause of the tripped circuit breaker.
2	**SWATHPRO BYPASS** Switch	Use this switch to turn the booms on and off manually. This switch is used if the microswitch stops working.
3	**RIGHT BOOM** Switch	Use this switch to turn on and off the right boom shutoff.
4	**NARROW SWATH** Switch	Use this switch to turn on and off the outermost valves on each boom.
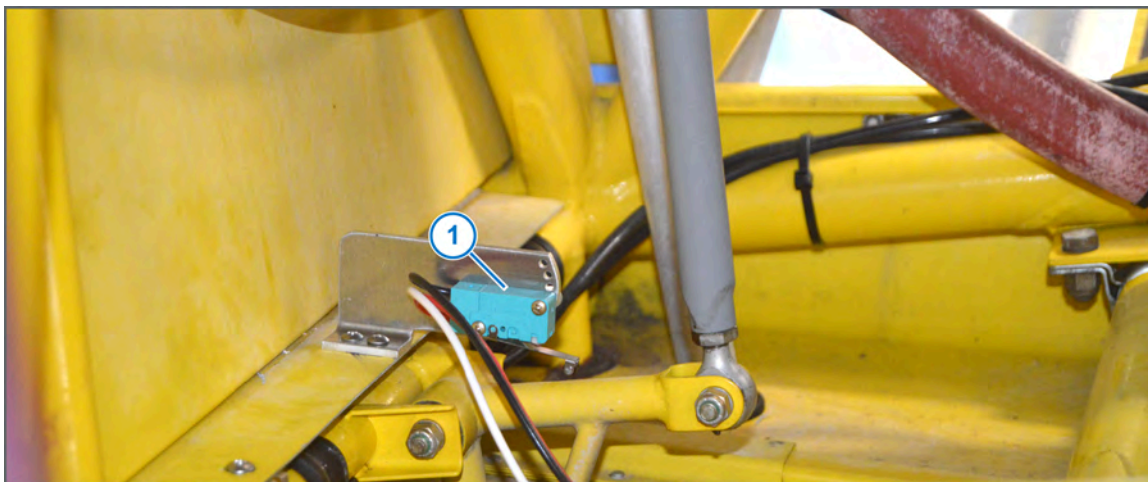
Figure 22: Microswitch

Move the spray handle up and down to operate the microswitch (Figure 22, Item 1).

If the microswitch is not operating correctly, see Operate the SwathPRO Bypass Switch or Spray Without the Microswitch.

SWATHPRO MAIN Circuit Breaker Switch

Figure 23: Main Switch

The circuit breaker switch labeled **SWATHPRO MAIN** (Figure 23, Item 1) is shown in the correct operating position. This switch controls the primary power to the system. When the switch is in the off position, the system is fully disabled.

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Section 8: Handling, Service, and Maintenance

All maintenance specified procedures specified in the POH and associated supplements remain unchanged when the SwathPRO™ system is installed.

For maintenance requirements of the SwathPRO™ system, refer to the Instructions for Continued Airworthiness, 320700-005.

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