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Troubleshooting / Service Guide for SureFire PWM Liquid Application Systems

SureFire Commander II Controller

Always verify the controller settings. See the screenshots in Section F of the system manual.

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The pump won't run.

Electric Pump System

EPD flashing 4 times

1. Find the EPD (electric pump driver). Should have a steady blinking light (one blink per second) in the middle when pumps should be off. (*On EPDs sold after 2019, this light will go off after 5 minutes of inactivity.*) In Run mode, the center light should be steady red, the upper right should be steady red. If Status LED is flashing 4 times, then pausing, EPD has tripped due to low voltage condition. Unplug the Power Supply to the EPD to reset. If condition persists, check Power Supply cables from battery to EPD to insure solid connections and good electrical path. Check connections at battery. Check connectors at the hitch and at the EPD. (*There should be at least 11-12 volts at the point where the EPD connects to the battery power harness, when tested under load. This voltage may show up when there is no load, but the harnessing may not be good enough to deliver 11-12 volts under load.*)

No Lights on EPD

1. There should be a steady blinking light in the middle of the EPD. (*On EPDs sold after 2019, this light will go off after 5 minutes of inactivity.*) If no light is ON, check the 40-amp fuse in the EPD harness near the battery. Use a voltmeter to verify that there is 12-13 volts at the Power Supply connector that plugs into the EPD. **Check this under load.** It may show adequate voltage with nothing on, but bad wiring or connectors or even a blown fuse may show voltage with no load, but will not support the current needed with a load.

Will pumps run?

1. Connect the two large connectors that are plugged into the bottom of the EPD to each other (bypass the module and supply 12 volts directly to pumps). Plug the pumps into a good battery with jumper cables, if necessary.
2. Do the pumps run? If not, check the 40 amp fuse in the EPD harness near the tractor battery. Inspect harnesses and connections. If 2-pump system, plug pumps in by themselves to check each individually.

Electric pumps only run with 12 volts direct from battery

Check to see if a PWM signal is getting to the EPD:

1. Connect pumps and power harness back to EPD.
2. Go to **Manual Mode (MAN)** to investigate this issue.
3. In **MAN**, turn dial to **Volume/Minute**, put in **Run** mode, turn on **Boom 1**, hold down **“+” button** for ten seconds. A single tap of this button produces a very small change in signal to the valve, so you must hold it.
4. After holding **“+” button**, remove PWM valve connector at EPD and check voltage. You will need 4-12 volts to turn pumps on.
5. If 4-12 volts is not present, check harnesses and review control valve type setup.
6. Check voltage at the 10-pin connector (pins D & E) out of the Commander II controller.
7. Check to see if **“P-FLO”** shows on the screen during the startup sequence.
8. Check all setup items with the setup information shown in the system manual.

For more complete system information see the manual for your system. Manuals can be seen at www.surefireag.com/support. The manuals also contain wiring harness diagrams.

Hydraulic Pump Will Not Turn

Turn hydraulics off, go to the **SureFire Hydraulic PWM valve** and use the manual override (red knob) on top of the electric coil to **manually open the valve** (Manual Override UP = valve fully open). There may be dirt in here that needs to be cleaned out before you can turn and raise the override. Turn hydraulics on **at a low flow only** as the valve is 100% open. Start the **pump in Manual (MAN) mode. MAN > Volume per Minute > Boom 1 ON > RUN**. Gradually increase the hydraulic flow from the cab. If pump does not turn, try hydraulic lever in opposite direction. Try switching to a different remote. Does the pump turn? If it turns, your problem is electric / electronic. If the pump still does not turn, you have a hydraulic problem.

Electric / Electronic Problem

(Need to determine if PWM signal is getting to the PWM hydraulic valve and if valve is opening)

1. Close manual override (lock down)
2. Run in **Manual (MAN)** mode to investigate this issue.
3. Verify hydraulics are on.
4. In **MAN** with dial at **Volume/Minute**, hold down “+” button for a few seconds. A single tap of this button produces a very small change in signal to the valve, so you must hold it.
5. Take a metal object and hold it next to the coil. If the coil is working, you will feel the magnetic pull.
6. If no magnetic force is felt, disconnect the PWM valve connector and check voltage. You will need 6-12 volts to get hydraulic valve to open.
7. If 6-12 volts is not present, check harnesses and review control valve type setup.
8. Check voltage between pins D & E (yellow and green) on 10-pin connector out of Commander II.
9. You can remove the electromagnetic solenoid with proportional valve to see if the valve moves when a PWM signal is sent to it. Look closely; it's a small movement.
10. Check the electromagnetic solenoid coil by putting an ohmmeter on the two pins in the connector on the side. A good coil should have 7-9 ohms.

Manual (MAN) Mode is a very useful diagnostic tool in servicing the Commander II system. It is a good way to prime the pump initially. While running in MAN, it is helpful to also check Pressure.

MAN > Volume/Min > Boom 1 ON > RUN

Hold (+) button down

Observe gal/min on screen.

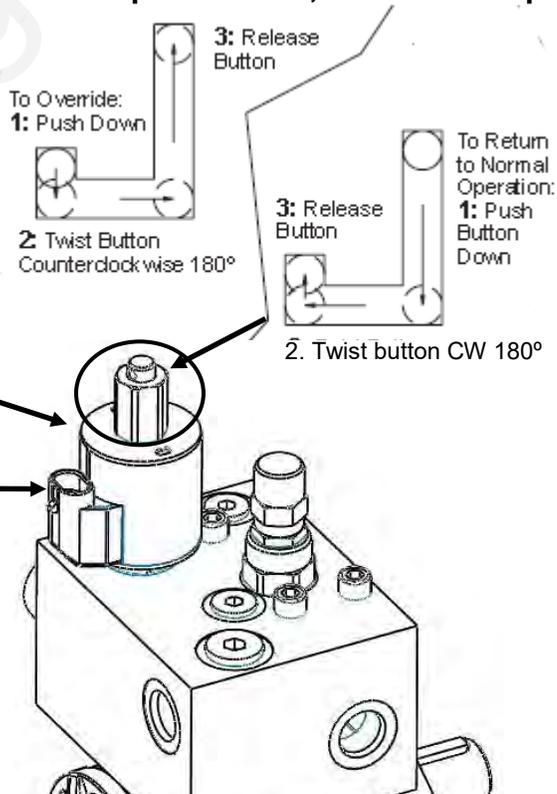
Hydraulics Problem

1. Leave the manual override open on the SureFire valve.
2. Check the hose routings. The “P” port on the SureFire valve should hook to pressure. The “T” port is the return that should flow back to the tractor.
3. Try hoses in a different hydraulic remote. Inspect hydraulic connectors for damage or restrictions.

Hydraulic Manual Override

Down - Normal Operation

Up - Override, valve 100% open



Application Rate Fluctuates

First, you need to determine if the fluctuation is caused by the controller sending fluctuating signals to the valve or because of something else.

1. **Inspect & clean pump inlet strainer.** Strange flow rate fluctuations are very often due to an obstruction to the pump inlet. Inspect plumbing from tank to pump.

OR

1. Go to **MAN > RUN > Vol/Min > Booms ON > Hold (+) button >**
2. Turn the system on. Watch the flow in GPM and PSI. **Does the system run steady in Manual Mode?**
3. Is the flow steady within a very small range? For example, a fluctuation from 12.3 to 12.6 GPM would be considered normal. A fluctuation from 11-15 GPM is a problem. If only a small normal fluctuation is seen in section test, skip steps 4-8 and proceed to "Application Rate Fluctuates in Field" below.
4. If there is a large fluctuation, observe the system flow. Is the discharge a steady stream; are the flow indicator balls floating steady?
5. If visually the flow is steady, but the display reports a fluctuation in GPM, inspect the flowmeter. See section B of manual for flowmeter information. Check connections between tank and pump. A loose connection may not show up as a leak, but it can be a place where air can be sucked in. Air in the system will cause erratic flowmeter operation.
6. If visually the flow is unsteady, the flowmeter is working correctly reporting a flow problem. Is the pump turning steady or surging?
7. If the pump is turning steady, the hydraulic circuit is functioning correctly. Look for any type of obstruction in the pump inlet. Clean the strainer. If continually plugging the strainer investigate fertilizer quality and necessary strainer size.
8. If the pump speed is surging, there is a hydraulic problem.

Application Rate fluctuates in field, but flow in Manual mode is stable.

This problem indicates the valve calibration needs changed. The system is surging because the Rate Controller is moving the hydraulic valve too much.

1. Turn dial to SPEED. Look for any wild fluctuations in speed indicating a sensor problem.
2. Change the Valve **Control Speed** in **Cal Mode** by reducing the value (range is -4 to +3).

Application Rate is slow to get to the Target Rate

1. You may need to increase the Control Speed in Cal mode (range is -4 to +3) if system is slow in returning to Target Rate when speed changes. If this is set too high, the system will oscillate and not lock on to rate.
2. If slow getting to Target Rate when starting, increase PWM minimum on Special Cal page 3 (AREA). If this is set too high, the pump may not slow down enough at low rates or low speeds, and you may overapply. In some cases, that may be an acceptable tradeoff

Console is Erratic in Operation

- If you have a **two-way radio**, it may be mounted too close to the console. Keep all cables away from the radio, its antenna and power cable.
- **Ignition wires** may be causing the console to malfunction. Keep cables away from ignition wires or install ignition suppressor.
- Reroute all cables away from **electric solenoids, air conditioning clutches** and similar equipment.

Console Appears Dead

- Using your voltmeter, check for 12 volts at Commander power connector. Check for damaged power cable or reversed terminals. Check fuse in power cable and any other fuses or circuit breakers in path. Inspect connections to Commander II power switch.

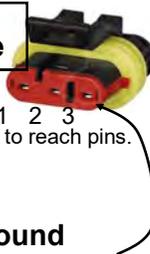
No Flow shown on display, but liquid is being pumped

Flowmeter Tap Test

See which flowmeter connector you have



3-pin MP Tower



Remove red guard to reach pins. Don't break red side clips.

Flowmeter pinout:

A- Signal B- 12V Power C- Ground

3-pin AMP SuperSeal 1- Ground 2- 12V Power 3- Signal

1. Unplug the flowmeter. With voltmeter, check for **12 volts between Power & Ground** of flowmeter connector. Should have **9 volts between signal and ground**. If voltage is not present, inspect wiring harness and check for voltage at harness connection(s) nearer the Rate Controller—10 pin —Power is pin J-WHT; Ground is pin K-BLK; Signal is pin F-BLU.
2. If 12 volts is present, then conduct a **tap test**. Go to setup and change the flow cal to 10 (CAL > VOLUME). Have a second person watch Volume/Min on the screen while other person taps repeatedly (use a short piece of wire or a paper clip) between signal and ground pins of flowmeter connector. A flow value (gpm) should show up indicating the wiring is not damaged. (If alone, note or reset a volume counter to 0, MAN > RUN > Boom ON, and check for increased volume after tapping.)
3. If the flow showed on the screen during the tap test, your wiring to that point is good. If tap test did not work, go back to the next harness connection and do a tap test there between signal and ground.
4. If the tap test registers flow on the display, replace flowmeter.
5. Change Flow Cal back to appropriate Flow Cal when finished with Tap Test.
6. SureFire has a Speed/Flow Simulator (PN 219-01462) or a Tap Tester (212-03-3912Y1) that can be used to confirm if the wiring is good between the flowmeter and controller.

Field Verification of Flowmeter Calibration

Always verify the flow cal setting by comparing the amount actually applied in the field (from weigh tickets) with the amount shown on the display. Adjust the flow cal as needed to get less than 1% difference between the actual amount applied and the amount shown on the display.

In general:

Increase the Flow Cal number if not enough product is actually being applied. (If you want more, increase the number)

Decrease the Flow Cal number if too much product is being applied. (If you want less, decrease the number)

Formula to Adjust Flow Cal Number

(Volume shown on display) / (Volume actually applied) X flow cal number in display = new flow cal

Example: Display shows 727 gallons was applied. Weigh ticket shows 750 gallons was actually applied. Flow cal number in display was 3000. (We applied too much, so we will decrease the flow cal.)

$727 / 750 \times 3000 = 2908$ (new flow cal number to set in display)

(Any adjustments to the flow cal number will only be as accurate as the measurements used in figuring it.)

Section Valve(s) will not move

1. If a valve is not opening, plug in another Section connector from a valve that is working to that valve. Plug the Section connector from the valve that is not working into a valve that is working.
2. Check the harness connection to the non-working valve. It is a 3-Pin Weather Pack connector. See Section D of manual for wiring diagrams.
3. Check voltage pin A to Pin B. Must be 12 volts, if not, go back to 10-pin on Commander II and check voltage (Power-pin J-white; Ground-pin K-black).
4. If voltage is present on pins A&B of 3 pin connection to valve, then check pin C to Pin B. This should be 12 volts when the valve is commanded on or open, this should be zero volts when valve is off or closed.
5. If signal voltage is not present to open valve, use diagrams to check at the 10 pin connector on back of Commander II (Sect 1-pin A-BRN; Sect 2-pin B-RED; Sect 3-pin C-ORG; Ground-pin K-BLK)
6. Remove the actuator from the valve and see if the actuator will operate. Rotate the valve ball manually to be sure it is free to move. Return it to the same orientation where it was.
7. If constant voltage (Pins A&B) and switched voltage (Pins C&B) are present, inspect, repair or replace the valve.

Pin	Function
A	+ 12 V Constant
B	Ground
C	+ 12 V Signal

If valve indicator stays GREEN all the time or if valve indicator is not in full ON or full OFF position, replace actuator. Pull gray pin to remove actuator from valve.



This is a 3-way valve. If product will not flow when valve is ON, either move the outlet hose to the other outlet port, or remove actuator and rotate valve ball 180°, and replace actuator. Product should flow

Commander II Error Messages

through the port closest to the Indicator light when the valve is open (green).

Message	Description
Lo P	Low Power to Commander II, check all power and ground connections
no SPEEd	(When vehicle is not moving, this is a normal condition) Will flash in display if dial is in RATE position and there is no speed signal regardless of all other conditions. Check speed sensor and connections.
no FLo	Will flash in display if rotary switch is in Rate position and should have flow (In Run, some sections on, speed greater than zero) but no flow is detected. Check flowmeter and flow harness connections. Check to see if pump is running or not. Check strainer.
no FLo StoP	Pumps will stop and this message will be displayed if no FLo condition continues for 60 seconds. Console Power must be cycled to reset this condition. Check flowmeter and connections. Use Manual mode for priming and plumbing troubleshooting to avoid this error.
no boom	Will flash in display if dial is in Width position in Cal mode and no sections are turned on.
FILL	Will flash in display if tank level is equal to or less than tank set point. Adjust these settings in Special Calibration.
SPEC	Appears when entering Special Calibration mode
CLEAR	Alerts user that the currently selected counter will be reset to zero if RESET button is held for 2 seconds.
OFL	Displayed when a DISTANCE, AREA or VOLUME counter has overflowed their maximum value. Hold RESET button for 2 seconds to reset the counter.

Other issues

1. “My rate won’t go low enough. I want 8 gpa, but it won’t put down less than 11 gpa.”

- A. Check Flow Cal and Boom Width setup. (CAL mode > Volume; CAL mode > AREA)
- B. Check **PWM Minimum in Special Cal mode (SPEC)**. (SPEC > page3 > AREA)

2. “I can’t get up to rate. I want 12 gpa, and I can’t get more than 10 gpa.”

- A. How many GPM are required? Does your pump have that capacity? If you have two electric pumps, are both pumps working as they should? On electric pumps, the capacity decreases as the pressure increases.
- B. Is a recirculation valve open, allowing too much product to recirculate?
- C. Is the strainer plugged? If the strainer is too small, product can gel up around the strainer.
- D. Does the pump have enough hydraulic oil to hit the desired rate?
- E. Run in MAN mode and see the Volume/Minute and Pressure.
- F. Run an AUTO Test Speed test to see what rate and speed it will hit.
- G. Are the Flow Cal and Width Cal set correctly? (If only using 1 section, width for Boom 2 and 3 must be 0.)

3. “My pressure is too high / too low.”

The pressure will be what it is depending on how hard it has to push to get the amount of liquid you are moving from the pressure sensor to where it leaves the system. This pressure will depend on the product itself, the volume (gal/min) you are moving and how much restriction there is to that flow. The orifice or metering tube will be the primary restriction, but it is possible that other parts of the system may add to the total pressure. *The pressure a system develops will be less (possibly much less) with water than it will be with a fertilizer product.*

What pressure is “too low”?

You need enough pressure to open the check valves. If the pressure is too low, some check valves will open before others, so that some rows may be flowing while others are not. **With 4 lb check valves, we like at least 8 PSI. With 10 lb check valves, we like at least 15-20 PSI.**

What pressure is “too high”?

There are a few products that may have flow characteristics that are better at lower rather than higher pressures. With most products that is not a concern.

The plumbing components of a SureFire system are rated at 100 PSI or above. On an electric pump system, the pump capacity decreases as the pressure increases. Our standard Tower pump has an internal 70 PSI bypass. **With an electric pump, we like to see pressures from 10 to 30 PSI.** If the pump has the capacity to hit the rate at higher pressures, there is not a problem with doing that, but for long-term operation it would be best to switch to a larger orifice or metering tube.

The SureFire PumpRight hydraulic pump has the ability to pump up to 290 PSI. SureFire plumbs these with a 100 PSI pressure relief valve (PRV) so that plumbing components will not be damaged if high pressure develops. **Typical operating pressures with hydraulic pumps will be 20-60 PSI,** but the pump will work fine at 80-90 PSI if that is needed. If continually running in that high range, consider a larger orifice or metering tube.

Lower pressure will not necessarily reduce the **velocity of the output stream** at the row. Conversely, higher pressure will not necessarily increase the velocity of the output stream at the row. The velocity of the output stream is determined by the volume of the flow and the size of the opening at the output. Changing the pressure by changing an orifice or metering tube upstream from the outlet will not affect the velocity of the output stream if the flow volume remains the same.

Options if pressure is too high with orifices: Use a bigger orifice. Slow down. If pressure is too low, use a smaller orifice.

With metering tube: Options if pressure is too high: Use a larger diameter tube. Shorten the tubes that are on now. Slow down. *(The pressure in a metering tube is related to the viscosity of the product. Many products change viscosity as the temperature changes. A product will have a higher viscosity (and therefore higher pressure) on a cold morning than it will on a hot afternoon.*

With metering tube: Options if pressure is too low: Switch to a smaller diameter tube. Use a longer tube.

4. How do I set the Recirculation knob?

Generally, the recirculation knob is closed. If tank agitation is necessary while applying, the recirculation hose can be plumbed back to the tank. Electric pumps do not have the capacity to do much agitation. A small amount of recirculation may be desired if the pump needs to run slowly and the output is not smooth. Start with a quarter turn of the knob (less on an electric pump). A half turn of the knob will recirculate a lot. If too much is recirculated, the pump may not be able to hit the rate to the rows. Opening recirculation will not lower the pressure required to push the desired product to the rows.



Commander II for SureFire PWM Liquid System Quick Start Card

In Field Operating Instructions

VOLUME: Displays total gallons (liters) of liquid applied. Can be reset to 0 by holding the reset button.

3 SECTION SWITCHES: Turns application ON or OFF for each section. If not dividing implement into sections, use Section 1 switch only.

AREA: Displays the area of coverage by the equipment in acres (hectares). May be reset.

VOLUME/MINUTE: Displays gallons (liters) of liquid applied per minute. Use this to read instant flow in GPM.

DISTANCE: Displays the distance traveled in feet (meters). May be reset.

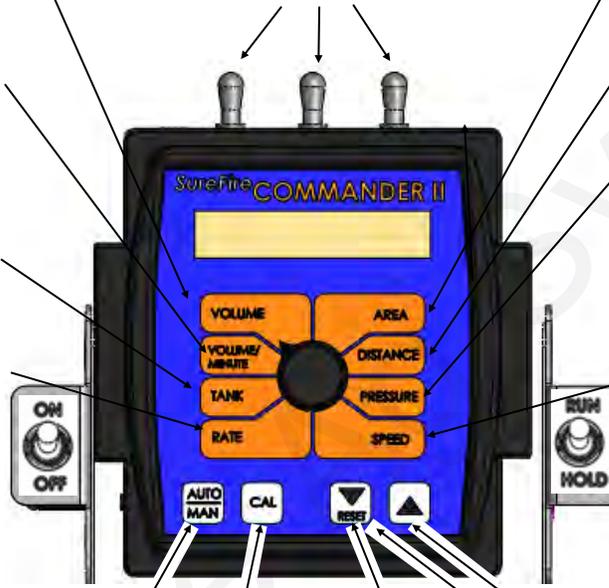
TANK: Displays gallons (liters) of liquid remaining

PRESSURE: Displays the liquid pressure at the location of the optional pressure sensor. In addition to displaying Pressure the console will warn the operator with HiPSI (High Pressure) message when the input pressure exceeds the limit pressure (set in Special Cal)

RATE: Displays application rate GPA(LPH)

SPEED: Displays ground speed in miles per hour (Kilometers per hour).

ON/OFF: Commander II power switch. When the console is turned on (except when starting in "SPECIAL" CALIBRATE) the data display will show the **Number of Hours** it has operated for one second, followed by the **Software Part Number (45124)** and the **Software Revision (rP X)** for 1.5 seconds each. Then it will display the **Control Mode (P-FLO or S-FLO)** for 1.5 seconds.



CAL: This key is used to enter & exit calibration mode.

RUN/HOLD: Turns liquid application on (RUN) or off (HOLD)

AUTO/MAN: Key which changes operation from automatic control to manual.

RESET / - : When not in CAL, clears the selected counter when held for two seconds.

+ & - : Plus & Minus keys are used to increase and decrease values

Five Steps for Commander II Setup for SureFire PWM Liquid Systems

- 1. Commander II Special Cal Quick Setup** (Factory defaults are for Tower Electric Pump Systems so skip this step with brand new Commander II and Tower Electric System)
- 2. Standard Calibration**
- 3. Initial Operation in Manual Mode**
- 4. Test Speed Operation in Automatic Mode**
- 5. Speed Signal Verification & Field Operation**

Commander II Special Cal Quick Setup

Step 1



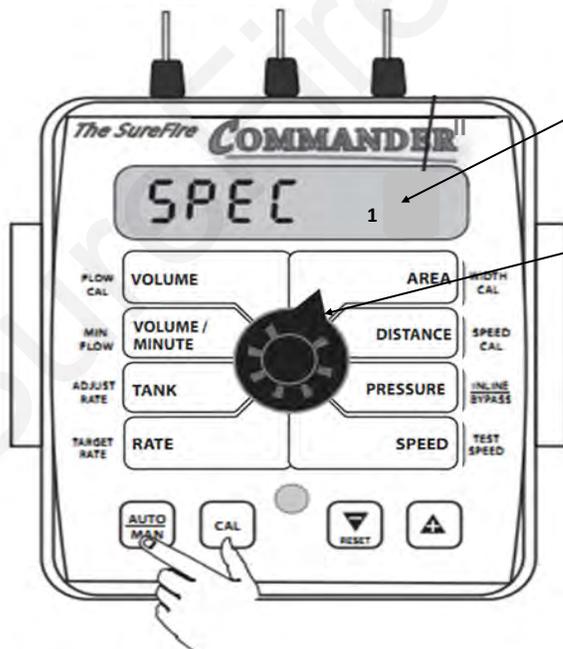
The Commander II is shipped from the factory set up for PWM driven Tower Electric Pumps. If installing a new Tower system you can skip this procedure. The defaults for EP-E (see below) are already loaded.

The Commander II has a quick setup feature to load the necessary defaults for a SureFire Tower or PumpRight system. **Follow the steps below BEFORE performing standard calibration on next page.**

To change defaults:

1. Power off Commander II
2. Enter Special Cal by holding both the AUTO/MAN and the CAL button down while turning on the power switch.
3. You should see "SPEC" on the screen, if not repeat steps one and two
4. Ensure "1" displays to indicate Page 1 in Special Cal. Press CAL to change if necessary.
5. Turn dial to point at AREA
6. Select desired defaults from chart below (Press the UP or DOWN arrow to change selection.)
 - Select "EP-E" for Tower Electric Pumps with PWM control (and English units) (*EP-E is Electric PWM-English*)
 - **Select "HP-E" for PumpRight or other Hydraulic Pumps** ← Hydraulic setup
7. Save changes by holding CAL until red light goes out (about 3 seconds)

NOTE: The above procedure will load all default values in the Commander II. It must be done before standard calibration. For example, if you entered your implement width, then did the quick setup above, the Commander II would default back to 240 inches.



This number tells you which special CAL screen you are on. Pressing the CAL button will change this number. Quick Setup is on Page 1, with dial turned to AREA.

Select "EP-E" for Tower Electric Pumps

Select "HP-E" for PumpRight Hydraulic Pumps

Standard Calibration Procedure:

Step 2



1. Press CAL key for one (1) second to enter calibration mode.
2. Red light will be on steady and CAL will be displayed in CAL mode.
3. Turn the dial to the items listed below and set as instructed.
4. When complete, press CAL for one (1) second to exit CAL mode. Red light should go out and CAL will not be displayed. **You MUST exit Calibration mode to save your settings.**

FLOW CAL: Enter the calibration number for your **flowmeter** here. On electromagnetic flowmeters the calibration number is from the chart below. **(These numbers are for flowmeters sold after 10/15/2012. These meters have a blue label with white text. Earlier flowmeters (white label with black text) use different FLOW CAL numbers.)** On turbine flowmeters, the calibration number is on a metal tag attached to the flowmeter.

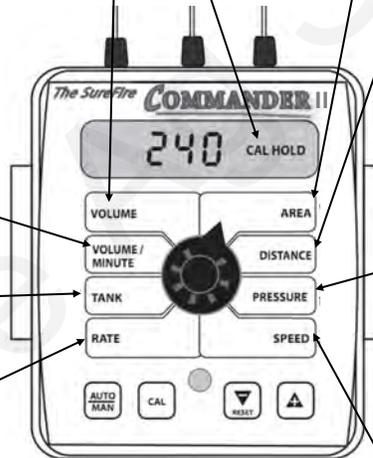
Quick Tip: To quickly change the flow cal, press the AUTO/MAN button to allow you to directly change the 2 left digits (thousands). Then press the UP or DOWN arrow to change the number. Press AUTO/MAN again to change the right 3 digits.

Flow Range (GPM)	Pulses/Gallon	Commander II Flow CAL
0.13 - 2.6	3000	6000
0.3 - 5	3000	6000
0.6 - 13	2000	4000
1.3 - 26	2000	4000
2.6 - 53	2000	4000

P/F Ratio: Not used at this time.

ADJUST RATE: Sets amount of rate change by pressing "+" or "-" button once. Usually set to 1.0. This allows you to change from 8 GPA to 9 GPA to 10 GPA etc.

TARGET RATE: Set to your intended target rate in Gallons per Acre.



NOTE: This indicates you are in CAL mode.

WIDTH CAL: Enter the width of each fertilizer or chemical section of your implement. For a single section system, set Section One to the full implement width in inches. For example, for an 8 row 30" implement, set Section One to 240 inches. To set the section widths the Run/Hold Switch has to be in Run and the Section Switch must be ON. If using a single section implement, set Section 2 and 3 to ZERO.

SPEED CAL: Used in calibration mode to enter the speed calibration number in inches (cm) per pulse. Default is 0.189 for SureFire Astro GPS speed sensor.

When using the shaft speed sensor on grain drills, this will need calibrated. SureFire recommends you enter a value of 1.0 as a starting point. See section G for that calibration procedure under "Ground Speed Displayed is not

CONTROL SPEED: Typically -2 for Tower Electric Pumps & for PumpRight Hydraulic Pumps.

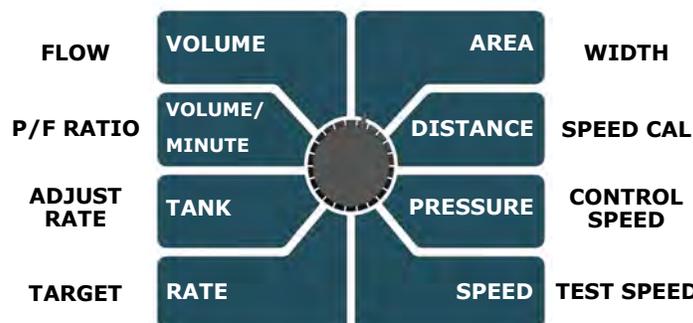
Allows adjustment of response to "tune" the system for use with fast or slow valves. For example, if response is too slow, use the "+" button to adjust the valve response number to 1, 2 or 3.

TEST SPEED: Use this mode to verify controller automatic operation only AFTER initial operation in MANUAL mode.

Standard CAL Factory Defaults: (for Software Revision **rP E & later**)

Software Revision identification displays briefly when Commander II is started.

Electric Pumps: 6000
Hydraulic Pumps: 4000
 Off
 1.0 GPA
 10.0 GPA



Boom 1: 240 Inches
 Boom 2: 0 Inches
 SPEED CAL: 0.189
 CONTROL SPEED: PWM Electric: -2
 PWM Hydraulic: -2
 Servo Electric: -1
 TEST SPEED: Off

Initial Operation Instructions

SureFire highly recommends you perform these exact steps with water to verify system is correctly installed and ready for field use.

Note: When testing with water, the system will develop much less pressure than it will have with fertilizer.



Step 3

Test the system in **MANUAL mode**.

1. Push the AUTO/MAN button until **MAN** is displayed on the Commander II. You are now in Manual mode.
2. Put the system in **RUN**. Turn the console switch to RUN or lower the implement if using a mercury Run/Hold Switch. When HOLD Is not displayed on the screen the system is in RUN.
3. Turn **Section 1 switch ON**.
4. Open the Air Bleed valve on the Tower. Be prepared to close the valve when water comes out.
5. Turn dial to **VOLUME/MINUTE** position. Is a number displayed? If so push the "+" button. Does the flow increase? Push the "-" button. Does the flow decrease?
6. If no reading in VOLUME/MINUTE, is the pump turning and is there water present at the pump inlet?
NOTE: Feel if pump is vibrating to tell if it is running.
7. If water is being pumped, but no reading on the Commander VOLUME/MINUTE, check the flowmeter connections and the Flow Cal value.

Proceed to STEP 4, ONLY when you can increase and decrease the VOLUME/MINUTE reading using the "+" and "-" keys on the Commander II.

Now, we will operate the Commander II in

Test Speed mode. (AUTO MODE)

Step 4

1. Enter calibration by pushing and holding the **CAL** button until CAL is displayed on the Commander II and the red light is on.
2. Push the AUTO/MAN button until **AUTO** is displayed, indicating you are in automatic mode.
3. Turn the dial to **Test Speed** in the bottom right corner. Use the + key to adjust to your field operating speed.
4. Turn Run/Hold switch on Commander II to **RUN**.
5. Turn Run/Hold **mercury switch to run** by lowering the implement, unplugging it, or manually tilting the switch.
6. Turn at least **Section 1 switch on**.
7. You should now be dispensing liquid as if you were traveling through the field at the test speed you entered. *The system will develop much less pressure with water than it will have with fertilizer.*

Proceed to the next step when liquid application is verified in AUTO mode with Test Speed operation.

Finally, we will verify the Commander II Speed is correct.

Turn the dial to **SPEED**. Drive the tractor. Does the speed reading seem reasonable and correct? The ASTRO II will be a more accurate speed than an un-calibrated tractor speedometer.

You are now ready to verify regular field application.

Step 5

For more information about the operation of your Commander II system, see the full manual—available at www.surefireag.com/support

See SureFire publication "396-3269Y1 Navigating the Metering Tube Maze" for more information on how metering tube works.

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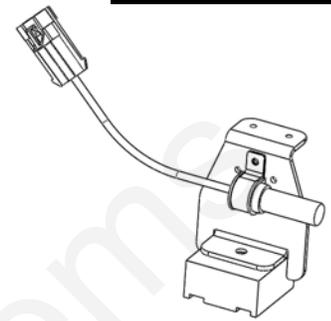


Mercury Run/Hold Switch for Commander II

D

Wiring & Elec.

The Mercury Run/Hold Switch turns liquid application on and off automatically when the implement is raised or lowered. The switch is mounted on a component that rotates when the implement is raised and lowered. The switch is attached to a magnetic base for easy mounting to any metal part of your tractor hitch or implement.



For mounted 3-point equipment:

- Mount the switch on the tractor 3 point arms.
- See the pictures below for switch orientation in run and hold positions.
- Use the 18048 “Y” Run/Hold adapter (included in box with Commander II controller) to plug the switch in at the back of the Commander II controller. See Layout #2 or #3 showing this wiring connection.

For hitch drawn implements:

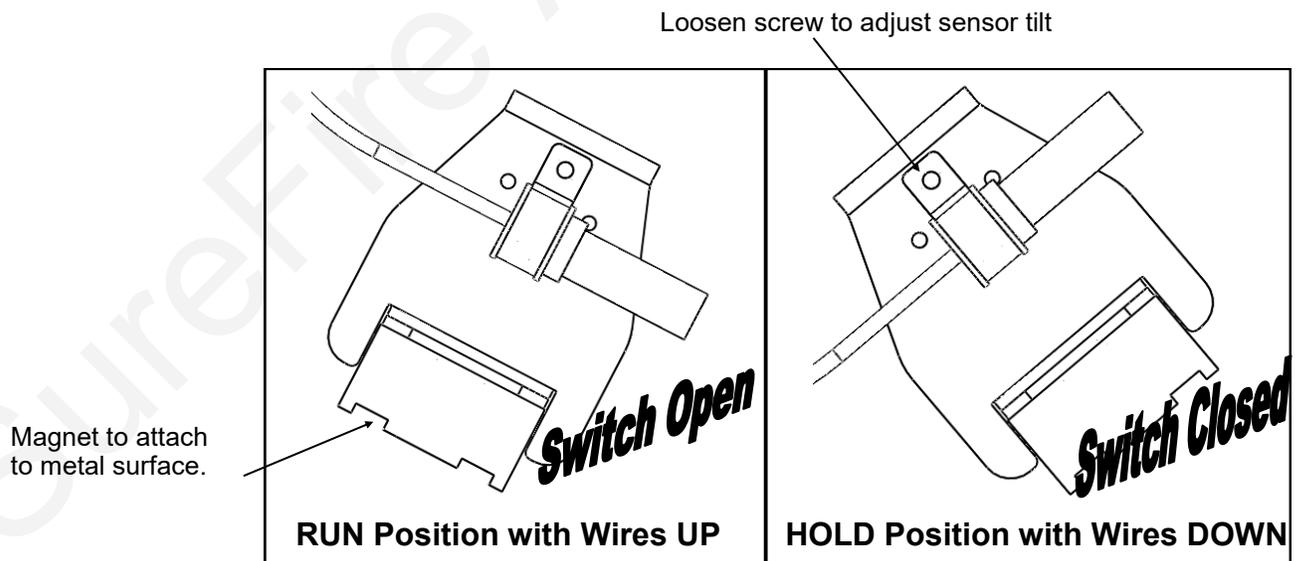
- Mount the switch on a wheel frame that rotates as it lifts the wheels up and down to raise and lower the implement.

Commander II Run/Hold Switch Logic

How to Adjust:

If your controller is turning off product application before or after you want, tilt the switch. If it turns off after you want when lifting the implement, tip more to the HOLD position. If product application should begin sooner when you lower the implement, tip more to the RUN position.

You can adjust the switch by moving the magnet or by loosening the screw and rotating the mercury switch.



How to Test:

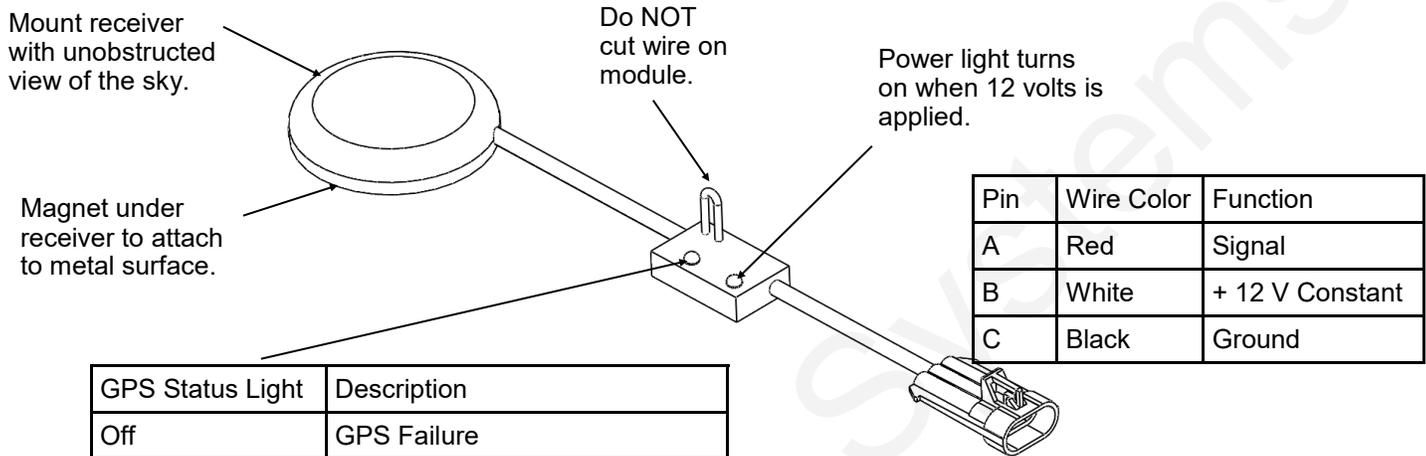
To test the run / hold mercury switch you will need a volt meter. Set the meter to test continuity (or ohms). With the wires down, you should have continuity between the two pins in the connector. With the wires up, the switch should be open (no continuity).

Astro GPS Speed Sensor



The Astro GPS Speed Sensor is the simplest speed sensor to use with the SureFire Commander II Controller. The GPS receiver uses the GPS satellites to track only speed. The output from Astro is a pulse to communicate speed to the Commander II.

- PN 203-01-01410 Astro 2, 2 Hz GPS Receiver (most common with Commander II)
- PN 203-01-01425 Astro 5, 5 Hz GPS Receiver

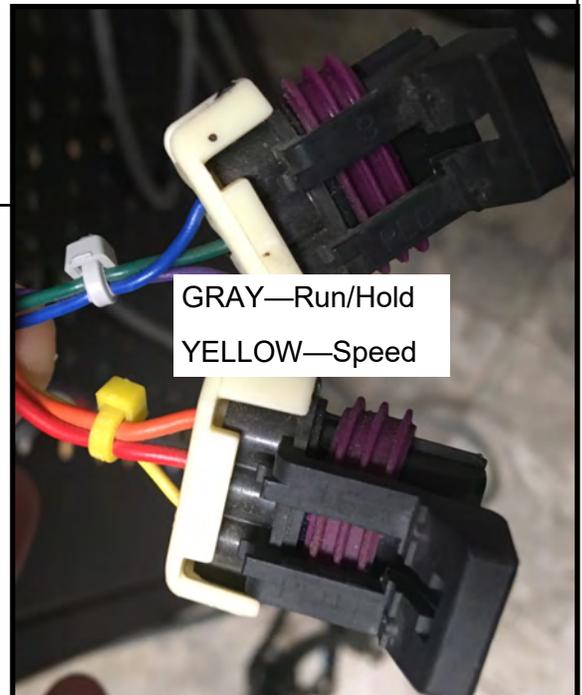
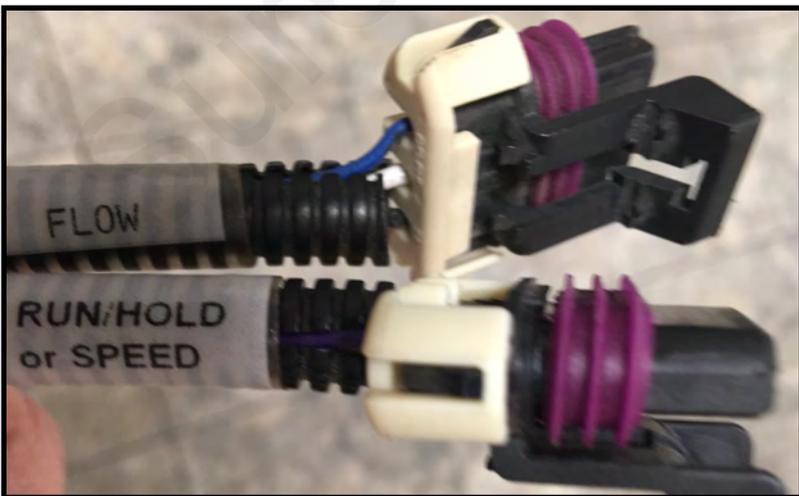


GPS Status Light	Description
Off	GPS Failure
Blinking	Acquiring GPS satellites
On	GPS signal acquired

My Commander is Clicking

ISSUE: Controller goes back and forth quickly and repeatedly from RUN to HOLD. Controller has a fast clicking sound (1) when I start driving or (2) when I start applying.

FIX: (1a) The Run/Hold connector by the console could be plugged into the Speed connector from the Astro GPS sensor. (1b) If a speed sensor or shaft sensor on the implement is plugged into the "RUN/HOLD or SPEED" connector, SPEC CAL > page 2 > RATE > must be set to SPEED. (2) The Run/Hold connector on the implement may be plugged into the flowmeter. Both are 3-pin MP connectors. This could be on the implement or at the back of the Commander II console.



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