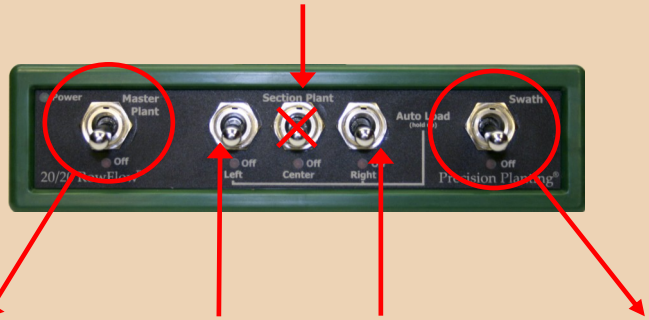
Precision Planting®

20/20 RowFlow™

The **Cab Control Module** (CCM) is composed of three parts:

- The Left part is the master plant switch.
- The Center part is composed of three section control switches that control individual motors.
- The Right part is the Swath control switch.

Center Section Switch is *only* used to turn *off* or *on* Center Section of planter.

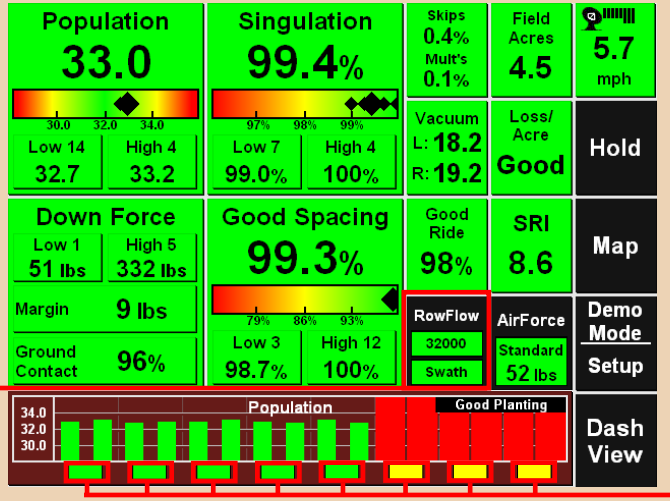


Toggle switch on left side of CCM is the Master Plant switch.

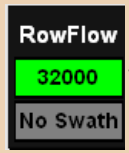
- Moving master plant switch to the down position will turn ***off*** all motors. i.e. all sections.
- On startup, a safety message will appear reminding the operator to manipulate the Master Plant switch upon leaving the cab to prevent accidental turning of the meters due to unstable GPS or radar.

- Section switches are used to **auto load** meters by holding ***only the outside two switches*** up. All three motors (if equipped with three) will spin when outside two switches are held up.
- Holding the ***outside two switches*** of section control up is how the motors are spun to **calibrate** the motors. (If equipped with three motors, all will spin when outside two switches are held up)

Toggle switch on right of CCM is swath control. Moving switch to the down position is turning ***swath control off*** which means ***all rows will be on***. i.e. will be planting



Visually displays clutch status and relationship to associated rows.
This view is accessible through **DASHVIEW–POPULATION**



Top - VR

Bottom - Swath

The first time the monitor boots up after RowFlow has been connected, the home screen will automatically be configured to show the RowFlow button. 20/20 SeedSense is formatted so that buttons are color coded thus the color of RowFlow buttons are as important as the text in each button

Top of RowFlow Button

- **No RFM** (Gray) – No RFM is detected.
- **Dflt Rate** (Yellow) – Motor control is in Variable rate mode, but GPS is not stable (or detected), and therefore the commanded population is the default population.
- **Var Rate** (Green) – Motor control is in Variable rate mode, commanded population is based upon the variable rate prescription assigned to the current field.
- **32000** (Yellow) – Motor control is in manual mode (with 32000 commanded population), a variable rate map is assigned to the current field but not being referenced.
- **32000** (Green) – Motor control is in manual mode (with 32000 commanded population), No variable rate map is assigned to current field.
- **Rate Off** (Red) – The left CCM Switch is toggled Down, ALL motors will not spin.
- **No VR** (Gray) – No Seeding Motors are setup .

Bottom of RowFlow Button

- **No RFM** (Gray) – No RFM is detected.
- **Swath Hold** (Yellow) – Swath control is in automatic mode, but GPS is not stable (or detected) and all sections are in plant mode.
- **Swath** (Green) – Swath control is in automatic mode, and active.
- **Manual** (Yellow) – Swath control is in Manual mode, section status is determined by the RowFlow control page.
- **Swath Off** (Red) – The right CCM Switch is toggled Down, and all sections are in plant mode.
- **No Swath** (Gray) – Swath Control is not setup .

In situations where GPS is unstable or unreliable or where radar is not available, the low speed start button can be used to allow the motors to start before acceleration is detected. This button can be configured by pressing **DASHVIEW—CONFIGURE—4X4 BUTTON—** (BUTTON WISHED TO REPLACE BY LOW SPEED START)

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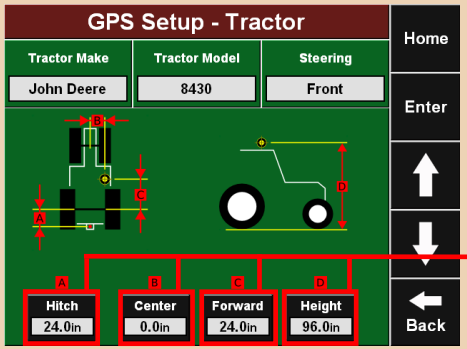
20/20 RowFlow™

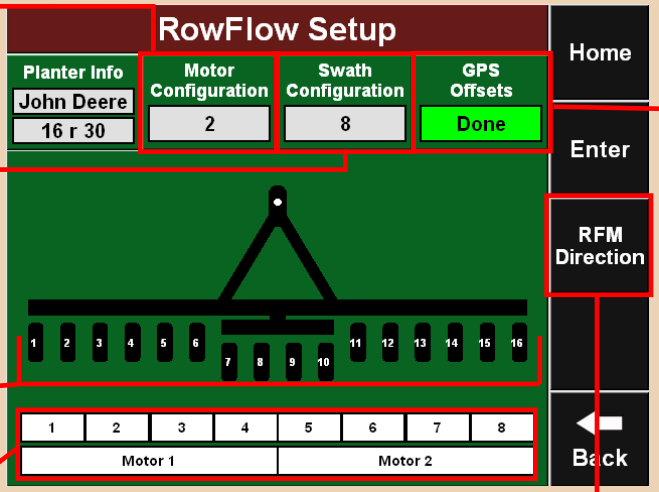
RowFlow Setup page is where you will find the basic information on the configuration of your planter. It lists the number of motors configured and the number of swath sections that are set up. It also gives a visual of how the planter is configured based on the GPS measurements, planter info, and swath and motor configurations. It is accessible by going to SETUP—SYSTEMS—ROWFLOW SETUP.

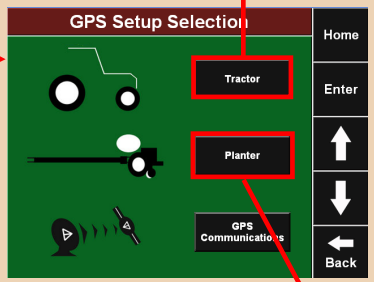


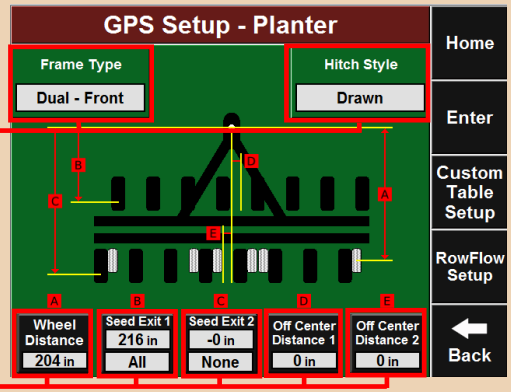
The four boxes at the bottom of the tractor page in GPS setup are for the measurements for the GPS to know where the receiver is located on the tractor. It needs following measurements—

A. Center of rear axle to pivot point of planter hitch.
B. Receiver to center of tractor.
C. Receiver to center of rear axle.
D. Receiver to the ground.

Note: If the receiver is on the opposite side of the tractor from what is shown, it can be flipped to the other side with the flip button next to where measurements are entered.







Motor Configuration

Shows the number of motors configured for the planter. Takes you to Motor Setup page.

Swath Configuration

Shows the number of swath sections for the planter. Takes you to Swath Section Setup page.

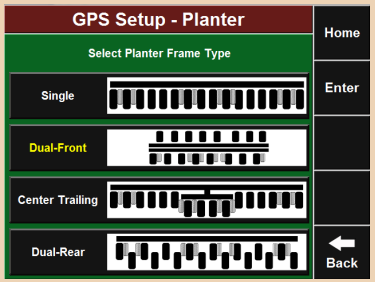
Planter Diagram

The diagram in the middle of the Setup page shows how your planter is configured based on the number of rows and spacing entered in the planter info and the measurements entered in the GPS offsets. **THIS DIAGRAM SHOULD LOOK LIKE YOUR PLANTER.**

Swath and Motor Diagram

The bottom diagram on the Setup page shows the configuration of your clutches and motors and the rows associated with each.

Use the Frame Type button to select your planter frame. Also use the Hitch Style button to select your Hitch type



RFM mounting positions:

The RFM Direction button takes to you the page where you are able to select the orientation of the RFM on the planter. The RFM may be mounted *horizontally* at a right angle to the planter bar with the label up or down and the ports facing to the left, right, rear, or front of the planter. It also may be mounted *vertically* with the ports *down* and the label facing toward the left, right, rear, or front of the planter. In any of these positions, the RFM must be mounted within 5° of level both horizontally and vertically.

Specific measurements need to be taken to ensure accurate swath control and mapping of seed drop. Precise measurements are needed of the following distances—

A. Distance from pivot of hitch to center of lift wheels with the planter lowered.
B. Distance from pivot of hitch to shortest seed exit with the planter lowered (end of seed tube).
C. Distance from pivot of hitch to longest seed exit with the planter lowered (end of seed tube).
D. Distance from *center* of **front frame rows** to centerline of planter.
E. Distance from *center* of **rear frame rows** to centerline of planter.

Note: For 3-point planters, center of rear axle is used in place of pivot of hitch

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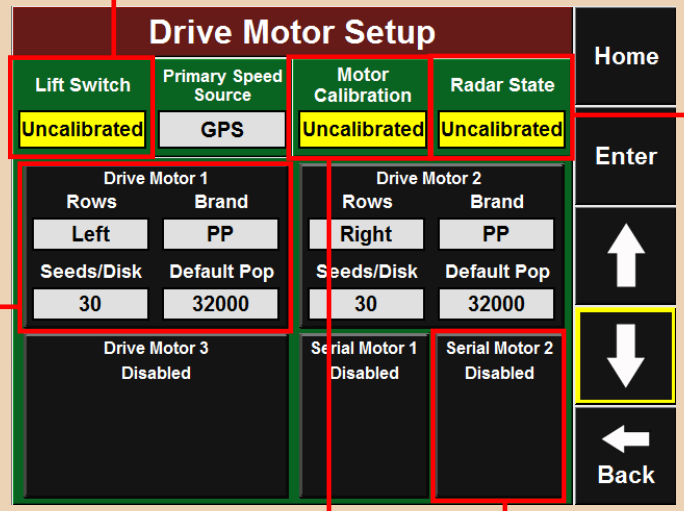
20/20 RowFlow™

The Drive Motor Setup page is where the hydraulic motors are configured and calibrated along with the Lift Switch and Radar calibrations. The base page will give basic information about each motor concerning which rows it is associated with, number of seeds per disc, brand of motor, and the default population for non-variable rate situations.

This page is accessible by going to SETUP—SYSTEMS—ROWFLOW (SETUP) —MOTOR CONFIGURATION or by pressing the ROWFLOW button on home screen—SETUP—MOTOR CONFIGURATION.



Hydraulic Motors

The 20/20 SeedSense can control up to 3 hydraulic motors **or** 2 Serial motor drives per RFM. Hydraulic motors can be enabled and configured by pressing on each motor drive button and going through the following steps (Note: for Serial motors, see text on opposite side of page) -

1. Enable motor.
2. Select rows controlled by motor.
3. Select Motor Brand. **IMPORTANT!** Selecting motor brand tells the 20/20 how to read the speed sensor data for controlling motor RPM. It is possible to use two different motors on the same planter as long each motor brand is selected correctly.
4. Select number of seeds per meter. (i.e # of holes on disk)
5. Enter default Population. (Note: on the right side of this page is "Out of RX" button. It can be configured so that when the planter goes outside of a prescription it will plant the current population or the default population.)

After the hydraulic motors are enabled, they will need to be calibrated. For instructions on this, see adjacent text.

Motor Calibration

To calibrate the motors, the planter will need three things.

1. Hydraulic pressure to spin the motors.
2. At least **200** seeds in **at least 4 rows per motor**
3. Correct Vacuum pressure running (if applicable)

Once the above criterion are met, press the motor calibration button. For first calibration, manually set the gear ratio to 3.

1. Press ***Run Cal*** button on the right side of screen.
2. Ensure crop is a singulated crop and press continue.
3. Lift and hold Auto Load Switches on CCM. These are the ***outside switches*** of the Section control switches. **Hold** switches until calibration is completed.
4. Review Gear ratios and verify as feasible ratios based on sprocket configuration.

Lift Switch Calibration

To calibrate the lift switch, press the large black button with the planter in the various positions specified by the button. For a push-button lift switch, the "planting percent" value will be half of lifted value and will be pushed with the planter in lifted position.

Radar Calibration

To calibrate the radar for RowFlow, the following need to be present:

1. RFM connection to 20/20 Display is required.
2. Tractor must be driving straight at a constant speed of 4 MPH or greater for 300 ft. or more.
3. Good GPS reception is required.

Serial Motor Drives

The 20/20 SeedSense can also work with Rawson Drive motors by communication through a serial port. To do this, 20/20 sends signals to the AccuRate controller through the serial port on the RowFlow base harness. The AccuRate Controller then takes the signals from the 20/20 and sends commands to the Rawson motors accordingly. To enable Serial motors, work through the following steps after pressing on the serial motor button on the setup page. (Note: this must be done for each serial motor)

1. Enable Motor.
2. Select rows controlled by motor.
3. Enter Base population.*
4. Select the Incremental Change used by the AccuRate controller to increase or decrease population.

* The "Out of RX" button is available here to assign the out of prescription population as either the current population or to the default population which is the same as the Base population.

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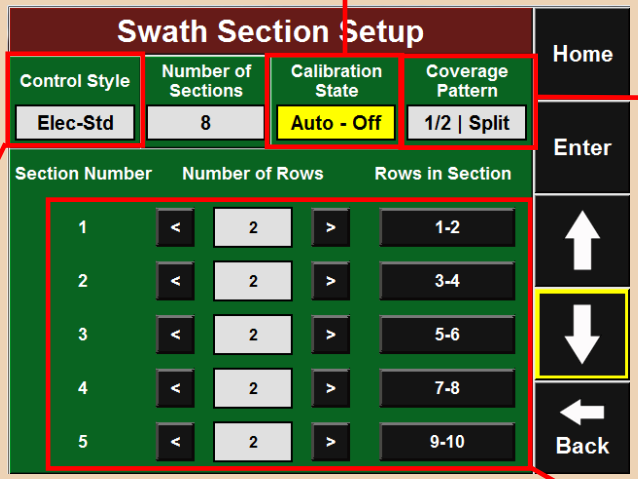
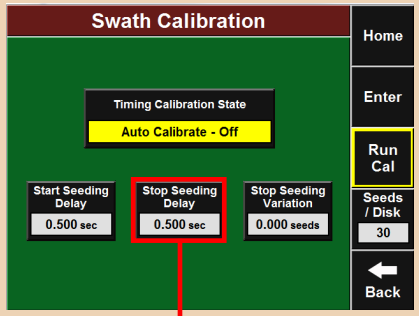
20/20 RowFlow™

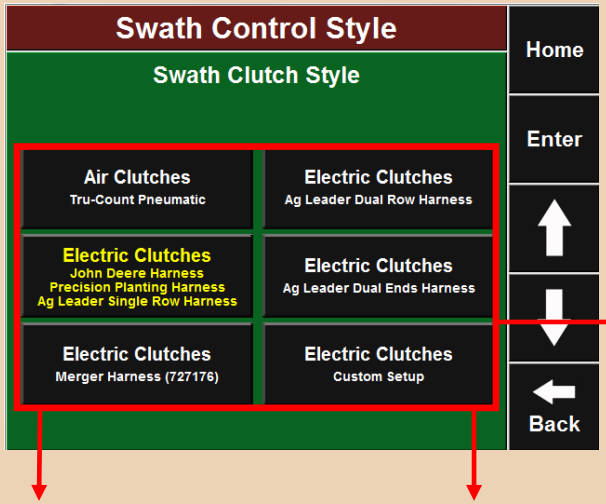
Swath Calibration needs to be done to set the delays for starting and stopping of seeding. This is done by pressing the Calibration State button and either manually entering the seeding delays or using the Run Cal button to build the seeding delays. Note: for ground drive planters, the Auto Calibration button is useful for setting the seeding delays

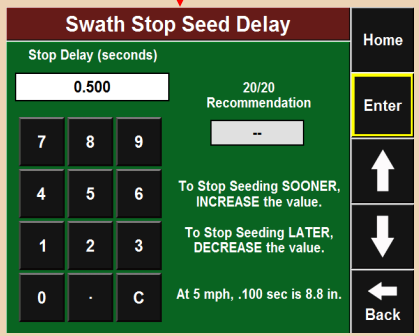
Swath Section Setup page is where swath control is configured and seeding delays are calibrated. Swath control configuration is where the 20/20 is told what rows it will be controlling and how it will be controlling them. The swath harness that is installed on the planter will dictate what configuration will be used. This is accessed by the ROWFLOW button—SETUP—SWATH CONFIGURATION



The coverage pattern button is where the headland offsets and over/under/50% plant preferences are set. If on single row clutches, no over/under/50% will be available.







IMPORTANT! **It is crucial that the correct harness is selected for accurate and correct row clutch control.** The 20/20 monitor controls row clutches based on the information given to it about the harness that is on the planter. If the wrong harness is selected, clutch performance will be negatively affected. The following are descriptions of each harness:

- Air Clutches: ***Tru-Count***—Pneumatic clutches powered by an external air source, **controlled** via an electric signal to a solenoid within the control manifold.
- Electric Clutches: ***Ag Leader Dual Row***—Each electrical clutch output controls two row clutches. i.e. two rows are tied together.
- Electric Clutches: ***Ag Leader Dual Ends***— The outside two row clutches on each side of planter are controlled by one electrical clutch output. (Note: all row clutches inside the outside two rows are controlled as single row clutches)
- Electric Clutches: ***John Deere, Precision Planting, Ag Leader Single Row***— Each electrical clutch output controls only one row clutch.
- Electric Clutches: ***Merger Harness***— Takes 8 rows and merges the electrical row clutches together so that the electrical clutch output is working with 4 clutch wires, i.e. each electrical output is controlling two row clutches.
- Electric Clutches: ***Custom Setup***— Each row will be assigned to a clutch output and a swath section manually. Only use after consulting dealer.

This is where the actual number of rows are assigned to each section and which rows are assigned to that section.

- Number of rows may be added by pressing the arrows up or down on each side of white box. This will assign the next available row to that section. (Note: If the rows get completely messed up, press the "number sections button"—OTHER—enter 0— then reenter correct number of sections. This will restart with blank row assignments.)
- Number of rows may be added by pressing on the black box in "rows in Section" area and manually listing the rows in the section.

Seeding delays can be manually entered to improve clutch performance or to customize delays to plant longer or shorter into headlands. The delays may be entered by pressing on the delay buttons. The stop seeding variation is the difference in the number of seeds that drop each time after the clutch is engaged and the meter is commanded to stop. This will be different for each planter setup. NOTE: Before manually changing delays, make sure that stop seeding variation is within performance capabilities.

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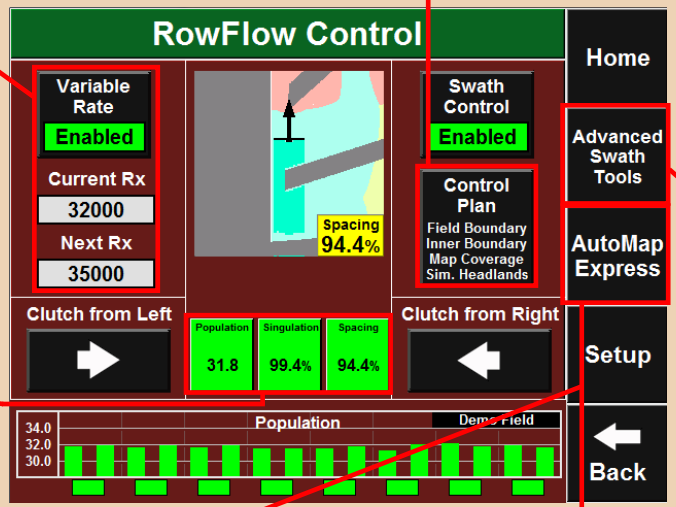
20/20 RowFlow™

The RowFlow Control page is the home for controlling preferences on how RowFlow controls population and swath coverage. The operator can change what aspects of the map row clutches will be controlled to or manually run the clutches using the two arrows or the manual section button that appears when swath is disabled. It is also where the operator can change from variable rate to manual rate population changes. The RowFlow control page is reached by pressing the ROWFLOW button on the homepage.

Variable Rate

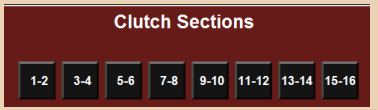
The left side of the RowFlow control page is the variable rate controls. When enabled, the operator is able to see what the current population is and what the next population is going to be. When variable rate is in manual mode, the map will disappear and up to eight preset populations will appear. From these, the operator can manually select a population.



While in the RowFlow control page, it is still possible to see what the **population, singulation**, and **spacing** are of the planter.

Control Plan

Pressing the control plan button will allow the operator to select which aspects of the map RowFlow will activate clutches for. When Swath Control is in manual mode, this button changes to MANUAL SECTION CONTROL and brings up a screen as shown to control the clutch sections.



Advanced Swath Tools

Advanced Swath is for creating boundaries and simulated headlands while in field.

To create a field boundary:

- Press the ADVANCED SWATH TOOLS then BOUNDARY.
- Enter the offset distance from the center of tractor to the edge of planter by pressing the SETUP OFFSET button. Make sure that the offset is to the correct side of the planter (ie. closest to field edge)
- Position the planter at the edge of the field as if to plant the outside round and press the RECORD FIELD BOUNDARY.
- Plant the outside round of the field and press END FIELD BOUNDARY when finished. Advanced Swath will connect and create field boundary.
- Note: if at any time during this process, it is necessary to stop planting the outside round, the recording may be paused with the PAUSE button and then resumed by pressing the RESUME button (PAUSE button changes to RESUME).

To create a simulated headland:

- Press ADVANCED SWATH then HEADLANDS.
- Enter the desired Headland width and press create headland for field boundary and inner boundary as desired.

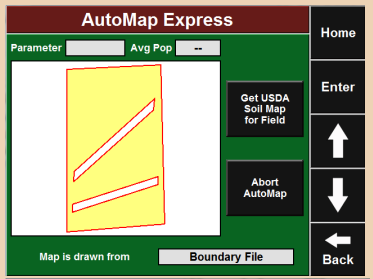
RTK Quality GPS is strongly recommended to maintain accurate boundaries and clutch shutoffs for headlands.

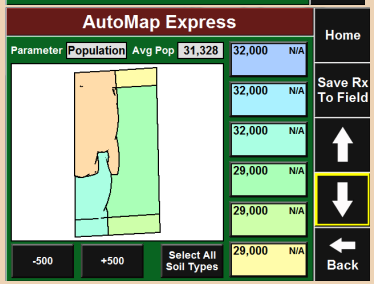
AutoMap Express

Operator may create a new prescription or edit an existing prescription.

To create a new prescription:

- Press AUTOMAP EXPRESS
- Field boundary must be loaded or created (see Advanced Swath for details)
- A USB drive with USDA soil data for correct county on it inserted into 20/20 display
- Press GET USDA SOIL DATA FOR FIELD. Once the soil data is loaded, prescription will need to be edited.
- To edit the prescription for each soil type, press on the soil type and then press the **-500** or **+500** buttons at the bottom of the screen until desired population is reached.
- Note: if it is desired to change all populations by the same amount, all soil types may be selected by pressing SELECT ALL SOIL TYPES





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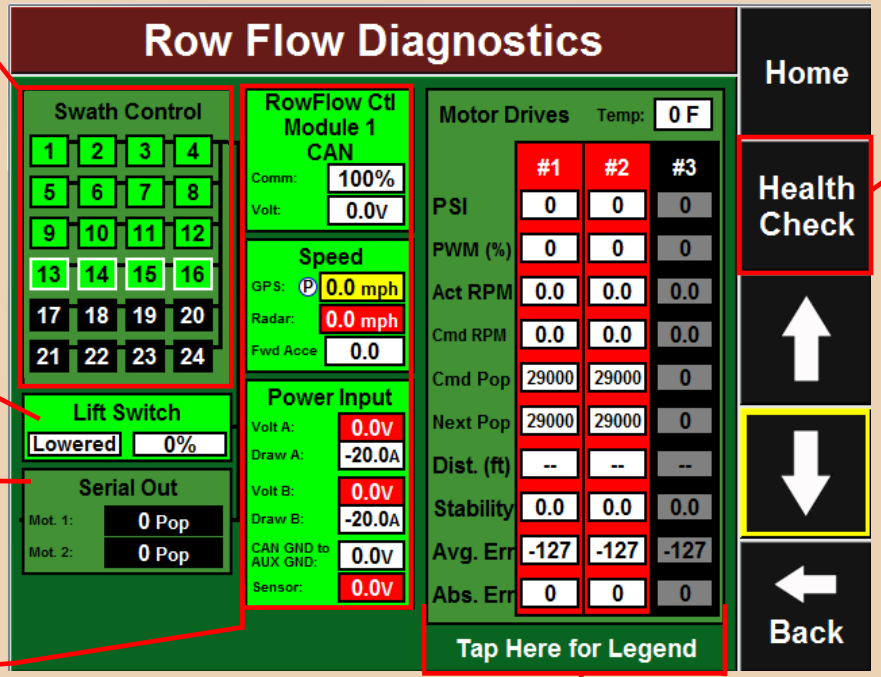
20/20 RowFlow™

The RowFlow Diagnostics page shows current data on how the components of RowFlow are performing and what may be causing problems. It is the starting point for diagnosing problems with RowFlow. To reach this page, press SETUP—DIAGNOSE—ROWFLOW. The first page shown in RowFlow Diagnostics is the diagnostic page for the first RFM. If the planter is equipped with two RFM's, press the down arrow on the right side to see diagnostics for the second RFM.



Swath Control

- The **Swath Control** box shows the current state of each clutch that is plugged into the RFM base harness. Tap the Legend to see what all the colors indicate.
- When each clutch is activated, it will place a white box around the clutch as shown. It is not a signal that something is wrong but is showing it is working correctly.
- Tapping on the **Swath Control** box will show the average seeding delays for the last 10 and 50 cycles of each row clutch.

Lift Switch

Shows the status of the lift switch and what percentage the switch is at. Note: with Rotary Height Sensors, this is important to note what percentage the switch is at for each planter position—lowered, lifted, planter engaged.

Serial Out

When using a serial motor, the motor drive box should be ignored and the serial box will be used to see what the commanded population is. Note: For serial motors, the 20/20 can only tell the AccuRate controller what speed to spin the motors and has no information on what the motors are actually doing, thus no diagnostics exist for serial motors.

RowFlow Ctl Module

Shows communication status and current voltage

Speed

Shows GPS and Radar MPH and the *white P* shows which is primary

Power Input

Shows the voltage and draw of the two power legs of the RFM and the voltage of CAN and sensor. Note: press each power leg to see what each leg is providing power to.

Health Checks

RowFlow has five Health Checks that an operator can run to troubleshoot problems.

- **Setup/Wiring**—Checks the setup of the system and if the wiring is working correctly.
- **Manual Swath**—Cycles through all the swath sections and user listens to see if the system passes or fails.
- **Voltage/Current**—Cycles power to the motors and clutches to check the stability of the electrical system.
- **Motor Stability**—Drive motors at 3mph and 7mph and checks the stability of the motors at the different speeds.
- **RFM Direction**— Checks the RFM direction by starting and stopping the planter.

Motor Drive Diagnostics

The Motor Drive box shows what the motors are currently doing and what the 20/20 is commanding of the motors.

- PWM—Pulse Width Modulation—Commands signal to hydraulic motors: can be used as duty cycle of control solenoid.
- Act RPM—Actual RPM—Number of revolutions per minute each motor is actually turning.
- Cmd RPM—How fast the 20/20 is commanding the motor to turn. If this does not match Act RPM, there may be a problem with the speed sensor or the hydraulic system of the tractor.
- Cmd Pop—What the commanded population is for each motor.
- Next Pop—The next population for each motor.
- Dist. (ft) - Distance to the next population change and counts down from 200 ft.
- Stability, Avg. Err., Abs. Err, - All three are measures of the stability of the motors and can be seen by pressing on any of the three. If the motors fail, it is normally due to a hydraulic system problem or too slow motor RPM.

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