MORRIS

OPERATOR'S MANUAL

ELITE
MONITOR
GROUND DRIVE

N72270-01

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Introduction

The monitor features an easy to use Touch Screen operation. The monitor utilizes a multiplexed data communication system to monitor the functions of the Air Cart. In the multiplexed system, all sensors communicate with the monitor on the same three wires.

The system can monitor and display status of the following functions:

- Fan speed (up to 3)
- Ground speed
- Shaft speeds (up to 4)
- Bin levels (up to 4)
- Flow Blockage (up to 192 runs)

An audio alarm will sound upon detection of: low or high fan speed, low or high shaft speed, low bin level and failure of sensors. Also, loss of flow in any runs that are being monitored with Blockage Modules will generate alarms. Audio alarms persist until the alarm condition is removed or until the alarm is acknowledged by the operator by pressing the appropriate soft key.

In addition, the monitor can determine and display:

- Field Area
- Total Area
- Application Rate (weight per unit area)

The monitor allows the following settings to be changed:

- High and Low fan speed alarm point
- High and Low shaft speed alarm point for 4 shafts
- Ground speed pulses per 400 ft and pulses per revolution
- Pulses per revolution of fans and 4 meter shafts
- Low bin alarm for 4 bins
- The number of Blockage Modules that are connected to the monitor
- The width of the implement
- Imperial or metric units

The settings listed above, as well as field and accumulated areas are stored in nonvolatile memory. This means that the information is retained even when power is disconnected.

The monitor has one tractor harness attached to it. The Tractor harness has a power plug that connects to the tractor power supply and a three pin plug that brings power and communications to the remote sensors through the main harness. The Tractor harness also has a four pin plug for optional radar or GPS connection.

MONITOR - N72101

CLUTCH SWITCHES

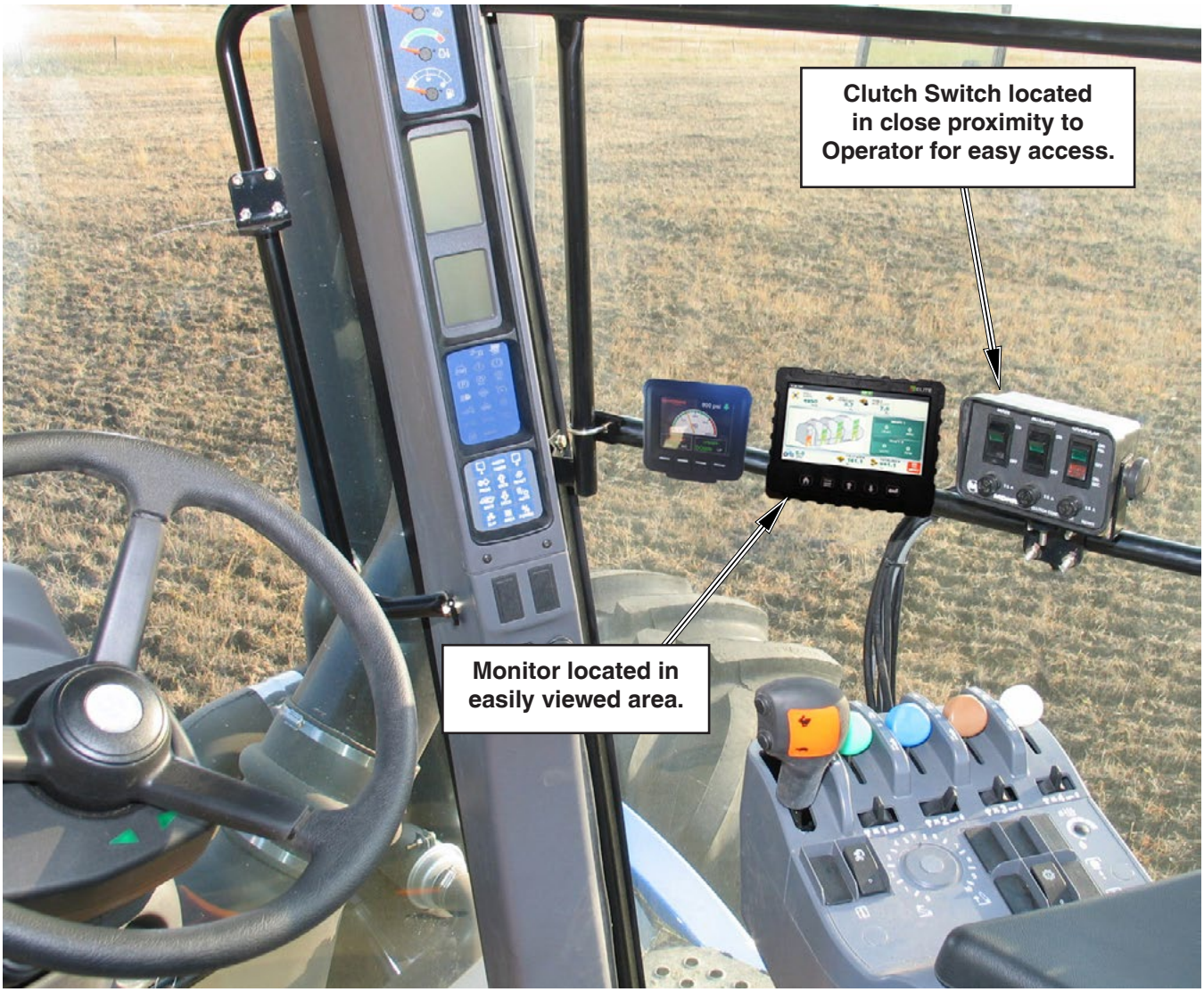
Monitor

Installing Monitor

- Locate monitor and clutch switch in a convenient location in cab.
- Plug Monitor power cable directly to a 12V power plug / power bar in cab.
- Connect Clutch Switch power cables directly to a 12V battery.
  - White or Red wires **positive**.
  - Black wires **negative**.
- Route cable harness to seeding tool and Air Cart. Ensure cables clear any pinch points (i.e. tractor articulation point, hitch point, etc.)
- Program monitor as described in *System Installation* and *Monitor Programming* Sections.

Note: Locate monitor, power and ground wires away from radio and antenna if tractor is so equipped.

Note: Do not connect monitor or clutch switch directly to starter switch.



Identifying Monitor Switches

The five keys on the monitor face are used for controlling the monitor.

Home Key • Used to return to Main screen.

Menu Key • Used to access Main Settings Menu.

Up Key • No function attached to this key.

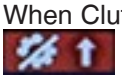
Down Key • No function attached to this key.

Back Key • No function attached to this key.

Note: Monitor will show "communication errors" if the system installation (Sensor Learn Mode) was not completed. *See Sensor Installation.*

Home Screen - Operation Overview

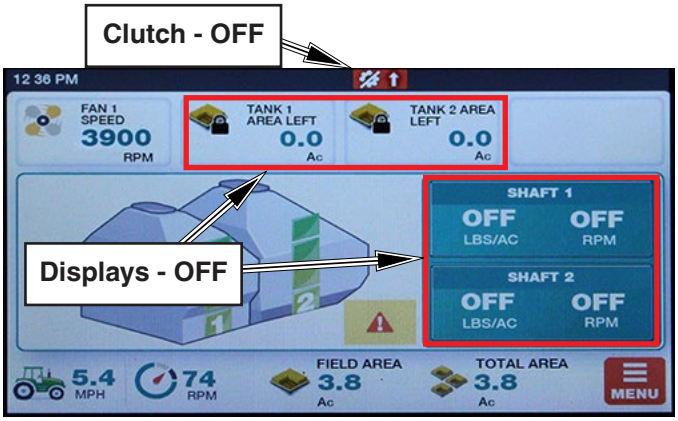
Clutch In Motion Indicator

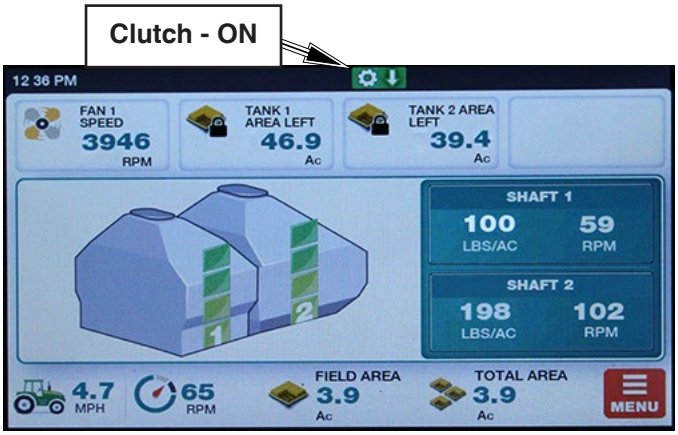
When Clutch is OFF the indicator will be displayed as  and all functions associated with the meter shafts will display OFF or have a zero count.

When Clutch is ON the indicator will be displayed as and all functions associated with the meter shafts will display their application.

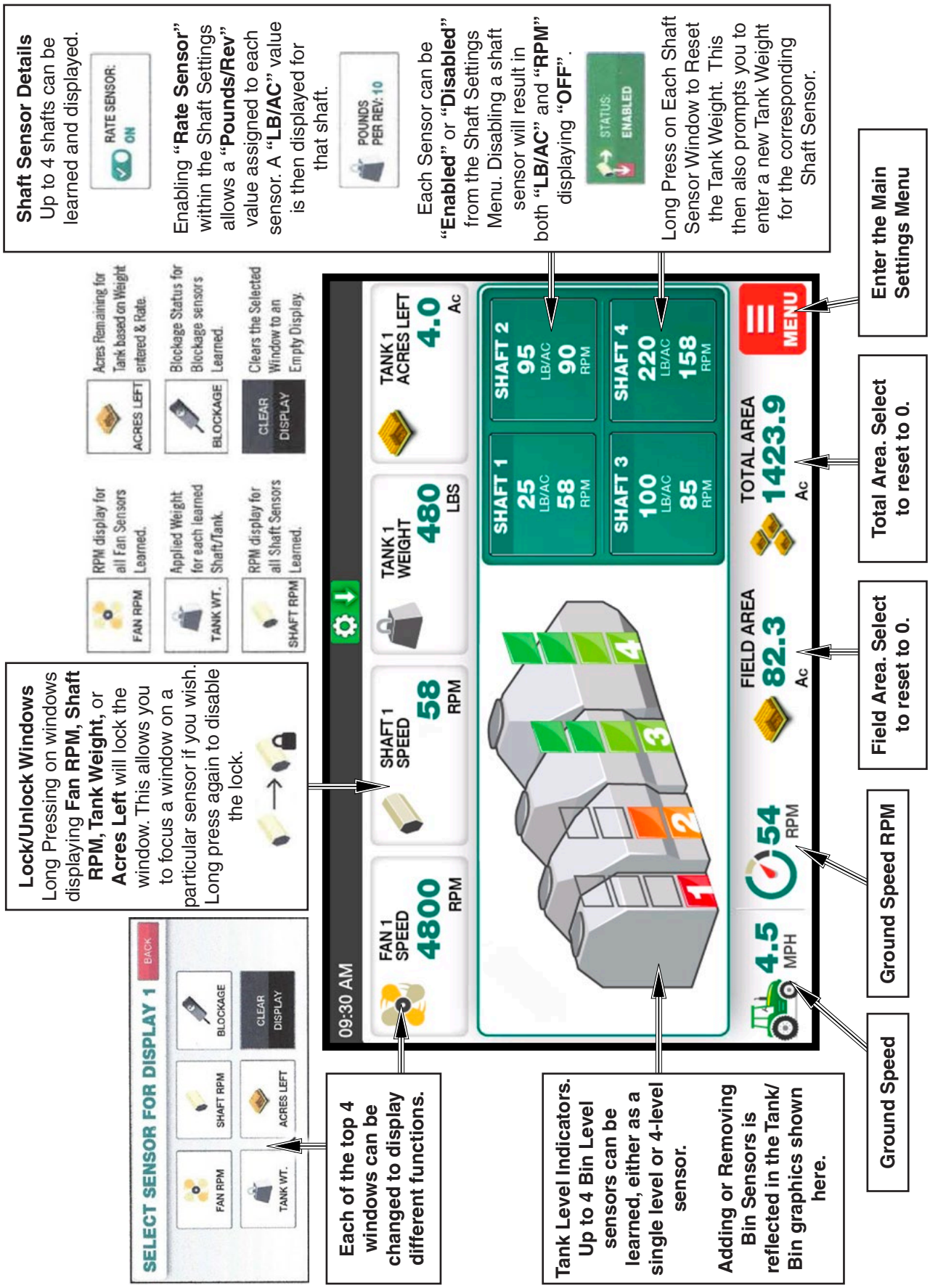
Note: The monitor also emits a double beep whenever the "In Motion" condition becomes true or false.

Home Screen Overview continued on next page.





Home Screen - Operation Overview



Startup

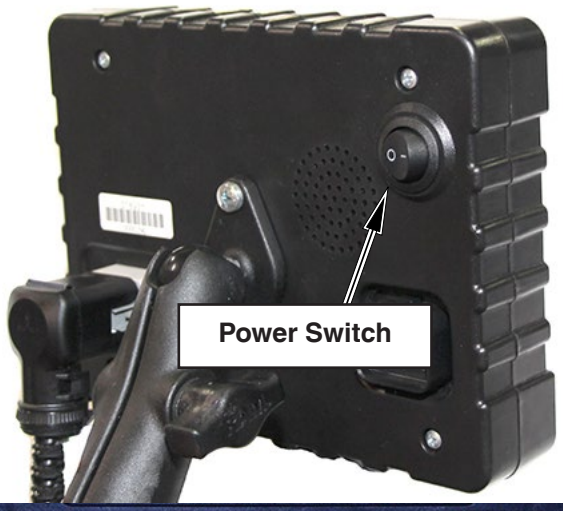
Power On

Toggle the Power switch to turn the monitor on.

When the unit is turned on, the following display sequence takes place:

- ELITE is displayed while the LOUP bar loads.

  This Splash Screen is displayed for a short time – long enough to go through the system startup and wakeup all of the sensors (approximately 3 seconds).
- If any sensors are found, the monitor proceeds to the “Operating” screen
- If no sensors are found, the monitor will display a “COMM ERROR ALARM”.



Power Off

Toggle the Power switch to turn the monitor off.

Operating Screen

Note: Monitor will show “communication errors” if the system installation (Sensor Learn Mode) was not completed. *See Sensor Installation.*

COMM ERROR ALARM Screen

Sensor Installation

The installation procedure is required to configure the monitor to the sensors attached to it.

The operator may have to redo the installation if:

1) An extra tank is added to the Air Cart.
2) Replacing or adding sensors.
3) Replacing monitor with a new monitor.

Installation Precautions

1) During installation the monitor has a predetermined order in which it wants the sensors attached. The installer must be sure that the proper sensor is plugged in the proper sequence.

   i.e. If during installation the installer plugs in the Front Shaft and Ground Speed sensors in the wrong order, the monitor would not know this. The monitor would interpret Front Shaft rpm from the Ground Speed shaft and vice versa.

2) There may be occasions when the operator will not have use of all the sensors.

   i) During sensor installation when the monitor prompts for an unused sensor to be plugged in, the operator can press the SKIP THIS SENSOR key to skip over the sensor. **The sensor will be assigned a disabled status.** A sensor disabled by this method can only be enabled by repeating the installation procedure.

Note: Skip "LIFT SWITCH". The shaft ground speed sensor is connected to the clutch eliminating the need for a lift switch sensor.

   ii) During operation the operator can disable shaft sensors. When disabled, alarms for that shaft sensor and corresponding Bin Level sensor are ignored and no monitoring occurs.

3) Blockage modules attached to the harness are handled differently than the sensors attached to the harness. See Assembly Section *"Blockage Module".*

   Optical Sensors - the blockage modules **have to be unplugged from the harness** before sensor installation can be performed and are connected like the other sensors requested by the monitor during sensor installation.

Note: Each monitor is unique to the sensors installed. If monitor is moved to another Air Cart it has to be reprogrammed to match the sensors.

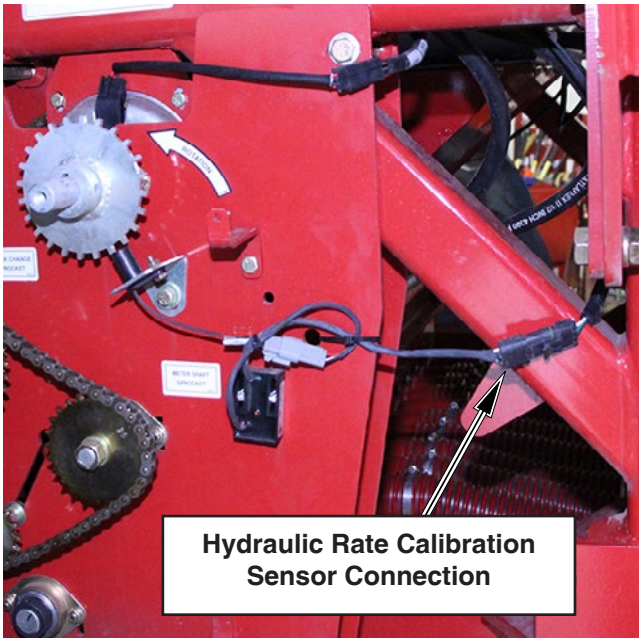
Sensor Installation Order
Speed (Ground)
Lift Switch
Rate Calibration
Bin 1
Bin 2
Bin 3
Bin 4
Shaft 1
Shaft 2
Shaft 3
Shaft 4
Fan 1
Fan 2
Fan 3
Blockage Modules

Sensor Installation - Continued

Installation Procedure

- **Disconnect** all the sensors (3 pin connector) from the harness before turning monitor on.

Note: Disconnect Hydraulic Rate Calibration at sensor connection indicated below.



1. Turn monitor on. With no sensors found, the monitor display “COMM ERROR ALARM” screen.

   Press “CLEAR ALL ALARMS”.

2. The monitor will display the HOME screen.

   Press “MENU” key.

3. The monitor will display the SETTINGS screen.

   Press “INSTALL SETUP” key.

Continued on next page.

Sensor Installation - Continued

Installation Procedure - Continued

4. The monitor will display the INSTALLATION screen.

   Press “LEARN NEW SYSTEM” key.

5. MANUAL LEARN CONFIRM screen will display.

   Press “YES, LEARN NEW SYSTEM” key to start sensor learn sequence.

6. The display will indicate to install the SPEED sensor indicating that the speed sensor may now be connected. Connect the speed sensor.

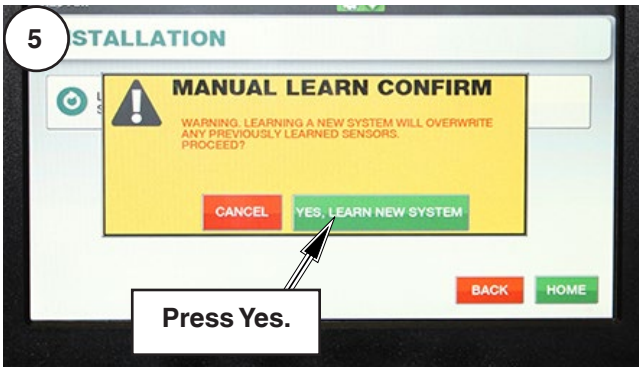
   The process is the same for rest of the sensors in the sequence.

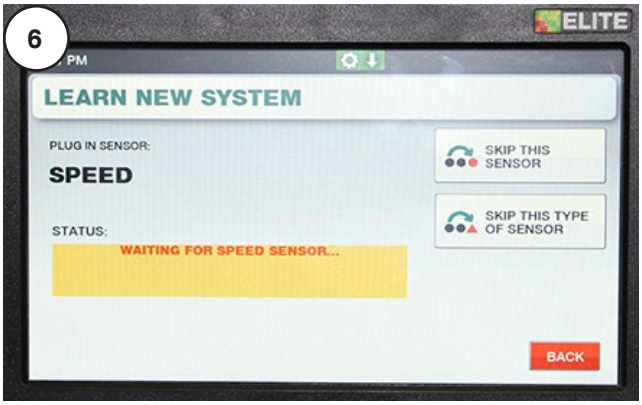
7. When the monitor requests a sensor that **will not be used** in the configuration, press the “Skip this Sensor” key and the monitor will skip the sensor and advance to the next one in the sequence.

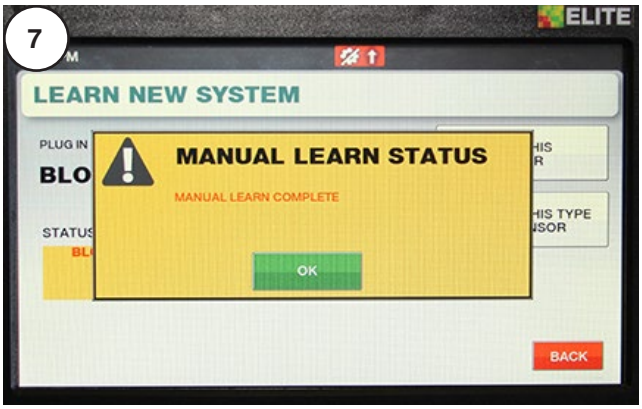
Note: There are **12 Blockage Modules**. To skip past the blockage modules, press the “Skip this Type of Sensor” the monitor will skip all of the blockage modules and advance to the next type of sensor in the sequence.

8. When all sensors in the list have either been learned or skipped, the monitor will display “Manual Learn Complete”. Press the OK key to complete sensor installation. The monitor will return to the SETTINGS screen.

   To verify the installation, turn the monitor off, then turn it on again. The monitor will now proceed to the “Operating” screen with no comm errors.







Monitor Settings

Navigating Settings Screens

The settings screen contains all the configuration information required to tailor the monitoring capabilities to the installed system and user preferences. Only setting parameters that are relevant are displayed (i.e. if no Shaft 3 is installed, there will not be any Shaft 3 setting parameters made available).

Pressing the **MENU** key when in the "**HOME** Screen" enters this mode.

The "**SETTINGS** screen" will list all of the user adjustable parameters available.

Speed Settings

Located by selecting "**Menu**" and "**Speed Settings**", these settings control the type of speed input being used as well as calibrating the speed displayed on the main screen.

Select the "**Source**" button to change the type of Speed Input to use. There are four options Shaft Speed, Radar, GPS, and Simulated Speed.

1. SHAFT SPEED SENSOR: Uses the shaft rotation sensor located on the Cart to obtain ground speed. Unless otherwise configured this is also used as the lift switch for acres accumulation.

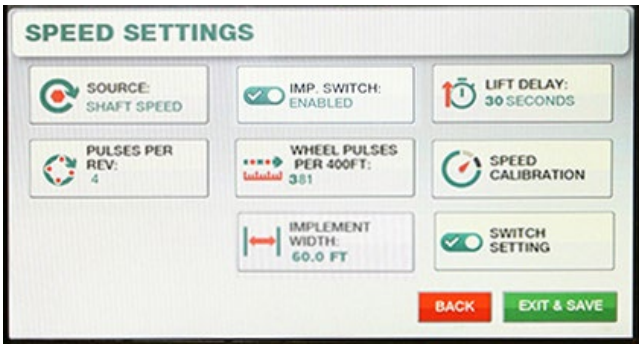
Note: The shaft ground speed sensor is connected to the clutch eliminating the need for a lift switch sensor.

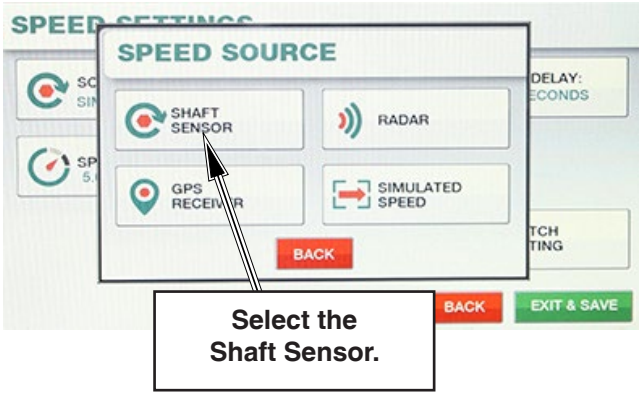
2. RADAR SPEED: Uses the tractor radar for the source of ground speed. Depending on the implement configuration a lift switch may be needed when using radar, this is to ensure accurate accumulation of field acres.

3. GPS SPEED: Uses a GPS receiver for the source of ground speed. Depending on the configuration a lift switch may be needed when using GPS, this is to ensure accurate accumulation of field acres.

4. SIMULATED SPEED: Allows the user to enter a static speed into the monitor without any other speed source. For use in more unique conditions such as a GPS/Radar failure, or other troubleshooting.

Available when "**Simulated Speed**" is selected as the source. Use this field to enter the static speed of choice. The monitor will continually display this speed at all times until otherwise specified.



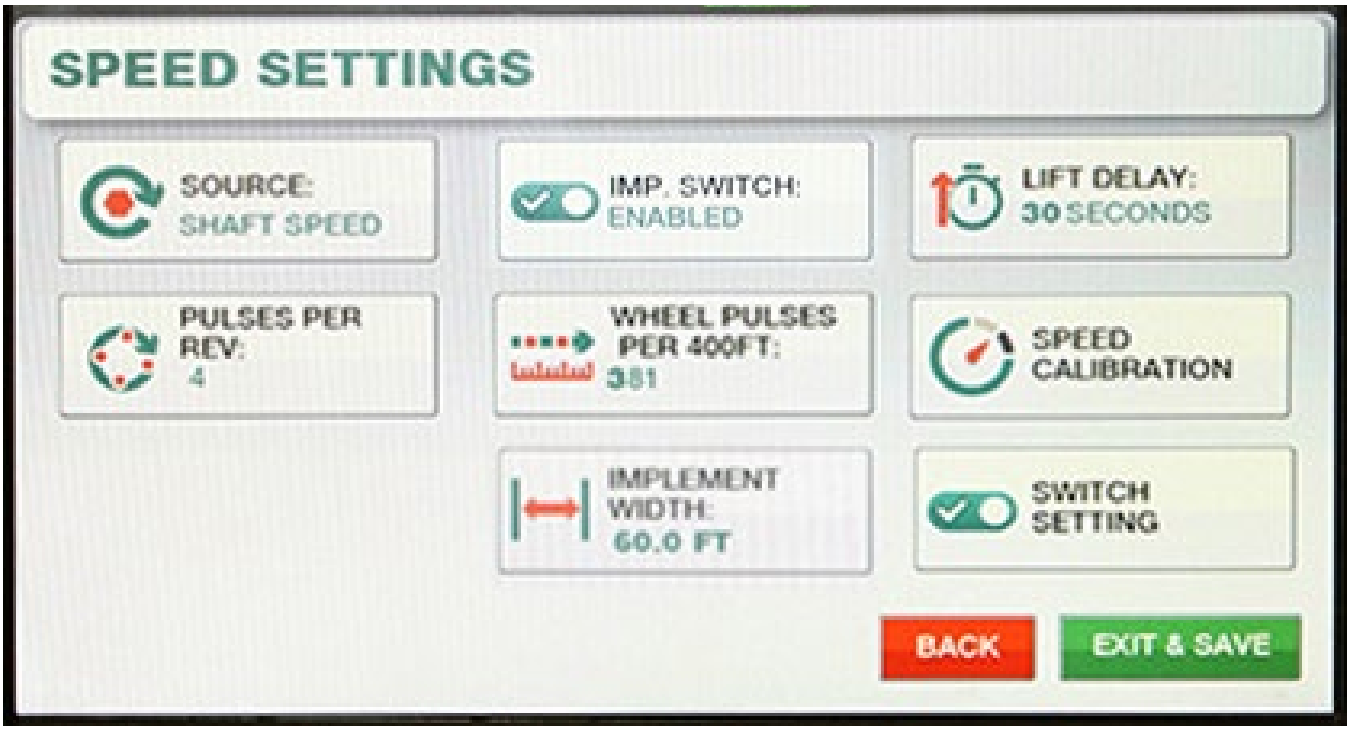


Important

The Ground Drive Air Cart only supports the Shaft Speed Sensor.

Monitor Settings - Continued

Speed Settings - Continued



Note: All Menu settings can be set before selecting "Exit & Save".

Pulses Per Revolution

Available when "Shaft Speed" is selected. Pulses per Rev (Revolution) are the number of magnets the Air Cart mounted speed sensor sees in one revolution of the shaft being monitored. Use keypad to set this number to **4** and select "**Exit & Save**".

Wheel Pulses Per 400FT

Available when "Shaft Speed" is selected. This is the ground speed calibration number for the Air Cart mounted speed sensor.

To change, refer to **PP400 Chart** on next page, select Tire Size on Cart and enter number into the keypad and select "**Exit & Save**".

Implement Width

Use keypad to set this number to the working width of seeding tool and select "**Exit & Save**".

Switch Setting

Select the "**Raised Open**" setting by pressing the **Set Highest** key.

Implement Switch

The implement switch is used to tell the monitor if a lift sensor is being used to determine when the Air Cart is seeding and when it's not. The lift switch sensor is used when shaft rotation cannot be used. (i.e. Radar and GPS)

Morris Air Carts use the shaft ground speed sensor which is connected to the clutch eliminating the need for a lift switch sensor.

Each button push toggles this setting between "Disabled" and "Enabled".

When a "Lift Switch" sensor is learned to the monitor, toggle the "Imp. Switch" button to "Enabled".

If shaft speed sensor is used set to "**Enabled**".

Lift Delay

When enabled, the Lift Delay specifies the seconds given to make a turn before an Alarm sounds. This value can range between 1 and 99 seconds.

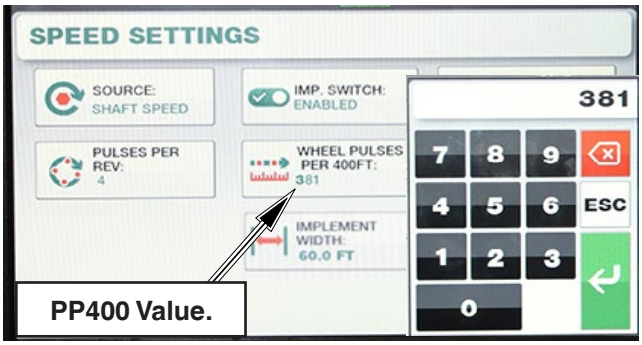
Use keypad to set this number to **30**.

Monitor Settings - Continued

Wheel Pulses Per 400 Feet (PP400)

The chart contains average PP400 values, for the tire options offered by Morris.

Note: Air Carts without brakes use a 63 tooth drive sprocket. Air Carts with brakes use a 64 tooth drive sprocket.



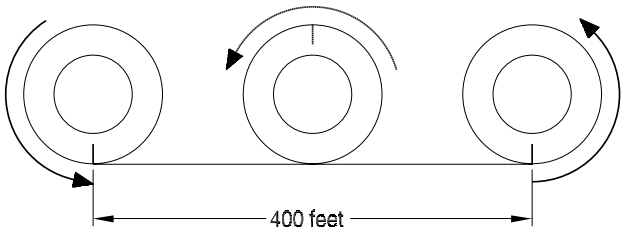
PP400 - Ground Drive				
Tire Size (Good-Year)	**Tire Style**	**Rating**	**Pressure**	**PP400**
800/65R32	Lug	172 A8	15 psi	382
			20 psi	381
No Brakes 800/65R32 Dual Wheels	Lug	172 A8	20 psi	381
Brakes 800/65R32 Dual Wheels	Lug	172 A8	20 psi	387
900/60R32	Lug	176 A8	17 psi	356
			26 psi	351
710/70 R38	Lug	166 A8	36 psi	351
800/70R38 Dual Wheels	Lug	173 A8	20 psi	342
850/80R38 Dual Wheels	Lug	180 A8	15 psi	312
520/85R38 Dual Wheels	Lug	155 A8	20 psi	377

PP400 Math Calculation

To determine PP400 value, first determine the tire circumference as outlined below:

- The tire circumference should be checked under normal field conditions with tanks half full.
- Mark tire and starting point.
- Drive air cart 10 revolutions of tire.
- Mark ending point.
- Measure distance from starting point to ending point and divide by 10 to get the rolling circumference of the tire.

Note: The PP400 can also be determined using the speed calibration feature.



Formulas - Imperial

Monitor PP400 Setting:

For 32” Rim = 80640/Tc

For 38” Rim = 80640/Tc **PP400 =** _____

Monitor PP400 Setting: BRAKES

For 32” Rim = 81920/Tc

For 38” Rim = 81920/Tc **PP400 =** _____

Tc = Tire Circumference measured in inches

Formulas - Metric

Monitor PP400 Setting:

For 32” Rim = 2048.256/Tc

For 38” Rim = 2048.256/Tc **PP400 =** _____

Monitor PP400 Setting: BRAKES

For 32” Rim = 2080.768/Tc

For 38” Rim = 2080.768/Tc **PP400 =** _____

Tc = Tire Circumference measured in meters

Monitor Settings - Continued

Speed Calibration

If the operator does not know what the pulses per 400 feet should be, or, if more accuracy is desired for present levels of tire inflation or soil conditions, the monitor can be put into “Speed Calibration” mode, pulses will be counted while driving a specified distance.

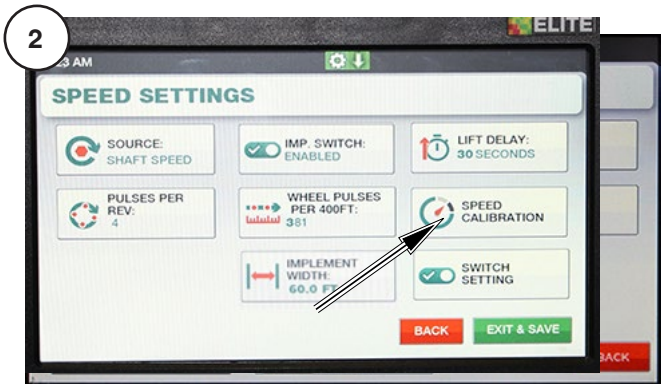
To start the Pulse Counting Mode:

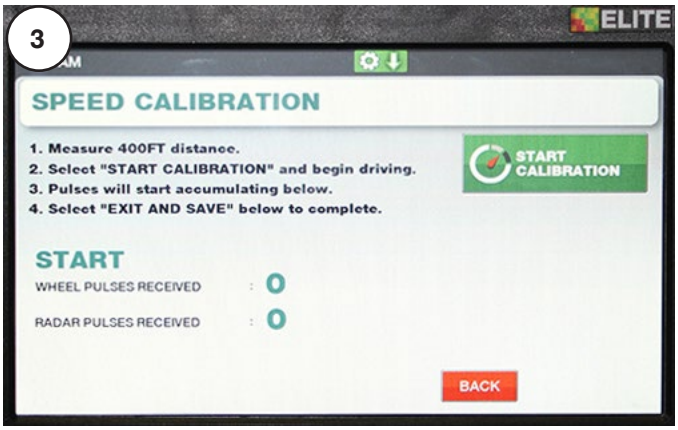
1. Measure and mark out 400 feet (121.92 m).
2. Select **SPEED SETTINGS** under the “Settings Menu”.

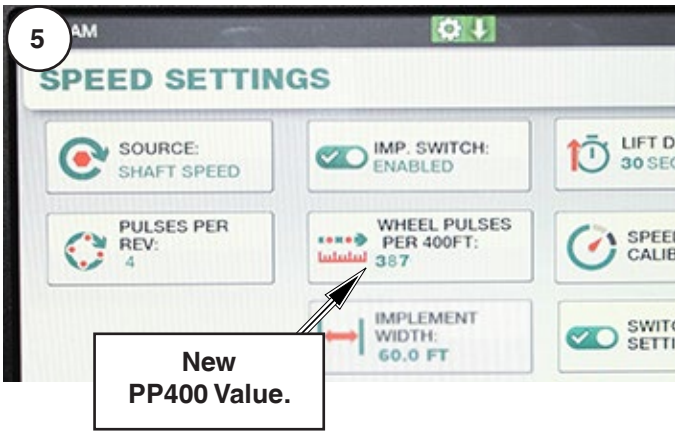
   Then select **SPEED CALIBRATION**.
3. Press **START CALIBRATION** to start the pulse count sequence.

   Drive the marked distance and the monitor will count the number of pulses.
4. When the distance has been travelled, stop forward travel. Press the “**Exit and Save**” to save the new pulse count under the **SPEED SETTINGS** screen.
5. The new value will now be displayed under “**Wheel Pulses Per 400 Feet” (PP400).**
6. To exit **SPEED SETTINGS** press the “E**xit and Save**” to save changes.

Note: The monitor can accept PP400 values from 50 to 9999. Therefore, if the new count is less than 50, the existing count is not replaced. The monitor will state “Pulses Too Low” and display options to “Continue Driving” or “Cancel Calibration”.







Monitor Settings - Continued

Shaft and Fan Settings

1. From the **HOME** screen press "**MENU**" key.

   The monitor will display the **SETTINGS** screen.

   Press "**SHAFT & FAN SETTINGS**" key.

2. The monitor will display the "**SHAFT & FAN SETTINGS**" screen. Starting with **SHAFT 1**.

   Under Shaft 1 set:

   - **Status** - Enabled and **Rate Sensor** - ON

   Pressing the green arrow or red arrow to navigate through the sensors available.

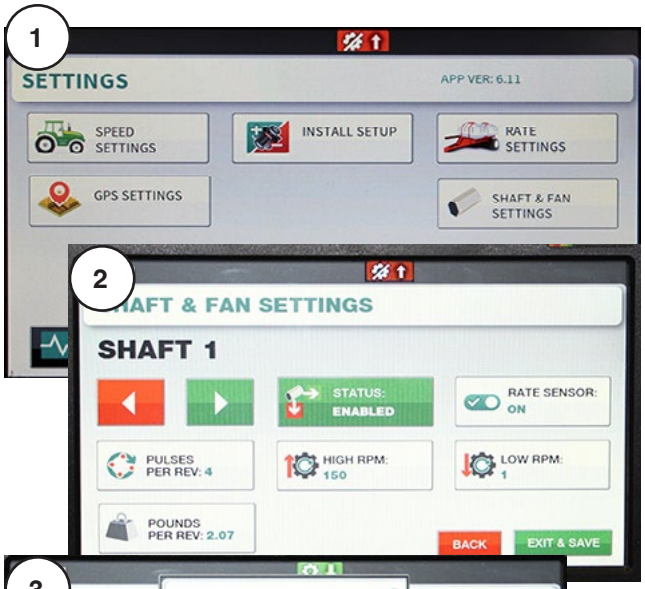
3. Set **PULSES PER REV** to 4 and **HIGH RPM** to 150 and **LOW RPM** to 2

   Repeat steps 2 and 3 for the other shafts.

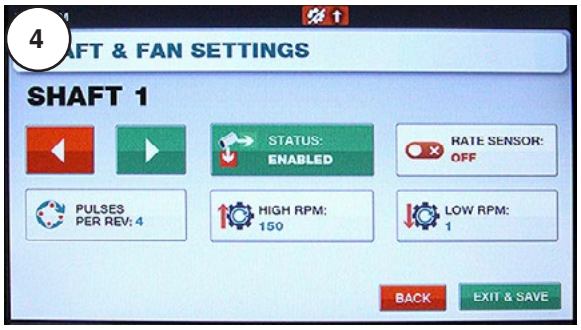
Note: All Shaft & Fan settings can be set before selecting "Exit & Save".

To save changes press **EXIT & SAVE**.

The monitor will return to the **SETTINGS** screen.



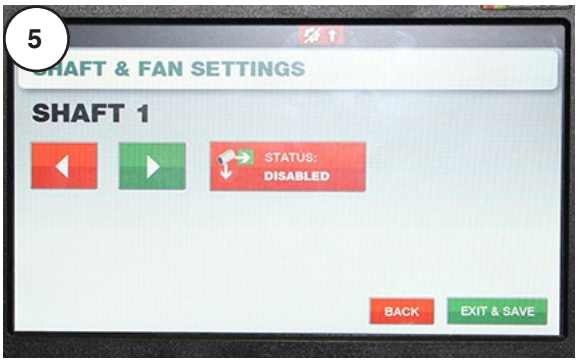
4. Turning **Rate Sensor** OFF will close the pounds per rev icon and also the Home screen window for the shaft. The shaft will still be monitored for alarms.



Tank Not In Use

5. If a tank is not being used for an application switch the shaft Status to DISABLED. This will eliminate nuisance alarms.

Remember to Enable shaft when resuming use of tank.



Monitor Settings - Continued

Shaft and Fan Settings - Continued

Rate Setting

6. POUNDS PER REV is automatically set during the Rate Calibration procedure. This value can be manually edit under each shaft setting over-riding the saved setting from Rate Calibration. Once it is overwritten the Rate Calibration value cannot be retrieved. Therefore, it is recommended to keep a record of the Rate Calibration WT/REV value for each tank in a note pad for reference.

   This value is used to calculate the Applied Rate and Tank Area Left display on the home screen.

   Best practice is to perform a Rate Calibration to obtain an accurate WT/REV however, if a quick setting is required the Rate Charts at the end of this section can be used as an estimated value.

Note: Rate Calibration feature does not function on Carts not equipped with Hydraulic Rate Calibration. Manual entry from the charts is the only option on such Carts.

7. Set the Fans to:
   - **PULSES PER REV** to 2
   - **HIGH RPM** to 5000 and **LOW RPM** to 3000

   To save changes press **EXIT & SAVE**.

   The monitor will return to the **SETTINGS** screen.

Note: All Shaft & Fan settings can be set before selecting "Exit & Save".

Settings Menu Chart - Ground Drive

Install Setup

Install New System	See “Sensor Installation”
Add a Sensor	See “Sensor Replacement”
Remove a Sensor	See “Sensor Replacement”

Important

Select “Exit and Save” in each Menu Setting to save changes.

Speed Settings

Source	Set to “Shaft Speed”
Pulses Per Rev	Set to 4
Implement Switch	Enabled
Wheel Pulses Per 400 Feet	See PP400 Chart
Implement Width	Set to width of seeding tool
Lift Delay	30 seconds - Can be adjusted to user preference.
Speed Calibration	See “Pulse Counting Mode for PP 400”
Switch Setting	ON _ Raised Open _ press Set Highest key

Shaft Settings

Shaft 1, Shaft 2, Shaft 3 and Shaft 4

Alarm Setting	Enabled (default)	Set to Disabled if tank is not in use.
Settings	Pulses Per Rev	Set to 4
	High Alarm Point	150 rpm - Can be adjusted to 200 for high rates.
	Low Alarm Point	2.0 rpm - Can be adjusted to 1 rpm for low rates.

Fan Settings

Pulses Per Rev	Set to 2
Low Alarm Point	Set to 3000 rpm
High Alarm Point	Set to 5000 rpm

Blockage Module Settings

Runs per Module Setup	Set individual Module number of Runs
Individual Runs Setup	Allows Runs to be Enabled/Disabled
Blockage Module Test	See “Blockage Module Test”
Blockage Calibration	See “Blockage Calibration”

Display & Updates

Brightness	50% (default)	Set as desired.
Volume	50% (default)	Set as desired.
Clock		Set as desired.
Units	Select Imperial or Metric	
System Update	Software Update	
	Factory Reset - Locked to prevent accidental reset	
	Unlock Reset - Locked to prevent accidental reset	

Note: Only setting parameters that are relevant are displayed (i.e. if no Shaft 3 is installed, there will not be any Shaft 3 setting parameters made available).

Alarms

Introduction

All configured sensors and various other operating conditions are continuously monitored. Alarms fall into one of the following three categories:

- **Sensor alarms** are alarms which are generated when information returned by a sensor exceeds the appropriate threshold.
- **Communication alarms** occur when a sensor repeatedly does not respond to attempts at communication.
- **System alarms** are for various other conditions that are found to be in fault.

When an alarm condition occurs, the monitor will beep repeatedly and an alarm screen will pop up indicating the fault condition.

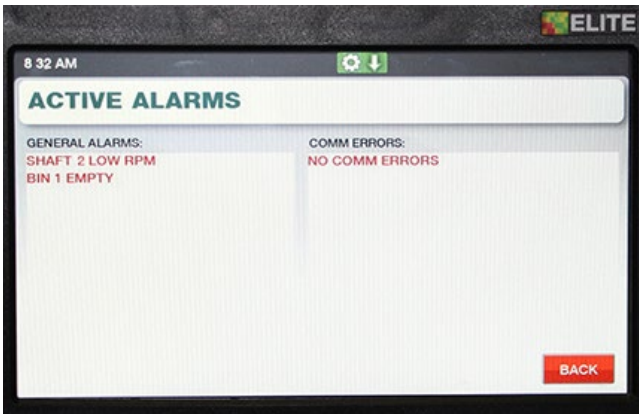
The audio alarm and alarm screen persist until the alarm condition is fixed or until it is acknowledged by the operator. Follow the steps on the screen to fix or acknowledge the alarm.

After acknowledgement, the “Operating Screen” will be displayed with a flashing “Warning Symbol” indicatng unfixed alarms. Press the “Warning Symbol” to shown the “Active Alarm” window to view alarms.

When the alarm condition is corrected, the flashing “Warning Symbol” notification is removed from the “Operating Screen”.

Alarm Screen

Alarm - Operating Screen



Nuisance Shaft Alarm

Low application rates of Canola may cause the seed shaft to rotate less than 2 rpm.

The low shaft rpm will cause the monitor to give a shaft alarm, since the shaft is rotating below the default alarm threshold of 2 rpm.

To avoid this nuisance alarm, change the seed shaft low rpm alarm setting to 1 rpm and change pulses to 1.

Note: Change the setting back to 2 rpm and 4 pulses when returning to higher application rates.

Alarms - Continued

"In Motion" Notification

The "In Motion" condition means that the monitor, based on ground speed and clutch state, considers that the system is supposed to be actively seeding.

The monitor emits a double beep whenever the "In Motion" condition becomes true or false. This condition is defined as *speed greater than 2 mph (3.2 Kph)* and *drive clutch engaged.*

1. If ground speed is less than 2 mph (3.2 Kph) for more than 30 seconds the monitor will alarm and display "Should be Seeding".
2. If ground speed is greater than 2 mph (3.2 Kph) for more than 30 seconds and clutch is not engaged the monitor will alarm and display "Clutch Switch is Off".
3. Certain alarms are inhibited when the "In Motion" condition is false. These are described elsewhere in this manual, but an example is whether to generate an alarm for a stopped shaft.

If a speed sensor is unavailable the metering shaft monitoring and associated functions will not display.

Low Fan Alarms

Low fan alarms are handled differently because a stopped fan can result in damage to the metering mechanics as unblown material accumulates. **Low fan alarms cannot be acknowledged while the system is "in motion".** Thus, if a low fan alarm occurs during active seeding, the user will **not be able** to silence the alarm but will need to stop the vehicle or disengage the clutch. When this happens, the monitor accepts it as an acknowledgement of the alarm, and an effective "automatic acknowledge" takes place, resulting in the beeper being silenced and the resumption of normal display with "Fan Low RPM" flashing in the alarm window.

Area Display

There are two area counters, field area and total area. They are both accumulated whenever the system “In Motion” condition is true. Area counts are stored in memory when the unit is turned off.

The area counts can be displayed on the “Operating Screen” as outlined in “Navigating the Operating Screen”. The FIELD AREA and the TOTAL AREA are displayed to the nearest tenth of an acre (or hectare).

Resetting Area

To clear FIELD AREA and/or TOTAL AREA follow the steps below.

- From the “Operating Screen” press the desired function of “Field Area” or “Total Area”.
- The monitor will ask “Are you sure?”
- Press the CANCEL key to leave area count and return to the “Operating Screen”.

  OR

  Press the YES, CONFIRM key to clear area and return to the “Operating Screen”.

Rate Calibration

The practice of doing a rate calibration is strongly recommended as it will confirm the **actual** amounts of product being metered.

The following procedure should be followed for every change of product.

- Ensure correct seed plates are installed.
- Fill tank 1/2 full and drive 600 - 1000 feet to compact product in the tanks.
- Select and install meter rate sprocket per Rate Chart.
- Set Flapper Valves to the **"Calibration"** position.
- Remove the metering chain from the transmissions that are **not** being checked.
- Open lower collector door at the bottom of the collector body.
- Hook the Rate Calibration Insert on collector bottom and rotate up into position. Secure in place with slide lock.
- Slide rate check box on the collector body.
- Engage hydraulic lever to run air cart.
- **Turn off fan** by switching selector valve (located in the fan supply line) to calibration position.
- **Prime metering wheels first** by using the primer switch to start and stop the meter drive. Allow the drive to run until material begins to fall through the collector body.

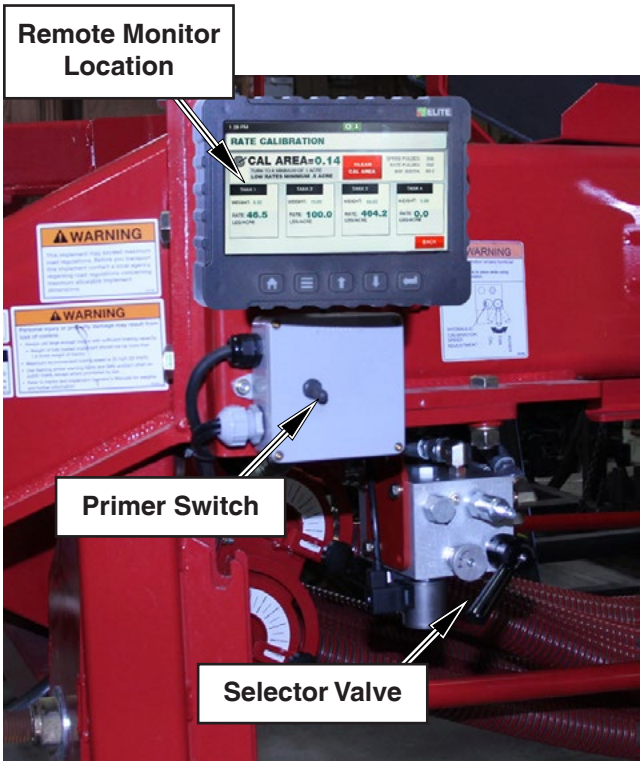
Note: ***Ensure the fan is not running.***

- Empty material from rate check box and reinstall it on the same collector.
- The monitor can be relocated to the remote monitor location for ease of calibration. The 10 pin plug connects to the monitor.

Actual Sample

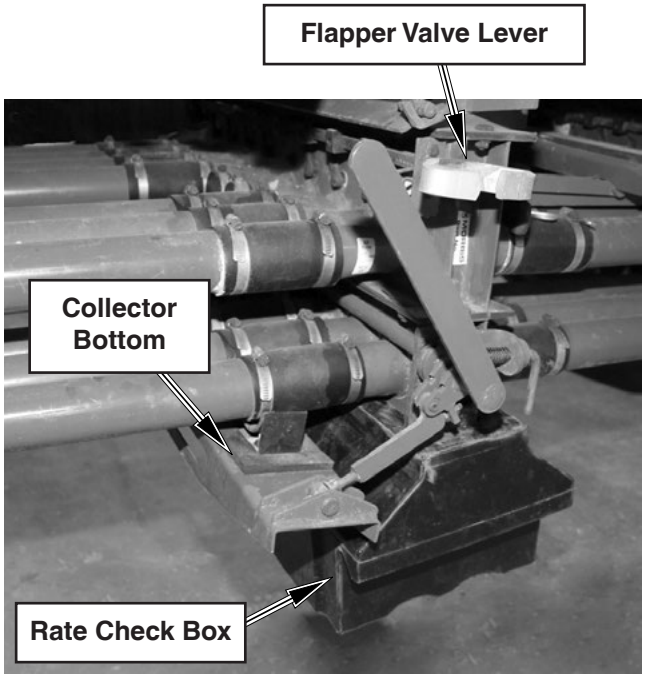
- See following page.

Note: Rate Calibration feature does not function on Carts not equipped with Hydraulic Rate Calibration.



Important

Flapper Valves must be set to "CALIBRATION"



Double Shoot Shown

Rate Calibration - Continued

Actual Sample

Example: Calibrate Shaft 1.

Note: Rate Calibration always displays four tanks even if the Cart only has two or three tanks.

1. From the HOME screen press the MENU key to enter the SETTINGS screen.

   Press RATE SETTINGS.

2. The monitor will display the RATE SETTINGS screen.

   Press RATE CALIBRATION key to enter function.

Note: The "Rate Cal Num" is Factory set and can not be adjusted.

3. PRIME METER will be displayed, press the prime button it will turn green, then prime metering wheels as outlined on previous page.

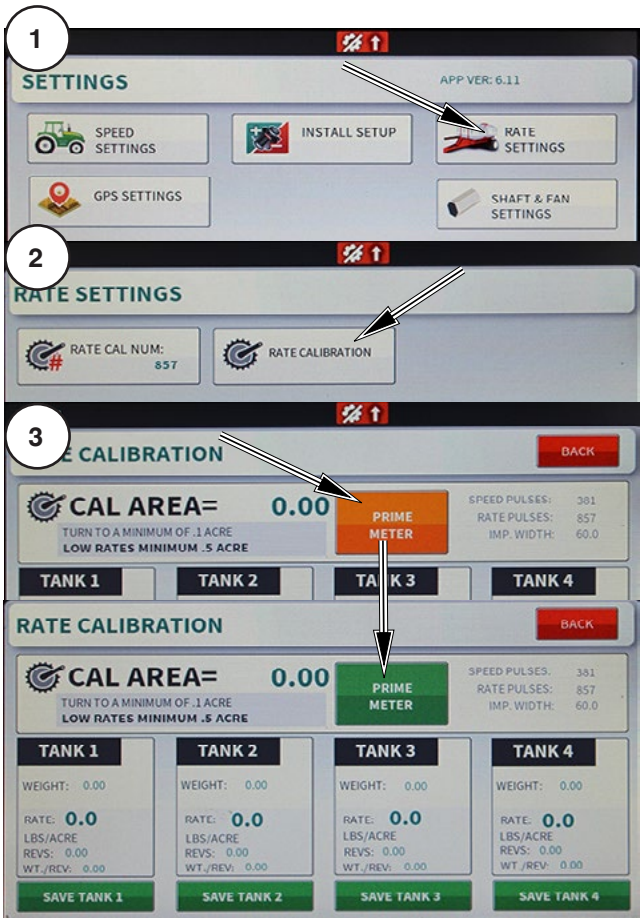
Note: Tapping "Prime Meter" a second time takes you directly to "Start". Only do this if meter wheels are already primed.

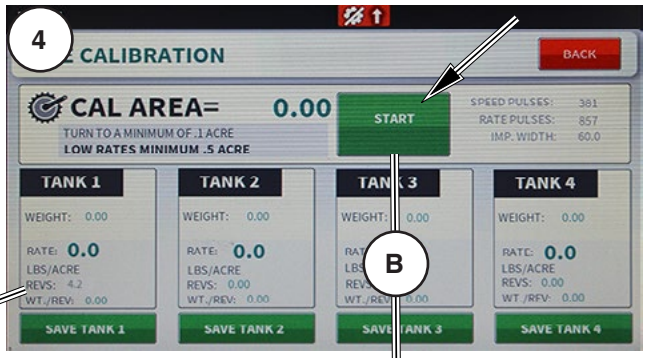
4. START will now be displayed:

   a. Press and hold WT/REV area to bring up warning to RESET TANK CAL WEIGHT, select "Yes" to zero the Tank information.

   b. Press the start button, then engage Hydraulic Calibration Motor by holding switch in ON position to begin CAL AREA count.

Note: REVS must be cleared before taking a sample in order to have an accurate WT/REV calculation.





Rate Calibration - Continued

Actual Sample - Continued

5. Release switch when desired Area count is reach on the monitor.

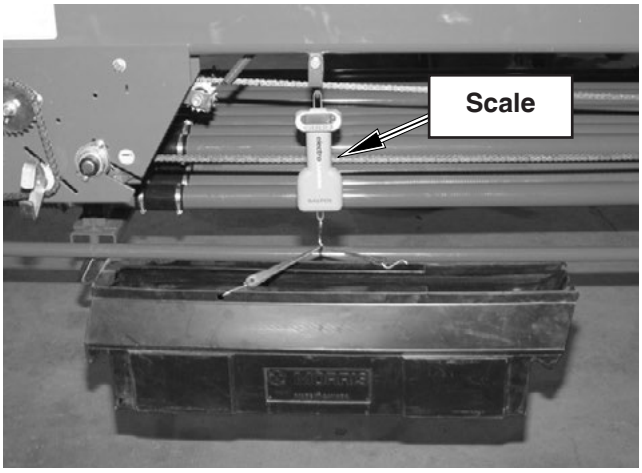
   Remove the rate check box from the collector body.

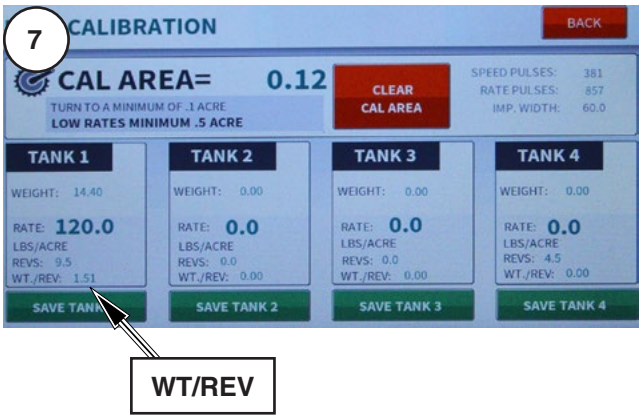
   Weigh the sample by using tarp straps to hook rate check box to spring scale.

Note: Remember to subtract the weight of the rate check box from the total sample weight. Accuracy of sample is critical for actual application rate accuracy.

6. Press WEIGHT under the Tank being calibrated. Use the key pad to enter the value of the sample weight.
7. The Monitor automatically displays application rate under RATE.

Continued on next page. . .





Rate Calibration - Continued

Actual Sample - Continued

8. To perform a second rate check:
   a. Press and hold WT/REV area to bring up warning to RESET TANK CAL WEIGHT, by selecting "Yes" will zero the Tank information.
   b. Press CLEAR CAL AREA to zero Cal Area.
   c. Repeat steps 4 to 7.
9. Press SAVE TANK to retain value, before moving to next Tank.

Repeat steps 3 to 9 for eachTank.

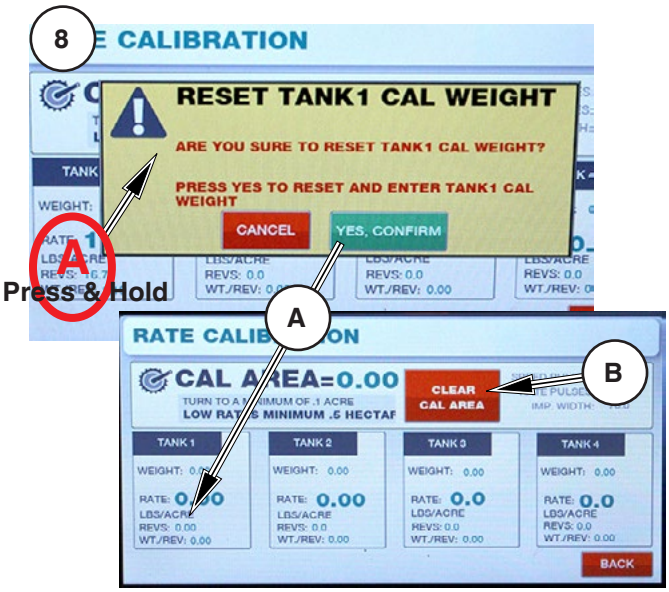
10. Press BACK to return to RATE SETTINGS screen.

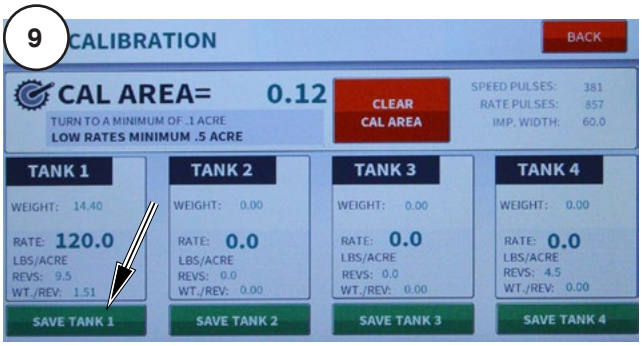
    Under the RATE SETTINGS screen press EXIT & SAVE to save calibration rates and exit back to SETTINGS screen.

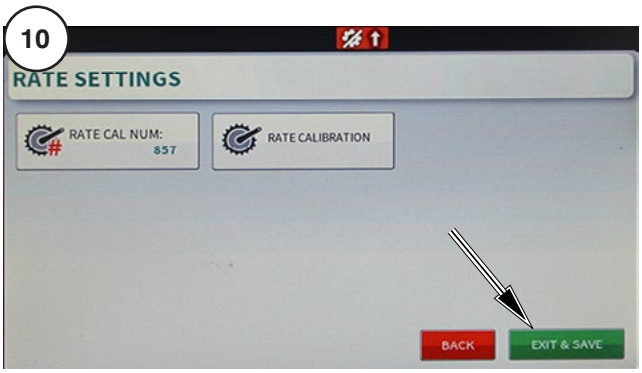
11. Check under the Shaft Settings to verify the WT/REV saved correctly from the Rate Calibration screen.
12. Replace the bottoms of the collectors. Place rate check box into storage bracket.

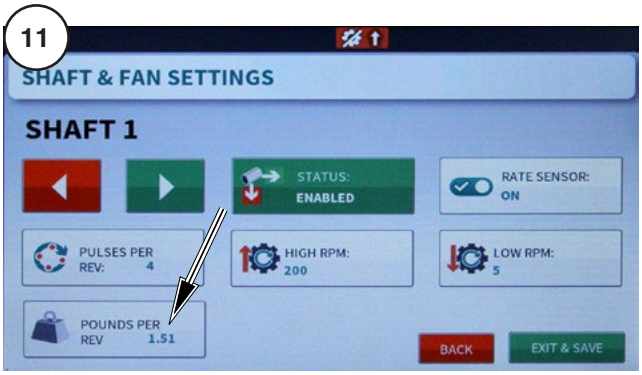
Note: Upon "EXIT & SAVE" **from the Rate Settings screen, the WT/REV from each tank gets automatically transferred to the appropriate shaft setting.**

The WT/REV value can be manually edit under each shaft setting over-riding the saved setting, which then cannot be retrieved. Therefore, it is recommended to keep a record of the WT/REV for each tank in a note pad for reference.









Displayed Rates

There are two rates that can be displayed on the Home Screen:

1. **Applied Rate** - This is calculated based on the Weight per Rev (WT/REV) saved for each Tank during Rate Calibration.

   Best practice is to perform a Rate Calibration to obtain an accurate WT/REV however, if a quick setting is required the Rate Charts at the end of this section can be used as an estimated value.

2. **Tank Area Left** - This is calculated based on the Weight per Rev (WT/REV) saved for each Tank during Rate Calibration and the weight entered for each Tank. This is meant to be used as a reference on remaining acres, not an actual. The exactness of this value is based on the accuracy of the Tank Weight and the WT/REV entered.

Note: Rate Calibration feature does not function on Carts not equipped with Hydraulic Rate Calibration. Manual entry from the charts is the only option on such Carts.

Determine the product weight in each Tank by:

1. Get each tank capacity **(V)** from the Specification section, bushel (bu) for Imperial measurements or litre (l) for metric measurements.
2. Determine the density of product **(PD)** in pounds per bushel (lbs/bu) for Imperial measurements or kilograms per litre (kg/l) for metric measurements.
3. Use formula below to get weight of each tank.

Tank Weight Formula

PD = Product Density **V** = Tank Volume

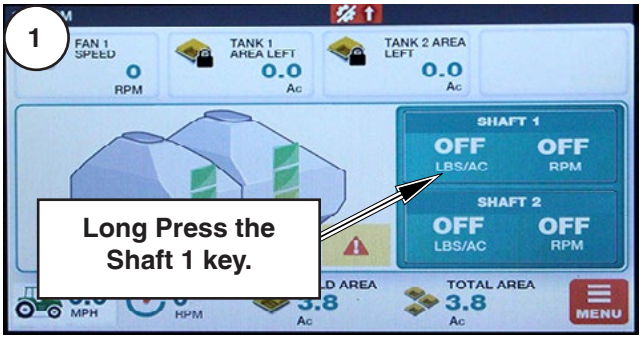
PD x V = Tank Weight _____

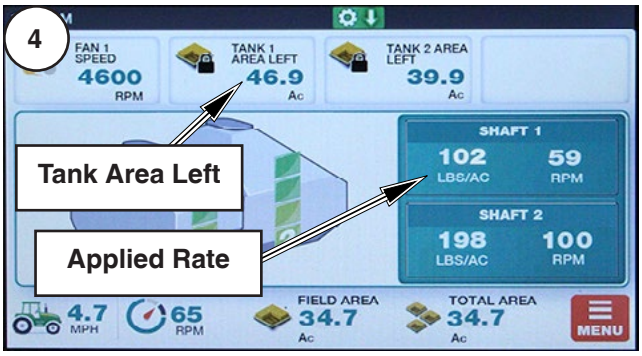
Enter Tank Weight for each shaft on Home screen.

1. Long Press on each Shaft Window to Reset the Tank Weight. This will prompt to enter a new Tank Weight for the corresponding Shaft.
2. The monitor will display a RESET TANK WEIGHT screen.

   Press YES, CONFIRM key to enter function.
3. Enter tank weight and press enter.
4. Tank Area Left will now be displayed while seeding.

Tank Weight for each shaft will have to be reset each time the tanks are filled.





Sensor Replacement

The monitor will alarm the operator if there is a faulty sensor in the system by displaying a communication error for the sensor.

To replace a faulty sensor, follow the steps below.

Example: Replace Fan 1 sensor.

1. From the HOME screen press the MENU key to enter the SETTINGS screen.

   Press INSTALL SETUP.

2. The monitor will display the INSTALLATION screen.

   Press ADD A SENSOR key to enter function.

3. The monitor will display the sensor types available. For this illustration we will select FAN SENSOR.

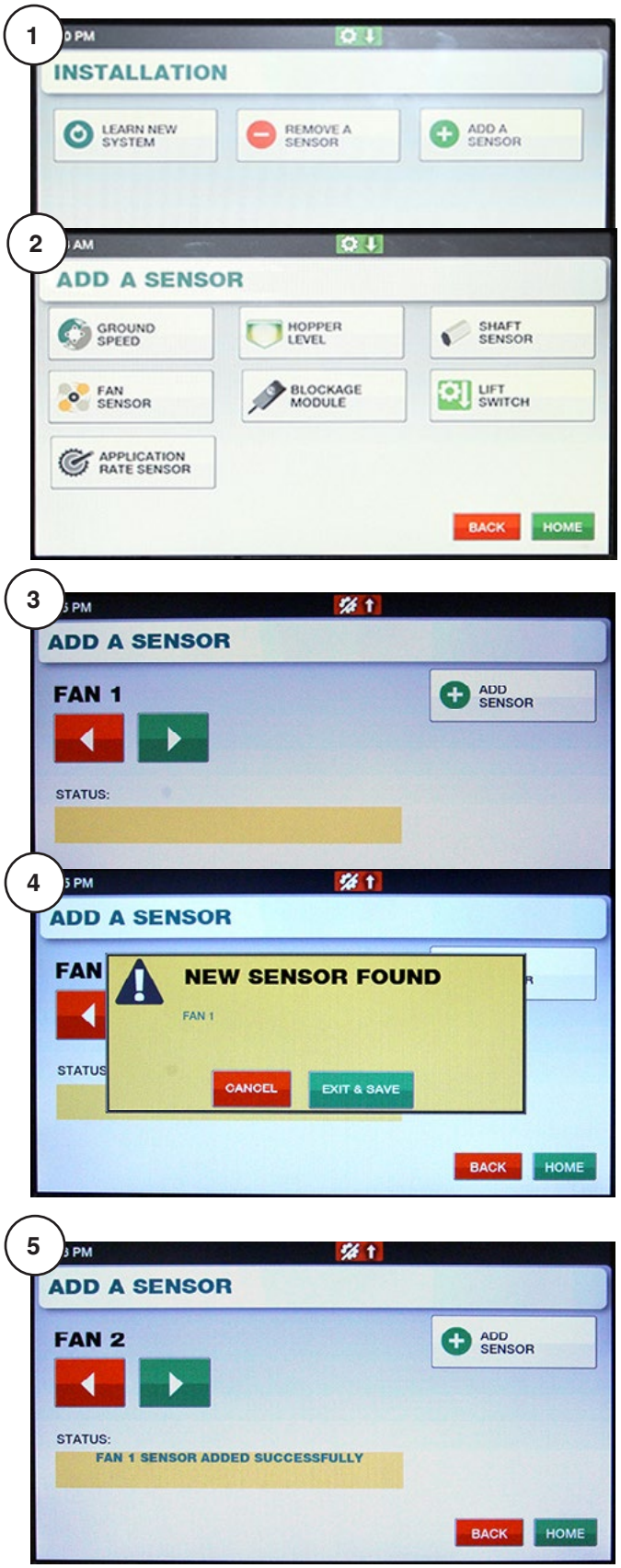
   Pressing the green arrow or red arrow will scroll through the sensors available.

   Pressing ADD SENSOR will promote the monitor to search for new sensor. Plug new sensor into harness at this point.

4. Once the monitor acknowledges the new sensor, the monitor will display NEW SENSOR FOUND Press "Exit and Save" to accept sensor.

5. The monitor will display FAN 1 SENSOR ADDED SUCCESSFULLY under Status confirming sensor installation. Press "HOME" to return to operating screen.

Note: Sensors can also be removed from the system in the same manner by selecting the REMOVE A SENSOR choice from step 2.



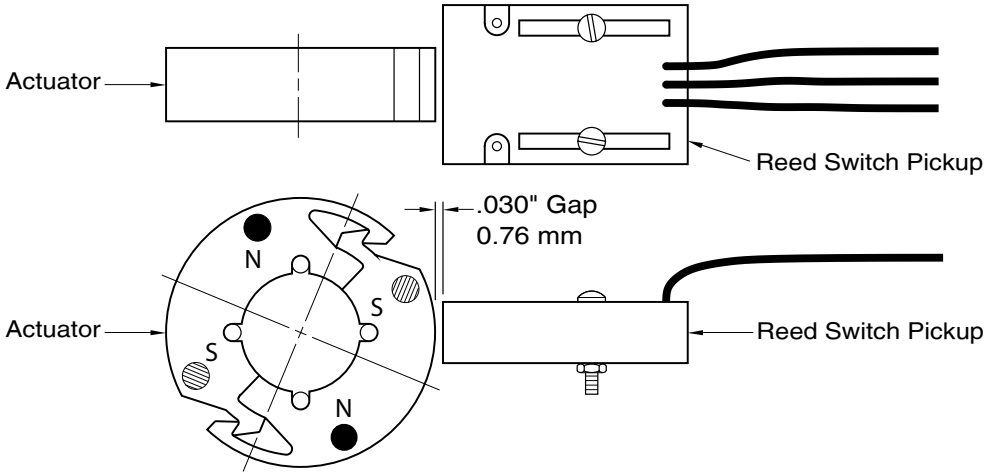
Sensor Gap Settings

Reed Switch Sensors

These sensors are used on slowly revolving shafts, in this case the meters and ground speed.

Check the gap between the sensor and actuator.

A gap of .030 inch (0.76 mm) is recommended.

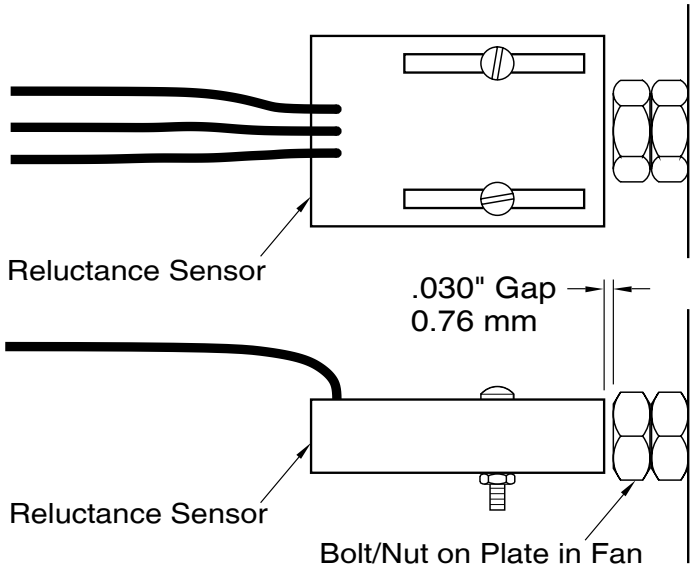


Variable Reluctance Sensors

These sensors are used on high speed shafts, in this case the fan.

Target to sensor gap is critical with these sensors.

A gap of .030 inch (0.76 mm) is recommended.



Trouble Shooting Guide

Most electronic problems are usually one of the following:

- Harness connections.
- Damaged harness wires.
- Loose terminal in harness plug.
- Sensor to Actuator clearance.
- Defective sensor.

The monitor will alert the operator of these problems as a communication error.

Checking Harness

First, check for the obvious things like broken connections, loose terminals, insulation rubbed off and so forth.

- Check continuity of wires with ohm meter.

Checking Sensors

The best approach to testing a sensor is to substitute a suspected sensor with a known good one. If the problem goes away, the sensor is faulty. If it does not go away, it is faulty wiring.

Bin Level Sensors ensure there is no foreign material covering the optical sensor. Remove material with a cloth as not to damage lens.

Make sure sensor wires are not damaged.

Checking Blockage System

Check modules by performing a blockage module test on the monitor.

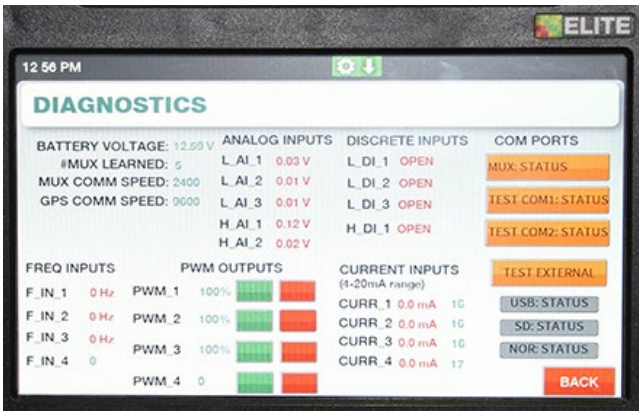
Optical sensors make sure the “optical eyes” are not coated with material or worn down. Remove material with a cloth as not to damage lens.

Pin sensors make sure there is no buildup of material on the pins. Remove material buildup with a knife and gently scraping away the material buildup.

Make sure sensor wires are not damaged.

Diagnostics

The Diagnostics screen can help in identifying issues with sensors, harnessing or other items. Status reports for Battery Voltage, Sensors Learned, MUX Communication speed and GPS Communication speed are displayed. Contact Loup Electronics if you need technical support.

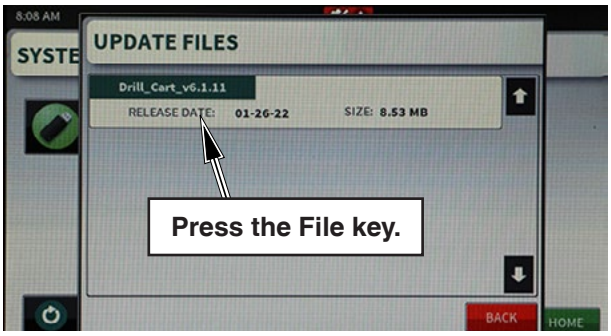


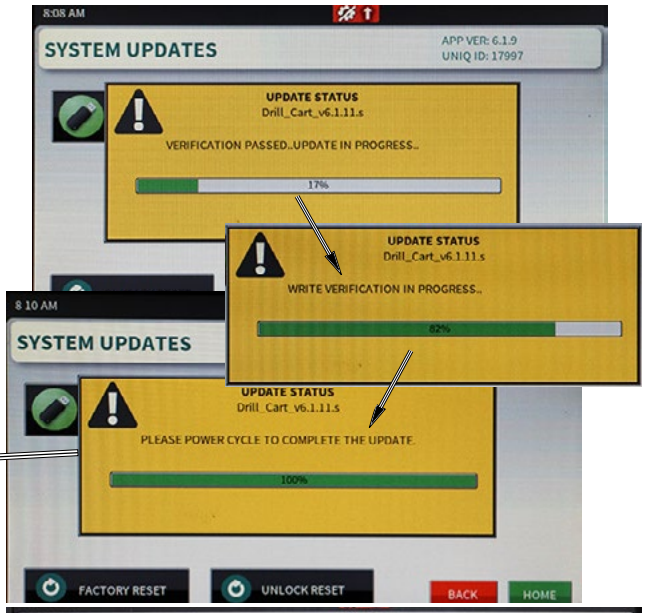
Updating Software

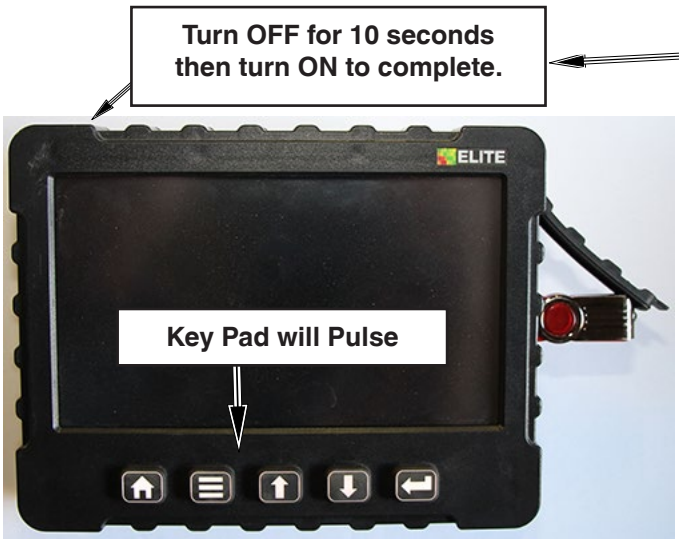
Download software from www.morris-industries.com. The file downloaded will be in a .ZIP format and need to be extracted. When extracted you should see a folder titled “EliteUpdate” and within it the Elite software file. Copy the “EliteUpdate” folder to the root level of the USB drive.

Update Process

1. Insert the USB drive on the right had side of the Elite console.
2. Select “MENU - DISPLAY & UPDATES - SYSTEM UPDATES - SOFTWARE UPDATE”
3. Monitor should now show a popup window displaying the update file on the USB drive.
4. Select the new version to begin loading the software. When done loading the console will ask you to cycle power. Wait 10 seconds to ensure software download is complete.
5. Turn monitor off and remove USB drive. Wait 10 seconds and turn monitor on. Upon doing so the monitor will start with a blank screen and the keypad will pulse for a short period as it finished the update. The console will then boot into the newest version.
6. Confirm the monitor has been updated by checking the version number inside the main settings screen.







Calibration Chart - Imperial

WT/REV (LBS./REV)

SLOW SPEED DRIVE
SEED & INOCULANT

# of Outlets	SSD-1	SSD-2	SSD-3	SSD-4	SSD-5
21	0.032	0.035	0.036	0.045	0.053
22	0.034	0.037	0.038	0.047	0.056
23	0.035	0.039	0.040	0.049	0.058
24	0.037	0.040	0.042	0.051	0.061
25	0.038	0.042	0.043	0.053	0.063
26	0.040	0.044	0.045	0.055	0.066
27	0.041	0.045	0.047	0.058	0.068
28	0.043	0.047	0.049	0.060	0.071
29	0.044	0.049	0.050	0.062	0.073
30	0.046	0.050	0.052	0.064	0.076
31	0.047	0.052	0.054	0.066	0.078
32	0.049	0.054	0.056	0.068	0.081
33	0.050	0.055	0.057	0.070	0.083
34	0.052	0.057	0.059	0.072	0.086
35	0.053	0.059	0.061	0.075	0.088
36	0.055	0.060	0.062	0.077	0.091
37	0.057	0.062	0.064	0.079	0.094
38	0.058	0.064	0.066	0.081	0.096
39	0.060	0.065	0.068	0.083	0.099
40	0.061	0.067	0.069	0.085	0.101
41	0.063	0.069	0.071	0.087	0.104
42	0.064	0.071	0.073	0.090	0.106
43	0.066	0.072	0.075	0.092	0.109
44	0.067	0.074	0.076	0.094	0.111
45	0.069	0.076	0.078	0.096	0.114
46	0.070	0.077	0.080	0.098	0.116
47	0.072	0.079	0.082	0.100	0.119
48	0.073	0.081	0.083	0.102	0.121
49	0.075	0.082	0.085	0.104	0.124
50	0.076	0.084	0.087	0.107	0.126
51	0.078	0.086	0.089	0.109	0.129
52	0.079	0.087	0.090	0.111	0.131
53	0.081	0.089	0.092	0.113	0.134
54	0.083	0.091	0.094	0.115	0.137
55	0.084	0.092	0.095	0.117	0.139
56	0.086	0.094	0.097	0.119	0.142
57	0.087	0.096	0.099	0.122	0.144
58	0.089	0.097	0.101	0.124	0.147

DIRECT DRIVE
SEED

# of Outlets	DD-1	DD-2	DD-3	DD-4	DD-5	DD-6	DD-7	DD-8	DD-9	DD-10
21	0.153	0.207	0.269	0.294	0.347	0.380	0.428	0.444	0.517	0.569
22	0.160	0.217	0.282	0.308	0.363	0.398	0.448	0.465	0.541	0.596
23	0.168	0.227	0.295	0.322	0.380	0.416	0.469	0.486	0.566	0.624
24	0.175	0.237	0.307	0.336	0.396	0.434	0.489	0.508	0.590	0.651
25	0.182	0.247	0.320	0.350	0.413	0.452	0.509	0.529	0.615	0.678
26	0.189	0.257	0.333	0.364	0.429	0.470	0.530	0.550	0.640	0.705
27	0.197	0.266	0.346	0.378	0.446	0.488	0.550	0.571	0.664	0.732
28	0.204	0.276	0.359	0.392	0.462	0.506	0.571	0.592	0.689	0.759
29	0.211	0.286	0.372	0.406	0.479	0.524	0.591	0.613	0.714	0.786
30	0.218	0.296	0.384	0.420	0.495	0.542	0.611	0.635	0.738	0.813
31	0.226	0.306	0.397	0.434	0.512	0.560	0.632	0.656	0.763	0.841
32	0.233	0.316	0.410	0.448	0.528	0.578	0.652	0.677	0.787	0.868
33	0.240	0.326	0.423	0.462	0.545	0.596	0.672	0.698	0.812	0.895
34	0.248	0.336	0.436	0.476	0.561	0.615	0.693	0.719	0.837	0.922
35	0.255	0.345	0.448	0.490	0.578	0.633	0.713	0.740	0.861	0.949
36	0.262	0.355	0.461	0.504	0.594	0.651	0.734	0.761	0.886	0.976
37	0.269	0.365	0.474	0.518	0.611	0.669	0.754	0.783	0.910	1.003
38	0.277	0.375	0.487	0.532	0.627	0.687	0.774	0.804	0.935	1.030
39	0.284	0.385	0.500	0.546	0.644	0.705	0.795	0.825	0.960	1.057
40	0.291	0.395	0.512	0.560	0.660	0.723	0.815	0.846	0.984	1.085
41	0.299	0.405	0.525	0.574	0.677	0.741	0.835	0.867	1.009	1.112
42	0.306	0.414	0.538	0.588	0.693	0.759	0.856	0.888	1.033	1.139
43	0.313	0.424	0.551	0.602	0.710	0.777	0.876	0.909	1.058	1.166
44	0.320	0.434	0.564	0.616	0.726	0.795	0.897	0.931	1.083	1.193
45	0.328	0.444	0.577	0.630	0.743	0.813	0.917	0.952	1.107	1.220
46	0.335	0.454	0.589	0.644	0.759	0.831	0.937	0.973	1.132	1.247
47	0.342	0.464	0.602	0.658	0.776	0.850	0.958	0.994	1.156	1.274
48	0.350	0.474	0.615	0.672	0.792	0.868	0.978	1.015	1.181	1.301
49	0.357	0.484	0.628	0.686	0.809	0.886	0.998	1.036	1.206	1.329
50	0.364	0.493	0.641	0.700	0.825	0.904	1.019	1.058	1.230	1.356
51	0.371	0.503	0.653	0.714	0.842	0.922	1.039	1.079	1.255	1.383
52	0.379	0.513	0.666	0.728	0.858	0.940	1.060	1.100	1.279	1.410
53	0.386	0.523	0.679	0.742	0.875	0.958	1.080	1.121	1.304	1.437
54	0.393	0.533	0.692	0.756	0.892	0.976	1.100	1.142	1.329	1.464
55	0.401	0.543	0.705	0.770	0.908	0.994	1.121	1.163	1.353	1.491
56	0.408	0.553	0.717	0.784	0.925	1.012	1.141	1.184	1.378	1.518
57	0.415	0.562	0.730	0.798	0.941	1.030	1.162	1.206	1.402	1.545
58	0.422	0.572	0.743	0.812	0.958	1.048	1.182	1.227	1.427	1.573

DIRECT DRIVE
FERTILIZER

# of Outlets	DDF-1	DDF-2	DDF-3	DDF-4	DDF-5
21	0.302	0.339	0.377	0.425	0.456
22	0.316	0.356	0.395	0.445	0.478
23	0.331	0.372	0.413	0.465	0.500
24	0.345	0.388	0.431	0.485	0.522
25	0.359	0.404	0.449	0.506	0.543
26	0.374	0.420	0.467	0.526	0.565
27	0.388	0.436	0.484	0.546	0.587
28	0.403	0.452	0.502	0.566	0.609
29	0.417	0.469	0.520	0.587	0.630
30	0.431	0.485	0.538	0.607	0.652
31	0.446	0.501	0.556	0.627	0.674
32	0.460	0.517	0.574	0.647	0.696
33	0.474	0.533	0.592	0.667	0.717
34	0.489	0.549	0.610	0.688	0.739
35	0.503	0.566	0.628	0.708	0.761
36	0.518	0.582	0.646	0.728	0.782
37	0.532	0.598	0.664	0.748	0.804
38	0.546	0.614	0.682	0.769	0.826
39	0.561	0.630	0.700	0.789	0.848
40	0.575	0.646	0.718	0.809	0.869
41	0.589	0.663	0.736	0.829	0.891
42	0.604	0.679	0.754	0.850	0.913
43	0.618	0.695	0.772	0.870	0.935
44	0.633	0.711	0.790	0.890	0.956
45	0.647	0.727	0.807	0.910	0.978
46	0.661	0.743	0.825	0.930	1.000
47	0.676	0.760	0.843	0.951	1.022
48	0.690	0.776	0.861	0.971	1.043
49	0.704	0.792	0.879	0.991	1.065
50	0.719	0.808	0.897	1.011	1.087
51	0.733	0.824	0.915	1.032	1.109
52	0.748	0.840	0.933	1.052	1.130
53	0.762	0.857	0.951	1.072	1.152
54	0.776	0.873	0.969	1.092	1.174
55	0.791	0.889	0.987	1.112	1.195
56	0.805	0.905	1.005	1.133	1.217
57	0.820	0.921	1.023	1.153	1.239
58	0.834	0.937	1.041	1.173	1.261

Calibration Chart - Imperial

WT/REV (LBS./REV)

SLOW SPEED DRIVE
SEED & INOCULANT

# of Outlets	SSD-1	SSD-2	SSD-3	SSD-4	SSD-5
59	0.090	0.099	0.102	0.126	0.149
60	0.092	0.101	0.104	0.128	0.152
61	0.093	0.102	0.106	0.130	0.154
62	0.095	0.104	0.108	0.132	0.157
63	0.096	0.106	0.109	0.134	0.159
64	0.098	0.107	0.111	0.136	0.162
65	0.099	0.109	0.113	0.139	0.164
66	0.101	0.111	0.115	0.141	0.167
67	0.102	0.113	0.116	0.143	0.169
68	0.104	0.114	0.118	0.145	0.172
69	0.105	0.116	0.120	0.147	0.174
70	0.107	0.118	0.122	0.149	0.177
71	0.109	0.119	0.123	0.151	0.180
72	0.110	0.121	0.125	0.154	0.182
73	0.112	0.123	0.127	0.156	0.185
74	0.113	0.124	0.128	0.158	0.187
75	0.115	0.126	0.130	0.160	0.190
76	0.116	0.128	0.132	0.162	0.192
77	0.118	0.129	0.134	0.164	0.195
78	0.119	0.131	0.135	0.166	0.197
79	0.121	0.133	0.137	0.168	0.200
80	0.122	0.134	0.139	0.171	0.202
81	0.124	0.136	0.141	0.173	0.205
82	0.125	0.138	0.142	0.175	0.207
83	0.127	0.139	0.144	0.177	0.210
84	0.128	0.141	0.146	0.179	0.212
85	0.130	0.143	0.148	0.181	0.215
86	0.131	0.144	0.149	0.183	0.217
87	0.133	0.146	0.151	0.185	0.220
88	0.134	0.148	0.153	0.188	0.222
89	0.136	0.149	0.154	0.190	0.225
90	0.138	0.151	0.156	0.192	0.228

DIRECT DRIVE
SEED

# of Outlets	DD-1	DD-2	DD-3	DD-4	DD-5	DD-6	DD-7	DD-8	DD-9	DD-10
59	0.430	0.582	0.756	0.826	0.974	1.066	1.202	1.248	1.452	1.600
60	0.437	0.592	0.769	0.840	0.991	1.085	1.223	1.269	1.476	1.627
61	0.444	0.602	0.781	0.854	1.007	1.103	1.243	1.290	1.501	1.654
62	0.452	0.612	0.794	0.868	1.024	1.121	1.263	1.311	1.525	1.681
63	0.459	0.622	0.807	0.882	1.040	1.139	1.284	1.333	1.550	1.708
64	0.466	0.632	0.820	0.896	1.057	1.157	1.304	1.354	1.575	1.735
65	0.473	0.641	0.833	0.910	1.073	1.175	1.325	1.375	1.599	1.762
66	0.481	0.651	0.846	0.924	1.090	1.193	1.345	1.396	1.624	1.789
67	0.488	0.661	0.858	0.938	1.106	1.211	1.365	1.417	1.648	1.817
68	0.495	0.671	0.871	0.952	1.123	1.229	1.386	1.438	1.673	1.844
69	0.503	0.681	0.884	0.966	1.139	1.247	1.406	1.459	1.698	1.871
70	0.510	0.691	0.897	0.980	1.156	1.265	1.426	1.481	1.722	1.898
71	0.517	0.701	0.910	0.994	1.172	1.283	1.447	1.502	1.747	1.925
72	0.524	0.710	0.922	1.008	1.189	1.301	1.467	1.523	1.771	1.952
73	0.532	0.720	0.935	1.022	1.205	1.320	1.488	1.544	1.796	1.979
74	0.539	0.730	0.948	1.036	1.222	1.338	1.508	1.565	1.821	2.006
75	0.546	0.740	0.961	1.050	1.238	1.356	1.528	1.586	1.845	2.033
76	0.554	0.750	0.974	1.064	1.255	1.374	1.549	1.607	1.870	2.061
77	0.561	0.760	0.986	1.078	1.271	1.392	1.569	1.629	1.894	2.088
78	0.568	0.770	0.999	1.092	1.288	1.410	1.589	1.650	1.919	2.115
79	0.575	0.780	1.012	1.106	1.304	1.428	1.610	1.671	1.944	2.142
80	0.583	0.789	1.025	1.120	1.321	1.446	1.630	1.692	1.968	2.169
81	0.590	0.799	1.038	1.134	1.337	1.464	1.651	1.713	1.993	2.196
82	0.597	0.809	1.051	1.148	1.354	1.482	1.671	1.734	2.018	2.223
83	0.604	0.819	1.063	1.162	1.370	1.500	1.691	1.756	2.042	2.250
84	0.612	0.829	1.076	1.176	1.387	1.518	1.712	1.777	2.067	2.278
85	0.619	0.839	1.089	1.190	1.403	1.536	1.732	1.798	2.091	2.305
86	0.626	0.849	1.102	1.204	1.420	1.554	1.752	1.819	2.116	2.332
87	0.634	0.859	1.115	1.218	1.436	1.573	1.773	1.840	2.141	2.359
88	0.641	0.868	1.127	1.232	1.453	1.591	1.793	1.861	2.165	2.386
89	0.648	0.878	1.140	1.246	1.469	1.609	1.814	1.882	2.190	2.413
90	0.655	0.888	1.153	1.260	1.486	1.627	1.834	1.904	2.214	2.440

DIRECT DRIVE
FERTILIZER

# of Outlets	DDF-1	DDF-2	DDF-3	DDF-4	DDF-5
59	0.848	0.953	1.059	1.193	1.282
60	0.863	0.970	1.077	1.214	1.304
61	0.877	0.986	1.095	1.234	1.326
62	0.891	1.002	1.112	1.254	1.348
63	0.906	1.018	1.130	1.274	1.369
64	0.920	1.034	1.148	1.294	1.391
65	0.935	1.050	1.166	1.315	1.413
66	0.949	1.067	1.184	1.335	1.435
67	0.963	1.083	1.202	1.355	1.456
68	0.978	1.099	1.220	1.375	1.478
69	0.992	1.115	1.238	1.396	1.500
70	1.006	1.131	1.256	1.416	1.522
71	1.021	1.147	1.274	1.436	1.543
72	1.035	1.164	1.292	1.456	1.565
73	1.050	1.180	1.310	1.477	1.587
74	1.064	1.196	1.328	1.497	1.608
75	1.078	1.212	1.346	1.517	1.630
76	1.093	1.228	1.364	1.537	1.652
77	1.107	1.244	1.382	1.557	1.674
78	1.121	1.261	1.400	1.578	1.695
79	1.136	1.277	1.418	1.598	1.717
80	1.150	1.293	1.435	1.618	1.739
81	1.165	1.309	1.453	1.638	1.761
82	1.179	1.325	1.471	1.659	1.782
83	1.193	1.341	1.489	1.679	1.804
84	1.208	1.357	1.507	1.699	1.826
85	1.222	1.374	1.525	1.719	1.848
86	1.236	1.390	1.543	1.739	1.869
87	1.251	1.406	1.561	1.760	1.891
88	1.265	1.422	1.579	1.780	1.913
89	1.280	1.438	1.597	1.800	1.934
90	1.294	1.454	1.615	1.820	1.956

SLOW SPEED DRIVE

SEED & INOCULANT

CALIBRATION MATERIAL	SEED PLATE USED	DENSITY LBS/FT^3	DENSITY LBS/BUSHEL	CHART COLUMN
CANOLA	FINE	42	52	SSD - 1
MUSTARD CANARY SEED	FINE	45 35	56 44	SSD - 2
ALFALFA CLOVER	FINE	34 36	42 45	SSD - 3
NODULATOR	MEDIUM	56	70	SSD - 4
TAG TEAM	MEDIUM	55	69	SSD - 5

DIRECT DRIVE

SEED

CALIBRATION MATERIAL	SEED PLATE USED	DENSITY LBS/FT^3	DENSITY LBS/BUSHEL	CHART COLUMN
SAFFLOWER	MEDIUM	21	26	DD - 1
OATS	MEDIUM	31	39	DD - 2
BARLEY	MEDIUM	40	50	DD - 3
FLAX	FINE	43	54	DD - 4
SPRING WHEAT DURUM WINTER WHEAT FALL RYE	MEDIUM	50 51 48 45	62 63 60 56	DD - 5
LENTILS (LAIRD)	MEDIUM	48	60	DD - 6
LENTILS (ESTON)	MEDIUM	48	60	DD - 7
PINTO BEANS	COARSE	47	59	DD - 8
FABA BEANS GARBONZO BEANS CHICK PEAS (LARGE)	COARSE	50 50 46	62 62 57	DD - 9
ADMIRAL PEAS (SMALL & MEDIUM)	COARSE	50	62	DD - 10

DIRECT DRIVE

FERTILIZER

CALIBRATION MATERIAL	SEED PLATE USED	DENSITY LBS/FT^3	DENSITY LBS/BUSHEL	CHART COLUMN
46 - 0 - 0	MEDIUM	48	60	DDF - 1
34 - 17 - 0	MEDIUM	52	65	DDF - 2
20.5 - 0 - 0 - 24	MEDIUM	60	75	DDF - 3
11 - 51 - 0 COARSE AGGREGATE BLENDS	COARSE	56	70	DDF - 4
0 - 0 - 60 0 - 45 - 0	COARSE	67 62	83 77	DDF - 5

Calibration Chart - Metric

WT/REV (KGS./REV)

SLOW SPEED DRIVE
SEED & INOCULANT

# of Outlets	SSD - 1	SSD - 2	SSD - 3	SSD - 4	SSD - 5
21	0.015	0.016	0.017	0.020	0.024
22	0.015	0.017	0.017	0.021	0.025
23	0.016	0.018	0.018	0.022	0.026
24	0.017	0.018	0.019	0.023	0.028
25	0.017	0.019	0.020	0.024	0.029
26	0.018	0.020	0.020	0.025	0.030
27	0.019	0.021	0.021	0.026	0.031
28	0.019	0.021	0.022	0.027	0.032
29	0.020	0.022	0.023	0.028	0.033
30	0.021	0.023	0.024	0.029	0.034
31	0.021	0.024	0.024	0.030	0.036
32	0.022	0.024	0.025	0.031	0.037
33	0.023	0.025	0.026	0.032	0.038
34	0.024	0.026	0.027	0.033	0.039
35	0.024	0.027	0.028	0.034	0.040
36	0.025	0.027	0.028	0.035	0.041
37	0.026	0.028	0.029	0.036	0.042
38	0.026	0.029	0.030	0.037	0.044
39	0.027	0.030	0.031	0.038	0.045
40	0.028	0.030	0.032	0.039	0.046
41	0.028	0.031	0.032	0.040	0.047
42	0.029	0.032	0.033	0.041	0.048
43	0.030	0.033	0.034	0.042	0.049
44	0.031	0.034	0.035	0.043	0.050
45	0.031	0.034	0.035	0.044	0.052
46	0.032	0.035	0.036	0.044	0.053
47	0.033	0.036	0.037	0.045	0.054
48	0.033	0.037	0.038	0.046	0.055
49	0.034	0.037	0.039	0.047	0.056
50	0.035	0.038	0.039	0.048	0.057
51	0.035	0.039	0.040	0.049	0.058
52	0.036	0.040	0.041	0.050	0.060
53	0.037	0.040	0.042	0.051	0.061
54	0.037	0.041	0.043	0.052	0.062
55	0.038	0.042	0.043	0.053	0.063
56	0.039	0.043	0.044	0.054	0.064
57	0.040	0.043	0.045	0.055	0.065
58	0.040	0.044	0.046	0.056	0.067

DIRECT DRIVE
SEED

# of Outlets	DD - 1	DD - 2	DD - 3	DD - 4	DD - 5	DD - 6	DD - 7	DD - 8	DD - 9	DD - 10
21	0.069	0.094	0.122	0.133	0.157	0.172	0.194	0.201	0.234	0.258
22	0.073	0.098	0.128	0.140	0.165	0.180	0.203	0.211	0.246	0.271
23	0.076	0.103	0.134	0.146	0.172	0.189	0.213	0.221	0.257	0.283
24	0.079	0.107	0.139	0.152	0.180	0.197	0.222	0.230	0.268	0.295
25	0.083	0.112	0.145	0.159	0.187	0.205	0.231	0.240	0.279	0.307
26	0.086	0.116	0.151	0.165	0.195	0.213	0.240	0.249	0.290	0.320
27	0.089	0.121	0.157	0.172	0.202	0.221	0.250	0.259	0.301	0.332
28	0.092	0.125	0.163	0.178	0.210	0.230	0.259	0.269	0.312	0.344
29	0.096	0.130	0.169	0.184	0.217	0.238	0.268	0.278	0.324	0.357
30	0.099	0.134	0.174	0.191	0.225	0.246	0.277	0.288	0.335	0.369
31	0.102	0.139	0.180	0.197	0.232	0.254	0.287	0.297	0.346	0.381
32	0.106	0.143	0.186	0.203	0.240	0.262	0.296	0.307	0.357	0.394
33	0.109	0.148	0.192	0.210	0.247	0.271	0.305	0.317	0.368	0.406
34	0.112	0.152	0.198	0.216	0.255	0.279	0.314	0.326	0.379	0.418
35	0.116	0.157	0.203	0.222	0.262	0.287	0.324	0.336	0.391	0.430
36	0.119	0.161	0.209	0.229	0.270	0.295	0.333	0.345	0.402	0.443
37	0.122	0.166	0.215	0.235	0.277	0.303	0.342	0.355	0.413	0.455
38	0.126	0.170	0.221	0.241	0.285	0.312	0.351	0.365	0.424	0.467
39	0.129	0.175	0.227	0.248	0.292	0.320	0.360	0.374	0.435	0.480
40	0.132	0.179	0.232	0.254	0.300	0.328	0.370	0.384	0.446	0.492
41	0.135	0.184	0.238	0.260	0.307	0.336	0.379	0.393	0.458	0.504
42	0.139	0.188	0.244	0.267	0.315	0.344	0.388	0.403	0.469	0.517
43	0.142	0.192	0.250	0.273	0.322	0.353	0.397	0.413	0.480	0.529
44	0.145	0.197	0.256	0.279	0.329	0.361	0.407	0.422	0.491	0.541
45	0.149	0.201	0.262	0.286	0.337	0.369	0.416	0.432	0.502	0.553
46	0.152	0.206	0.267	0.292	0.344	0.377	0.425	0.441	0.513	0.566
47	0.155	0.210	0.273	0.299	0.352	0.385	0.434	0.451	0.525	0.578
48	0.159	0.215	0.279	0.305	0.359	0.394	0.444	0.461	0.536	0.590
49	0.162	0.219	0.285	0.311	0.367	0.402	0.453	0.470	0.547	0.603
50	0.165	0.224	0.291	0.318	0.374	0.410	0.462	0.480	0.558	0.615
51	0.168	0.228	0.296	0.324	0.382	0.418	0.471	0.489	0.569	0.627
52	0.172	0.233	0.302	0.330	0.389	0.426	0.481	0.499	0.580	0.640
53	0.175	0.237	0.308	0.337	0.397	0.435	0.490	0.508	0.591	0.652
54	0.178	0.242	0.314	0.343	0.404	0.443	0.499	0.518	0.603	0.664
55	0.182	0.246	0.320	0.349	0.412	0.451	0.508	0.528	0.614	0.676
56	0.185	0.251	0.325	0.356	0.419	0.459	0.518	0.537	0.625	0.689
57	0.188	0.255	0.331	0.362	0.427	0.467	0.527	0.547	0.636	0.701
58	0.192	0.260	0.337	0.368	0.434	0.476	0.536	0.556	0.647	0.713

DIRECT DRIVE
FERTILIZER

# of Outlets	DDF - 1	DDF - 2	DDF - 3	DDF - 4	DDF - 5
21	0.137	0.154	0.171	0.193	0.207
22	0.143	0.161	0.179	0.202	0.217
23	0.150	0.169	0.187	0.211	0.227
24	0.157	0.176	0.195	0.220	0.237
25	0.163	0.183	0.203	0.229	0.246
26	0.170	0.191	0.212	0.239	0.256
27	0.176	0.198	0.220	0.248	0.266
28	0.183	0.205	0.228	0.257	0.276
29	0.189	0.213	0.236	0.266	0.286
30	0.196	0.220	0.244	0.275	0.296
31	0.202	0.227	0.252	0.284	0.306
32	0.209	0.235	0.260	0.294	0.315
33	0.215	0.242	0.269	0.303	0.325
34	0.222	0.249	0.277	0.312	0.335
35	0.228	0.257	0.285	0.321	0.345
36	0.235	0.264	0.293	0.330	0.355
37	0.241	0.271	0.301	0.339	0.365
38	0.248	0.279	0.309	0.349	0.375
39	0.254	0.286	0.317	0.358	0.385
40	0.261	0.293	0.326	0.367	0.394
41	0.267	0.301	0.334	0.376	0.404
42	0.274	0.308	0.342	0.385	0.414
43	0.280	0.315	0.350	0.395	0.424
44	0.287	0.323	0.358	0.404	0.434
45	0.293	0.330	0.366	0.413	0.444
46	0.300	0.337	0.374	0.422	0.454
47	0.307	0.345	0.383	0.431	0.463
48	0.313	0.352	0.391	0.440	0.473
49	0.320	0.359	0.399	0.450	0.483
50	0.326	0.367	0.407	0.459	0.493
51	0.333	0.374	0.415	0.468	0.503
52	0.339	0.381	0.423	0.477	0.513
53	0.346	0.389	0.431	0.486	0.523
54	0.352	0.396	0.440	0.495	0.532
55	0.359	0.403	0.448	0.505	0.542
56	0.365	0.411	0.456	0.514	0.552
57	0.372	0.418	0.464	0.523	0.562
58	0.378	0.425	0.472	0.532	0.572

Calibration Chart - Metric

WT/REV (KGS./REV)

SLOW SPEED DRIVE
SEED & INOCULANT

# of Outlets	SSD - 1	SSD - 2	SSD - 3	SSD - 4	SSD - 5
59	0.041	0.045	0.046	0.057	0.068
60	0.042	0.046	0.047	0.058	0.069
61	0.042	0.046	0.048	0.059	0.070
62	0.043	0.047	0.049	0.060	0.071
63	0.044	0.048	0.050	0.061	0.072
64	0.044	0.049	0.050	0.062	0.073
65	0.045	0.050	0.051	0.063	0.075
66	0.046	0.050	0.052	0.064	0.076
67	0.046	0.051	0.053	0.065	0.077
68	0.047	0.052	0.054	0.066	0.078
69	0.048	0.053	0.054	0.067	0.079
70	0.049	0.053	0.055	0.068	0.080
71	0.049	0.054	0.056	0.069	0.081
72	0.050	0.055	0.057	0.070	0.083
73	0.051	0.056	0.057	0.071	0.084
74	0.051	0.056	0.058	0.072	0.085
75	0.052	0.057	0.059	0.073	0.086
76	0.053	0.058	0.060	0.074	0.087
77	0.053	0.059	0.061	0.074	0.088
78	0.054	0.059	0.061	0.075	0.089
79	0.055	0.060	0.062	0.076	0.091
80	0.055	0.061	0.063	0.077	0.092
81	0.056	0.062	0.064	0.078	0.093
82	0.057	0.062	0.065	0.079	0.094
83	0.058	0.063	0.065	0.080	0.095
84	0.058	0.064	0.066	0.081	0.096
85	0.059	0.065	0.067	0.082	0.097
86	0.060	0.066	0.068	0.083	0.099
87	0.060	0.066	0.069	0.084	0.100
88	0.061	0.067	0.069	0.085	0.101
89	0.062	0.068	0.070	0.086	0.102
90	0.062	0.069	0.071	0.087	0.103

DIRECT DRIVE
SEED

# of Outlets	DD - 1	DD - 2	DD - 3	DD - 4	DD - 5	DD - 6	DD - 7	DD - 8	DD - 9	DD - 10
59	0.195	0.264	0.343	0.375	0.442	0.484	0.545	0.566	0.658	0.726
60	0.198	0.269	0.349	0.381	0.449	0.492	0.555	0.576	0.670	0.738
61	0.202	0.273	0.354	0.387	0.457	0.500	0.564	0.585	0.681	0.750
62	0.205	0.278	0.360	0.394	0.464	0.508	0.573	0.595	0.692	0.763
63	0.208	0.282	0.366	0.400	0.472	0.517	0.582	0.604	0.703	0.775
64	0.211	0.286	0.372	0.407	0.479	0.525	0.592	0.614	0.714	0.787
65	0.215	0.291	0.378	0.413	0.487	0.533	0.601	0.624	0.725	0.799
66	0.218	0.295	0.384	0.419	0.494	0.541	0.610	0.633	0.737	0.812
67	0.221	0.300	0.389	0.426	0.502	0.549	0.619	0.643	0.748	0.824
68	0.225	0.304	0.395	0.432	0.509	0.558	0.629	0.652	0.759	0.836
69	0.228	0.309	0.401	0.438	0.517	0.566	0.638	0.662	0.770	0.849
70	0.231	0.313	0.407	0.445	0.524	0.574	0.647	0.672	0.781	0.861
71	0.235	0.318	0.413	0.451	0.532	0.582	0.656	0.681	0.792	0.873
72	0.238	0.322	0.418	0.457	0.539	0.590	0.666	0.691	0.804	0.885
73	0.241	0.327	0.424	0.464	0.547	0.599	0.675	0.700	0.815	0.898
74	0.244	0.331	0.430	0.470	0.554	0.607	0.684	0.710	0.826	0.910
75	0.248	0.336	0.436	0.476	0.562	0.615	0.693	0.720	0.837	0.922
76	0.251	0.340	0.442	0.483	0.569	0.623	0.702	0.729	0.848	0.935
77	0.254	0.345	0.447	0.489	0.577	0.631	0.712	0.739	0.859	0.947
78	0.258	0.349	0.453	0.495	0.584	0.640	0.721	0.748	0.870	0.959
79	0.261	0.354	0.459	0.502	0.592	0.648	0.730	0.758	0.882	0.972
80	0.264	0.358	0.465	0.508	0.599	0.656	0.739	0.768	0.893	0.984
81	0.268	0.363	0.471	0.515	0.607	0.664	0.749	0.777	0.904	0.996
82	0.271	0.367	0.477	0.521	0.614	0.672	0.758	0.787	0.915	1.008
83	0.274	0.372	0.482	0.527	0.622	0.681	0.767	0.796	0.926	1.021
84	0.277	0.376	0.488	0.534	0.629	0.689	0.776	0.806	0.937	1.033
85	0.281	0.380	0.494	0.540	0.637	0.697	0.786	0.815	0.949	1.045
86	0.284	0.385	0.500	0.546	0.644	0.705	0.795	0.825	0.960	1.058
87	0.287	0.389	0.506	0.553	0.652	0.713	0.804	0.835	0.971	1.070
88	0.291	0.394	0.511	0.559	0.659	0.722	0.813	0.844	0.982	1.082
89	0.294	0.398	0.517	0.565	0.666	0.730	0.823	0.854	0.993	1.095
90	0.297	0.403	0.523	0.572	0.674	0.738	0.832	0.863	1.004	1.107

DIRECT DRIVE
FERTILIZER

# of Outlets	DDF - 1	DDF - 2	DDF - 3	DDF - 4	DDF - 5
59	0.385	0.433	0.480	0.541	0.582
60	0.391	0.440	0.488	0.550	0.592
61	0.398	0.447	0.496	0.560	0.601
62	0.404	0.455	0.505	0.569	0.611
63	0.411	0.462	0.513	0.578	0.621
64	0.417	0.469	0.521	0.587	0.631
65	0.424	0.477	0.529	0.596	0.641
66	0.430	0.484	0.537	0.606	0.651
67	0.437	0.491	0.545	0.615	0.661
68	0.443	0.499	0.553	0.624	0.670
69	0.450	0.506	0.562	0.633	0.680
70	0.457	0.513	0.570	0.642	0.690
71	0.463	0.521	0.578	0.651	0.700
72	0.470	0.528	0.586	0.661	0.710
73	0.476	0.535	0.594	0.670	0.720
74	0.483	0.543	0.602	0.679	0.730
75	0.489	0.550	0.610	0.688	0.739
76	0.496	0.557	0.619	0.697	0.749
77	0.502	0.565	0.627	0.706	0.759
78	0.509	0.572	0.635	0.716	0.769
79	0.515	0.579	0.643	0.725	0.779
80	0.522	0.587	0.651	0.734	0.789
81	0.528	0.594	0.659	0.743	0.799
82	0.535	0.601	0.667	0.752	0.808
83	0.541	0.609	0.676	0.761	0.818
84	0.548	0.616	0.684	0.771	0.828
85	0.554	0.623	0.692	0.780	0.838
86	0.561	0.631	0.700	0.789	0.848
87	0.567	0.638	0.708	0.798	0.858
88	0.574	0.645	0.716	0.807	0.868
89	0.580	0.653	0.724	0.817	0.877
90	0.587	0.660	0.733	0.826	0.887

Calibration Chart - Metric

SLOW SPEED DRIVE
SEED & INOCULANT

CALIBRATION MATERIAL	SEED PLATE USED	DENSITY Kgs/M^3	DENSITY Kgs/BUSHEL	CHART COLUMN
CANOLA	FINE	671	24	SSD - 1
MUSTARD CANARY SEED	FINE	722 568	25 20	SSD - 2
ALFALFA CLOVER	FINE	542 580	19 20	SSD - 3
NODULATOR	FINE	903	32	SSD - 4
TAG TEAM	MEDIUM	890	31	SSD - 5

DIRECT DRIVE
FERTILIZER

CALIBRATION MATERIAL	SEED PLATE USED	DENSITY Kgs/M^3	DENSITY Kgs/BUSHEL	CHART COLUMN
46 - 0 - 0	MEDIUM	619	22	DDF - 1
34 - 17 - 0	MEDIUM	671	24	DDF - 2
20.5 - 0 - 0 - 24	MEDIUM	774	27	DDF - 3
11 - 51 - 0 COARSE AGGREGATE BLENDS	COARSE	722	25	DDF - 4
0 - 0 - 60 0 - 45 - 0	COARSE	864 800	30 28	DDF - 5

DIRECT DRIVE
SEED

CALIBRATION MATERIAL	SEED PLATE USED	DENSITY LBS/FT^3	DENSITY LBS/BUSHEL	CHART COLUMN
SAFFLOWER	MEDIUM	335	12	DD - 1
OATS	MEDIUM	503	18	DD - 2
BARLEY	MEDIUM	645	23	DD - 3
FLAX	FINE	697	25	DD - 4
SPRING WHEAT DURUM WINTER WHEAT FALL RYE	MEDIUM	800 813 774 722	28 29 27 25	DD - 5
LENTILS (LAIRD)	MEDIUM	774	27	DD - 6
LENTILS (ESTON)	MEDIUM	774	27	DD - 7
PINTO BEANS	COARSE	761	27	DD - 8
FABA BEANS GARBONZO BEANS CHICK PEAS (LARGE)	COARSE	800 800 735	28 28 26	DD - 9
ADMIRAL PEAS (SMALL & MEDIUM)	COARSE	800	28	DD - 10

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