



OPERATOR'S MANUAL

Monitor N37010

Morris Version 2

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Introduction

Introduction

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
- Ground speed
- Shaft speeds (up to 3)
- Bin levels (up to 3)
- Flow Blockage (up to 192 runs)
- Seed rates & Seed Counts (up to 24 rows)
- Auxiliary bin pressure

An audio alarm will sound upon detection of: low or high fan speed, low shaft speed, low bin level. Also, loss of flow in any runs that are being monitored with Blockage Modules, and low seed rates when seed counting sensors are used also generate alarms. Audio alarms persist until the alarm condition is removed or until the alarm is acknowledged by the operator by pressing the ACK button.

In addition, the monitor can determine and display:

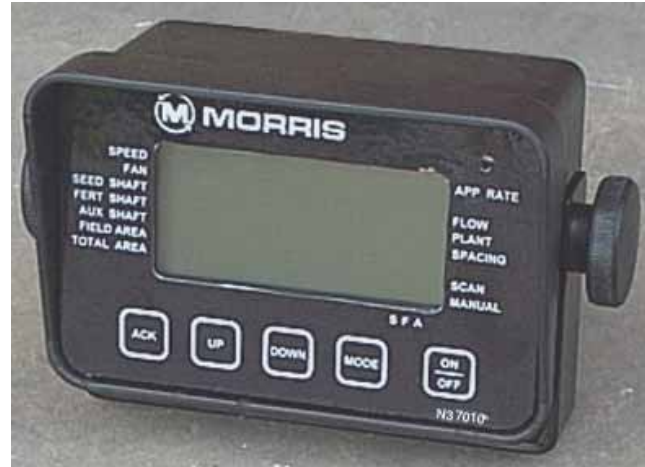
- Field Area
- Total Area
- Application Rate (weight per unit area)

The monitor allows the following settings to be changed:

- High and Low fan speed alarm point
- Ground speed pulses per mile and pulses per revolution
- Pulses per revolution of fan and 3 shafts
- Low bin alarm for 3 bins
- The number of Blockage Modules that are connected to the monitor
- Seed rate alarm points for 9 seed types (Plant)
- The width of the implement
- Display imperial or metric units

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

Two cables exit the rear of the monitor. There is a two wire power cable that connects to the tractor power supply. The other is a three wire cable that brings power and communications to the remote sensors through the main harness.



MONITOR - Version 2 shown

Important

This manual covers both ground drive and VRT drive settings for the Morris 7000 series and EIGHT series Air Carts. The charts are identified as 7000 series or EIGHT series. Only refer to the section and charts pertaining to Air Cart in use.

Introduction

Identifying Monitor Version - Continued

The following chart is a summary of the differences between version 1 and version 2 monitor.

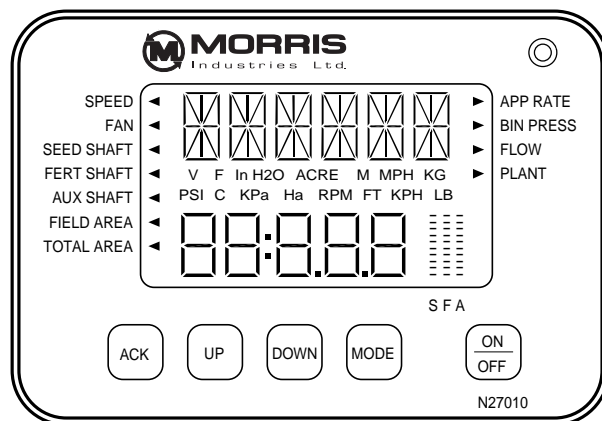
Hardware Differences		
Feature	Version 1	Version 2
Memory	64 kBytes	256 kBytes
Lighting	Backlit display only.	Backlit display and keys.
Radar	No support for RADAR speed sensor.	Hardware input for RADAR speed sensor.

Software Differences		
Feature	Version 1	Version 2
Ground speed pulses per mile setting	User enters pulses per mile of travel.	User enters pulses per 400 feet of travel.
Ground Speed Calibration	User enters calibrate mode then drives for one mile and stops. User saves counts.	User enters calibrate mode, starts driving. When passing start point, press mode. When passing end point (400 feet), press mode. User then saves count..
Shaft calibration mode on VAR system	User enters code byte to specify RPM and number of revs.	User chooses desired revs using UP and DOWN keys. Then user chooses desired RPM using UP and DOWN keys.
Application rate calculation on non-VAR system	Ther is no SAVE screen after the application rate is displayed.	There is a SAVE screen after the application rate is displayed.
Bin pressure	There was a display position for bin pressure sensor, but this was not functional	No display position for Bin Pressure sensor.
Flow	Support only for pin sensor type blockage modules.	Support for both pin sensor type blockage modules and optical blockage modules.
Population display	No indication when population display is in either SCAN or MANUAL mode.	There are SCAN and MANUAL indicators to show which mode the population display is in.
Spacing Display	No spacing display.	Displays seed spacing in seeds/ft or inches/seed
Self-Calibration prompt	No prompt.	Prompts for the user to wait while the seed counting sensors and the optical blockage modules do their self-calibration on power-up.
Var Rate screen	No save prompt for the drive and weigh calibration.	Ther is a save prompt for the drive and weigh calibration.
Var Console	In a non-VAR system, still prompts for the var console during the installation.	If no var controller is installed, no var console is prompted for during the installation.
Population display	No ability to set the row spacing.	User can enter the row spacing for the system.

Identifying Monitor Switches

The five push buttons are used for controlling the monitor.

- ACK**
- Acknowledge. Primarily used for acknowledging alarms. Also used for exiting from program mode, resetting area, and accessing some special functions.
- UP**
- Used for moving function selection icon. Also used to increment parameter in program mode.
- DOWN**
- Used for moving function selection icon. Also used for decrementing parameter in program mode.
- MODE**
- Used to enter program mode. Also used for going to next parameter in program mode.
- ON/OFF**
- Used to turn monitor on and off.



Identifying Monitor Displays

Function Indicators

- The left and right side of the display have triangular icons for indicating the current selected display function.
- These icons will flash when alarm conditions occur for a function.

Upper Display

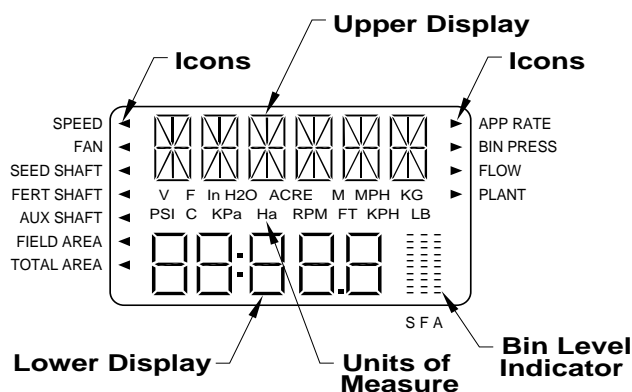
- Displays the selected function, and alarm conditions.
- This line is also used to give information during monitor programming and initial system installation.

Lower Display

- Displays the reading for the selected function, with the unit of measure displayed above value.
- This line is also used to indicate the parameter value during monitor programming.

Bin Level Indicator

- The bars will flash and the audio alarm will sound when bin level is low.



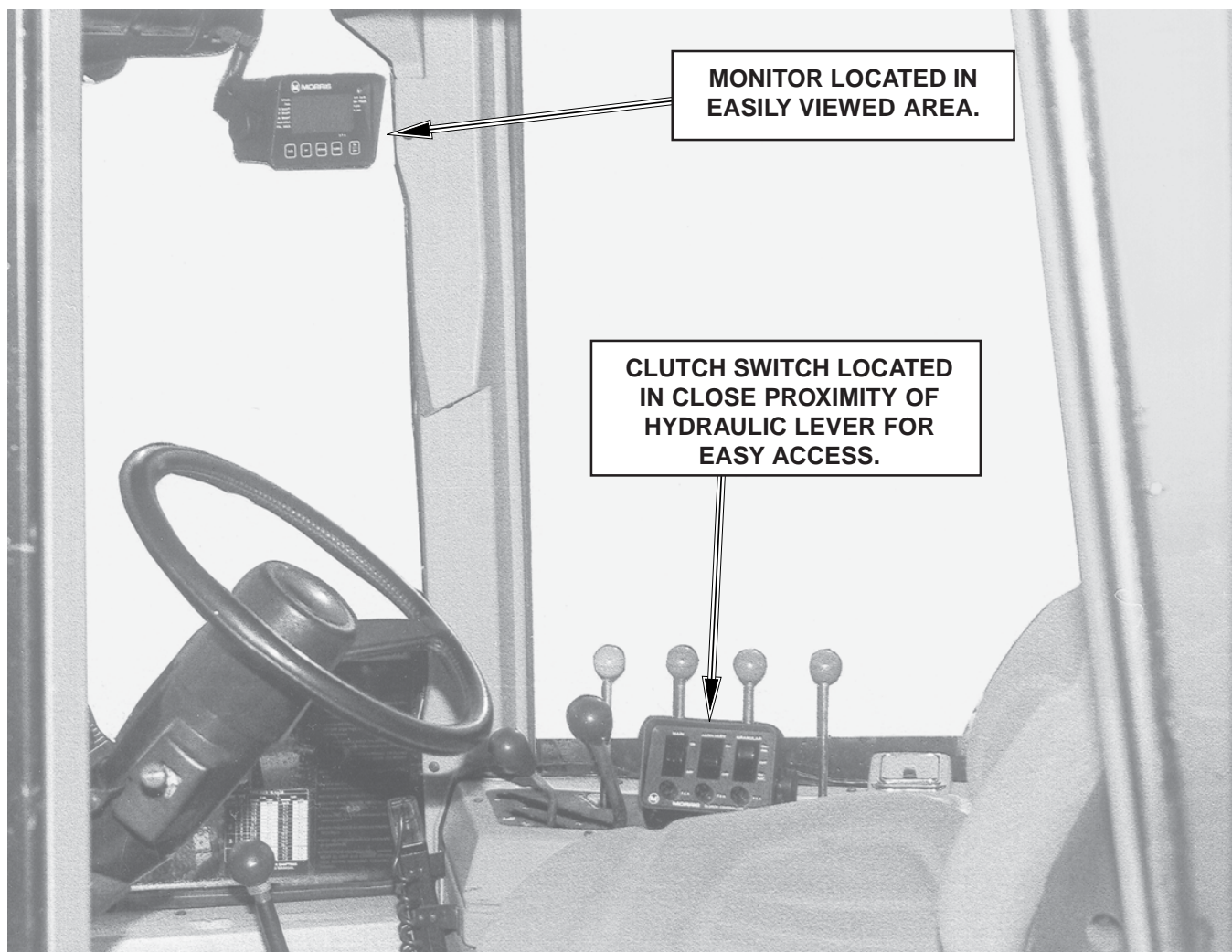
Introduction

Preparing Monitor

- Locate monitor and clutch switch in a convenient location in cab.
- Connect power cables to a 12 volt power supply source, preferably one that has no power to it when the ignition is turned off.
 - 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 directly to starter switch.



Section 2: Ground Drive

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Ground Drive

Start-up

Normal Start-up

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

- All of the display segments turn on one at a time, and then off one at a time.
- MORRIS is briefly displayed.
- The Version/Issue number of the monitor software is displayed. **This number should be included with any reports of faulty or unexpected system operation.**
- The sensor numbers of all previously learned sensors are displayed in sequence as initial communication with each sensor takes place.
- The normal operating display starts with the ground speed function active.
- Once normal operating starts the monitor will alarm specific sensors; in 10 seconds the bins alarm and in 30 seconds the speed alarm. Press the **ACK** key for each alarm, this will cancel the alarms returning the monitor to ready mode.

It may occur that an error is detected on start-up. In that case the sequence is slightly modified as described in the section on Start-up Error Messages.

Special Start-up

There are two types of special actions that can be controlled when starting up the unit.

- **START SENSOR CONFIGURATION LEARN:** This allows a new sensor configuration to be learned, with the existing configuration cleared from memory.
- **RESET SETTING:** All stored settings, such as pulses per revolution values, alarm points, etc. are restored to their factory default values. All areas and seed counts are also zeroed.

The two actions can be selected independently or together by holding down certain key combinations when the unit is turned on, see chart.

Monitor ID
Version Number

Special Startup	
Button Combination	What Occurs
ACK and DOWN	FORCED LEARN of all sensors (other settings retained)
ACK and MODE	RESET SETTINGS (sensor configuration retained)
ACK and DOWN and MODE	BOTH FORCED LEARN and RESET SETTINGS

Start-up - Continued

Start-up Error Messages

In rare circumstances certain fault conditions may be detected at start-up. There are two distinct classes of such fault conditions and they are reported differently.

First Class

The **first class** is due to faults that occur while the unit was operating and which cause the unit to restart. In this case, the monitor will display the error message instead of the normally displayed MORRIS. It will then wait for a key press before proceeding with the start-up sequence. The possible error messages are:

COPRST, UUORST, CLKMON, and IMPRST

Second Class

The **second class** includes various conditions that the monitor checks for after the Version Number is displayed. In most cases, when such conditions are detected the system is forced to do a complete factory reset (as if the monitor were turned on with the ACK, Down and Mode keys all held as described above). The possible displayed messages are:

VERCHG, SNSCHG, EEPCS1, EEPCS2, BDSERP, and VERCHS

Note: If any of the error messages appear more than twice, the monitor is probably faulty.

Startup Error Codes	
Monitor Display	Display Meaning
VERCHG	Should only be true after installation of new software that changes the way nonvolatile memory (on chip EEPROM) is used. Forces a factory reset.
SNSCHG	Should only be true after installation of new software that changes the order or composition of the default list of connectable sensors. Forces a factory reset.
EEPCS1 EEPCS2	Some data in the microprocessor nonvolatile memory (EEPROM) is invalid. Data is stored in two banks. The message indicates which bank had the problem. If only the first bank is corrupt, then the good bank 2 copy will be used and there will not be a forced factory reset.
BDSERP	A test of the integrity of the additional nonvolatile memory chip (Serial EEPROM) has failed.
VERCHS	Should only be true after installation of new software that changes the way nonvolatile memory (Serial EEPROM) is used. Forces a factory reset.

Ground Drive

System Installation

Sensor LEARN Mode

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) A granular applicator is added to the Air Cart.
- 2) Replacing faulty sensors.
- 3) Replacing faulty 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 function is plugged in.
 - 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 a full complement of sensors. These sensors can be programmed to be ignored in two ways:
 - i) During initial installation when the monitor prompts for a sensor to be plugged in, the operator can press **ACK** 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.
 - ii) During operation the operator can disable sensors by setting the pulses per revolution to zero. When pulses are set to zero alarms for that 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*".

Pin Sensors - the blockage module **does not have to be removed from the harness** during initial system installation.

Optical Sensors - the blockage module **have to be removed from the harness** during initial system 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	
Sensor Number	Sensor
1	Ground speed
2	Fan
3	Shaft 1 or (Seed Shaft)
4	Shaft 2 or (Fertilizer Shaft)
5	Shaft 3 or (Auxiliary Shaft)
6	Tank 1 or (Seed Bin)
7	Tank 2 or (Fertilizer Bin)
8	Tank 3 or (Auxiliary Bin)
9	Bin Pressure (Version 1 only)
10	VarCon (Variable Rate) (Version 1 only) (Version 2 calls for installation only if var controller is installed)
11-35	Plant Sensors
36-48	Optical Blockage Modules (Version 2 only)

Version 2.3 and above use Shaft 1, Shaft 2, Shaft 3, Tank 1, Tank 2 and Tank 3.

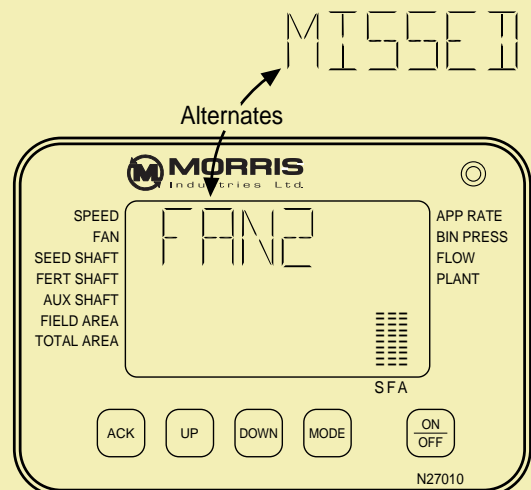
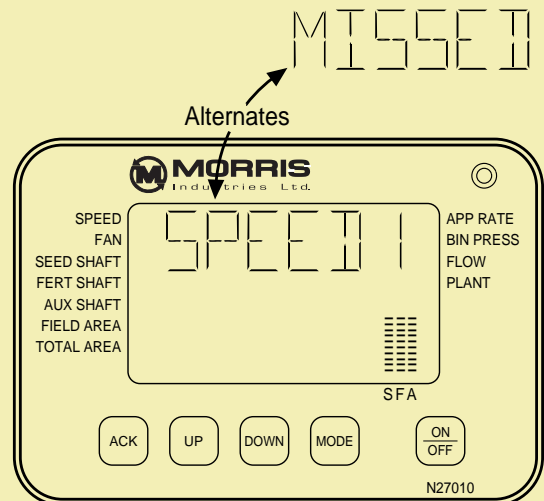
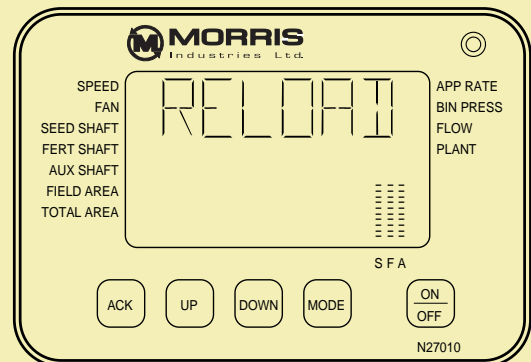
System Installation - Continued

Installation Procedure

- **Disconnect** all the sensors (3 pin connector) from the harness before turning monitor on.
- Hold down both buttons: **ACK-DOWN** and turn on monitor. Continue holding the buttons until **KEYOFF** appears on the display.
- **RELOAD** will be displayed briefly on line 1 when the ACK-DOWN buttons are released. Each sensor must now be individually recognized by the monitor. The monitor will display the order in which the sensors must be plugged in.
- The display on line 1 will alternate between **MISSED** and **SPEED 1**, indicating that the ground speed sensor may now be connected.
- The monitor will give a double beep when it acknowledges the sensor.
- The display on line 1 will now alternate between **MISSED** and **FAN 2**, indicating that the fan sensor may now be connected. Connect the fan sensor.
- The process is the same for rest of the sensors in the sequence.
- When the monitor requests a sensor that **will not be used** in the configuration, press the **ACK** key, and the monitor will skip the sensor and advance to the next one in the sequence.

Note: There are “24” **PLANT SENSORS**. To skip past the plant sensors press **ACK** and **MODE** buttons together.

- When all sensors in the list have either been learned or skipped, the installation is complete. The monitor automatically advances to its normal operating mode, where the ground speed is displayed. Since the fan and shafts are not rotating, alarms will be soon generated (some are delayed). These will need to be silenced with the **ACK** key.
- To verify the installation, the monitor may be turned off, then turned on again. Now, only the names of the learned (but not the skipped) sensors will quickly flash by on the display as the unit goes through its normal “wake up” sequence, after which it advances to its default operating mode, where the ground speed is displayed.



Ground Drive

Monitor Programming

Most of the function positions have settings that may be changed. These include various configuration details, alarm trip points, and some convenient options such as whether imperial or metric units should be used for numeric display.

Procedure

The following explains the procedure for entering and exiting any of the Change Settings modes.

Saved settings are retained even after power has been removed from the monitor.

Note: When the operator is in any of the “*change settings*” modes, the monitor will not generate normal monitor alarms (low fan speed, shaft speed and so on).

Entering Change Settings Mode

- Use the UP or DOWN button to move the triangle icon to desired function.
- Hold the MODE button until 4 short beeps and 1 long beep sounds. Release button after the long beep. This starts the change settings mode.
- Display line 1 will show a description of what the setting is.
- Display line 2 will indicate the present numeric value of the setting. An appropriate unit is also indicated.
- Now, each press of the MODE button will advance the display to the next settable item for that function, cycling back to the first one after reaching the end. The last display in the cycle is the save prompt, which allows the user to decide whether settings should be saved into memory.

See charts on following pages for monitor program settings.

Exiting from Change Settings Mode

- Press MODE button until the **SAVE** display appears on display line 1.
- If settings should be saved, press UP to choose yes (Y). Then hold down ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- If settings should not be saved (but remain as they were before the mode started) press DOWN to choose no (N). Then press ACK button, which immediately exits Change Settings Mode.

Note: To “*TURN OFF*” any shaft not in use set pulses to 0. This will eliminate any nuisance alarms caused by an inactive shaft.

Monitor Programming - Continued

PP400 for 7000 Series Air Cart

PP400 - Standard Drive			
Tire Size (Good-Year)	Tire Style	Rating	PP400
16.5L x 16.1	Softrac II	6 ply	516
	Sure Grip Traction	6 ply	498
21.5L x 16.1	Softrac II	6 ply	455
	Sure Grip Traction	8 ply	451
	Softrac II	10 ply	455
18.4L x 26	Sure Grip Traction	12 ply	451
	AWT (Implement)	10 ply	361
23.1L x 26	AWT (Implement)	8 ply	341
	TD8 Sure Grip	10 ply	310
	AWT (Implement)	12 ply	341

PP400 for EIGHT Series Air Cart

PP400 - Standard Drive				
Tire Size (Good-Year)	Tire Style	Rating	Pressure	PP400
23.1 x 26	TD8 Lug	10 ply	28 psi	310
	AWT	12 ply	24 psi	341
30.5 x 32	AWT	12 ply	20 psi	382
			24 psi	380
	Lug	14 ply	20 psi	386
800/65 R32	Lug	LI 172	22 psi	381
			15 psi	382
900/60 R32	Lug	176 A8	20 psi	381
			17 psi	356
520/85 R38 Dual Wheels	Lug	155 A8	26 psi	351
			20 psi	377

Ground Drive

Monitor Programming - Continued

Base Monitor Programming											
MONITOR FUNCTION	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	PRESS BUTTON
	Hold for five beeps 4 short and 1 long beep		Set with UP/DOWN buttons			Set with UP/DOWN buttons			Set with UP/DOWN buttons		Hold for five beeps 4 short and 1 long beep
SPEED	MODE	PPM PP400	* See Chart PPM/PP400	MODE	PPR	4	MODE			SAVE Y	ACK
FAN	MODE	PULSES	2	MODE	LO FAN	3000	MODE	HI FAN	5000	MODE	ACK
SHAFT 1 (SEED)	MODE	PULSES	4	MODE	LEVEL	20	MODE			SAVE Y	ACK
SHAFT 2 (FERT)	MODE	PULSES	2	MODE	LEVEL	20	MODE			SAVE Y	ACK
SHAFT 3 (AUX)	MODE	PULSES	0	MODE	LEVEL	20	MODE			SAVE Y	ACK
FIELD AREA or TOTAL AREA	MODE	WIDTH	Seed Tool Width	MODE	UNITS	0-Imperial or 1-Metric	MODE			SAVE Y	ACK
APP RATE											
BIN PRESS Version 1											
FLOW	MODE	BOXES	0	MODE	TYPE	0	MODE			SAVE Y	ACK
PLANT Version 1	MODE	SDTYPE	1	MODE	SEEDRT	0	MODE			SAVE Y	ACK
PLANT Version 2	MODE	SDTYPE	1	MODE	SEEDRT	15000	MODE	RSPACE	7.5	MODE	ACK
SPACE Version 2	MODE	SELECT	0	MODE						SAVE Y	ACK

Canola Setting

Note: Air Carts equipped with Granular Tank or Third Tank, Auxiliary Shaft pulse setting must be set to 4 not 0.

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 false seed shaft alarm, since the shaft is rotating below the alarm threshold of 2 rpm.

To avoid this nuisance alarm change the seed shaft pulse setting from 4 to 1, the monitor will think the shaft rpm is 4 times what it actually is.

Example: Actual Seed Shaft rpm is 5.

Monitor set at **4 pulses** will read a seed shaft rpm of **5**.

Monitor set at **1 pulses** will read a seed shaft rpm of **20**.

Note: Change the pulse setting back to 4 when returning to higher application rates.

Monitor Programming - Continued

When an Air Cart is equipped with a granular tank, blockage modules, or plant counter the settings listed in the Monitor Options Programming chart must be used.

Note: To “**TURN OFF**” any shaft not in use set pulses to 0. This will eliminate any nuisance alarms caused by an inactive shaft.

Monitor Options Programming												
MONITOR FUNCTION	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	PRESS BUTTON
	Hold for five beeps (4 short and 1 long beep)		Set with UP / DOWN buttons			Set with UP / DOWN buttons			Set with UP / DOWN buttons		Set with UP / DOWN buttons	Hold for five beeps (4 short and 1 long beep)
AUX SHAFT 3	MODE	PULSES	4	MODE	LEVEL	20	MODE			MODE		ACK
FLOW Pin Version 1 or 2	MODE	BOXES	Number of Blockage modes used	MODE	TYPE	0	MODE					ACK
FLOW Optical Version 2 only	MODE	INSTAL	Y	MODE	M01R--	Set number of runs for module	MODE (Will run through all blockage Modules)	M02R-- to M12R--	Set number of runs for module	MODE		ACK
PLANT Version 1	MODE	SDTYPE	1 - 9	MODE	SEEDRT	15000 - 35000	MODE			MODE		ACK
PLANT Version 2	MODE	SDTYPE	1 - 9	MODE	SEEDRT	15000 - 35000	MODE	RSPACE	0.1 - 99.9	MODE		ACK
SPACE Version 2	MODE	SELECT	0 - seeds/foot or seeds/meter 1 - inches/seed or cm/seed							MODE		ACK

Ground Drive

Monitor Programming - Continued

PP400 Math Calculation for Version 2

To determine PP400 value, first determine the tire circumference as outlined in *"Determining Tire Sprocket"* under Operation Section.

Note: The PP400 can also more accurately be calculated with the use of the monitor pulse counting mode.

Formula for 26 inch rim New Standard Drive - PP400 Value = $\left(\frac{109}{\text{New Tire Circumference}} \right) \times 516$
and 16.1 inch rim

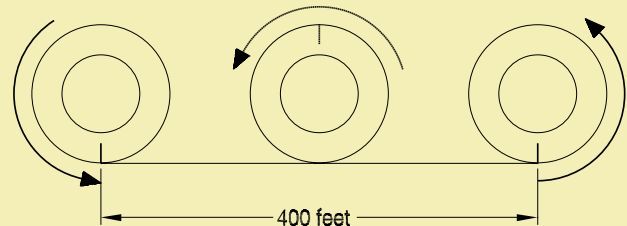
Formula for 32 inch rim New Standard Drive - PP400 Value = $\left(\frac{80640}{\text{New Tire Circumference}} \right)$

Pulse Counting Mode for PP 400 Version 2

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 Pulse Counting mode, in which the number of pulses associated with 400 feet of driving are determined.

To start the Pulse Counting Mode:

- Measure and mark out 400 feet (121.92 m).
- Select the SPEED position.
- Hold down the ACK key until after the long beep.
- Display line 1 will show START.
- To start the monitor counting the pulses, the MODE key must be pressed.
- Display line 1 will show COUNT and the bottom line will show "0".
- Drive distance and the monitor will count the number of pulses.
- When the 400 feet has been driven, the operator can press the MODE key once again to stop the pulse counting. This will bring up the SAVE screen.
- To save the count, select Y and then press and hold down ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.



Note: The monitor can accept PP400 values from 50 to 1000. Therefore, if the new count is less than 50, the existing count is not replaced.

Normal Operation

The text on either side of the display shows the names of all display functions on the monitor. A particular installation, however, might not use them all (such as installations without the third shaft/bin, or which do not have the FLOW option).

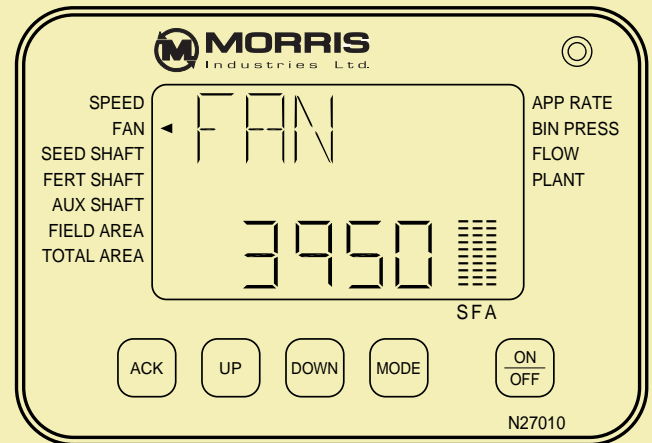
The operator controls which function will be active using the UP and DOWN buttons. The triangular indicator will indicate which function is active. A name will also appear on Line 1.

The numeric value for the selected function is displayed on line 2 unless that function is disabled, in which case line 2 will display OFF.

The unit of measurement for the displayed number is indicated in the units area of the display.

Following is a summary of what is displayed on line 2 for each function. Some functions are discussed later in more detail.

Note: Monitor will not function if the system installation (Sensor Learn Mode) was not completed. See Sensor Installation.



MONITOR FUNCTION	LINE 1 TEXT	WHAT APPEARS ON LINE 2
SPEED	SPEED	Ground speed in MPH or KPH
FAN	FAN	Fan speed in RPM
(SEED) SHAFT 1	SHAFT 1 (SSHAFT)	Shaft speed of the named metering shaft in RPM
(FERT) SHAFT 2	SHAFT 2 (FSHAFT)	
(AUX) SHAFT 3	SHAFT 3 (ASHAFT)	
FIELD AREA	F AREA	Area covered while seeding, in ACRES or HECTARES, since the last time the counter was zeroed. The FIELD counter can be cleared alone; clearing TOTAL clears FIELD also.
TOTAL AREA	T AREA	
APP RATE	APRATE	Determined application rate in pounds/acre or kg/hectare. Shows 0 after powerup until the procedure is done. More detail found in section on Application Rate.
BIN PRESS - Version 1	BPRESS	Pressure in the auxilliary bin in Inches of H2O, or KPa
FLOW	FLOW	OPEN if all runs are clear, or cycles through display of all blocked runs with format "MmmRrr", where mm=module address, rr=run number. More detail found in Flow section.
PLANT - Version 1	AVERAT	Seed Rates or Seed Counts. In either case, for a single run, averaged over all runs, or for the run with the minimum or maximum rate or count. Operator chooses what is shown. More detail found in section on the planter option.
	RAT	
	MIN, MAX	
PLANT - Version 2	AVG	Seed Rates or Seed Counts. In either case, for a single run, averaged over all runs, or for the run with the minimum or maximum rate or count. Operator chooses what is shown. More detail found in section on the planter option.
	RAT	
	MIN, MAX	
SPACE - Version 2	AVG	Number of seeds planter per distance unit or distance between speeds planted for a single run, averaged over all the runs or for the run with the minimum or the maximum rate.
	S/M (IN/S)	
	MIN, MAX	

Ground Drive

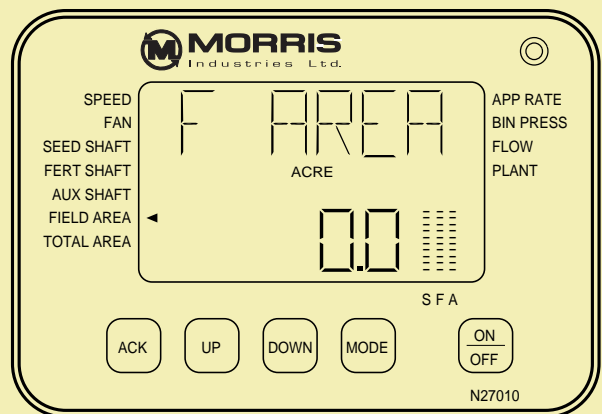
Area Display

There are two area counters, field area and total area. They are both accumulated whenever the system “in motion” condition is true, with one exception: when the system is in Application Rate mode, these area counters are not active. Area counts are stored in memory when the unit is turned off.

The counts are displayed by moving the triangle icon with the UP or DOWN button to the desired function. The FIELD AREA is displayed to the nearest tenth of an acre (or hectare) and the TOTAL AREA is displayed with no decimal. The appropriate unit icon (acres or hectares) is turned on.

Resetting the Field Acre Meter

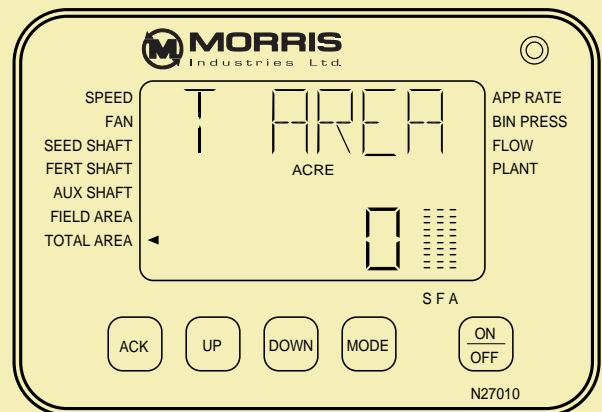
- Use the UP or DOWN button to move the triangle icon to FIELD AREA. (Diagram 27)
- Hold the ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- The field area will be reset to zero.



Resetting the Total Acre Meter

- Use the UP or DOWN button to move the triangle icon to TOTAL AREA. (Diagram 28)
- Hold the ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- The total area will be reset to zero.

Note: Field area will also be reset to zero when total area is reset.



Application Rate Check

The application rate function allows the operator a simple method for performing application rate calculations. When in application rate mode, the operator must move the Air Cart over a distance, where the seeded material must be collected. The material is weighed. The weight is entered into the monitor and the monitor calculates the application rate.

- Remove the wing nuts on the collector bottom.
- Remove the bottom of the collector.
- Remove the metering chain from the transmission that is **not** being checked.
- Check that the desired rate change sprocket is installed in the transmission.
- Turn the crank until material begins to fall through the collector body.
- Slide rate check box on the collector body.
- Use the UP or DOWN button to move the triangle icon to **APP RAT** (See Diagram 1). Line 2 will display the last application rate calculated. ***This is just the last calculation, it may not be the current application rate.***
- Hold the mode button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- The word **AREA** will be displayed on line 1. (See Diagram 2)
- The actual area will be displayed on line 2. The display will show 0.00 on line 2 when the mode is first entered.

Note: Because this is a special mode, the normal Field and Total acre counters are not incremented at this time.

- Engage the electric clutch. ***Ensure the fan is not running.***
- Drive the tractor forward until the display reads at least 1/10 acre (0.1) on line 2. (See Diagram 3)

Note: Less than 1/10 acre maybe required to ensure higher application rate does not over fill sample collector. If sample plugs collector bottom, damage to metering wheels may occur. Plus the sample collected will be inaccurate.

- Disengage the electric clutch and stop the tractor.
- Remove sample collector.

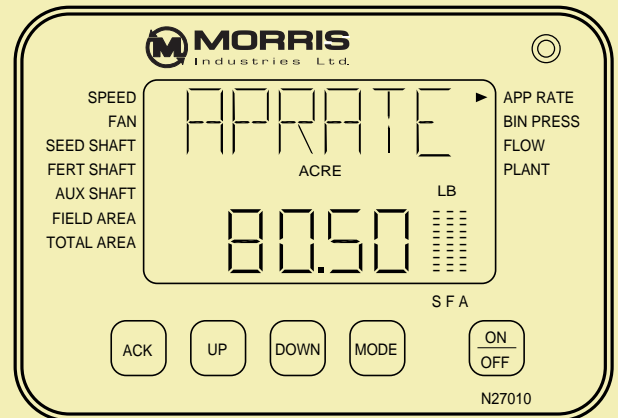


Diagram 1

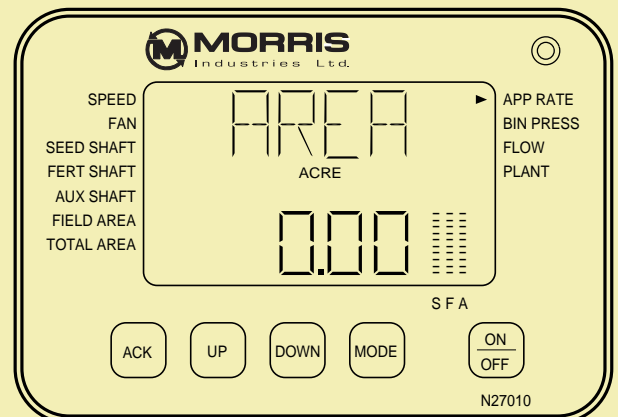


Diagram 2

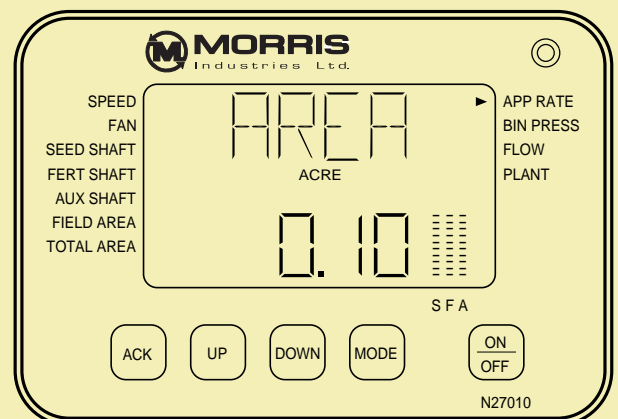


Diagram 3

Ground Drive

Application Rate Check - Continued

- 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.

- Press the mode button.
- The word **WEIGHT** will be displayed on line 1. (See Diagram 4)
- Enter the weight of the collected material on line 2 using the UP or DOWN buttons.
- Press the mode button.
- The word **RATE** will be displayed on line 1. (See Diagram 5)
- The calculated application rate will be displayed on line 2.
- Check this rate against rate required. If a different rate is required then increase or decrease the size of the rate change sprocket. Increasing the sprocket size will increase the rate and vice versa.
- To exit the application rate mode, press the ACK button until 4 short beeps and 1 long beep sounds.
- Replace the bottom of the collector.
- Follow the above procedure to check the rate of the other tank.

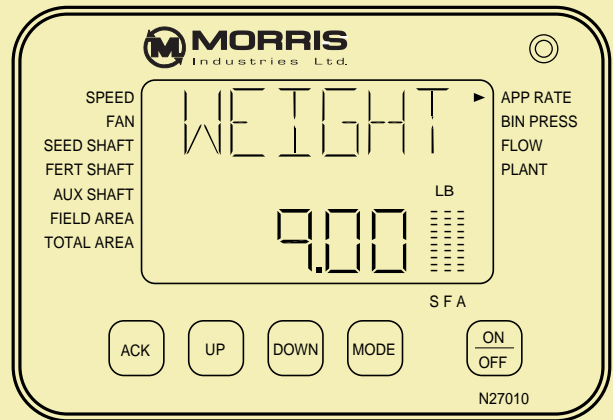


Diagram 4

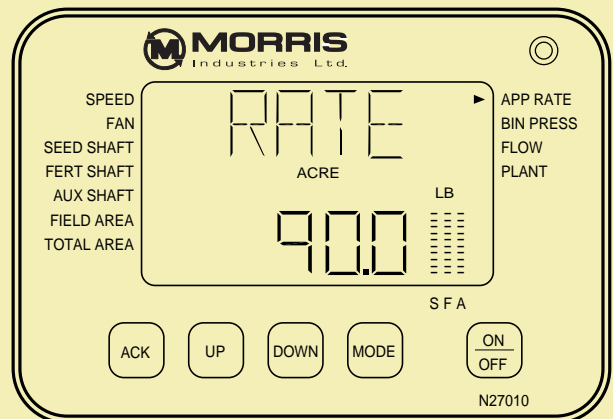


Diagram 5

Note: When in application rate mode, the field and total acres are not altered.

Section 3: VRT Drive

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Identifying Variable Rate Console Switches

The variable rate console provides the means to:

- Turn on or off each/all metering shaft(s).
- Increase or decrease the application rate of any given shaft.

Master On/Off

Activates the shaft On/Off buttons. If any of the seed or fertilizer buttons are in an On state during a Master On, the variable rate controller will initiate any required motor rotation of the respective shaft at the currently selected application rate. Master Off will deactivate all the shaft On/Off buttons and stop all motor rotation. A LED indicates whether the button is on or off.

Seed Shaft On/Off

Used to turn seed shaft on and off. A LED indicates the current state of the button.

Fertilizer Shaft 1 On/Off

Used to turn fertilizer shaft on and off. A LED indicates the current state of the button.

Fertilizer Shaft 2 On/Off

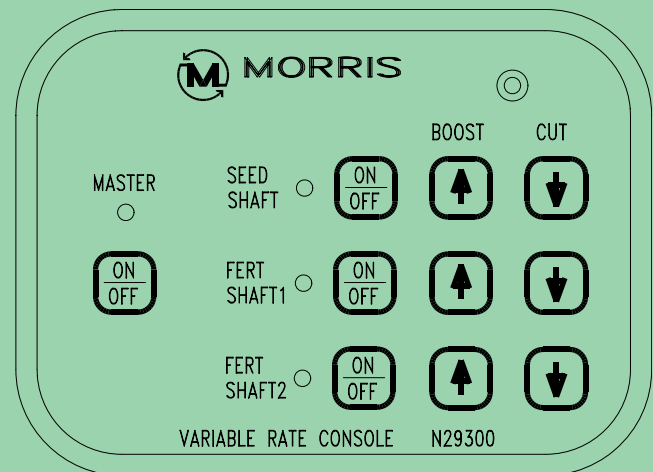
Used to turn auxiliary shaft on and off. A LED indicates the current state of the button.

Boost

Each push of the Boost button **increases** the application rate by **5%** of the **nominal rate** to a maximum of 50%. The respective LED will flash quickly indicating the application rate is higher than the nominal rate. To return the application rate to nominal, the respective shaft On/Off button is pressed once. The LED will stop flashing and will stay on.

Cut

Each push of the Cut button **decreases** the application rate by **5%** of the **nominal rate** to a minimum of 50%. The respective LED will flash slowly indicating the application rate is lower than the nominal rate. To return the application rate to nominal, the respective shaft On/Off button is pressed once. The LED will stop flashing and will stay on.



VRT Console

Note: The application rate can be increased or decreased up to 50%.

VRT Drive

Identifying Controller/Override Switches

The Controller/Override switches provides:

- Power to the variable rate control system.
- Manual override of the variable rate control system.

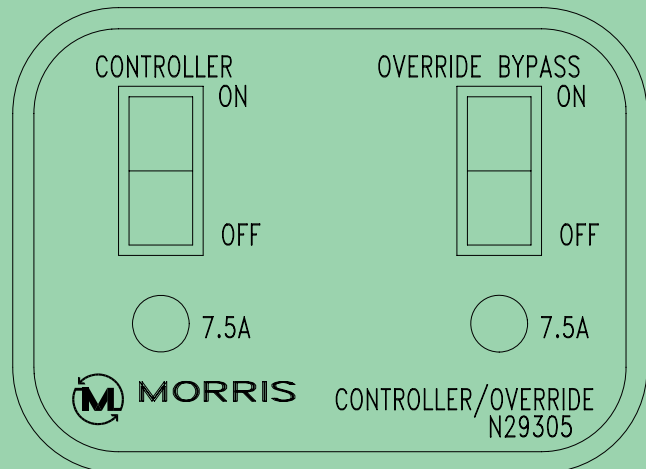
Controller On/Off

Activates the variable rate control system by supplying power to valve body.

Override Bypass

Used if a fault occurs in the electrical wiring of connections to the variable rate control system. The manual override system provides the ability to run the hydraulic motors at a fixed rate (not proportional to ground speed) and to turn the manual system on and off from the tractor cab. **This switch is normally left in OFF position.**

Note: The Controller Switch must be turned on before the monitor.



Controller Switch

Start-up

Turn power on in the following sequence:

1. **Controller Switch**
2. **Monitor**
3. **VRT Console** (To run metering system)

The VRT Hydraulic Motors will turn 1/2 revolution to check zero position when the tractor hydraulics are engaged to run the Air Cart System.

Normal Start-up

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

- All of the display segments turn on one at a time, and then off one at a time.
- MORRIS is briefly displayed.
- The Version number of the monitor software is displayed. **This number should be included with any reports of faulty or unexpected system operation.**
- The sensor numbers of all previously learned sensors are displayed in sequence as initial communication with each sensor takes place.
- The normal operating display starts with the ground speed function active.
- Once normal operating starts the monitor will alarm specific sensors; in 10 seconds the shafts alarm, 20 secs the bins alarm and in 30 seconds the speed alarm. Press the **ACK** key for each alarm, this will cancel the alarms returning the monitor to ready mode.

It may occur that an error is detected on start-up. In that case the sequence is slightly modified as described in the section on Start-up Error Messages.

Note: The Controller switch in the Controller/Override Module must be turned on before the monitor.

Monitor ID
Version Number

Start-up - Continued

Special Start-up

There are two types of special actions that can be controlled when starting up the unit.

- **START SENSOR CONFIGURATION LEARN:** This allows a new sensor configuration to be learned, with the existing configuration cleared from memory.
- **RESET SETTING:** All stored settings, such as pulses per revolution values, alarm points, etc. are restored to their factory default values. All areas and seed counts are also zeroed.

The two actions can be selected independently or together by holding down certain key combinations when the unit is turned on, see chart.

Start-up Error Messages

In rare circumstances certain fault conditions may be detected at start-up. There are two distinct classes of such fault conditions and they are reported differently.

First Class

The **first class** is due to faults that occur while the unit was operating and which cause the unit to restart. In this case, the monitor will display the error message instead of the normally displayed MORRIS. It will then wait for a key press before proceeding with the start-up sequence. The possible error messages are:

COPRST, UUORST, CLKMON, and IMPRST

Second Class

The **second class** includes various conditions that the monitor checks for after the Version Number is displayed. In most cases, when such conditions are detected the system is forced to do a complete factory reset (as if the monitor were turned on with the ACK, Down and Mode keys all held as described above). The possible displayed messages are:

VERCHG, SNSCHG, EEPSC1, EEPSC2, BDSERP, and VERCHS

Special Startup	
Button Combination	What Occurs
ACK and DOWN	FORCED LEARN of all sensors (other settings retained)
ACK and MODE	RESET SETTINGS (sensor configuration retained)
ACK and DOWN and MODE	BOTH FORCED LEARN and RESET SETTINGS

Note: If any of the error messages appear more than twice, the monitor is probably faulty.

Startup Error Codes	
Monitor Display	Display Meaning
VERCHG	Should only be true after installation of new software that changes the way nonvolatile memory (on chip EEPROM) is used. Forces a factory reset.
SNSCHG	Should only be true after installation of new software that changes the order or composition of the default list of connectable sensors. Forces a factory reset.
EEPCS1 EEPCS2	Some data in the microprocessor nonvolatile memory (EEPROM) is invalid. Data is stored in two banks. The message indicates which bank had the problem. If only the first bank is corrupt, then the good bank 2 copy will be used and there will not be a forced factory reset.
BDSERP	A test of the integrity of the additional nonvolatile memory chip (Serial EEPROM) has failed.
VERCHS	Should only be true after installation of new software that changes the way nonvolatile memory (Serial EEPROM) is used. Forces a factory reset.

System Installation

Sensor LEARN Mode

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) A granular applicator is added to the Air Cart.
- 2) Replacing faulty sensors.
- 3) Replacing faulty monitor with a new monitor.

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.

Installation Precautions

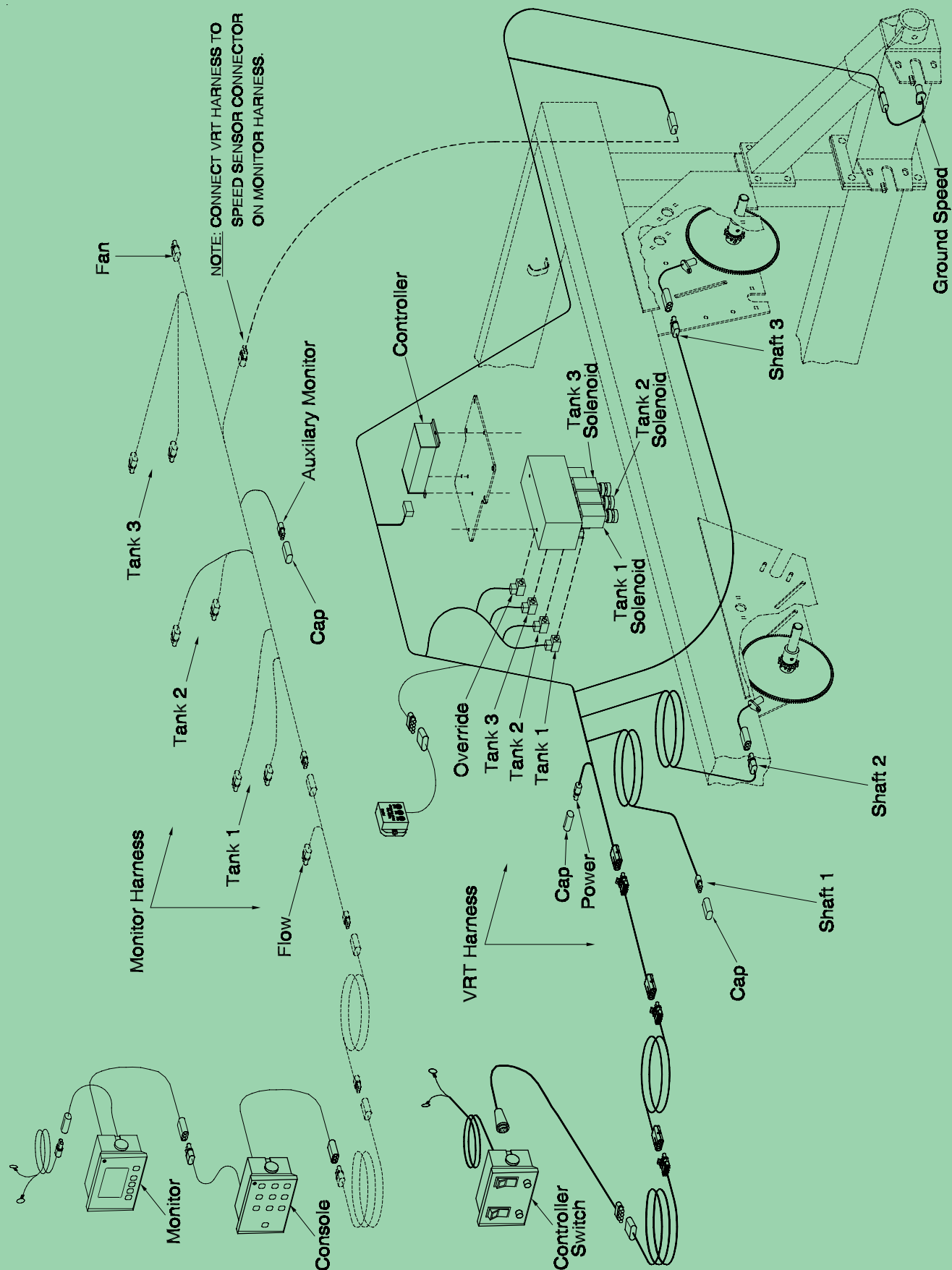
- 1) During installation the monitor has a predetermined order in which it wants the sensors attached. The installer must be sure that the proper function is plugged in.
 - i.e. If during installation the installer plugs in the Front Shaft and Ground Speed sensors in the wrong order, the monitor would 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 a full complement of sensors. These sensors can be programmed to be ignored in two ways:
 - i) During initial installation when the monitor prompts for a sensor to be plugged in, the operator can press **ACK** 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.
 - ii) During operation the operator can disable sensors by setting the pulses per revolution to zero. When pulses are set to zero alarms for that 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*".

Pin Sensors - the blockage module **does not have to be removed from the harness** during initial system installation.

Optical Sensors - the blockage module **have to be removed from the harness** during initial system installation.

Sensor Installation Order
Speed (Ground)
Fan
Shaft 1
Shaft 2
Shaft 3
Tank 1
Tank 2
Tank 3
VarCon (Variable Rate) (Unit calls for installation only if var controller is installed)
Plant Sensors
Optical Blockage Modules

VRT Drive



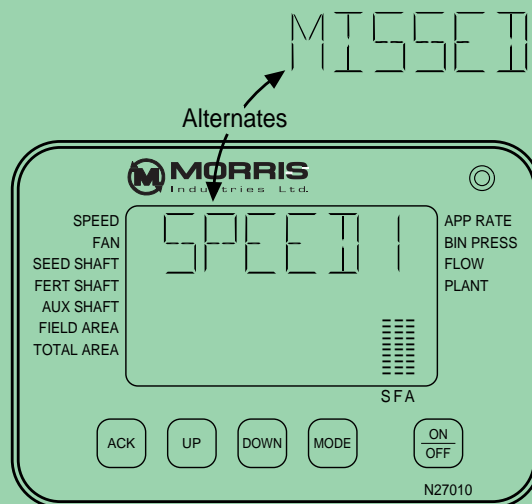
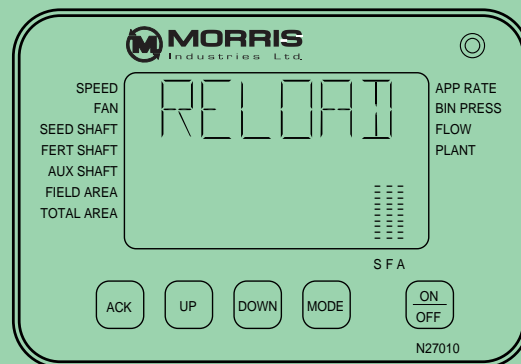
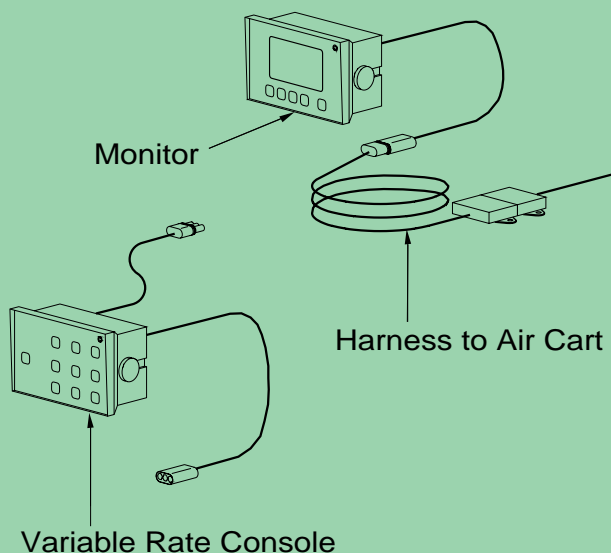
System Installation - Continued

Installation Procedure

- **Disconnect** all the sensors (3 pin connector) from the harness on the Air Cart. (**Black** Coloured Connectors).

Note: Do not disconnect the VRT sensors (Blue Coloured Connectors).

- **Disconnect** the Variable Rate Console (3 pin connector) from the harness.
- **Connect** the harness (3 pin connector) into the monitor.
- Turn on the Controller switch.
- Hold down both buttons: **ACK-DOWN** and turn on monitor. Continue holding the buttons until **KEYOFF** appears on the display.
- **RELOAD** will be displayed briefly on line 1 when the ACK-DOWN buttons are released. Each sensor must now be individually recognized by the monitor. The monitor will display the order in which the sensors must be plugged in.
- The display on line 1 will alternate between **MISSED** and **SPEED 1**, indicating that the variable rate harness (Controller) may now be connected to the monitor harness.
- The monitor will give a double beep when it acknowledges the Controller.
- The display on line 1 will now alternate between **MISSED** and **FAN 2**, indicating that the fan sensor may now be connected. Connect the fan sensor.



System Installation - Continued

Installation Procedure - Continued

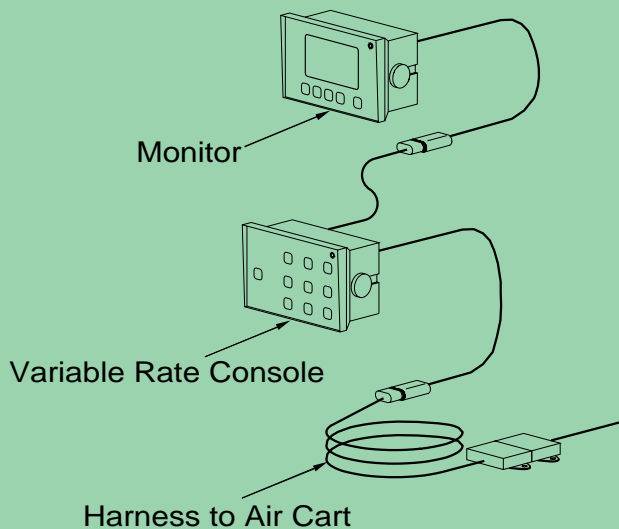
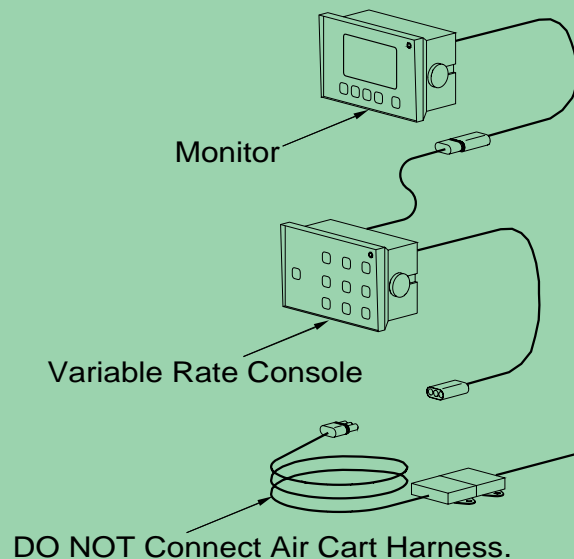
- The process is the same for rest of the sensors in the sequence.

Note: When the monitor requests a sensor that **will not be used** in the configuration, press the **ACK** key, and the monitor will skip the sensor and advance to the next one in the sequence.

- When the monitor displays **VARCON**, disconnect the harness from the monitor and connect the Variable Rate Console into the monitor **only**.
- Once monitor acknowledges the Console, the Air Cart harness can be plugged into the Variable Rate Console.

Note: There are “**24**” **PLANT SENSORS**. To skip past the plant sensors press **ACK** and **MODE** buttons together.

- After the 24 Plant Sensors have been ACK the monitor returns to normal operation mode and displays **SPEED** icon.
- When all sensors in the list have either been learned or skipped, the installation is complete. The monitor returns to normal operation mode and displays **SPEED** icon. Since the fan and shafts are not rotating, alarms will be soon generated (some are delayed). These will need to be silenced with the **ACK** key.
- To verify the installation, the monitor may be turned off, then turned on again. Now, only the names of the learned (but not the skipped) sensors will quickly flash by on the display as the unit goes through its normal “wake up” sequence, after which it advances to its default operating mode, where the ground speed is displayed.



System Installation - Continued

Installation Variations

The factory arrangement for the Monitor displays are

- Seed Shaft - Front Tank
- Fert Shaft - Rear Tank
- Aux Shaft - Third Tank/Granular Tank

If a different arrangement is desired the tank sensors must be learned in a different sequence and the wiring order of the VRT Harness must be changed.

Refer to “*Factory Setting for VRT Harness*”.

Example:

The operator uses the rear tank for seed only and the front tank for fertilizer and would like the monitor display to correspond.

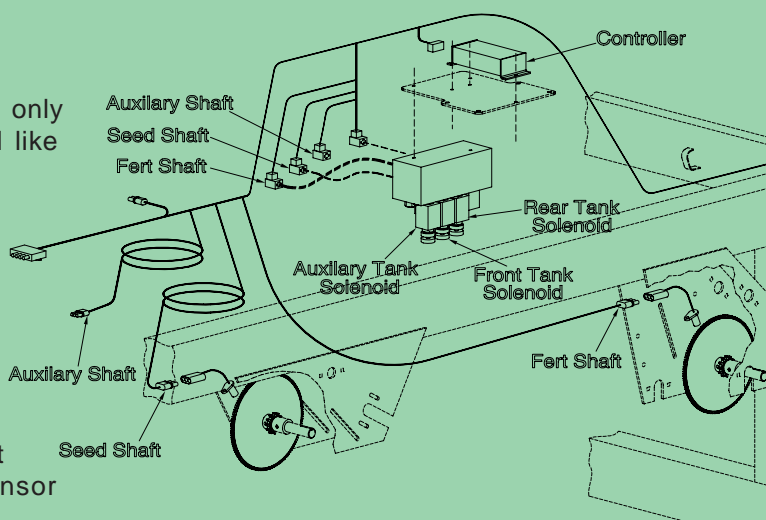
To set monitor displayed “*Seed shaft*” to rear tank and “*fert shaft*” to the front tank do the following:

Re-learn the sensors as describe in “*Installation Procedure*” with the following changes:

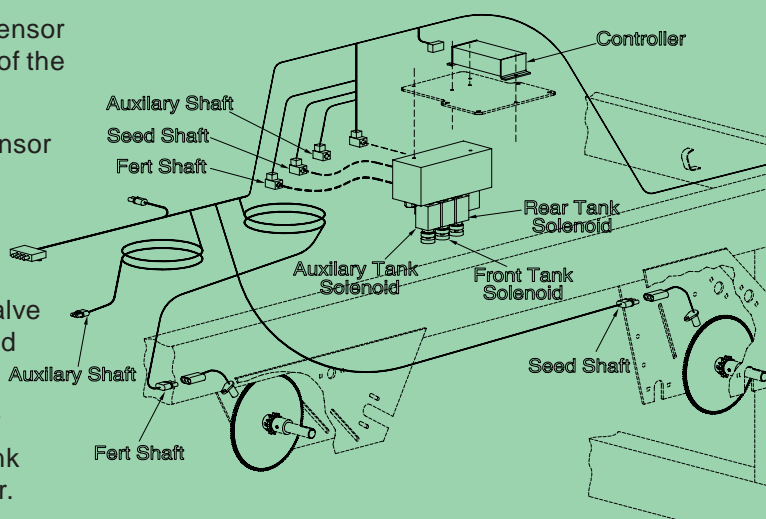
- When the monitor asks for the Seed Shaft Sensor connect the Rear Tank shaft sensor instead of the Front Tank shaft sensor.
- When the monitor asks for the Fert Shaft Sensor connect the Front Tank shaft sensor instead of the Rear Tank shaft sensor.
- When the monitor asks for the Seed Bin Sensor connect the Rear Tank shaft sensor instead of the Front Tank shaft sensor.
- When the monitor asks for the Fert Bin Sensor connect the Front Tank shaft sensor instead of the Rear Tank shaft sensor.

Change the VRT Harness wiring as follows:

- Change Shaft harness connections at the Valve Body; Seed Shaft to Rear Tank Solenoid and Fert Shaft to Front Tank Solenoid.
- Change the sensor connections for the VRT Hydraulic Motors; Seed Shaft to Rear Tank Sensor and Fert Shaft to Front Tank Sensor.



Harness Factory Arrangement



Harness Rearranged

Monitor Programming

Most of the function positions have settings that may be changed. These include various configuration details, alarm trip points, and some convenient options such as whether imperial or metric units should be used for numeric display.

Procedure

The following explains the procedure for entering and exiting any of the Change Settings modes.

Saved settings are retained even after power has been removed from the monitor.

Note: When the operator is in any of the “*change settings*” modes, the monitor will not generate normal monitor alarms (low fan speed, shaft speed and so on).

See charts on following pages for monitor program settings.

Entering Change Settings Mode

- Use the UP or DOWN button to move the triangle icon to desired function.
- Hold the MODE button until 4 short beeps and 1 long beep sounds. Release button after the long beep. This starts the change settings mode.
- Display line 1 will show a description of what the setting is.
- Display line 2 will indicate the present numeric value of the setting. An appropriate unit is also indicated.
- Now, each press of the MODE button will advance the display to the next setable item for that function, cycling back to the first one after reaching the end. The last display in the cycle is the save prompt, which allows the user to decide whether settings should be saved into memory.

Exiting from Change Settings Mode

- Press MODE button until the **SAVE** display appears on display line 1.
- If settings should be saved, press UP to choose yes (Y). Then hold down ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- If settings should not be saved (but remain as they were before the mode started) press DOWN to choose no (N). Then press ACK button, which immediately exits Change Settings Mode.

Note: To “*TURN OFF*” any shaft not in use set PULSES to ‘0’ and APRATE to ‘0’. This will eliminate any nuisance alarms caused by an inactive shaft.

Monitor Programming - Continued

PP400 for 7000 Series Air Cart

PP400 - VRT			
Tire Size (Good-Year)	Tire Style	Rating	PP400
16.5L x 16.1	Softrac II	6 ply	2,905
	Sure Grip Traction	6 ply	2,802
21.5L x 16.1	Softrac II	6 ply	2,560
	Sure Grip Traction	8 ply	2,539
	Softrac II	10 ply	2,560
	Sure Grip Traction	12 ply	2,539
18.4L x 26	AWT (Implement)	10 ply	2,033
23.1L x 26	AWT (Implement)	8 ply	1,919
	TD8 Sure Grip	10 ply	1,746
	AWT (Implement)	12 ply	1,919

PP400 for EIGHT Series Air Cart

PP400 - VRT				
Tire Size (Good-Year)	Tire Style	Rating	Pressure	PP400
23.1 x 26	TD8 Lug	10 ply	28 psi	1,164
	AWT	12 ply	24 psi	1,279
30.5 x 32	AWT	12 ply	20 psi	1,433
			24 psi	1,426
	Lug	14 ply	20 psi	1,447
			22 psi	1,428
800/65 R32	Lug	LI 172	15 psi	1,434
			20 psi	1,430
900/60 R32	Lug	176 A8	17 psi	1,337
			26 psi	1,317
520/85 R38 Dual Wheels	Lug	155 A8	17 psi	1,414

Monitor Programming - Continued

VRT Base Monitor Programming												
MONITOR FUNCTION	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	PRESS BUTTON
	Hold for five beeps 4 short and 1 long beep								Set with UP/DOWN buttons		Set with UP/DOWN buttons	Hold for five beeps 4 short and 1 long beep
SPEED	MODE	PPM PP400		MODE							SAVE Y	ACK
FAN	MODE	PULSES	2	MODE	LO FAN	3000	MODE	HI FAN	5000	MODE	SAVE Y	ACK
SEED SHAFT	MODE	APRATE	Set Rate	MODE	WT/REV	Product Weight/Rev	MODE	PULSES	4	MODE	LEVEL	20
FERT SHAFT	MODE	APRATE	Set Rate	MODE	WT/REV	Product Weight/Rev	MODE	PULSES	2	MODE	LEVEL	20
AUX SHAFT	MODE	APRATE	Set Rate	MODE	WT/REV	Product Weight/Rev	MODE	PULSES	0	MODE	LEVEL	20
FIELD AREA or TOTAL AREA	MODE	WIDTH	Seed Tool Width	MODE	UNITS	0-Imperial or 1-Metric	MODE				SAVE Y	ACK
APP RATE	MODE	TOPBTM	Shafts to Displayed	MODE							SAVE Y	ACK
BIN PRESS Version 1												
FLOW	MODE	BOXES	0	MODE	TYPE	0	MODE				SAVE Y	ACK
PLANT Version 1	MODE	SDTYPE	1	MODE	SEEDRT	0	MODE				SAVE Y	ACK
PLANT Version 2	MODE	SDTYPE	1	MODE	SEEDRT	15000	MODE	RSPACE	7.5	MODE	SAVE Y	ACK
SPACE Version 2	MODE	SELECT	0	MODE							SAVE Y	ACK

Note: Air Carts equipped with Granular Tank or Third Tank, Auxiliary Shaft pulse setting must be set to 4 not 0.

Canola Setting

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 false seed shaft alarm, since the shaft is rotating below the alarm threshold of 2 rpm.

To avoid this nuisance alarm change the seed shaft pulse setting from 4 to 1, the monitor will think the shaft rpm is 4 times what it actually is.

Example: Actual Seed Shaft rpm is 5.
Monitor set at 4 pulses will read a seed shaft rpm of 5.
Monitor set at 1 pulses will read a seed shaft rpm of 20.

Note: Change the pulse setting back to 4 when returning to higher application rates.

Monitor Programming - Continued

When an Air Cart is equipped with a granular tank, blockage modules, or plant counter the settings listed in the Monitor Options Programming chart must be used.

Note: To “TURN OFF” any shaft not in use set pulses to 0. This will eliminate any nuisance alarms caused by an inactive shaft.

Monitor Options Programming													
MONITOR FUNCTION	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON	Display Upper	Display Lower	PRESS BUTTON
	Hold for five beeps (4 short and 1 long beep)		Set with UP / DOWN buttons			Set with UP / DOWN buttons			Set with UP / DOWN buttons			Set with UP / DOWN buttons	Hold for five beeps (4 short and 1 long beep)
AUX SHAFT	MODE	APRATE	Set Rate	MODE	WT/REV	Product Weight/Rev	MODE	PULSES	4	MODE	LEVEL	20	MODE
FLOW Pin Version 1 or 2	MODE	BOXES	Number of Blockage modes used	MODE	BOXES	Number of Blockage modes used	MODE	BOXES	Number of Blockage modes used	MODE	TYPE	0	MODE
FLOW Optical Version 2 only	MODE	INSTAL	Y	MODE	M01R--	Set number of runs for module	MODE (Will run through all blockage modules)	M02R-- to M12R--	Set number of runs for module				MODE
PLANT Version 1	MODE	SDTYPE	1 - 9	MODE	SEEDRT	15000 - 35000							MODE
PLANT Version 2	MODE	SDTYPE	1 - 9	MODE	SEEDRT	15000 - 35000	MODE	RSPACE	0.1 - 99.9				MODE
SPACE Version 2	MODE	SELECT	0 - seeds/foot or seeds/meter 1 - inches/seed or cm/seed										MODE

Monitor Programming - Continued

Determining Tire Circumference

Factors that may affect the tire circumference and in turn metering rates and monitor PPM/PP400 values are as follows:

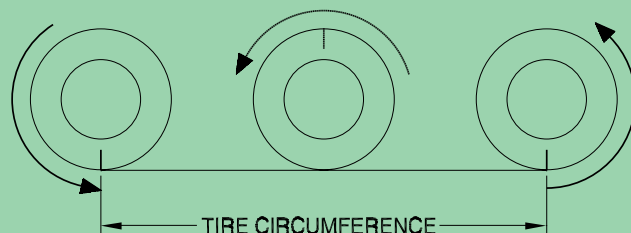
- Tire size tolerances can vary +/- 4%.
- Tire pressure.
- Field soil conditions (firm-unworked versus soft-worked)
- Tank capacity (empty tanks versus full tanks)
- Tire manufacturer (Good-Year versus Firestone)

Note: The values used for monitor PPM/PP400 values is based upon the tire circumference of Good-Year tires at proper pressure with half full tanks in normal working field conditions. (They are all based in reference to 16.5L x 16.1 tires.

16.5L x 16.1 tire - 6 ply rating - STII (Softrac II)
- 24 psi
- PPM = 38,341
- PP400 = 2,905

To determine tire circumference for other tires not listed in the PPM/PP400 chart or to check the actual tire circumference do the following:

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



PP400 Math Calculation

To determine PP400 value, first determine the tire circumference as outlined in "Determining Tire Sprocket" under Operation Section.

$$\text{Formula for 26 inch rim} \dots \dots \text{New VRT - PP400 Value} = \left(\frac{109}{\text{New Tire Circumference}} \right) \times 1,937$$

$$\text{Formula for 32 inch rim} \dots \dots \text{New VRT - PP400 Value} = \left(\frac{302,400}{\text{New Tire Circumference}} \right)$$

Monitor Programming - Continued

PP400 Math Calculation - Continued

Note: The PP400 can also more accurately be calculated with the use of the monitor pulse counting mode.

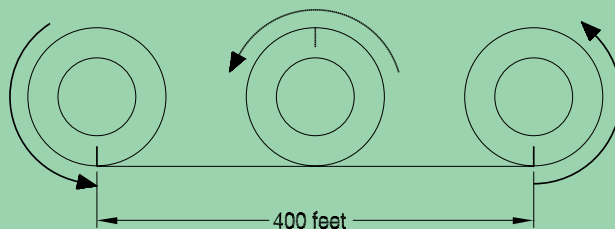
$$\text{New VRT - PP400 Value} = \left(\frac{109"}{\text{New Tire Circumference}} \right) \times 2,905$$

Pulse Counting Mode for PP 400

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 Pulse Counting mode, in which the number of pulses associated with 400 feet of driving are determined.

To start the Pulse Counting Mode:

- Measure and mark out 400 feet.
- Select the SPEED position.
- Hold down the ACK key until after the long beep.
- Display line 1 will show START.
- To start the monitor counting the pulses, the MODE key must be pressed.
- Display line 1 will show COUNT and the bottom line will show "0".
- Drive distance and the monitor will count the number of pulses.
- When the 400 feet has been driven, the operator can press the MODE key once again to stop the pulse counting. This will bring up the SAVE screen.
- To save the count, select Y and then press and hold down ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.



Note: The monitor can accept PP400 values from 50 to 1000. Therefore, if the new count is less than 50, the existing count is not replaced.

VRT Drive

Operation

The VRT monitor requires certain information in order to deliver the desired application rate.

- Implement Width
- Pulses Per Mile (PPM)
- Ground Speed
- Weight of Product per Revolution (WT/REV)
- Desired Application Rate (APRATE)

The monitor uses the PPM to determine the ground speed of the implement.

With the ground speed and the implement width the monitor determines the area the implement is covering per unit time.

With the area and the WT/REV the monitor determines the RPM the shaft motor must turn to deliver the APRATE.

EXAMPLES:

The chart below shows how the monitor determines the shaft RPM for two identical Air Carts on different size and spacing Seeding Tools.

Description	Machine 'A'	Machine 'B'
Air Cart Model	7180	7180
Number of secondary runs	60	60
Application Rate	100 lbs/acre	100 lbs/acre
Trip Spacing of Seeding Tool	12 inches	9 inches
Working Width of Seeding Tool	60 feet	45 feet
Travel Distance per acre (1 acre = 43560 sq.ft.)	726 ft = (43560 ft ² / 60 ft)	986 ft = (43560 ft ² /45 ft)
Travel Speed of 5 mph	440 ft/min (5 mph x 5280 ft/mile / 60 min/hr)	440 ft/min (5 mph x 5280 ft/mile / 60 min/hr)
Travel Time per acre at 5 mph	1.65 min = (726 ft / 440 ft/min)	2.20 min = (986 ft / 440 ft/min)
Material metered per Motor shaft revolution	2 lbs/rev	2 lbs/rev
Motor shaft revs for 100 lbs/acre (100 lbs material)	50 revs = (100 lbs /2 lbs/rev)	50 revs = (100 lbs /2 lbs/rev)
Motor shaft RPM - 100 lbs/acre	30.3 RPM = (50 revs / 1.65 min)	22.7 RPM = (50 revs / 2.20 min)

Operation - Continued

The text on either side of the display shows the names of all display functions on the monitor. A particular installation, however, might not use them all (such as installations without the third shaft/bin, or which do not have the FLOW option).

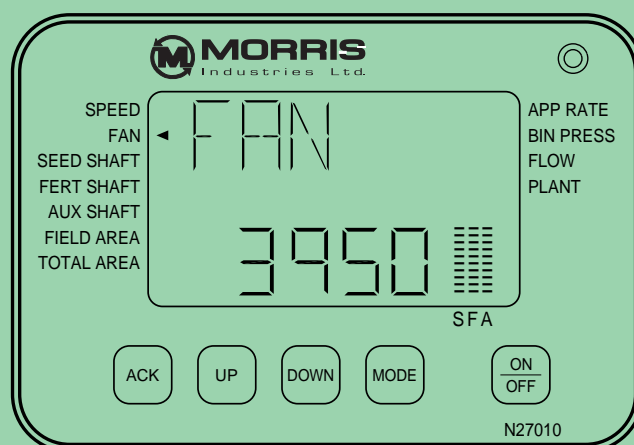
The operator controls which function will be active using the UP and DOWN buttons. The triangular indicator will indicate which function is active. A name will also appear on Line 1.

The numeric value for the selected function is displayed on line 2 unless that function is disabled, in which case line 2 will display OFF.

The unit of measurement for the displayed number is indicated in the units area of the display.

Following is a summary of what is displayed on line 2 for each function. Some functions are discussed later in more detail.

Note: Monitor will not function if the system installation (Sensor Learn Mode) was not completed. See Sensor Installation.



MONITOR FUNCTION	LINE 1 TEXT	WHAT APPEARS ON LINE 2
SPEED	SPEED	Ground speed in MPH or KPH
FAN	FAN	Fan speed in RPM
(SEED) SHAFT 1	SHAFT 1 (SSHAFT)	Shaft speed of the named metering shaft in RPM
(FERT) SHAFT 2	SHAFT 2 (FSHAFT)	
(AUX) SHAFT 3	SHAFT 3 (ASHAFT)	
FIELD AREA	F AREA	Area covered while seeding, in ACRES or HECTARES, since the last time the counter was zeroed. The FIELD counter can be cleared alone; clearing TOTAL clears FIELD also.
TOTAL AREA	T AREA	
APP RATE	APRATE	Determined application rate in pounds/acre or kg/hectare. Shows 0 after powerup until the procedure is done. More detail found in section on Application Rate.
BIN PRESS - Version 1	BPRESS	Pressure in the auxilliary bin in Inches of H2O, or KPa
FLOW	FLOW	OPEN if all runs are clear, or cycles through display of all blocked runs with format "MmmRrr", where mm=module address, rr=run number. More detail found in Flow section.
PLANT - Version 1	AVERAT	Seed Rates or Seed Counts. In either case, for a single run, averaged over all runs, or for the run with the minimum or maximum rate or count. Operator chooses what is shown. More detail found in section on the planter option.
	RAT	
	MIN, MAX	
PLANT - Version 2	AVG	Seed Rates or Seed Counts. In either case, for a single run, averaged over all runs, or for the run with the minimum or maximum rate or count. Operator chooses what is shown. More detail found in section on the planter option.
	RAT	
	MIN, MAX	
SPACE - Version 2	AVG	Number of seeds planter per distance unit or distance between speeds planted for a single run, averaged over all the runs or for the run with the minimum or the maximum rate.
	S/M (IN/S)	
	MIN, MAX	

VRT Drive

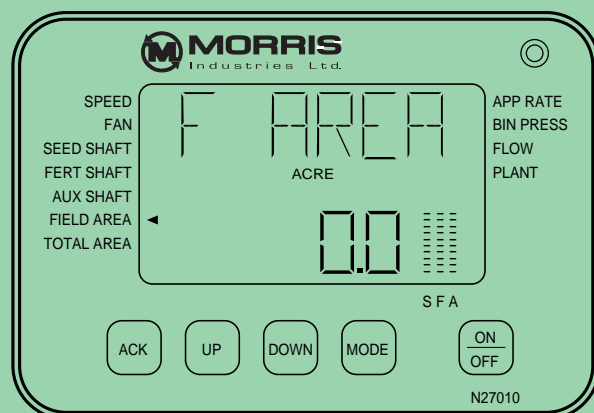
Area Display

There are two area counters, field area and total area. They are both accumulated whenever the system “in motion” condition is true, with one exception: when the system is in Application Rate mode, these area counters are not active. Area counts are stored in memory when the unit is turned off.

The counts are displayed by moving the triangle icon with the UP or DOWN button to the desired function. The FIELD AREA is displayed to the nearest tenth of an acre (or hectare) and the TOTAL AREA is displayed with no decimal. The appropriate unit icon (acres or hectares) is turned on.

Resetting the Field Acre Meter:

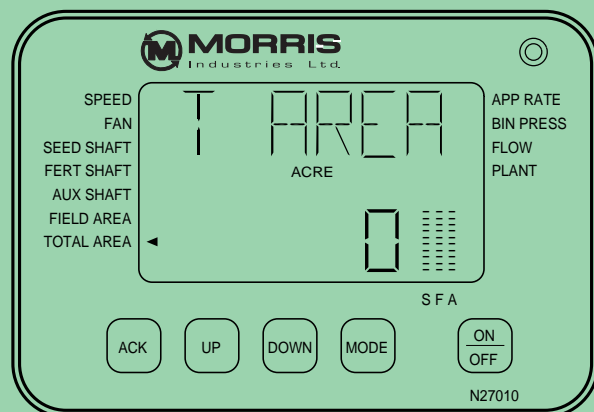
- Use the UP or DOWN button to move the triangle icon to FIELD AREA. (Diagram 27)
- Hold the ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- The field area will be reset to zero.



Resetting the Total Acre Meter:

- Use the UP or DOWN button to move the triangle icon to TOTAL AREA. (Diagram 28)
- Hold the ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- The total area will be reset to zero.

Note: Field area will also be reset to zero when total area is reset.



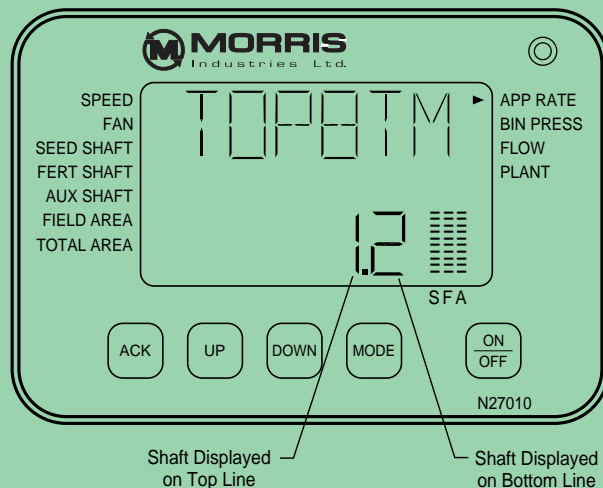
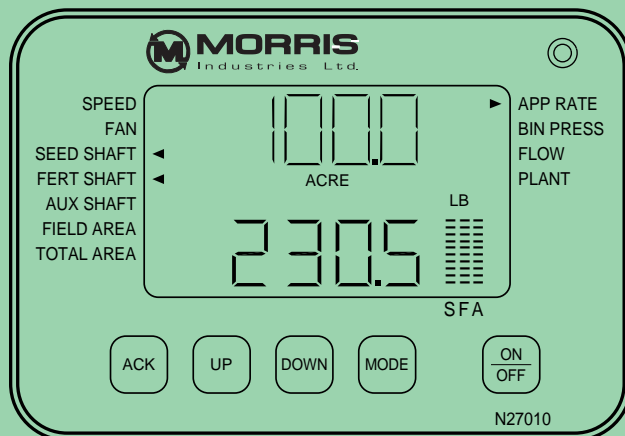
Application Rate Display

The application rate for two shafts are displayed by moving the triangle icon with the UP or DOWN button to **APP RATE**.

The triangle icon for the shafts being displayed will be ON so the operator knows which application rates are displayed.

To change which shafts are displayed follow the procedure below:

- Use the UP or DOWN button to move the triangle icon to **APP RATE**.
- Hold the MODE button until 4 short beeps and 1 long beep sounds. Release button after the long beep. This starts the change settings mode.
- Display line 1 will show **TOPBTM**.
- Display line 2 will indicate which shafts are being displayed.
- Display Options are: **1-2 1-3 2-3**
- Use the UP or DOWN button to change to the desired shafts to be displayed.
 - 1** Refers to **Seed Shaft**
 - 2** Refers to **Fert Shaft** (Fert 1)
 - 3** Refers to **Aux Shaft** (Fert 2)
- Press MODE button and **SAVE** display appears on display line 1.
- If settings should be saved, press UP to choose yes (Y). Then hold down ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- If settings should not be saved (but remain as they were before the mode started) press DOWN to choose no (N). Then press ACK button, which immediately exits Change Settings Mode.



VRT Drive

Preparing VRT

Zero Shaft Hydraulic Motor Solenoids

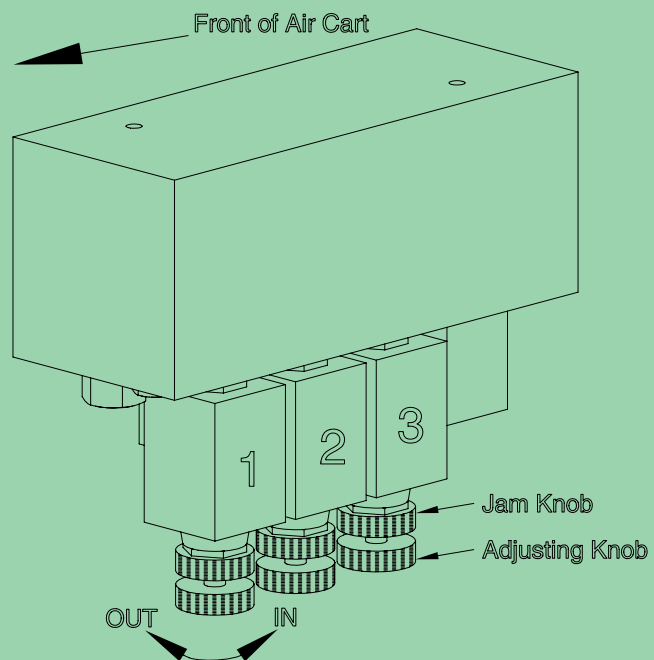
Upon initial setup the preload of the valves must be set to match the tractor hydraulics.

Note: Tanks must be empty.

Zero the shaft hydraulic motors by using the following procedure:

- Ensure there is no product in any tanks.
- Warm up hydraulic system by running fan system for 5-10 minutes. Hydraulic hoses at fan motor should be warm to touch.
- **Turn OFF** Monitor, VRT Console and Controller.
- Start with **all** adjusting Knobs **turned out fully**.
- Adjust each valve individually by following the procedure below:
 - Start with rear tank first Adjusting Knob '3'.
 - Loosen Jam Knob.
 - Turn Adjusting Knob IN until motor starts to turn.
 - Allow motor to turn for 1-2 minutes to allow for motor to reach optimal operating temperature.
 - Then turn Adjusting Knob OUT until motor stops turning.
 - Turn Adjusting Knob OUT an additional 1/2 turn.
 - Tighten Jam Knob to secure Adjusting Knob in place.
- Repeat the above procedure for the other valves.

Note: If Air Cart is *NOT* equipped with a Third Tank or Granular Tank solenoid '1' must be unplugged and the adjusting Knob turned out fully.



Note: It is recommended to check the zero of the valves at the start of each season or if a different tractor is used on the system.

Rate Calibration

The practice of doing a rate calibration is strongly recommended as it will confirm the **actual** amounts of product per motor revolution (**WT/REV**).

The VRT system requires the **WT/REV** in order to determine the shaft motor rpm to deliver the correct application rate.

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

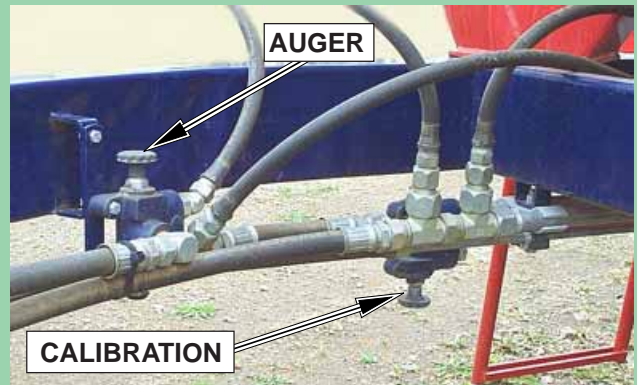
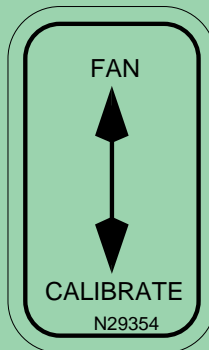
- Engage hydraulic lever to run Air Cart.
- **Turn off fan** by switching selector valve (located in the fan supply line) to calibration position.
- Remove the wing nuts on the collector bottom.
- Remove the bottom of the collector.
- Slide rate check box on the collector body.
- **Prime metering wheels 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.*

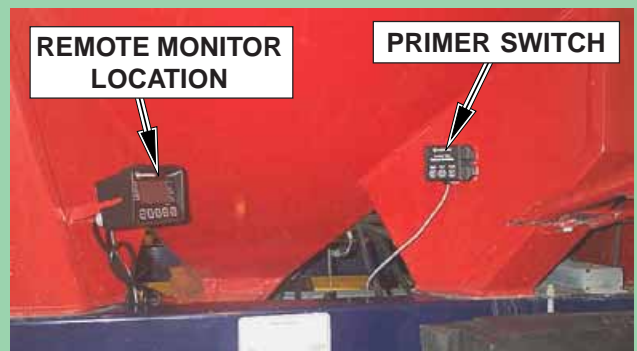
- Empty material from rate check box and reinstall it on the same collector.
- The monitor can be relocated to the remote monitor location for ease of calibration. The three pin plug connects to the monitor harness and the two pin connects to the VRT controller harness.

Actual Sample

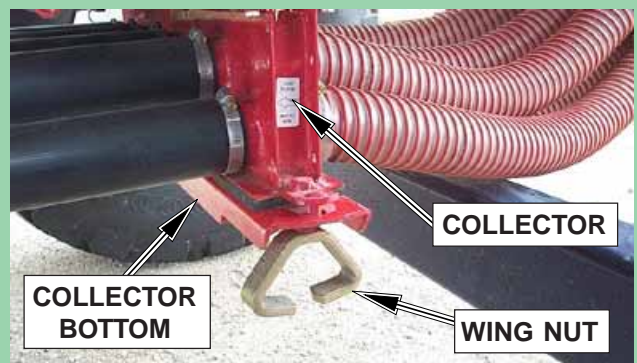
- Enter Calibration Mode for **actual sample**.
- Use the UP or DOWN button to move the triangle icon to the desired shaft.
- Hold the **ACK** button until 4 short beeps and 1 long beep sounds. Release button after the long beep.



Selector Valves



Primer Switch



Collector Bottom



Rate Check Box

VRT Drive

Rate Calibration - Continued

Actual Sample - Continued

Version 2 monitor will read as follows:

- The word **REVS** will be displayed on line 1. Line 2 will display the last entry used.
- Choose the desired revolutions wanted for the shaft to turn for calibration. Enter desired revs on line 2.
 - Use **20** for Direct Drive.
 - Use **50** for Slow Speed Drive.
- Press **Mode** button the word **RPM** will be displayed on line 1. Line 2 will display the last entry used.
- Choose the desired speed wanted for the shaft to turn during calibration. Enter desired revs on line 2.
 - Use **20** for Direct Drive.
 - Use **20** for Slow Speed Drive.

Note: *Ensure the fan is not running.*

- Press **Mode** button the word **REVING** will be displayed on line 1 and the shaft motor will start turning the desired number of revolutions.
- Line 2 will display progress as a % of the final number of rotations. (Range 0 to 100)
- Once line 2 displays 100 the shaft motor will come to a stop.
- Remove rate check box from the collector body.

Note: Accuracy of sample is critical for actual application rate accuracy.

Calibration - Version 2 Variable Rate		
Motor Revolutions		Motor RPM
10		
20		20
25		
50		50
100		160
200		200
400		

Rate Calibration - Continued

Actual Sample - Continued

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

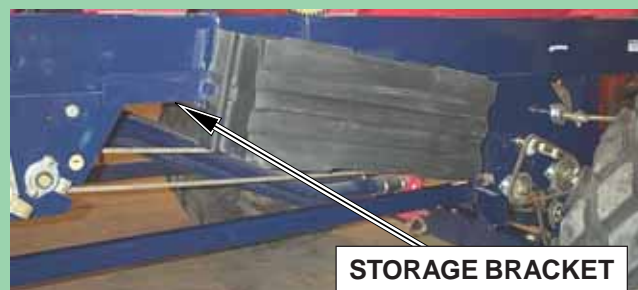
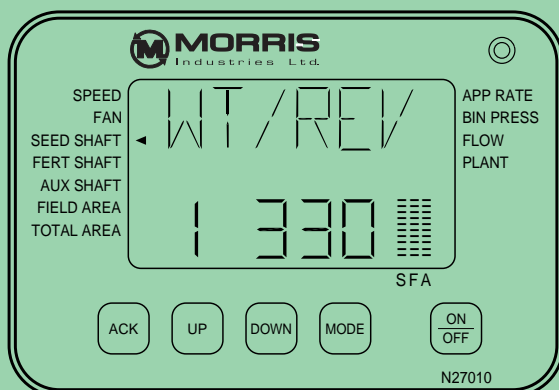
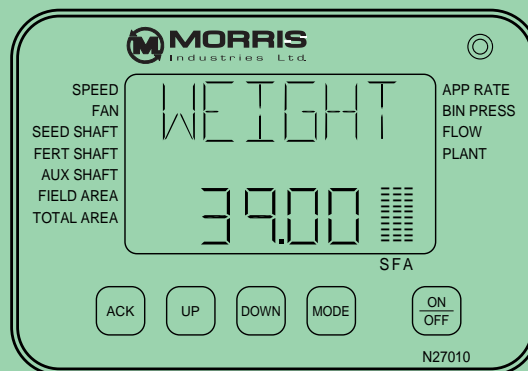
Note: Remember to subtract the weight of the rate check box from the total sample weight.

- Press the **MODE** button.
 - The word **WEIGHT** will be displayed on line 1.
 - Enter the weight of the collected material on line 2 using the UP or DOWN buttons.
 - Press the **MODE** button.
 - The word **WT/REV** will be displayed on line 1.
 - The calculated weight per rev will be displayed on line 2.
 - Press the **MODE** button.
 - The **SAVE** display appears on line 1. If the calculated weight per rev should be saved, press UP to choose yes (Y).
 - Exit calibration mode from the **SAVE** display, by pressing the ACK button until 4 short beeps and 1 long beep sounds.
- Note: Only when **SAVE Y** is displayed can the calibration mode data be saved on exit.**
- This new **WT/REV** figure will appear under the shaft program mode. *(If saved)*
 - Replace the bottom of the collector.
 - Follow the above procedure to check the rate of the other tanks.

Note: Accuracy of sample is critical for actual application rate accuracy.



Weigh Sample



Storage Bracket

VRT Drive

Rate Calibration - Continued

Below is a quick reference chart for metering calibration of a product.

Calibration Mode - Version 2	
ACK	Press ACK button and hold for five beeps - 4 short and 1 long.
REVS	Line one will display REVS. Enter desired number of revolutions on line two. Direct Drive - 20 Slow Speed Drive - 50
MODE	Press MODE button to select the speed at which the shafts will turn during calibration.
RPM	RPM will be displayed on line one. Enter desired number of revolutions on line two. Direct Drive - 20 Slow Speed Drive - 20
MODE	Press MODE button to begin calibration (RE Ving).
RE Ving	RE Ving will be displayed on line one. Line two will display % of final number of rotations (range 0 - 100). Once RE Ving is complete, weigh sample.
MODE	Press MODE button once reving has finished.
WEIGHT	Line one will display WEIGHT. Enter weight of sample collected on line two.
MODE	Press MODE button to display weight per rev (WT/REV).
WT/REV	Line one will display WT/REV. Line two will display the calculated weight per rev of sample collected.
MODE	Press MODE button to move to next function.
SAVE Y	To save WT/REV, press UP to choose yes (Y).
ACK	Press ACK button and hold for five beeps - 4 short and 1 long. This will save WT/REV and exit calibration mode.

NOTE: WT/REV can only be saved when **SAVE Y** is being displayed.

Important

Accuracy of sample is critical for actual application rate accuracy.

Prime metering wheels before taking actual sample.

Remember to subtract the weight of the rate check box from the total sample weight.

Metering Rate Adjustment

The metering rate adjustment for both tanks is done in the same manner. The rate varies with the speed of the metering wheels. A new rate is achieved by changing the APRATE and or the WT/REV under the shaft program mode of the monitor.

Determine a seed/fertilizer WT/REV from the chart:

- Determine which "Chart Column" the product to be applied falls into from the "Calibration Material" columns on the left.
- Go to the specific "Chart Column" and follow column down to the number of outlets on seeding tool.

Note: It is recommended to use a highlighter to make line easier to follow.

- At this intersection will be the required **WT/REV** for the product.

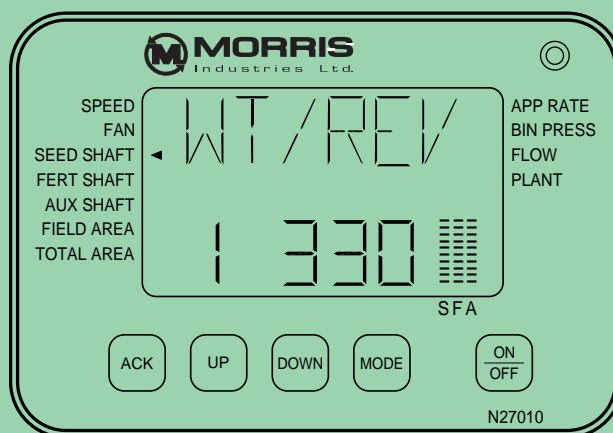
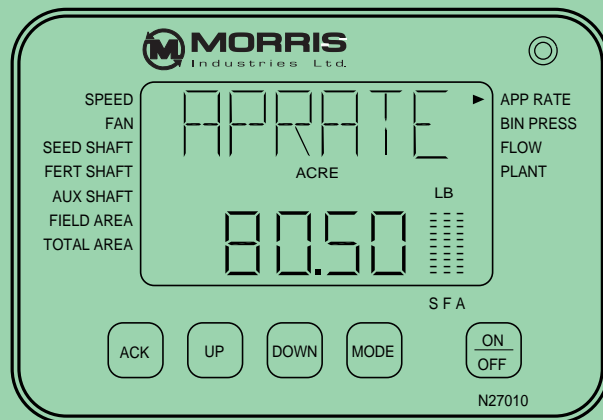
Change the **APRATE** and **WT/REV** on monitor as follows:

- Use the UP or DOWN button to move the triangle icon to the desired shaft.
- Hold the **MODE** button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- The word **APRATE** will be displayed on line 1. Line 2 will display the last application rate used.
- Use the UP or DOWN buttons to enter desired application rate of product.
- Press the **MODE** button.
- The word **WT/REV** will be displayed on line 1. Line 2 will display the last weight per rev used or the WT/REV determined under "Rate Calibration".
- Use the UP or DOWN buttons to enter desired weight per rev of product from calibration chart.

Note: It is recommended to set WT/REV by doing a "Rate Calibration".

- Press MODE button until the **SAVE Y** display appears on display line 1.
- Then hold down ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep. Settings have been saved.
- Follow the above procedure to set the rate of the other tanks.

Note: The charts should only be used as a guide. Specific rates can be achieved by using the rate check method as outlined under "Rate Calibration".



VRT Drive

Metering Rate Adjustment

Below is a quick reference chart for setting metering rate of a product.

Metering Rate Adjustments	
MODE	Press MODE button and hold for five beeps 4 short and 1 long beep.
APRATE	Line one will display APRATE. Enter desired application rate of product on line two.
MODE	Press MODE button to move to next function.
WT/REV	Line one will display WT/REV. Line two will display the calculated weight per rev of sample collected in calibration mode. NOTE: WT/REV can be manually changed if desired.
MODE	Press MODE button to move to next function.
PULSES	Line one will display PULSES. SEED SHAFT - 4; FERT SHAFT - 2; AUX SHAFT - 4
MODE	Press MODE button to move to next function.
LEVEL	Line one will display LEVEL. Line two will display 20.
MODE	Press MODE button to move to next function.
SAVE Y	To save changes press UP to choose yes (Y).
ACK	Press ACK button and hold for five beeps 4 short and 1 long beep. This will save changes and quite out of program mode.

Section 4: Alarms

Section Contents

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Alarms

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.

Note: To “*TURN OFF*” any shaft not in use set pulses to 0. This will eliminate any nuisance alarms caused by an inactive shaft.

When an alarm condition occurs the monitor will beep repeatedly, the indicator icon for the function will flash, and line 1 will indicate the fault condition.

The alarms persist until the alarm condition is removed or until the alarm is acknowledged by the operator. To acknowledge the alarm the ACK button must be pressed, which (if there are no other alarms pending) results in the silencing of the beeper and the return of the normal display. An exception to this is with low fan alarms, as is explained later. After acknowledgement, the indicator icon (or the upper portion of the bar graph in the case of bin level alarms) will continue to flash for as long as the alarm condition is present.

Note: If the monitor is in the “*change settings*” mode, no alarms will be generated.

When the alarm condition is corrected, the alarm indicators are removed resuming normal operation.

If more than one alarm condition occurs at the same time, pushing the ACK button will acknowledge each alarm in order of priority. Line 1 will indicate the highest priority alarm that has yet to be acknowledged.

The order of alarm priority is: High fan rpm, Low fan rpm, Seed shaft rpm, Fertilizer shaft rpm, Auxiliary shaft rpm, Grain flow, Seed bin low, Fertilizer bin low, and Auxiliary bin low.

When multiple alarms have been acknowledged, the function indicators for the alarmed functions will continue to flash.

Alarms - Continued

Sensor Alarm Chart

The following chart shows alarms which are generated when alarm thresholds are exceeded. Alarm points for some sensors are fixed, while others can be changed by the user.

Sensor Alarm Priority		
Monitor Display	Display Meaning	Alarm Point
FAN	Fan Speed Too Low or Fan Speed Too High	May be changed by Operator
SHAFT 1 (S SHAFT)	Shaft 1 (Seed Shaft) Rotation Too Slow	Fixed 2 RPM or less
SHAFT 2 (F SHAFT)	Shaft 2 (Fertilizer Shaft) Rotation Too Slow	
SHAFT 3 (A SHAFT)	Shaft 3 (Auxiliary Shaft) Rotation Too Slow	
FLOW	Loss of Seed Flow (Blockage Module Option)	Set by calibration process
TANK 1 (S BIN)	TANK 1 (Seed Bin) Low Level	Fixed
TANK 2 (F BIN)	TANK 2 (Fertilizer Bin) Low Level	
TANK 3 (A BIN)	TANK 3 (Auxiliary Bin) Low Level	
SPEED	Ground Speed below 2 mph	Fixed
CLUTCH	Clutch not engaged	
	Low Seed Rate (Seed Counting Option)	Adjustable alarm point
	Auxiliary Bin Pressure	Fixed

When an alarm condition arises, the beeper will sound, the appropriate triangular indicator will flash, and Line 1 will indicate the fault condition.

To prevent nuisance alarms during setup, while the unit is in any of the special modes, none of the ordinary sensor type alarms will be generated. The special modes include Change Settings mode, Application Rate mode, Pulses Per Mile Count mode, Flow Test and Calibration modes and so on (basically, any mode of operation that is initiated by holding down a button for 5 beeps).

Bin Level Alarms

Bin level alarms use the bar graphs and so are an exception to the above. There is still a Line 1 message and beeping, but instead of a triangular indicator the bar itself indicates the alarm. The lower portion of the bar remains solid, while the upper portion will flash.

Alarms

Alarms - Continued

Sensor Alarms - Continued

Low Fan Alarms

Low fan alarms are treated specially because a stopped fan can result in damage to the metering mechanics as unblown material accumulates. **Low fan alarms can not be acknowledged with the ACK button while the system is “in motion”.** If a low fan alarm occurs while the system is not in motion, the normal rules apply, and the user will be able to silence the alarm with the ACK key. (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.) Thus, if a low fan alarm occurs during active seeding, the user will **not be able** to silence the alarm with the ACK key, 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.

Ground Drive (“In Motion”) Alarm:

The monitor emits a double beep whenever the “In Motion” condition becomes freshly true or false. This condition is defined as *speed greater than 2 M.P.H. and drive clutch engaged*.

If ground speed is less than 2 mph for more than 30 seconds the monitor will alarm and display SPEED on line 1.

If ground speed is greater than 2 mph for more than 30 seconds and clutch is not engaged the monitor will alarm and display CLUTCH on line 1.

Note: There is no visual display associated with this feature. It is only intended to inform the operator that the clutch is operating properly.

Alarms - Continued

Sensor Alarms - Continued

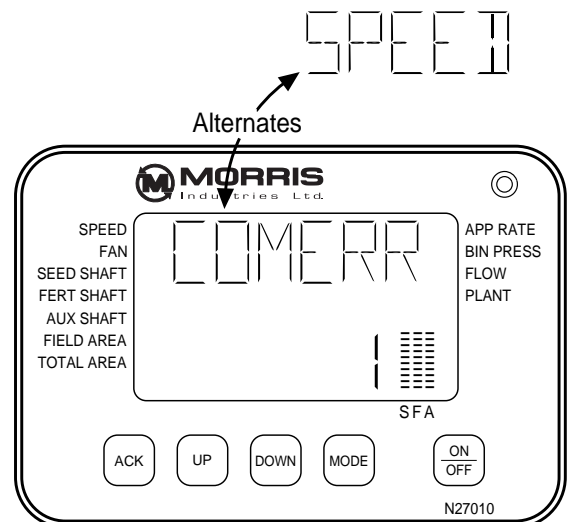
Communication Alarms

Communication Alarms occur when a sensor does not respond to repeated attempts at communication by the monitor.

- The monitor display will alternate between COMERR and SENSOR NAME on line 1.
- The monitor will display the SENSOR ID NUMBER on line 2.

After acknowledgement, the operator is reminded of which sensor is in fault by the blinking of the associated triangular indicator (or in the case of bin level sensors, the associated bar graph).

The display is slightly different when the communication fault is with a Blockage Module, as described under Flow (Blockage Module) Alarms.



Note: If no blockage modules are connected, the number of modules (“BOXES”) should be set to zero. This will prevent nuisance communication alarms.

System Error Alarms

System errors are displayed with “SYSERR” on line 1, and an error code on line 2. The conditions that are monitored, along with their corresponding error codes are listed in the table.

Line shorts must be located and fixed before normal operation will resume.

System Error Codes	
Monitor Display	Display Meaning
100	Data Line is Shorted Low (Usually a short to ground)
101	Data Line is Shorted High (Usually a short to +12V)
102	Transmitted Byte Not Also Recieved

Alarms

Notes

Section 5: Blockage Monitoring

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Blockage

Flow - Pin Sensors

Introduction

There are three modes of operation for the grain flow monitoring system. These are Operate, Test, and Calibrate. Normally, the system is in Operate mode, in which all modules are being monitored for blockage, and blockages cause monitor alarms. Test and Calibrate are special modes which are performed after the first installation and also possibly when the configuration, the normal seed rate, or the type of seed being used changes. The following sections describe each mode in the order that they would be used in a new installation.

Setting Flow Parameters

The number of blockage modules connected must be set at the Monitor console in order for the system to operate correctly. This should only need to be done when the blockage modules are first installed, and afterwards only if the number of blockage modules is changed. Refer to monitor programming.

Test Mode

This mode of operation is used to verify a correct installation. It allows the user to see whether all installed blockage modules are in fact communicating with the monitor, and whether the number of runs set for each blockage module are correct.

Calibration Mode

Calibration mode is used to measure the typical seed flow rate as determined by seed type and the Air Cart settings (i.e. metering rate, fan rpm etc.). The blockage module determines a calibration value and uses it to determine when a run has blocked.

Operation Mode

This is the normal mode of flow monitoring. Now, while the implement is in motion, the monitor will poll each blockage module for the status of its runs.

Note: This will occur regardless of which function on the monitor is presently displayed.

When the FLOW function is active, the display will show one of the following:

FLOW OFF	Indicates the system is set for zero blockage modules connected.
FLOW OPEN	Indicates that all runs are clear.
Mmm Rrr	Indicates which runs are blocked.
BLKERR	Monitor cannot communicate with one or more modules.

Important

CALIBRATION must be done each time the seeding rate or the seed type is changed.

Flow - Pin Sensors - Continued

Test Mode

This mode of operation is used to verify a correct installation. It allows the user to see whether all expected blockage modules are in fact communicating with the monitor, and whether the number of runs set for each blockage module are correct.

- Use the UP or DOWN button to move the triangle icon to FLOW. (Diagram 4)
- Hold the ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- **TEST** or **PASSED** will be displayed on line 1.
- This action puts the system in test mode.

Note: Test mode can only be entered if the unit is stationary.

- The monitor will display on line 2 in cyclical fashion each module's number (*address*) and the number of sensors that, that module is set to monitor. (Diagram 4)
- The operator may now verify that the number of sensors displayed for each module agrees with the individual sensors settings on each module (S1 SENSORS). This number may be different for each module on the system. (Maximum of 12 Sensors)
- Once the monitor has communicated with each module line 1 will display **PASSED**. (Diagram 5)

If there are blockage modules that the monitor is unable to communicate with, then the number of sensors displayed for those modules will be blanked out. If this condition persists for numerous attempts by the monitor, an alarm will occur and **BLK ERR** will be displayed on line 1. (Diagram 5) **BLK ERR** being displayed indicates a blockage module communication failure. The module number where the communication failure has occurred will be displayed on line 2. (Diagram 6) This fault is probably caused by an improper connection of the 3-wire system, or is a result of one or more modules having an incorrect address switch setting. See Assembly Section "Blockage Module".

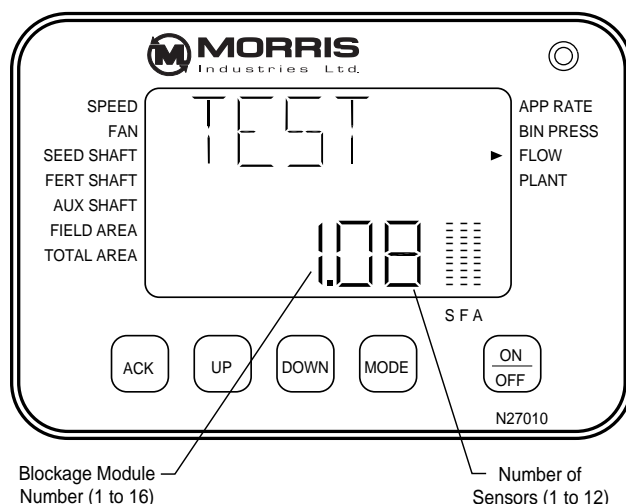


Diagram 4

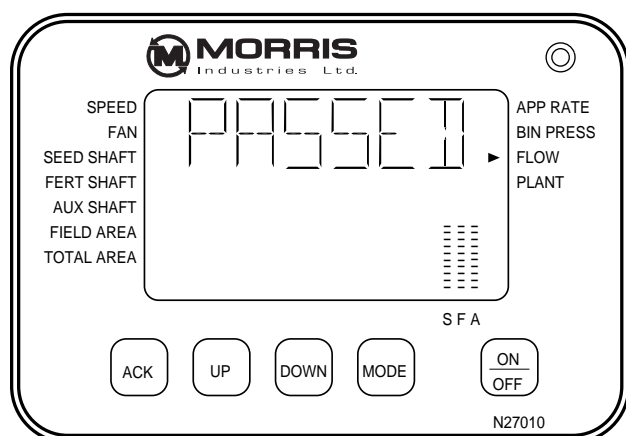


Diagram 5

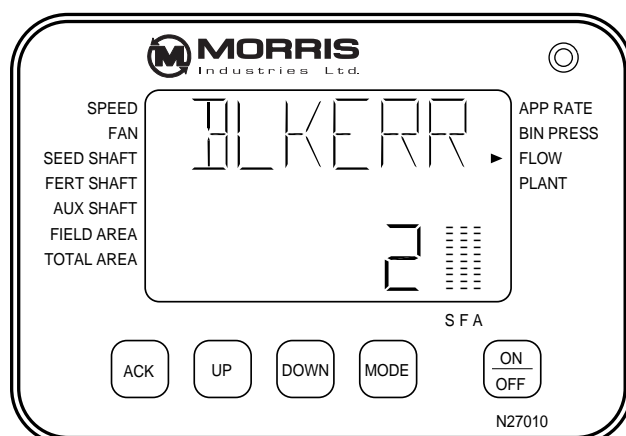


Diagram 6

Blockage

Flow - Pin Sensors - Continued

Calibration Mode

Calibration mode is used to measure the typical seed flow rate as determined by seed type and the Air Cart settings (i.e. metering rate, fan rpm etc.). The blockage module determines a calibration value and uses it to determine when a run has blocked.

Note: Calibration must be done whenever the seeding rate or the seed type is changed

- Use the UP or DOWN button to move the triangle icon to FLOW. (Diagram 4)
- Hold the ACK button until 4 short beeps and 1 long beep sounds. Release button after the long beep.
- **TEST** or **PASSED** will be displayed on line 1.
- Begin normal seeding. When the ground speed is greater than 2 m.p.h. (3 kph), calibration begins with **CAL** being displayed on line 1 (Diagram 7) accompanied by a double beep.

Note: There is a 30 second delay to prevent nuisance alarms occurring.

- Line 2 display will cycle through the blockage module numbers displaying which runs have **not yet calibrated**. (Diagram 7)
- When all runs on a module have calibrated line 2 will display the blockage module number and – for the sensors. (Diagram 8)
- When all modules have calibrated, the monitor will beep rapidly several times and display **CAL OK** on line 1. (Diagram 9)
- Exit calibration mode by depressing the ACK button.

Note: Do not exit calibration mode prematurely as any sensors that have not yet been calibrated will generate flow errors.

If it is desired to exit calibration mode prematurely and enter the operation mode, depress the ACK button, until 4 short beeps and 1 long beep sounds. Release button after the long beep.

Important

CALIBRATION must be done each time the seeding rate or the seed type is changed.

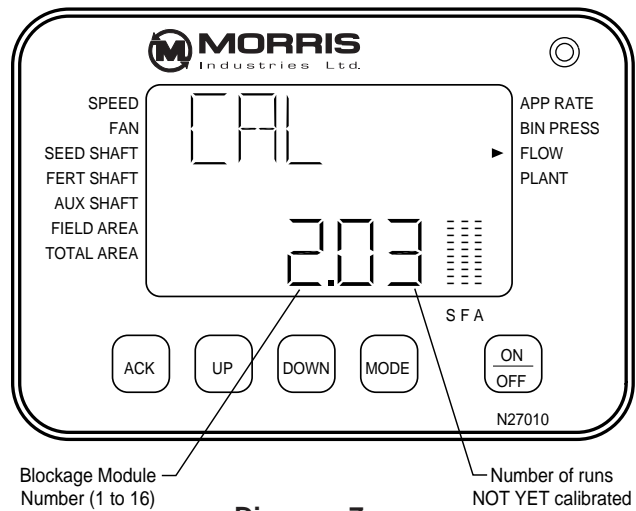


Diagram 7

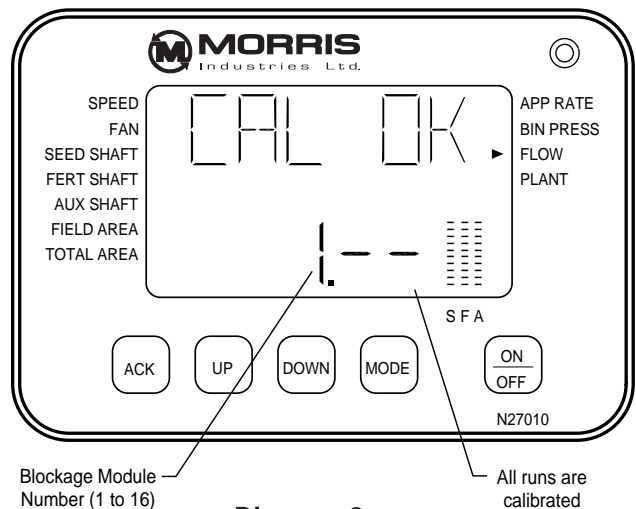


Diagram 8

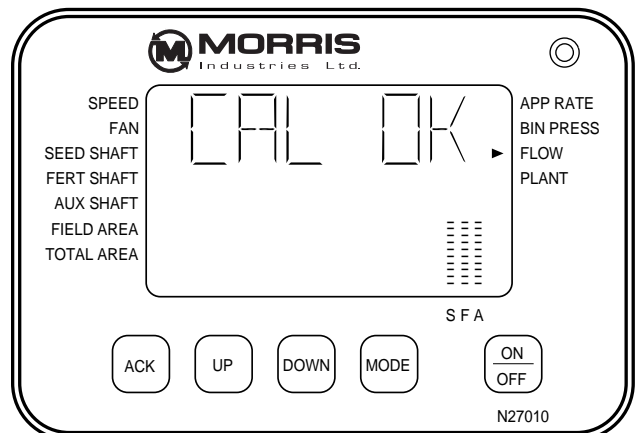


Diagram 9

Flow (Pin Sensors) - Continued

Calibration Mode - Continued

Calibration should be completed in approximately two to three minutes of continuous seeding. Any runs that have not calibrated in this time may be blocked and should be cleared. Calibration is suspended when the ground speed is less than 2 m.p.h. (3 kph). This allows the Air Cart to be stopped to clear blocked runs. The calibration procedure will resume when ground speed goes above 2 m.p.h. (3 kph).

Runs that do not calibrate will give flow alarms when normal operation is started, except when all runs for a module do not calibrate. In this special case the module assumes that all of its runs have been intentionally disconnected, so no alarms are required. This feature is useful when an entire section of an Air Cart is not being used.

All calibration data is stored until the next calibration is done (even with power disconnected). This means that if the same conditions are used for seeding, re-calibration is not required.

Operation Mode

This is the normal mode of flow monitoring. Now, while the implement is in motion, the monitor will poll each blockage module for the status of its runs.

Note: This will occur regardless of which function on the monitor is presently displayed.

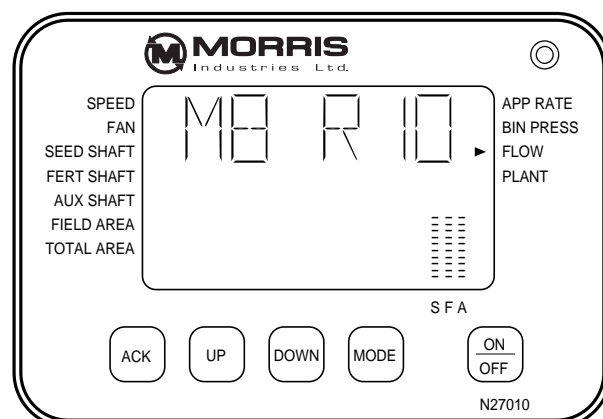
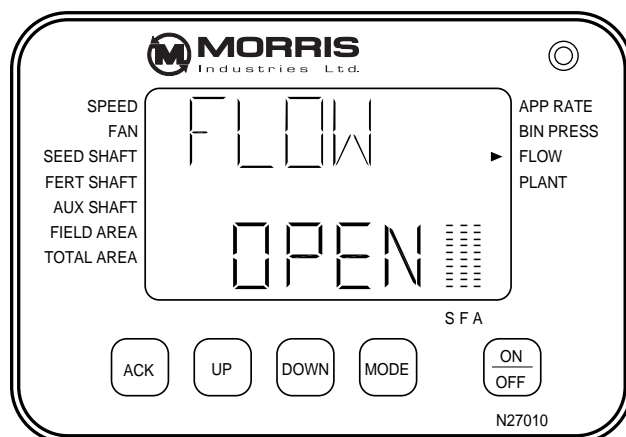
When a blocked run is detected, an audible alarm will sound and an alarm message will be displayed. These will persist until either the alarm is acknowledged using the ACK button or the alarm condition is removed.

When the FLOW function is active, the display will be one of the following:

- FLOW OFF** Indicates the system is set for zero blockage modules connected.
- FLOW OPEN** Indicates that all runs are clear.
- Mmm Rrr** Indicates which runs are blocked. (See Alarms)
- BLKERR** Monitor cannot communicate with one or more modules. (See Alarms)

Note: In double Shoot system sensors in same Module can be installed in seed and fertilizer lines and calibrated for different material flows at same time.

Note: If nuisance alarms occur change the sensitivity of the sensors by recalibrating.



Blockage

Flow - Optical Sensors

Introduction

The module should be mounted near the location of the sensors to minimize the length of cable between the sensors and the module.

The module should be bolted to a grounded metal surface. There should be a good ground path from the case of the module to the cultivator frame. Mounting the module on an air cart is not recommended. If the module must be mounted on an air cart, a ground wire should be run from the case of the module to the cultivator frame.

Optical Blockage Module Setup

The optical blockage module setup mode is different from the norm. The first screen allows the user to select which path to execute. The Install path is selected by choosing "Y" by pressing the UP arrow and then pressing MODE to advance to the next screen. The Setup path is selected by choosing "N" by pressing the DOWN arrow and then pressing MODE to advance to the next screen.

When the runs are connected to the optical blockage module, they must be connected in order - 1, 2, 3, ... Do not skip any runs. When a 8 is entered as the number of runs connected to the blockage module, run numbers 1 to 8 will be monitored.

Note: Once the module is mounted, it must be learned by the monitor. See the "System Installation".

Important

CALIBRATION must be done each time the seeding rate or the seed type is changed.

Note: It is highly recommended that the Install path is programmed first and then the Setup path.

Install			
Display 1	Function	Limits	Comments
MmmR--(*)	Number of runs connected to module number 1	0 to 16	Default number of runs is 16. MODE advances to the next module. If module is not connected, this number is not used in the monitor.

(*) mm is the module number. Its range is from 1 to 12.

Setup			
Display 1	Function	Limits	Comments
RUN	Enable/Disable individual runs in the system.	1 to the number of runs in the system.	UP/DOWN selects the RUN. The ACK key toggles between enabling and disabling an individual run. Mode advances to the SAVE screen. Default state of the runs: Enabled.

Flow (Optical Sensors) - Continued

Flow Function

The FLOW function indicates the status of Flow Monitoring based on information from the Blockage Modules. Line 1 will display FLOW. Line 2 will indicate "OPEN" when all monitored runs are clear. When runs are blocked, it will display in cyclical fashion, all blocked runs. See also the section on flow alarms.

The FLOW function supports two special modes, TEST and CALIBRATE.

Flow Test

This test will inform the user as to how many "good" optical sensors are connected to each module.

At the end of the test, ACK may be pressed to return to normal mode, or the user may start planting and the Calibration will automatically begin.

At any time during this test, ACK may be pressed and held until after the long beep to exit the Flow Test Mode.

Important

***CALIBRATION* must be done each time the seeding rate or the seed type is changed.**

Test		
Step	Action	Desired Result (Actual)
1	Stop the implement.	Do not move the implement, or run any seed, during the Flow test.
2	On the FLOW screen, press and hold the ACK key for 5 seconds.	TEST should be shown on line 1. Line 2 will cycle through the module numbers.
3	Wait	This may take a few minutes, depending on configuration and application. Should hear 4 short beeps and the screen should display "TST OK" on line 1. The bottom line will cycle through the various modules connected and display, for that module, the number of " good " sensors connected to it. The format of this display is MMr:RR, where MM is the number of the module being reported and RR is the number of valid runs connected to this module. These numbers should correspond to the actual number of sensors connected to the modules.
4	Press ACK	Monitor should revert to FLOW OPEN.

Blockage

Flow (Optical Sensors) - Continued

Flow Function - Continued

Flow Calibration

In calibration mode, the module determines the normal seed flow rate for each run. This calibrated flow rate is used to determine the threshold for indicating that a run is blocked. The calibration mode must be started by command from the monitor as follows:

At any time during this test, ACK may be pressed and held until after the long beep to exit the Flow Test Mode.

Calibration		
Step	Action	Desired Result (Actual)
1	Have the cart "in motion".	Should hear a double beep as the "in motion" boundary is crossed.
2	On the FLOW screen, press and hold the ACK key for 5 seconds.	CAL should be shown on line 1. Line 2 will cycle through the runs that haven't been calibrated yet.
3	Operate the cart in planting conditions.	As material flows through each tube all modules attempt to calibrate their sensors. Should hear 4 short beeps and the screen should display "CAL OK" on line 1 and "--" on line 2. This may take a few minutes, depending on configuration and application.
4	Press ACK	Monitor should revert to FLOW OPEN.

Alarms

Sensor Alarms

Flow (Blockage Module) Alarms

Regular Blockage Module Alarms - Pin Sensors

If a flow blockage occurs, a fault message 'FLOW' appears on line 1. (See Diagram 11) The operator must select the FLOW function to see the error.

There are two types of flow alarms. There can be seed flow alarms or communication error alarms.

The format for the seed flow alarms is 'MxxRyy'. (See Diagram 12) The 'M' indicates module and the 'xx' represents the blockage module number. The 'R' indicates run and the 'yy' is the seed run that has a blockage.

The format for the communication error alarms is **BLK ERR** will be displayed on line 1. (Diagram 13) The module number where the communication failure has occurred will be displayed on line 2. (Diagram 13) This fault is probably caused by an improper connection of the 3-wire system, or is a result of one or more modules having an incorrect address switch setting.

If communication errors are occurring and no blockage modules are connected, the monitor must be programmed to disable the flow monitoring function. This is done by setting the Blockage Module complement equal to zero.

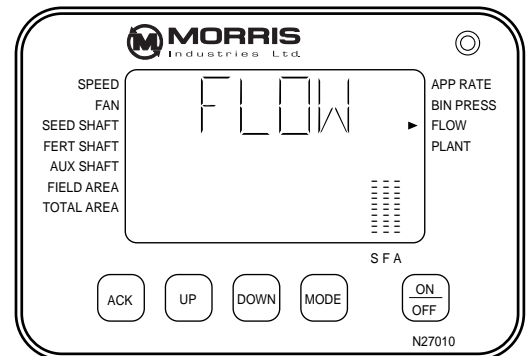


Diagram 11

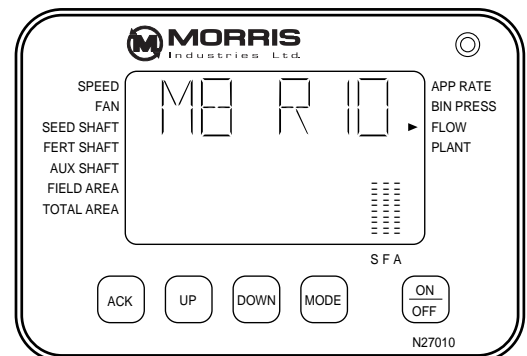


Diagram 12

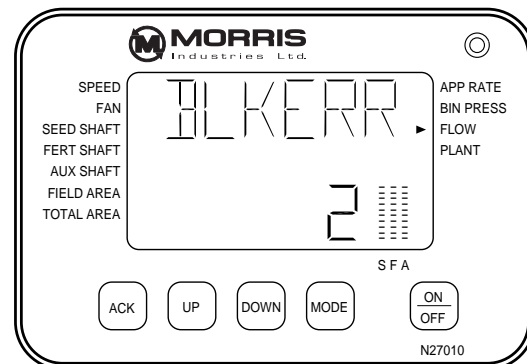


Diagram 13

Blockage

Alarms - Continued

Sensor Alarms - Continued

Optical Blockage Module Alarms

If the run does not pass the self-test mode, the blockage module will reports that run is bad. Sometimes this will happen if there is too much light shinning in the seed tube where the run sensor is positioned. This alarm by itself does not mean that the sensor is not working correctly.

During planting, if the blockage monitor does not see any seeds from a run sensor, it will report to the monitor that the run is blocked.

If a run is reported to be bad and blocked at the same time, the monitor will alert the user by saying “*BLOCK”. If the run is in this condition and the run is not blocked, and there are seeds flowing in that tube, that means that the sensor is not working. It should then be replaced.

The alarms can be silenced with the ACK key.

Optical Blockage Alarms		
Blockage module alarm		Meaning
Line 1	Line 2	
BAD	Run number (*)	Run failed self-test. May be due to too much light getting in the tube.
BLOCK	Run number (*)	The sensor has stopped seeing seeds. Clean out the blockage.
BLOCK	Run number ()	The sensor failed self-test and has stopped seeing seeds. If there is no blockage in the tube, the sensor may have stopped working properly.

(*) the numbering of the runs begins with module 1 and continues on through the last module.

Section 6: Trouble Shooting

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Trouble Shooting

Sensor Replacement

The monitor will alarm the operator if there is a faulty sensor in the system.

To replace the faulty sensor, the replacement sensor is plugged into the harness **prior to turning on the monitor**. When the power is turned on, the monitor will learn the new sensor in replace of the faulty sensor.

Note: This procedure will work when there is only one faulty sensor in the system.

When there is **more than one faulty sensor** in the system the installation of the replacement sensors is handled differently.

The monitor is turned on with nothing connected at the faulty sensor locations. The monitor will tell the operator what sensor should be attached to the harness. When it is attached the monitor will recognize it and then ask for the next sensor to be attached. This continues until all the replacement sensors have been attached.

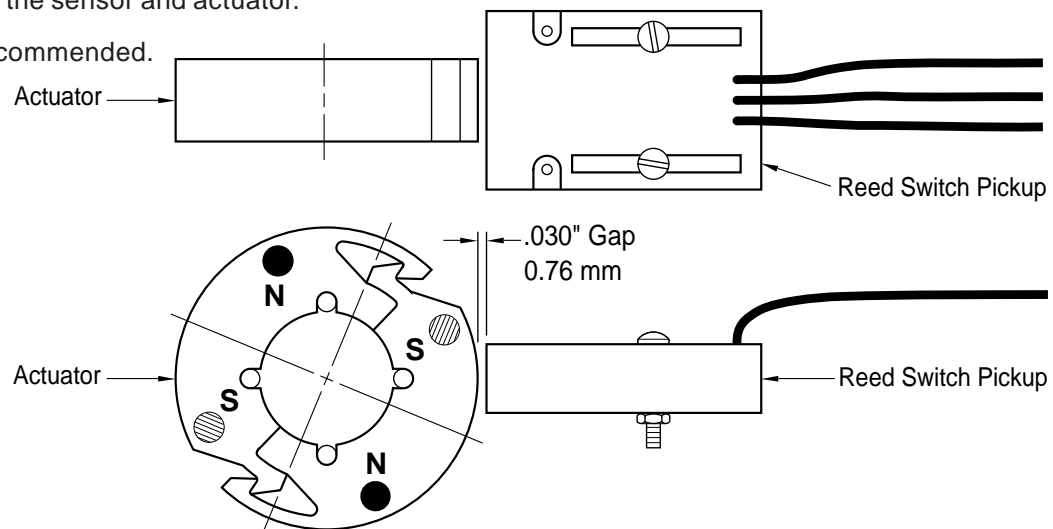
Sensor Gap Settings

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 is recommended.

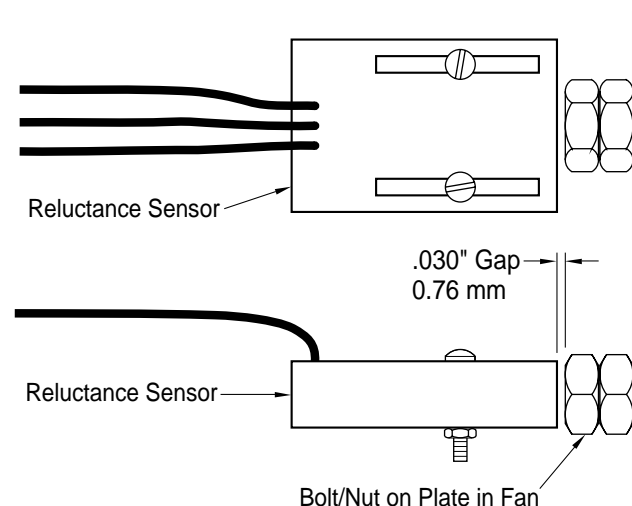


Variable Reluctance Sensors

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 is recommended.



Sensor Gap Settings - Continued

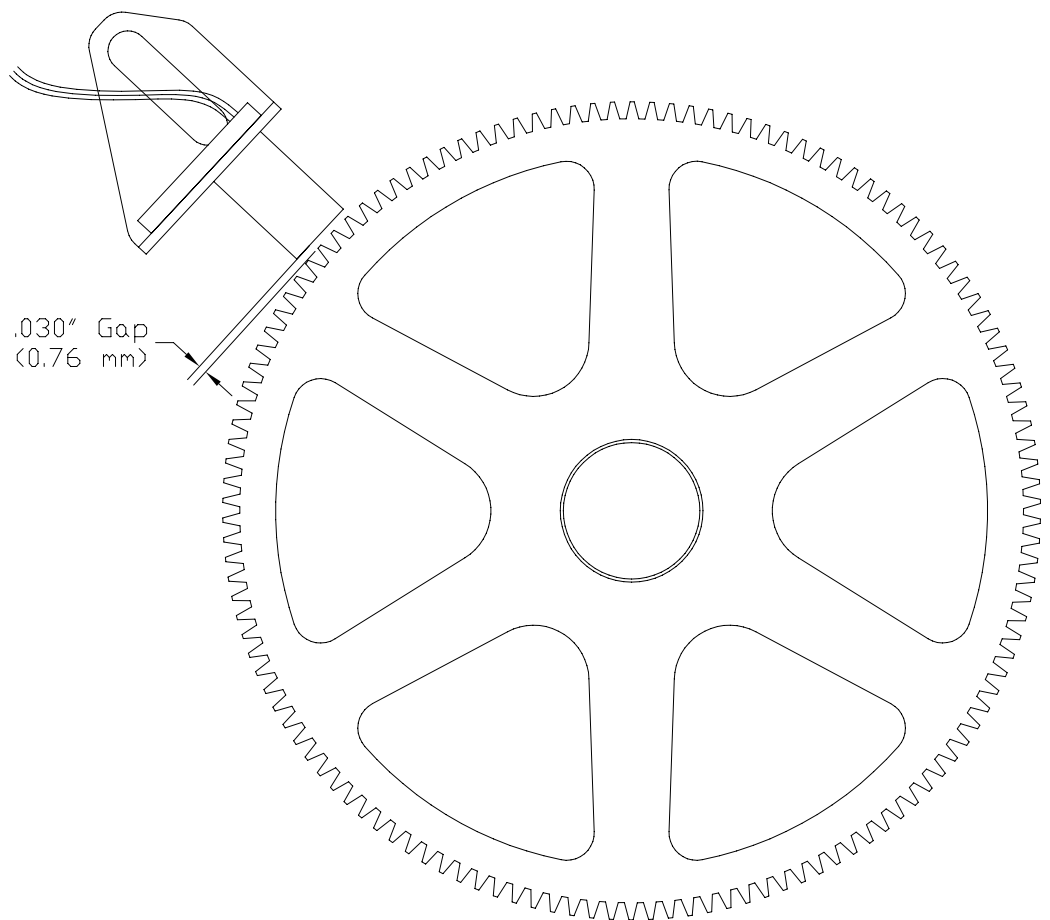
Hall Effect Sensors (VRT Drive)

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

Sensor wheel to sensor gap and position is critical with these sensors.

A gap of .030 inch is recommended.

The sensor must be centred on the sensor wheel.



Trouble Shooting

Trouble Shooting Guides

Most electronic problems are usually one of the following:

- Harness connections.
- Harness to sensor 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 outlined under “*Communication Alarms*” and “*System Error Alarms*”.

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.
- Take the connector shells off to see if any wires have worked loose.

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.

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

Checking Blockage Modules

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 or Blockage Module.

Note: Seed or material dust on the sensor may prevent the sensor from accurately sensing seed hits. The sensor pin may be cleaned using a sharp knife and gently scraping away the caked on material.



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