The *Vanguard System*

Table of Contents

The *Vanguard System*

List of Illustrations

The Vanguard System

INTRODUCTION

A. SYSTEM OVERVIEW

The VANGUARD Precision Information Center™ uses the latest microprocessor-based technology to take the guesswork out of the planting operation. Any time seeds are not going to the ground at the correct rate or another error condition occurs, an alarm is sounded and a message and row number, if appropriate, are displayed.

Precision Information Center™ offers new features such as greatly improved seed counting accuracy, simplified harnessing, advanced error diagnostics, and seed singulation when used with the new Seed Smart™ sensors. It is also compatible with the DICKEY-john Standard and Hi-Rate seed sensors.

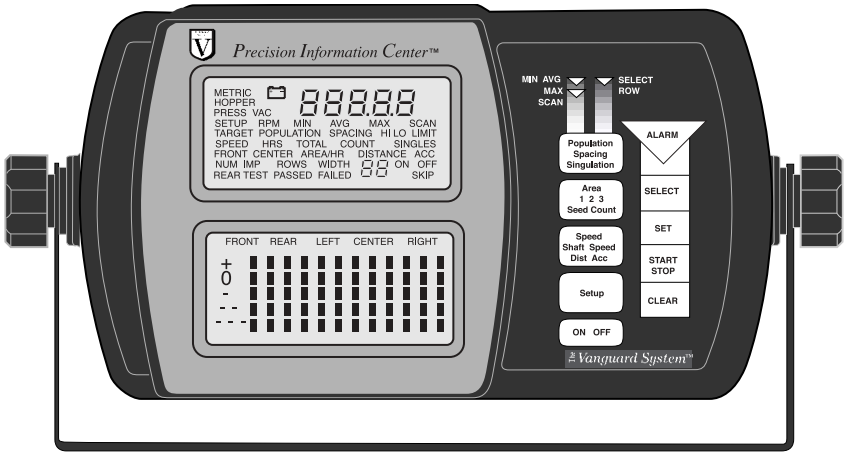
Additional features include a bargraph presentation of row-to-row planter performance, high and low population warnings, faster population updates, and the ability to disable individual row sensors from the monitor. An RS-232 interface is available for precision farming applications.

The Precision Information Center™ can monitor up to 36 rows. It stores planter configuration data and accumulated operational data in nonvolatile memory, retaining information even when disconnected from the tractor battery.

Figure 1 shows the Precision Information Center™ console. It consists of two custom Liquid Crystal Displays (LCDs) and twelve membrane switches. The top LCD display shows messages for the

Figure 1

VANGUARD Precision Information Center™ Console



selected Operate Mode function, Setup Mode constant, or Alarm Mode identifier and the value on a 5-digit numeric display. A 2-Digit numeric display identifies the row. The bottom LCD displays graphically the relative populations of 12 rows simultaneously. Larger planters have row groups displayed on a time-shared basis.

B. SWITCH OVERVIEW

The switches are used to control system power, select the mode of operation, and enter planter configuration constants. To help distinguish between switch names and display messages in the text of this manual, switch names are always shown in italicized print. An overview of the switches follows:

1. *ON•OFF*

Pressing this switch applies power to the monitor. Upon power up, the monitor performs internal diagnostic checks, illuminates all segments of the LCDs, sounds the alarm, and determines what type of seed sensor harness is connected. Depressing the *ON•OFF* switch for at least one second causes the monitor to power down.

2. *ALARM*

Momentarily pressing this switch silences the alarm and acknowledges the alarm condition. Additionally, holding the switch pressed for more than one second allows the volume level of the alarm to be adjusted. As the switch is held pressed, the alarm sounds continuously and the volume level slowly decreases to a minimum, then increases to a maximum. Releasing the switch establishes the desired volume level.

3. *SETUP*

This switch is pressed for one (1) second to enter the Setup Mode and to step from one Setup constant to the next as detailed in the SETUP chapter.

4. *MIN-AVG-MAX•SCAN*

This switch is pressed to toggle between the MIN-AVG-MAX and SCAN options for the function selected by the *Population• Spacing•Singulation* switch.

5. *SELECT ROW*

Pressing this switch while in the Population, Spacing, or Singulation functions freezes the upper LCD display on the current row data. Successive depressions then cause stepping from one row to the next. In the Setup Mode, this switch allows stepping through the rows while entering Row Status.

6. *SELECT, SET,* and *CLEAR*

These switches are used to change constants in the Setup Mode as explained in the SETUP chapter. The *CLEAR* switch is also used in the Operate Mode to reset the area and distance accumulators and the Run Hours function.

7. *START•STOP*

This switch is used in the Operate Mode Seed Count and Distance Accumulator functions. In the Setup Mode, it is used for the Distance Calibration and the Sensor Self-Test.

OPERATE MODE

A. OPERATE MODE

Performance of the following Operate Mode functions assumes the console has been properly installed and setup as detailed in the INSTALLATION and SETUP chapters respectively. Figure 2 lists all Operate Mode functions and shows which are available in the Speed-Area Mode, defined later. Notice this list includes all the function names on the three Operate Mode switches (*Population • Spacing • Singulation, Area • Seed Count,* and *Speed • Shaft Speed • Dist Acc*) plus the Run Hours function, which is performed automatically.

1. Run Hours

This is defined as the total number of accumulated hours, in 0.1 hour increments, the monitor has been powered. Run Hours are not accumulated during an All ROWS FAILED condition or if a lift switch is installed and the implement is in the up position. The Run Hours total is displayed for five (5) seconds immediately following the power up sequence. The *Setup* switch or any of the three Operate Mode switches can be pressed during the display of Run Hours to advance immediately to the desired function. Otherwise, the Population function is automatically selected. To zero the accumulated Run Hours, press the *CLEAR* switch for one (1) second while Run Hours are displayed. Figure 3 shows Run Hours of 47.5.

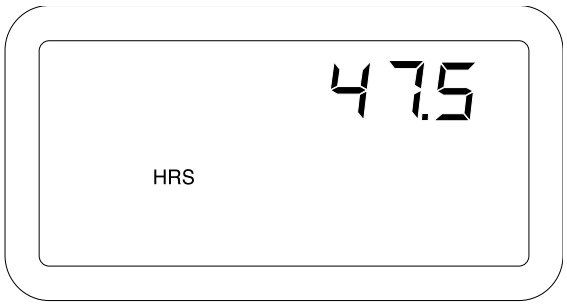
Figure 2

Operate Mode Functions

OPERATE Mode FUNCTION Name	*Available in SPEED-AREA Mode*
Run Hours	*Yes*
Population	*No*
Seed Spacing	*No*
Singulation	*No*
Area Accumulator 1	*Yes*
Area Accumulator 2	*Yes*
Area Accumulator 3	*Yes*
Seed Count	*No*
Speed	*Yes*
Shaft Speed	*Yes*
Distance Acc	*Yes*

Figure 3

Run Hours Display



2. Population

This is the amount of seeds, in thousands of seeds per acre (hectare), planted in a given row based upon the most recent sampling of the seeding rate for that row. The Population function is selected automatically upon power up or by pressing and releasing the *Population • Spacing • Singulation* switch until the POPULATION message appears on the display.

a. Population SCAN

This displays the population of each row for two (2) seconds, then advances to the next row. After the last row population is displayed, the average planter population (for all rows) is displayed, identified by the AVG message. SCAN is selected automatically upon power up or by pressing the *MIN-AVG-MAX • SCAN* switch until the SCAN message is displayed while in the Population function. Figure 4 shows a population of 158,400 seeds/acre on row 9 while in Population SCAN.

Figure 4

Population SCAN Display

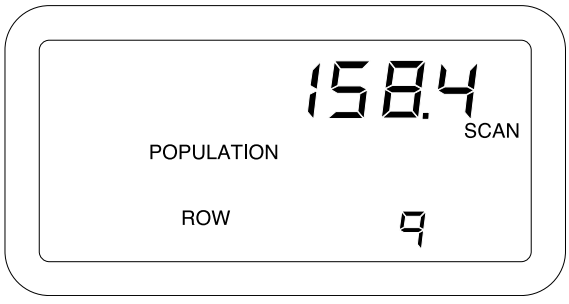
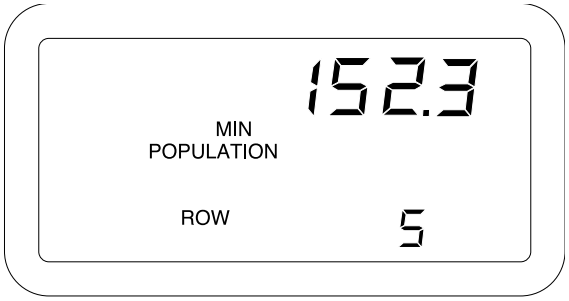


Figure 5

Population MIN-AVG-MAX Display



b. Population MIN-AVG-MAX
This displays the planter row with the minimum population, the average planter population, and the planter row with the maximum population in cyclic fashion, dwelling on each for three (3) seconds. This option is selected by pressing the *MIN-AVG-MAX•SCAN* switch while in the POPULATION function. Figure *5* shows a minimum population of 152,300 seeds/acre on row *5*.

c. Population SELECT ROW
Depressing the *SELECT ROW* switch while in either SCAN or MIN-AVG-MAX freezes the population display on the current row or the planter average. Pressing the *SELECT ROW* switch again causes the display to advance to the next planter row. (It will not step through the MIN-AVG-MAX sequence if previously in Population MIN-AVG-MAX.) Figure 6 shows a population of 157,400 seeds/acre on row 12 while in Population SELECT ROW.

Figure 6

Population SELECT ROW Display

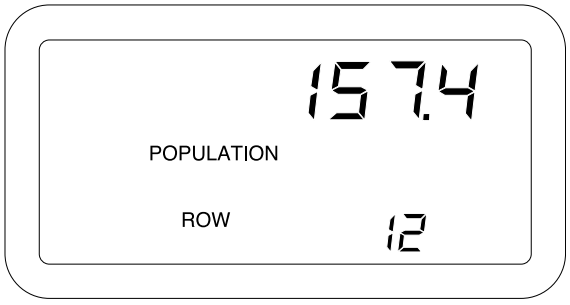
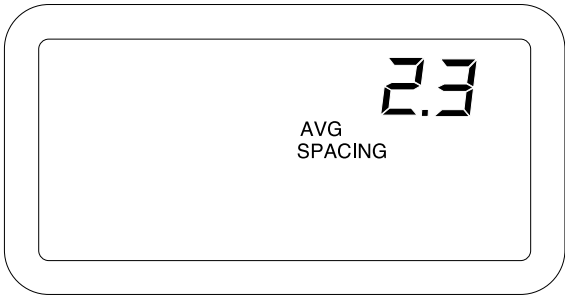


Figure 7

Seed Spacing Display



3. Seed Spacing

This is the calculated average spacing between seeds in the furrow, in inches (centimeters). The resolution is in tenths of an inch (centimeter). This function is selected by pressing and releasing the *Population • Spacing • Singulation* switch until the SPACING message appears on the display. The SCAN, MIN-AVG-MAX, and SELECT ROW options for displaying seed spacing data are selected in the same manner as for the POPULATION function. Figure 7 shows a planter average seed spacing of 2.3 inches between seeds.

4. Singulation

Seed singulation is the ratio of the number of seed singles (occurrences of single seeds dropped) to the total number of seeds dropped and is displayed as a percentage. This function is available only if the Seed Smart™ sensors are used. It is selected by pressing and releasing the *Population • Spacing • Singulation* switch until the % SINGLES message appears on the display. The SCAN, MIN-AVG-MAX, and SELECT ROW options for displaying seed singulation data are selected in the same manner as for the POPULATION function. Figure 8 shows

Figure 8

Seed Singulation Display

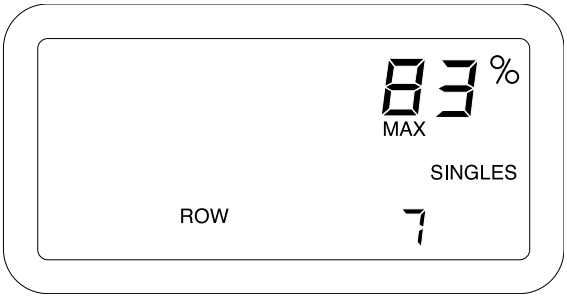
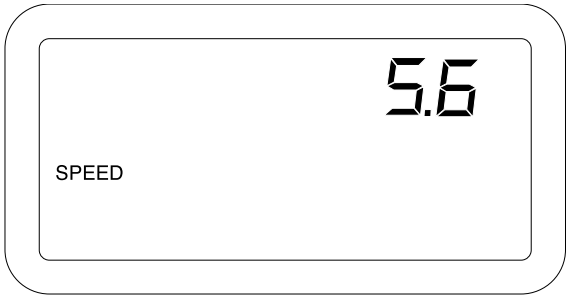


Figure 9

Ground Speed Display



a seed singulation of 83% for row 7 while in MIN-AVG-MAX.

5. Speed

This is the ground speed in MPH (Km/h), with 0.1 resolution, as measured by the ground speed sensor. This function is selected by pressing and releasing the *Speed • Shaft Speed • Dist Acc* switch until the SPEED message appears. The ground speed sensor can be either radar, Hall Effect, or reluctance type. Figure 9 shows a ground speed of 5.6 MPH.

6. Shaft Speed

This is the rotational speed of any shaft the user wishes to monitor. A Hall Effect or reluctance type sensor senses a multi-toothed gear mounted on the shaft, to a resolution of 1 RPM. Typically a shaft driving the planter mechanism is monitored. This function is selected by pressing and releasing the *Speed • Shaft Speed • Dist Acc* switch until the RPM message appears. Figure 10 shows a shaft speed of 53 RPM.

Figure 10

Shaft Speed Display

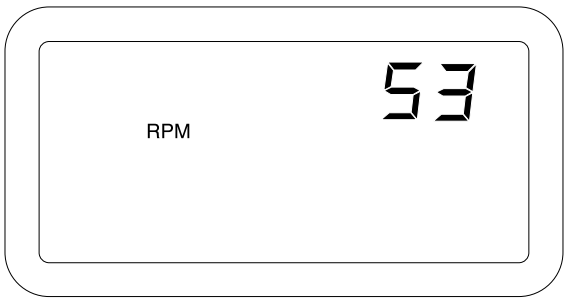
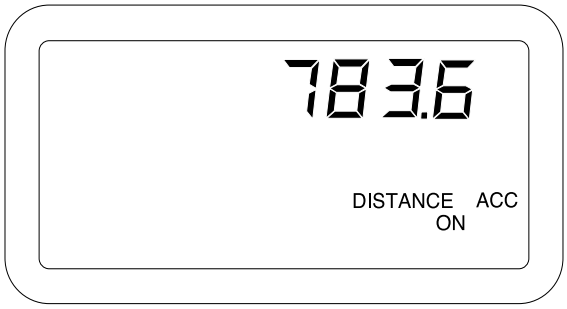


Figure 11

Distance Accumulator Display



7. Distance Accumulator

This function is used to measure distances in feet (meters), with 0.1 resolution. It can only be used after the Distance Calibration Constant has been accurately established (See the SETUP chapter for details). This function is selected by pressing and releasing the *Speed • Shaft Speed • Dist Acc* switch until the DISTANCE and ACC messages appear on the display.

The procedure for measuring a distance with this function is as follows: Press the *START • STOP* switch to start the measurement, then press it again to stop. The ON and OFF messages on the display indicate whether the distance accumulator is running or stopped. To zero the distance accumulator, press the CLEAR switch for at least one second. When a total of 9999.9 feet (meters) is exceeded, the accumulator rolls over to zero (0).

Any other Operate Mode function can be selected while the distance accumulator is running without affecting that other function. Figure 11 shows a running distance accumulator with 783.6 feet measured.

8. Area Accumulator 1

This is intended to be used as a field area accumulator, displaying acres with 0.1 resolution (hectares with 0.01 resolution). The area calculations are based on the IMPlement WIDTH and distance traveled. Area does not accumulate during an All ROWS FAILED condition, i. e., when the planter is raised.

This function is selected by pressing and releasing the *Area • Seed Count* switch until the AREA message appears and a "1" is shown in the lower, right corner of the display. Area Accumulator 1 is reset by pressing the *CLEAR* switch for at least one second. When a total of 9999.9 acres (999.99 hectares) is exceeded, the decimal point shifts to the right one place. When a total area of 99999 acres (hectares) is exceeded, it rolls over to zero (0). Figure 12 shows Area 1 Accumulator with 1674.3 acres.

Figure 12

Area Accumulator 1 Display

9. Area Accumulator 2

Area Accumulator 2 can be used as a second field area accumulator or to monitor seed or fertilizer usage. Operation is identical to that of Area Accumulator 1 described above. This function is selected by pressing and releasing the *Area • Seed Count* switch until the AREA message appears and a "2" is shown in the lower, right corner of the display.

10. Area Accumulator 3

This is intended to be used as a total area accumulator, for example, for season totals. Operation is identical to that of Area Accumulators 1 and 2 except the *CLEAR* switch must be held depressed for at least three (3) seconds to reset. This function is selected by pressing and releasing the *Area • Seed Count* switch until the TOTAL and AREA messages appear and "3" is shown in the lower, right corner of the display. Figure 13 shows an area of 4830.9 acres for Area Accumulator 3.

Figure 13

Area Accumulator 3 Display

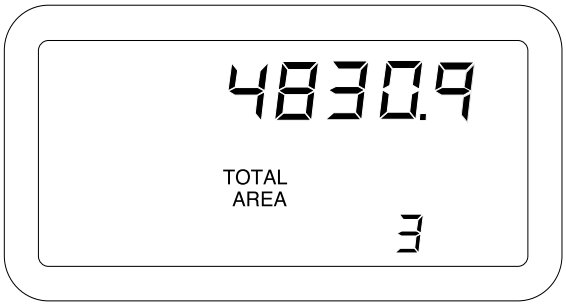
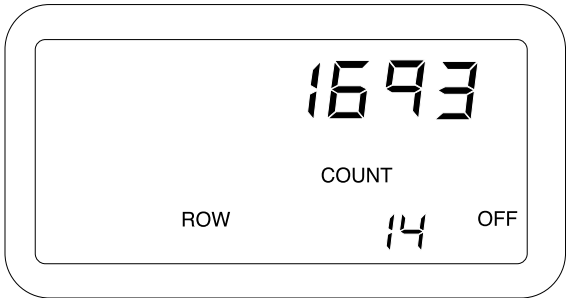


Figure 14

Seed Count Display



11. Seed Count

This function is used to count the number of seeds passing through each seed sensor. It is selected by pressing and releasing the *Area • Seed Count* switch until the COUNT message appears.

Press the *START • STOP* switch to start the measurement, then press it again to stop. The ON and OFF messages on the display indicate the Seed Count function status. To zero the accumulated seed count on the selected row, press the *CLEAR* switch until a beep occurs (about one second). To zero the seed count for all rows, press *CLEAR* for at least three (3) seconds. When a total of 99999 is exceeded, the count rolls over to zero (0). Depress the *SELECT ROW* switch to advance the display to the next row.

Any other Operate Mode function can be selected while Seed Count is running without affecting that other function. Figure 14 shows a stopped seed counter with 1693 seeds counted on row 14.

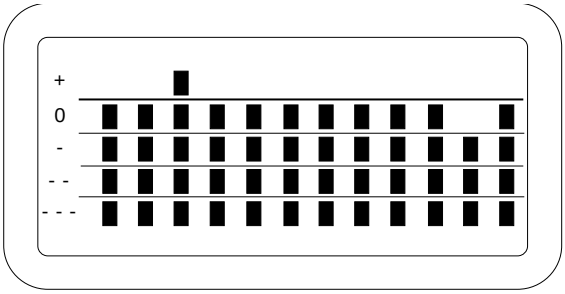
B. SPEED-AREA MODE

The Speed-Area Mode is used to monitor non-planting operations like cultivating. Only the Speed, Area, Shaft Speed, and Distance Accumulate functions are available in this mode. Figure 2, at the beginning of this chapter, shows this function availability in chart form. The console display for these functions is identical in the Speed-Area and Operate modes.

Enter the Speed-Area Mode as follows: A lift switch (Implement Status switch) must be connected and no seed sensors connected. Disconnect the planter harness at the tractor hitch. Power down, then power up the console. The alarm will sound momentarily and an "E 064" (no sensors connected) error code will be displayed. Press the *Speed • Shaft Speed • Dist Acc* or the *Area • Seed Count* switch, depending on which Speed-Area Mode function is desired.

Figure 15

12 Row Planter Bargraph Display



To accumulate Area in the Speed-Area mode, the lift switch must indicate the implement is down. Run Hours accumulate only when the implement is down. The Distance Accumulate function is independent of the lift switch status. It depends on pressing the *START•STOP* switch only.

C. POPULATION BARGRAPH

The bottom LCD displays the relative populations of up to 12 rows simultaneously, using a 5-segment, vertical bargraph for each row. The IMPlement Type Configuration parameter entered in the Setup Mode establishes the bargraph display arrangement used for each specific implement type.

The bottom segment of each row bargraph, marked "- - -", is always illuminated if a sensor for that row is present. The same segment also flashes during a ROW FAILED condition. Figure 15 represents a 12 row planter with all rows planting within 5% of the average planter population with two exceptions. Row 3 is planting over 105% of average and row 11 is planting between 86% and 95% of average.

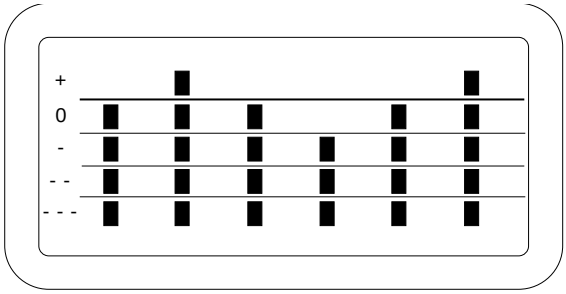
Figure 16

Bargraph Segment Turn-On Levels

Bargraph Segment	*Segment Turns on if Row Population is*
+	*>105%*
0	*>95%*
-	*>85%*
- -	*>75%*
- - -	*>0%*

Figure 17

6 Row Planter Bargraph Display



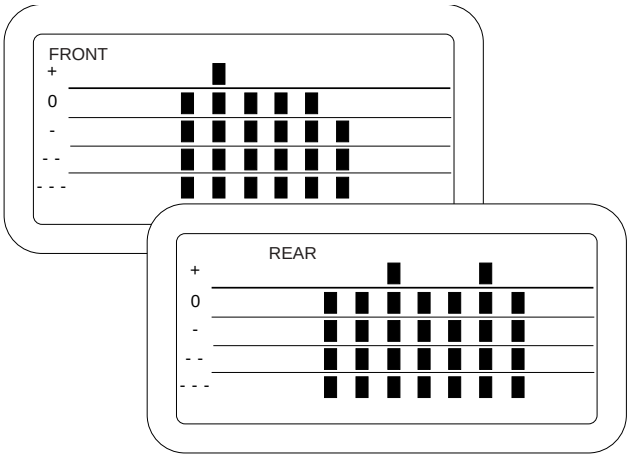
The zero (0) reference is established by the average population of all non-failed and active rows. Figure 16 defines the points at which the bargraph segments turn on, using the average population as reference.

For planters having less than 12 rows, the vertical bars representing the planter rows are spaced to use the full display width. For example, a 6-row planter is shown as in Figure 17.

For planters having more than 12 rows, the messages FRONT, REAR, LEFT, CENTER, and RIGHT are illuminated to identify the row group represented by the bargraph display at any given time. Each group is displayed for six (6) seconds. Figure 18 shows both bargraph displays for a split-row planter having six (6) FRONT rows and seven (7) REAR rows respectively.

Figure 18

13 Row Planter Bargraph Displays



SETUP MODE

A. CUSTOMER SETUP PARAMETERS

Additional parameters must be entered in the Customer Setup Mode to complete setup of the console. This mode is used to specify the types of ground speed and shaft speed sensors used, enable or disable hopper level sensors, and identify the software version.

The Customer Setup Mode is entered by holding the *Setup* switch depressed while powering on the console and continuing to hold it depressed until the Display Test begins. A flashing SETUP message indicates the console is in the Customer Setup Mode.

Additional messages uniquely identify the parameter displayed and available for editing. Use the *SELECT, SET,* and *CLEAR* switches as described previously to enter or change parameters. Also, press *Setup*, as before, to store the value and advance to the next parameter. To exit the Customer Setup Mode, power off the console.

Figure 19 shows the Customer Setup parameters, in the order of their presentation. As before, record all parameter values on the SETUP RECORD sheet on the last page of this manual, immediately after console entry. Definitions and considerations when entering values for each parameter are as follows:

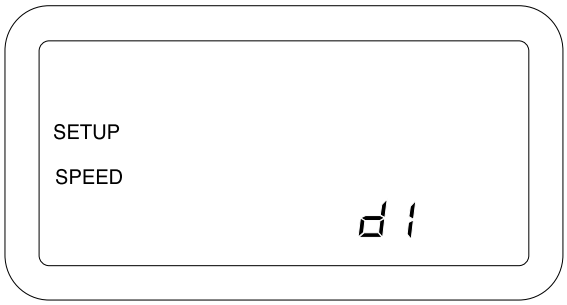
Figure 19

Customer Setup Parameter Chart

Order	CUSTOMER SETUP Mode PARAMETER Names
1	Ground Speed Sensor Type
2	Shaft Speed Sensor Type
3	Hopper Level Sensor 1 Enable
4	Hopper Level Sensor 2 Enable
5	Boot Version Number
6	Flash Version Number

Figure 20

Ground Speed Sensor Type Display



1. Ground Speed Sensor Type
This parameter allows choosing between a digital (radar or Hall Effect) type or reluctance type ground speed sensor. This parameter is identified by the message SPEED and a flashing SETUP message.

Pressing the *SET* switch causes the lower, right display to toggle between a flashing "d1" or "r1". If a digital (radar or Hall Effect) type ground speed sensor is used, press the *SET* switch until "d1" appears. If a reluctance type ground speed sensor is used, press the *SET* switch until "r1" appears. Figure 20 shows a digital type ground speed sensor selected.

2. Shaft Speed Sensor Type
This parameter allows choosing between a digital 1, digital 2, reluctance 1, or reluctance 2 type shaft speed sensor. This parameter is identified by the message RPM and a flashing SETUP message. Pressing the *SET* switch causes stepping between "d1, d2, r1, and r2" flashing on the lower, right display. The shaft speed sensor type used is clearly labeled on the sensor cable. Figure 21 shows a reluctance 2 type shaft speed sensor selected.

3. Hopper Level 1 Sensor Enable
This parameter enables or disables the DICKEY-john Hopper Level 1 Sensor. It is identified by the message HOPPER, a

Figure 21

Shaft Speed Sensor Type Display

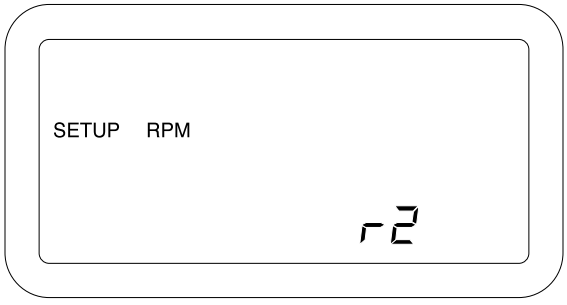
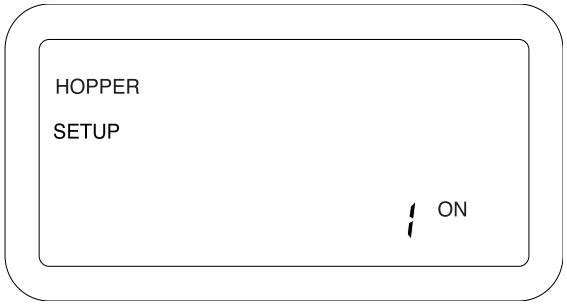


Figure 22

Hopper Level Sensor Display



"1" on the lower, right display, a flashing SETUP message, and either the ON or OFF message flashing. To enable or disable, press the *SET* switch to select ON or OFF respectively. Figure 22 shows the hopper level sensor is enabled.

4. Hopper Level 2 Sensor Enable
This parameter enables or disables the DICKEY-john Hopper Level 2 Sensor. It is identified by the message HOPPER, a "2" on the lower, right display, a flashing SETUP message, and either the ON or OFF message flashing. To enable or disable, press the *SET* switch to select ON or OFF respectively.

5. Boot Version Numbers
DICKEY-john's Service department may request the customer to observe, record, and report back the four different 4-digit numbers (to identify the "boot memory" software version) in the unlikely event field problems occur.

The first 4-digit number shows on the upper numeric display at the same time a "b1" identifier appears on the lower numeric display. Record this number, then press and release the *SELECT* switch to step to the "b2", "b3", and "bc" numbers, recording each 4-digit number along with its identifier. (To return to

Figure 23

Boot Version Number Display

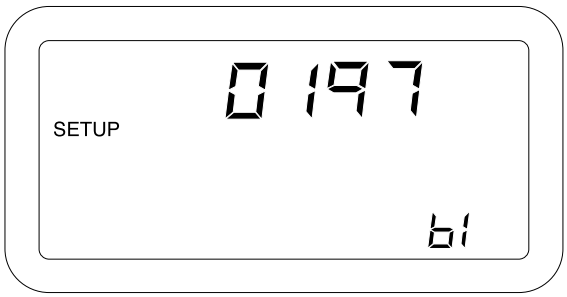
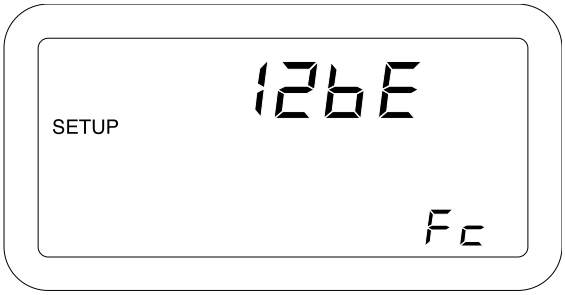


Figure 24

Flash Version Number Display



"b1", press *SELECT* again.) Press the *SETUP* switch to advance to the next constant. Figure 23 shows 0197 for "b1", the first Boot Version Number.

6. Flash Version Numbers

DICKEY-john's Service department may request the customer to observe, record, and report back the four different 4-digit numbers (to identify the "flash memory" software version) in the unlikely event field problems occur.

The first 4-digit number shows on the upper numeric display at the same time a "F1" identifier appears on the lower numeric display. Record this number, then press and release the *SELECT* switch to step to the "F2", "F3", and "Fc" numbers, recording each 4-digit number along with its identifier. (To return to "F1", press *SELECT* again.) Figure 24 shows "12bE" for "Fc", the last Flash Version Number.

Pressing the *SETUP* switch again causes a return to the first Customer Setup parameter, Ground Speed Sensor Type. To exit the Customer Setup Mode, power off the console.

B. SETUP CONSTANTS

The Setup Mode is used to enter the planter configuration constants which are listed in Figure 25, in the order of their presentation. Depressing the *Setup* switch for one (1) second places the console in the Setup Mode, which is identified by the SETUP message on the display. Additional messages uniquely identify the constant displayed and available for editing at any given time.

Each constant has a fixed number of digits. Leading zeroes are displayed. When it is desired to change the value of a constant, use the *SELECT, SET,* and *CLEAR* switches as follows:

Initially, the left most digit flashes on and off, indicating it is the "selected digit". Each depression of the *SET* switch increases the selected digit by one count. After reaching the maximum value of nine (9), the digit rolls over to zero (0). Pressing *CLEAR* zeroes the digit. Each depression of the *SELECT* switch makes the next digit to the right the selected digit.

When the desired value is entered (or there is no change from the original value), press the *Setup* switch to store the value and advance to the next constant on the list. If a value is entered which exceeds the minimum or maximum shown for that constant

Figure 25

Setup Mode Constants

Order	SETUP Mode CONSTANT Name	Default	Minimum	Maximum
1	Row Status	ON	N/A	N/A
2	POPULATION HI LIMIT	0034.0	0000.0	9999.9
3	POPULATION LO LIMIT	0026.0	0000.0	9999.9
4	NUMber of ROWS	N/A	1	36
5	ROW WIDTH	030.0	001.0	999.9
6	IMPlement WIDTH	N/A	0001.0	9999.9
7	Shaft Speed Constant	000.00	000.00	999.99
8	RPM HI LIMIT	0065	0000	9999
9	RPM LO LIMIT	0045	0000	9999
10	Distance Calibration	6096	250	9999
11	Sensor Self-Test	N/A	N/A	N/A
12	IMPlement Type Config.	01	01	N/A
13	English/METRIC Units	English	N/A	N/A

in Figure 25, the alarm sounds for one (1) second, the value of the exceeded limit appears on the screen, and the advance to the next constant is aborted.

CAUTION: To allow rapid recovery from an entry error, it is important to record all values of constants on the SETUP RECORD sheet on the last page of this manual, immediately after console entry.

To exit the Setup Mode, press any of the three Operate Mode switches (*Population • Spacing • Singulation, Area • Seed Count,* or *Speed • Shaft Speed • Dist Acc*). Exiting automatically stores the last constant changed.

The first parameter displayed after entering the Setup Mode is Row Status. Definitions and considerations when entering values for each constant are as follows:

1. ROW Status

This parameter allows placing individual seed sensors in ON, OFF, or SKIP status. For those situations where it is necessary to turn off certain rows on the planter (for example, with skip row planters or when planting point rows or seed corn), OFF status turns off the related sensors so alarms do not occur. The SKIP status setting, available only with Seed Smart™ sensors, allows removing a failed sensor from the harness "daisy-chain" (and jumpering with an extension harness) without disrupting row numbering.

The display initially shows the messages SETUP, ROW, 1, and the status of row 1. Figure 26 shows row 7 status set to OFF. Press the *SET* switch to toggle between ON and OFF for the Standard and Hi-Rate seed sensors and between ON, OFF, and SKIP for the Seed Smart™ sensor. Press the *SELECT ROW* switch to advance to the next row. When the status of all rows is correctly entered, press *Setup* to advance to the next Setup constant.

Figure 26

Row Status Display

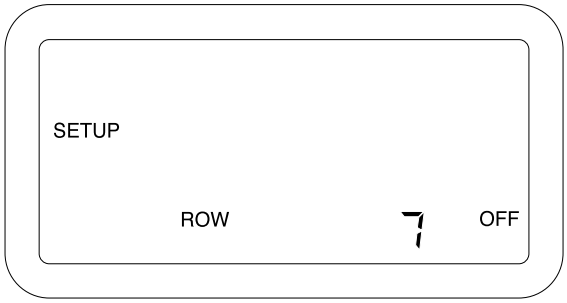
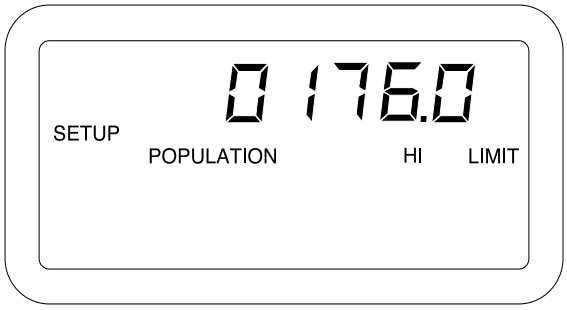


Figure 27

POPULATION HI LIMIT Display



2. POPULATION HI LIMIT

When the population on any row exceeds the value entered for this constant, in thousands of seeds per acre (hectare), the alarm sounds, as indicated under the heading ALARMS, POPULATION HI LIMIT Warning. Figure 27 shows the display for a limit of 176,000 seeds/acre.

3. POPULATION LO LIMIT

When the population on any row falls below the value entered for this constant, in thousands of seeds per acre (hectare), the alarm sounds, as indicated under the heading ALARMS, POPULATION LO LIMIT Warning. Figure 28 shows the display for a limit of 144,500 seeds/acre.

Figure 28

POPULATION LO LIMIT Display

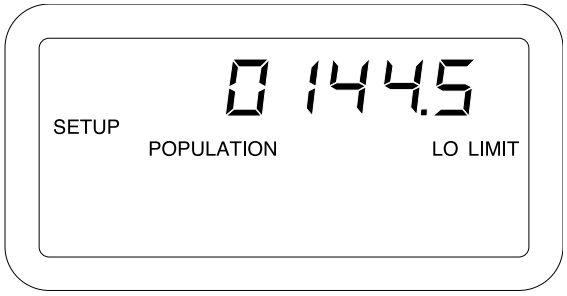
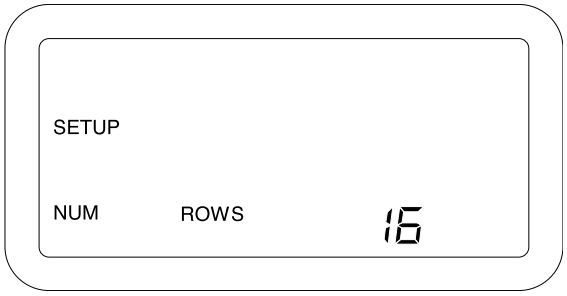


Figure 29

NUMber of ROWS Display



4. NUMber of ROWS

This parameter is used to calculate IMPlement WIDTH and is used in checking the number of sensors detected upon system power up. This value is displayed for confirmation and can only be altered by changing the IMPlement Type Configuration parameter. Figure 29 shows the display for sixteen (16) rows.

5. ROW WIDTH

This is the distance in inches (centimeters) between furrows, with a resolution of 0.1. Figure 30 shows a ROW WIDTH of 38.0 inches.

Figure 30

ROW WIDTH Display

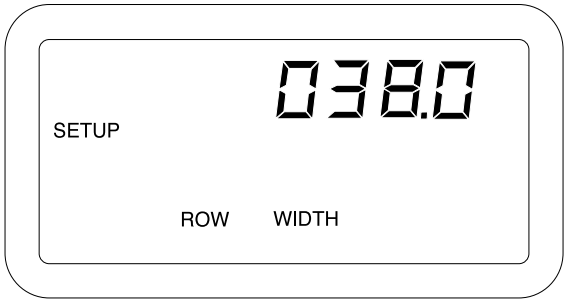
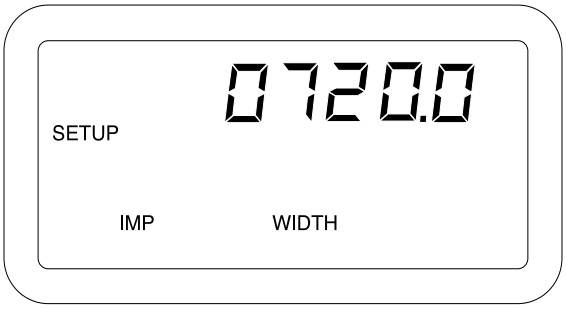


Figure 31

IMPlement WIDTH Display



6. IMPlement WIDTH
This is the planting width of the planter in inches (centimeters) with a resolution of 0.1. It is automatically calculated when either the NUMber of ROWS or the ROW WIDTH is changed and can be edited for special applications such as skip row planters. Figure 31 shows an IMPlement WIDTH of 720 inches.

7. Shaft Speed Constant
The Shaft Speed Constant is the number of pulses the shaft speed sensor generates in one revolution of the monitored shaft. This is typically the number of teeth (sense points) on the gear attached to the monitored shaft. If the sense gear is not directly attached to the monitored shaft, the Shaft Speed Constant can be entered as a decimal with 0.01 resolution. Entering a value of zero (000.00) disables the Shaft Speed function. Figure 32 shows the display with the SETUP and RPM messages and a Shaft Speed Constant of 26 pulses per revolution.

Figure 32

Shaft Speed Constant Display

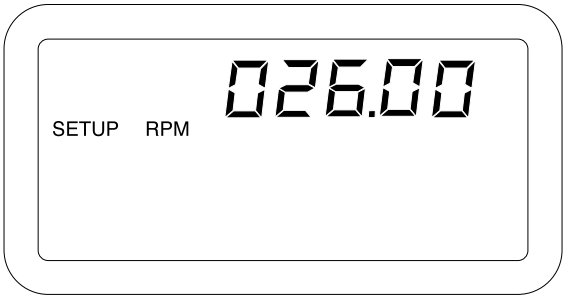
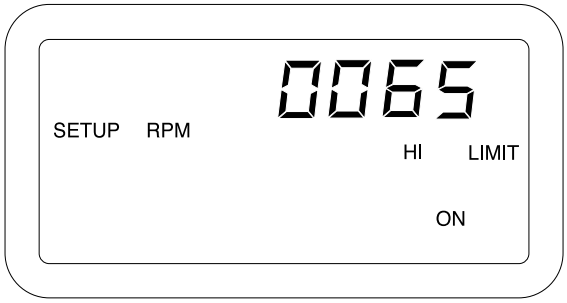


Figure 33

RPM HI LIMIT Display



8. RPM HI LIMIT (Shaft Speed) This constant is the highest shaft RPM allowed before sounding a warning alarm. The warning is enabled or disabled by selecting the ON or OFF message. Use the *SELECT* switch to advance one step to the right of the right most digit, then press the *SET* switch to toggle between ON and OFF. Figure 33 shows a limit of 65 RPM with the warning enabled.

9. RPM LO LIMIT (Shaft Speed) This constant is the lowest shaft RPM allowed before sounding a warning alarm. The warning is enabled or disabled by selecting the ON or OFF message. Use the *SELECT* switch to advance one step to the right of the right most digit, then press the *SET* switch to toggle between ON and OFF. Figure 34 shows a limit of 12 RPM with the warning disabled.

Figure 34

RPM LO LIMIT Display

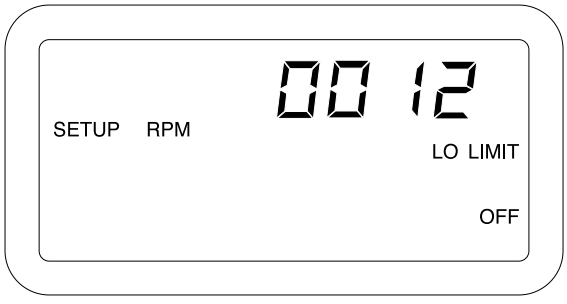


Figure 35

Distance Calibration Display

10. Distance Calibration

The Distance Calibration Constant is the number of pulses generated by the ground speed sensor while traveling a distance of 400 feet (100 meters). Figure 35 shows the display with the SETUP, SPEED, and COUNT messages and the default value of 6096, which is the nominal pulse count for the radar ground speed sensor. A smaller number, typically 3100, results with a reluctance ground speed sensor.

To perform the Distance Calibration:

Step 1.
Carefully measure a 400 foot (100 meter) course, plainly marking the start and finish points.

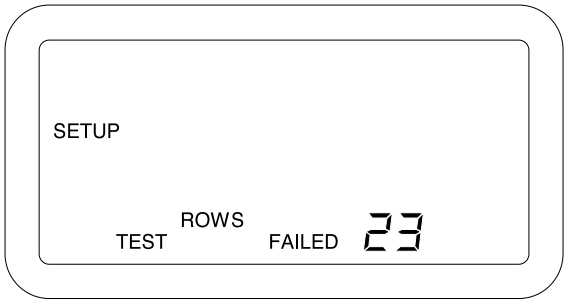
Step 2.
With the tractor moving between 2 and 5 MPH (3.2 and 8Km/h), press the *START•STOP* switch when the tractor is exactly even with the start marker. The display showing the Distance Calibration Constant zeroes, then counts the ground speed pulses.

Step 3.
When even with the finish marker, press the *START•STOP* switch.

Step 4.
To ensure best accuracy, perform this procedure at least three times. Record the count each time, then enter the average as the Distance Calibration Constant, using the *SELECT* and *SET* switches.

Figure 36

Sensor Self-Test Display



11. Sensor Self-Test

This test functions differently depending upon the type of seed sensors used on the planter. It is identified on the display by the SETUP, TEST, and ROW messages.

Start the test by pressing the *START• STOP* switch. The TEST message flashes while the test is executing and PASSED appears when complete. (This same test is performed automatically during console power up.)

If one or more sensors fail, the message FAILED and the row number of the first failed sensor is displayed. When multiple sensors fail, the "S" appears after the ROW message (displaying the message ROWS) and the *SELECT ROW* switch can be pressed to step through the failed row numbers. Figure 36 shows the display when multiple rows have failed.

If Standard or Hi-Rate sensors are used, each sensor is tested in sequence. The number of sensors passing is then compared with the NUMber of ROWS and IMPlement Type Configuration parameters to ensure agreement.

For Seed Smart™ sensors, the light path, circuitry, and communication link of each sensor is tested by an instruction which simulates dropping seeds, resulting in more comprehensive diagnostic information. Figure 37 shows the error codes possible (See ALARMS & ERROR

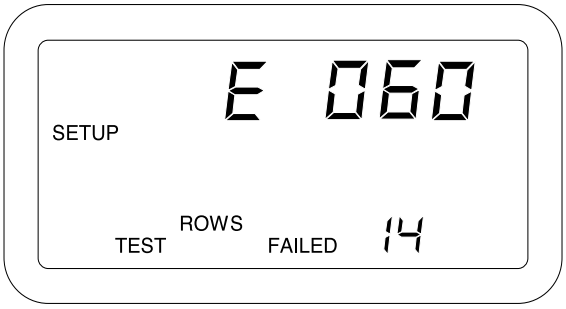
Figure 37

Seed Smart™ Sensor Error Codes

Error Code	Definition
E 060	Sensor Undercounted
E 062	Sensor Overcounted
E 063	Sensor Light Path Blocked

Figure 38

Seed Smart™ Error Display



CODES chapter for additional information). Figure 38 indicates a Self-Test in which multiple sensors failed and the row 14 sensor under-counted.

12. IMPlement Type Configuration Find the number identifying the specific planter type on the "Planter Configuration Instruction" (DICKEY-john Document No. 11001-1107). Enter this number using the *SELECT* and *SET* switches. The SETUP and IMP messages identify the display. This parameter defines the number of rows, the row number for each sensor, and the bargraph display arrangement. Figure 39 shows IMPlement Type Configuration 17 selected.

Figure 39

IMPlement Type Configuration Display

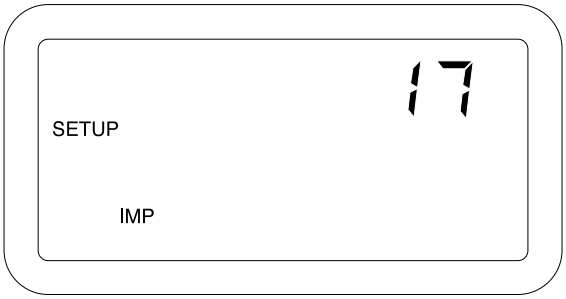
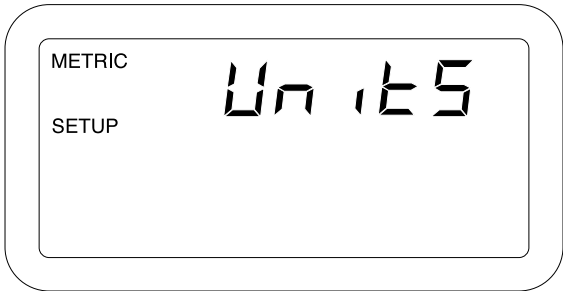


Figure 40

Units Selection Display



13. English/METRIC Units Selection

The user selects the system of units with this constant. The display is identified by the message SETUP and the word "UnitS" on the upper numeric display. The SET switch is used to toggle between English and Metric. Figure 40 shows the display when Metric units are selected. The METRIC message is absent when English units are selected.

ALARMS & ERROR CODES

A. ALARMS

Priority levels are assigned to the Precision Information Center™ alarms as shown in Figure 41, with Level 1 being the highest. If two alarm conditions are detected at the same time, only the higher priority alarm is displayed. If they are the same level, both are displayed simultaneously. Unless otherwise indicated below, when an alarm condition occurs, the monitor exits the current Operate Mode function to display the alarm. It returns to that Operate Mode function only after the alarm condition ceases or the *ALARM* switch has been pressed to acknowledge the alarm condition.

A "warning" alarm is accompanied by a beeping sound lasting for a fixed time period related to its priority - the higher the priority, the longer the alarm is sounded. Unless otherwise indicated, a "failure" alarm sounds continuously (not beeping) until the failure condition ceases or is acknowledged by pressing the *ALARM* switch.

Figure 41

Alarms Chart

ALARM Mode IDENTIFIER Name	Priority Level
Distance Sensor FAILED	1
Lock-On ROWS FAILED	2
All ROWS FAILED	2
ROW FAILED	3
POPULATION HI LIMIT Warning	4
POPULATION LO LIMIT Warning	4
RPM HI LIMIT Warning	4
RPM LO LIMIT Warning	4
HOPPER LO Warning	4
Battery Voltage Warning	5

1. Distance Sensor FAILED

If seed flow is detected without a signal from the ground speed sensor and the monitor is not in the Seed Count function, the alarm sounds continuously for five (5) seconds and the console automatically enters a mode to manually enter a ground speed value. A manual (simulated) ground speed value, in MPH (Km/h), appears on the display along with the SETUP, SPEED, and FAILED messages.

To continue in the Operate Mode without a functioning ground speed sensor, the operator must first enter a suitable manual ground speed value using the *SELECT, SET,* and *CLEAR* switches. Figure 42 shows the above mentioned Setup display with a manual ground speed of 5.3 MPH entered. The operator next presses the desired Operate Mode switch to return to planting.

CAUTION: It is important to maintain ground speed close to the manually-entered value to ensure accurate monitoring.

The console will continue to use this manual ground speed until the console is next powered off. If the damaged ground speed sensor or cable cannot be repaired or replaced before it is desired to continue planting, the same alarm display will reappear each time power is applied, with the manual ground speed value last entered being retained. Again, operation can continue by pressing the switch for the desired Operate Mode.

When the ground speed sensor has been properly repaired or replaced, normal operation will automatically resume without having to deactivate the manual ground speed. However, it is very important to remember to immediately repeat the Setup Mode Distance Calibration before resuming operation if a different ground speed sensor has been installed. Otherwise, the previously determined Distance Calibration Constant will be used, possibly resulting in ground speed measurement errors which may not be readily detected. Ground speed sensor cable-only repairs do not require recalibration.

Figure 42

Distance Sensor FAILED Display

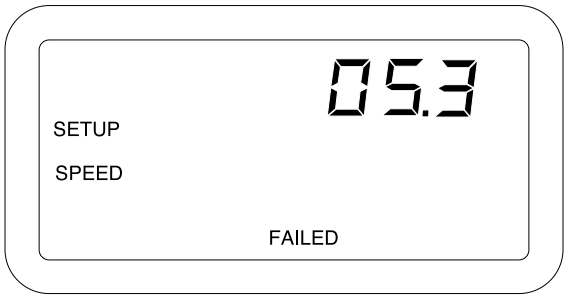
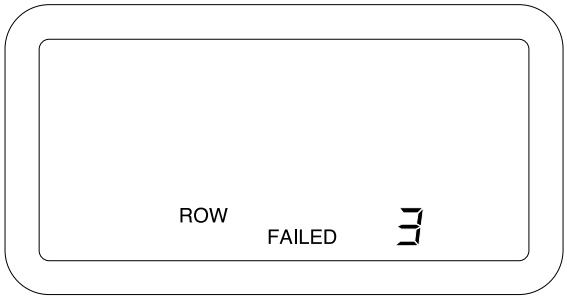


Figure 43

ROW FAILED Display



2. ROW FAILED

This occurs when two (2) seeds per second or less are detected. The alarm sounds continuously, the row number of the failed sensor appears with the messages ROW and FAILED, and the bottom segment of the failed row flashes on the bargraph display. If multiple rows fail, the numbers of the failed rows are sequentially displayed at the rate of one per second. Figure 43 shows a ROW FAILED condition on row 3.

3. All ROWS FAILED

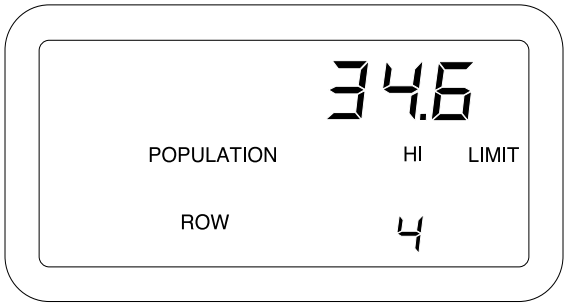
This occurs at the end of each row when the planter is lifted from the ground. The alarm sounds continuously for three (3) seconds, the ROWS and FAILED messages appear, the bottom segment of all rows flash on the bargraph display, and the row numbers are displayed sequentially. After the alarm silences, the monitor reverts to the previous Operate Mode function.

4. Lock-On ROW FAILED

If row failures occur and ground speed falls below 1.5 MPH (2.4 Km/h), the bottom segments of the failed rows on the bargraph display continue to flash and the failed row numbers are displayed sequentially. This ensures that as the user stops the planter, the All ROWS FAILED condition does not obscure the display of those rows which failed during planting. The continuously sounding alarm caused by the ROW FAILED condition is silenced when ground speed drops to zero or the *ALARM* switch is pressed.

Figure 44

POPULATION HI LIMIT Warning Display



5. POPULATION HI LIMIT Warning

This occurs when any row population exceeds the value entered for POPULATION HI LIMIT in the Setup Mode. The alarm beeps for four (4) seconds, the bargraph segments flash for that row, and the row number and actual population, in thousands of seeds per acre (hectare), are displayed. If multiple rows exceed the limit, the row numbers are displayed sequentially, along with their respective populations. Figure 44 shows a POPULATION HI LIMIT Warning on row 4 with a row population of 34,600 seeds per acre.

6. POPULATION LO LIMIT Warning

This occurs when any row population falls below the value entered for POPULATION LO LIMIT in the Setup Mode.

The alarm beeps for four (4) seconds, the bargraph segments flash for that row, and the row number and actual population, in thousands of seeds per acre (hectare), are displayed. If multiple rows exceed the limit, the row numbers are displayed sequentially, one per second, along with their respective populations. Figure 45 shows a POPULATION LO LIMIT Warning on row 13 with a row population of 23,100 seeds per acre.

Figure 45

POPULATION LO LIMIT Warning Display

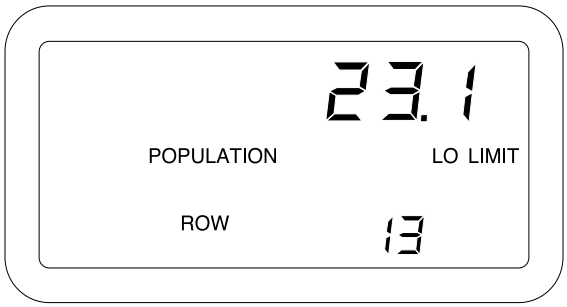
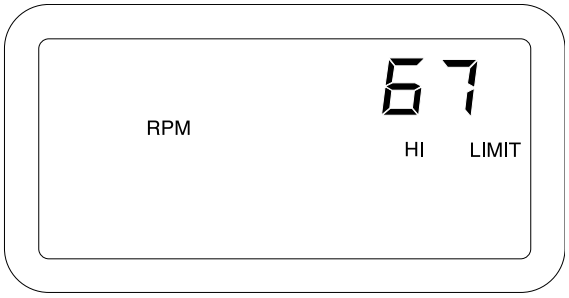


Figure 46

RPM HI LIMIT (Shaft Speed) Warning Display



7. RPM HI LIMIT (Shaft Speed) Warning

This occurs when the shaft speed exceeds the RPM HI LIMIT entered in the Setup mode. The alarm beeps for three (3) seconds and a display similar to Figure 46 (showing an excessive shaft speed of 67 RPM) with RPM, HI, and LIMIT messages appears.

8. RPM LO LIMIT (Shaft Speed) Warning

This occurs when the shaft speed falls below the RPM LO LIMIT entered in the Setup mode. The alarm beeps for three (3) seconds and a display similar to Figure 47 (showing a low shaft speed of 9 RPM) with RPM, LO, and LIMIT messages appears.

9. HOPPER LO Warning

The console has hopper level sensor inputs to detect the levels of seed and dry fertilizer (or other granular materials) in two different hoppers or bins. A low material level causes the alarm to sound continuously, the HOPPER and LO messages appear and the hopper number is displayed. If both hoppers are low, the hopper numbers are displayed alternately, one per second. Figure 48 shows a HOPPER LO Warning on hopper 2.

Figure 47

RPM LO LIMIT (Shaft Speed) Warning Display

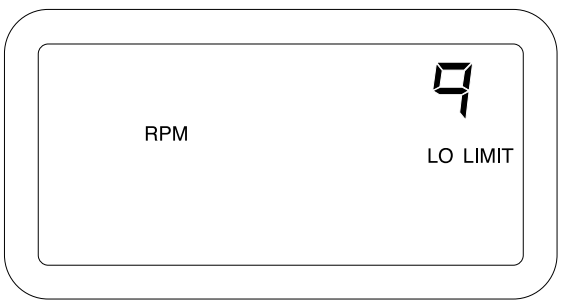
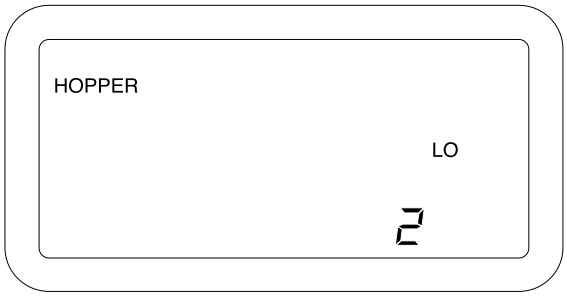


Figure 48

HOPPER LO Warning Display



10. Battery Voltage Warning

To ensure accurate operation of the seed sensors, the voltage to the console must be at least 11 volts. When the tractor battery voltage falls below this level, regardless of the Operate Mode function, the alarm beeps for three (3) seconds and the battery symbol appears. The battery symbol remains on the display until the low battery condition ceases. The warning beeps reoccur each time the monitor is powered on. Figure 49 shows the battery symbol in the Operate Mode SPEED function with a ground speed of 3.7 MPH.

Figure 49

Battery Voltage Warning Display

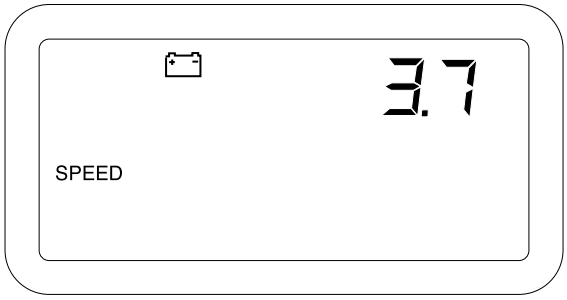


Figure 50

Precision Information Center™ Error Codes

Error Code	Description
E 020	Seed sensor supply fault to ground
E 021	Seed Sensor supply fault to battery
E 060	Seed Smart™ sensor undercounted during Self-Test
E 062	Seed Smart™ sensor overcounted during Self-Test
E 063	Seed Smart™ sensor blocked light path detected during Self-Test
E 064	No seed sensor detected
E 065	Number of rows less than number of sensors detected
E 066	Number or rows exceeds number of sensors detected (Seed Smart™ only)

B. ERROR CODES

Figure 50 shows a complete list of Precision Information Center™ Error Codes with a brief description of each. See the TROUBLESHOOTING chapter for additional details and recommended recovery procedures.

SYSTEM INSTALLATION

A. CONSOLE MOUNTING

The console should be mounted inside the tractor cab in a location accessible to the operator but does not obstruct the driving view.

Warning:
The console must not obstruct the view or interfere with the operation of the tractor.

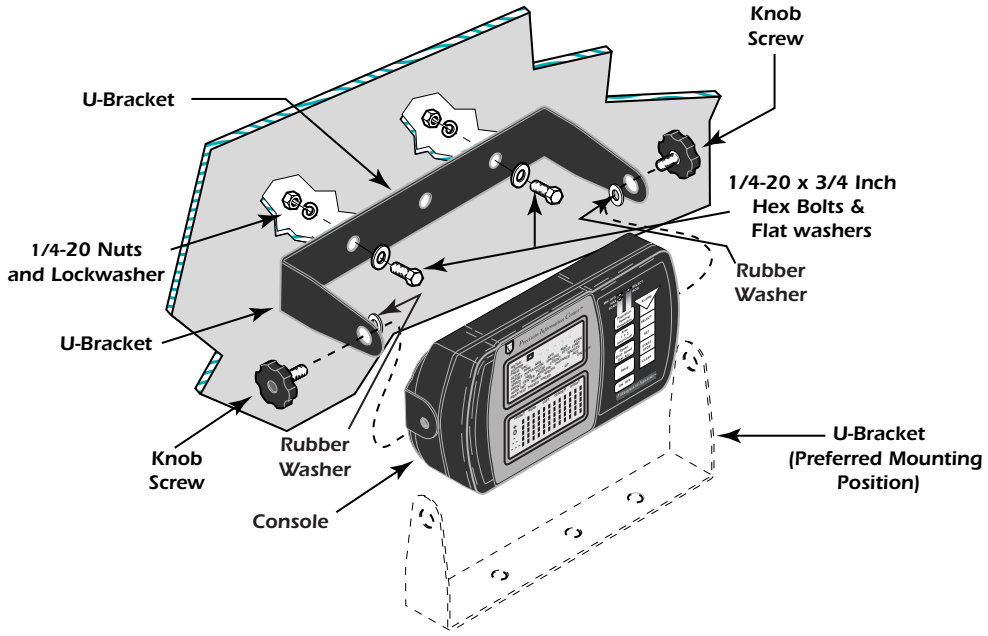
Refer to Figure 51 for a typical console mounting using the U-bracket and hardware. Install as follows:

Step 1.
Verify the rear side of the selected mounting surface is free of wiring or other obstructions and is accessible for inserting and tightening the mounting bolts.

Step 2.
Use the U-shaped mounting bracket as a template to mark the two outside holes of the bracket on the selected location and drill two $^{9}/_{32}$ inch holes. An alternate mounting method, which allows the console to swivel, requires drilling the center bracket hole only.

Figure 51

Display Console Mounting



Step 3.
Attach the mounting bracket to the mounting surface using the $^{1}/_{4}$ - 20 x $^{1}/_{2}$ inch bolts, lockwashers, flatwashers, and nuts.

Step 4.
Secure the console to the mounting bracket using the two knob screws. Insert the two rubber washers between the bracket and console.

Step 5.
Tilt console so that the two connectors on the rear of the console (J1 and J2) are accessible. Temporarily tighten the two knob screws.

B. CONSOLE HARNESSES INSTALLATION

Two connectors on the console rear (J1 and J2) connect all input and output signals to the Precision Information Center™. Depending upon planter configuration, several harness combinations are available to connect between the rear of the console and the tractor hitch. The particular harnesses required are determined at the time of order. The following discussion and Figures 52 through 53 describe all harness options.

Figure 52

Primary/Secondary Console Harnesses (Standard/Hi-Rate Seed Sensors)

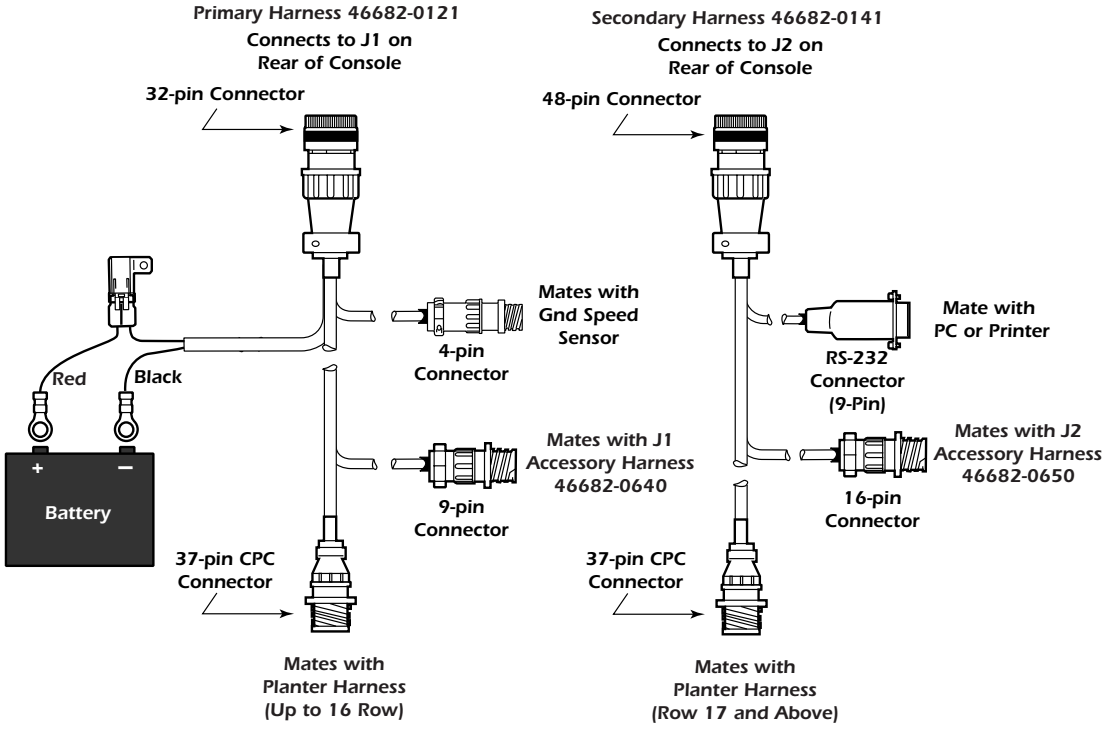
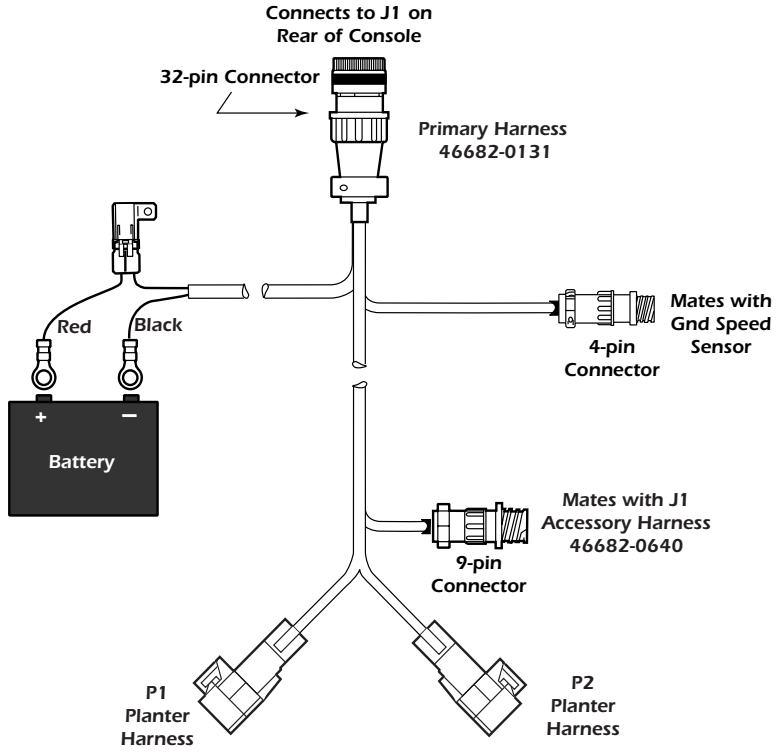


Figure 53

Primary Harness for Seed Smart™ Sensors

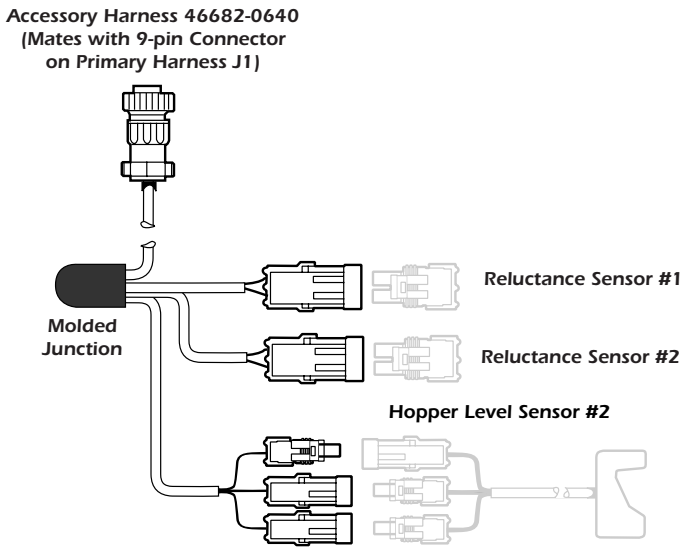


One of two separate primary harnesses (from J1) connect to the row seed sensors on the planter. The Standard and Hi-rate seed sensors uses the 46682-0121 harness and can monitor up to 16 rows. The Seed Smart™ sensors uses the 46682-0131 harness and can monitor up to 36 rows (See Figures 52 and 53). Both of these harnesses contain additional connectors for ground speed sensor, an accessory harness, and a lead for connecting power. The accessory harness (46682-0640) has connectors for two reluctance sensors and a hopper level sensor (See Figure 54).

When using the Hi-rate or Standard sensors, a secondary harness connects to J2 for monitoring planter rows 17 through 36 and additional accessory sensors through an accessory harness (46682-0650). A connector for interfacing to a PC (Personal Computer) or a printer is also a part of this harness (See Figure 52). For planters not requiring the additional row capacity, two other harnesses are optional for J2. One is an accessory adaptor harness (46682-0660) to allow connecting only the accessory harness (46682-0650). Another harness (46682-0670) contains only the RS-232 connector for the PC/Printer option (See Figure 55).

Figure 54

J1 Accessory Harness



The following procedures describe installing the primary (from J1) and secondary (from J2) harnesses from the rear of the console to the tractor hitch.

Step 1.
Select the correct set of harnesses from the above description and Figures 52 through 55.

Step 2.
Route the primary planter monitor harness from J1 on the console rear to the rear of the tractor, near the hitch. Route it on the side of the tractor opposite the alternator and spark plugs. Locate the harness to prevent being pinched, cut, or stepped on and secure it with wire ties.

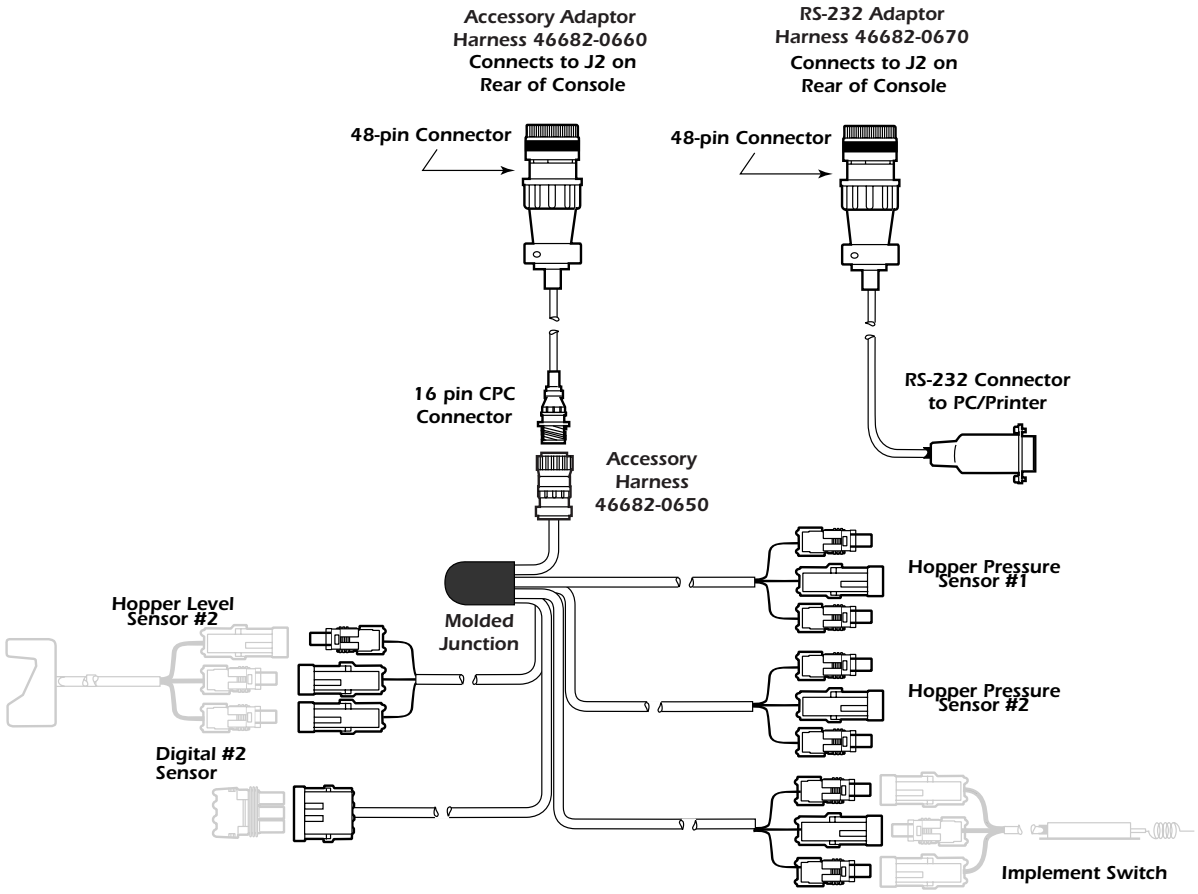
Step 3.
For planters with more than 16 rows (Hi-rate or Standard sensors only) and other sensors requirements, layout the secondary harness leading from J2 on the rear of the console to the hitch. Route this cable in a similar fashion as the primary cable.

C. GROUND SPEED SENSOR INSTALLATION

The ground speed sensor may be one of three types - radar, reluctance, or Hall Effect. A radar sensor connects directly to the designated connector on the primary harness. A reluctance sensor or a Hall effect sensor connects to one of the connectors on the accessory harness for J1 (See Figure 54).

Figure 55

J2 Accessory Adaptor and RS-232 Adaptor Harnesses



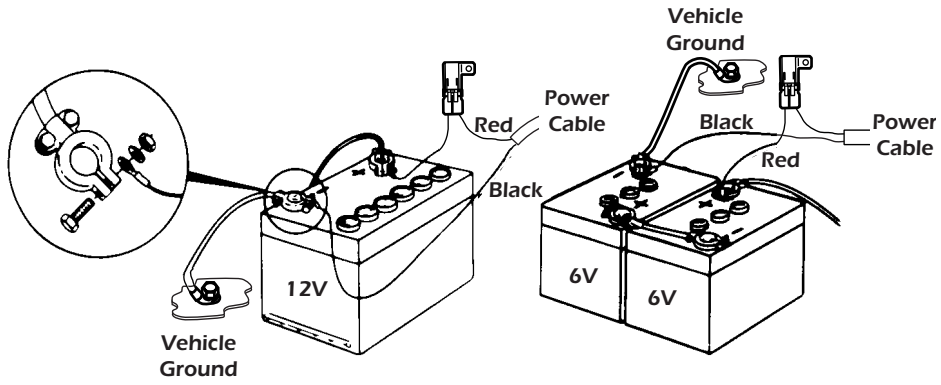
Sensor mounting instructions accompanies the sensor. Select the mounting location and install as the instructions describe. Enter the parameters for the particular sensor and perform the Distance Calibration as detailed in the Setup chapter.

D. OTHER SENSORS

Several other sensors may also be installed as per instructions accompanying each sensor. These include fan speed, hopper level, hopper pressure, lift switch, and reluctance sensors. Install each sensor as described by the installation sheet received with the particular sensor.

Figure 56

12 Volt Battery Source Connections



E. POWER CONNECTION

The power connections are made last to avoid accidental shorts during harness installation.

The Precision Information Center™ operates on 12 volts DC only. The battery connections consist of two wires, each terminated with a ring terminal.

Before making the battery connections, determine the tractor battery arrangement from Figures 56, 57, or 58. After the 12 volt source is known, connect the black wire directly to the negative (-)

Figure 57

24 Volt Battery Source Connections

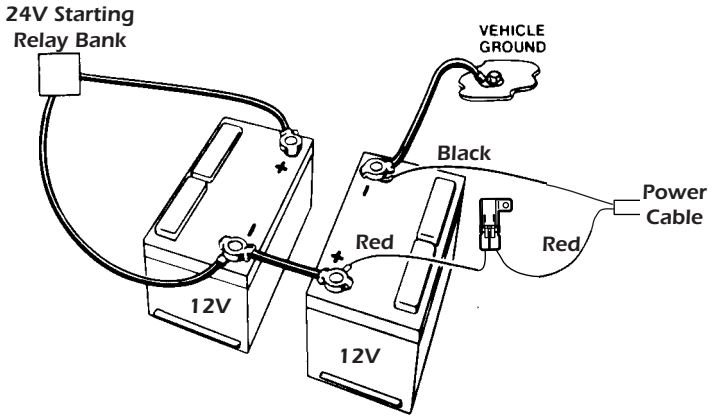
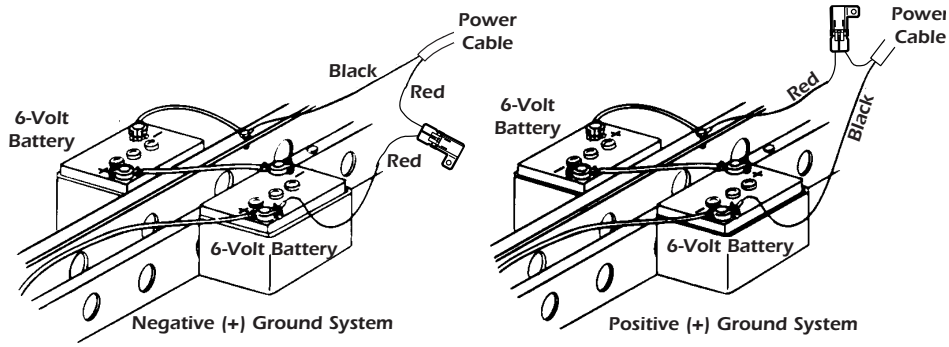


Figure 58

Negative or Positive Source Connections



terminal of the battery. The red wire (containing the fuse link) connects directly to the positive (+) battery terminal. Make sure the connections are clean and tight. Do not route these wires in close proximity to the existing battery cables. Secure the battery wires with wire ties.

If your tractor battery arrangement differs from that shown or if any doubt exists about how to connect to the battery, use a voltmeter first. Verify 11 to 14 volts across the battery connection points. On tractors using two batteries, be sure to make connections to the grounded battery.

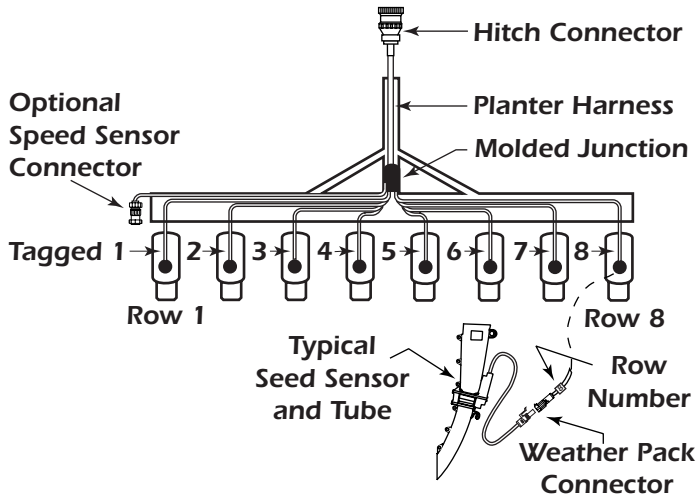
WARNING: Before welding on the frame or chassis, be certain to disconnect battery leads.

F. SEED SENSORS

The Precision Information Center™ system is compatible with the DICKEY-john Standard and Hi-Rate seed sensors and also the new Seed Smart™ sensors. The seed sensors and chutes are designed to fit specific planter types. Installation of these are described in separate installation instructions accompanying the sensors.

Figure 59

Standard Planter Harness Configuration



G. PLANTER HARNESS

The Precision Information Center™ uses three basic planter harness configuration. Standard Harnesses are available for 4, 6, 8, or 12 row planters, a Squadron Harness for 8, 12, 16, or 24 row planters, and a different Seed Smart™ harness configuration can accommodate any number up to 36 rows.

1. STANDARD and HI-RATE HARNESSES INSTALLATION

Step 1.
Layout the harness along the frame of the planter to each seed sensor location.

Step 2.
Secure the black, potted molded junction of the harness trunk to the tool bar at the center of the planter as shown in Figure 59.

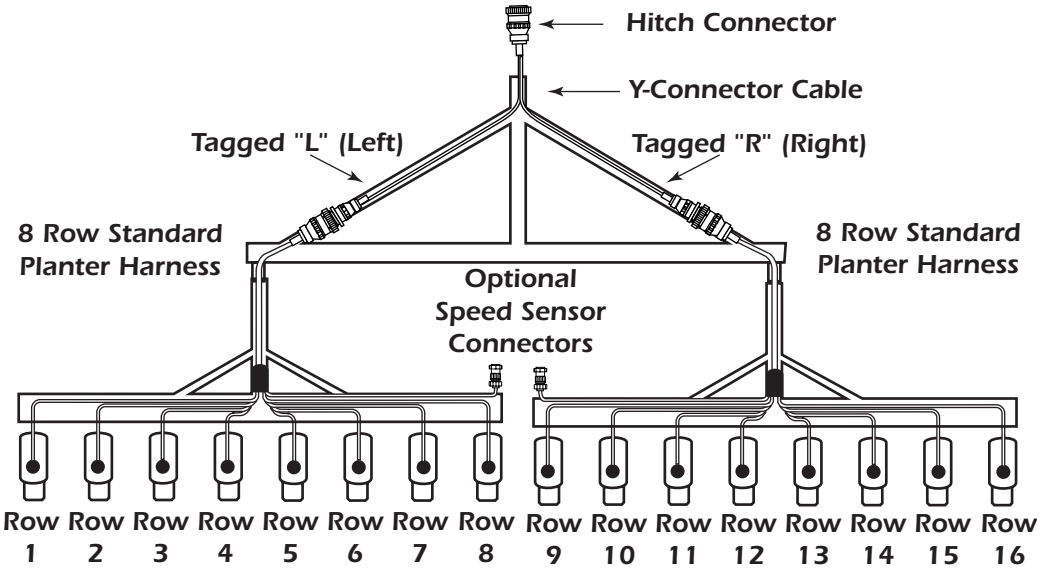
Step 3.
Connect the individual row leads (identified with row numbers) to the corresponding planter row sensors. Row 1 is on the left side of the planter as shown is Figure 59.

Step 4.
Route and secure the cable containing the hitch connector to the planter hitch.

Step 5.
Coil all excess cable including unused row leads, if any, and secure to the planter with wire ties in a location to prevent pinching or damage.

Figure 60

Squadron Planter Harness Configuration



2. SQUADRON HARNESS INSTALLATION

A Squadron Harness uses two Standard Harnesses and a Y-connector cable. Each Standard Harness installs on half of the planter and connects together through the Y-connector cable.

Step 1.

Install both Standard or Hi-rate seed Harnesses as explained in the proceeding procedure.

Step 2.

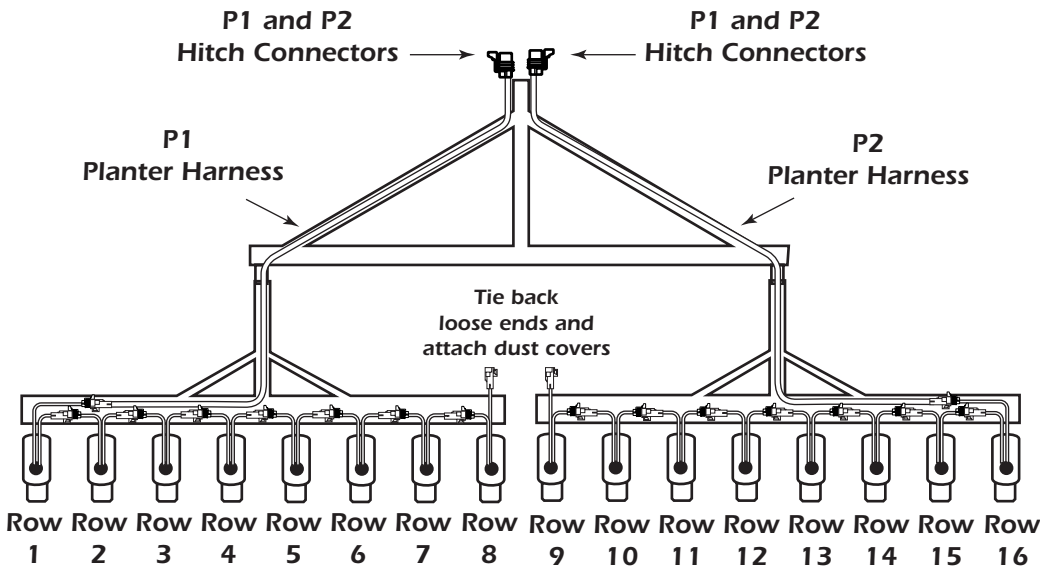
Install the Y-connector cable as shown in Figure 60 to connect the two halves together. Route the leg of the cable tagged "L" to the left harness and the leg tagged "R" to the right harness of the planter.

Step 3.

Coil all excess cable and secure with wire ties in a location to prevent cable damage.

Figure 61

Seed Smart™ Planter Harness Configuration



3. SEED SMART™ HARNESS INSTALLATION

The Seed Smart™ Harness configuration differs from the standard and squadron harnesses in that a single cable connects to Row 1 and then serially (daisy chains) connects to each following row. The harness from the console divides into two halves at the planter hitch. This configuration can monitor any number of rows up to a maximum of 36. The only requirement is that each half can drive no more than 18 sensors. In general, each half should contain approximately the same number of rows. Refer to Planter Configuration Instructions 11001-1107 for specific layout of your planter.

Step 1.
Layout the harness along the frame of the planter to row 1 as shown in Figure 61. Secure the harness to the tool bar.

Step 2.
Route each successive lead to the next adjacent row. Connect the newly installed sensor to the proceeding sensor in a daisy chain fashion.

Step 3.
When the last sensor is installed, coil up the loose pigtail, attach the dust cap, and secure with a wire tie to avoid pinching or damaging.

TROUBLESHOOTING

A. MONITOR DEAD

Probable Cause
1. Blown console fuse.
2. Poor battery connections.
3. Cut or broken battery cable.
4. Low battery voltage.
5. Defective console.

Corrective Action
1. Check console fuse located. If blown, replace with a 5 Amp, type AGC fuse. If it blows again, contact DICKEY-john Field Service Department to replace console. See inside, back cover of this manual for phone number.
2. Clean and tighten battery connections.
3. Repair by splicing, soldering, and individually taping each wire. USE ONLY ROSIN CORE SOLDER.
4. Verify battery voltage is at least 12 volts. If not, recharge or replace battery.
5. Contact DICKEY-john Field Service Department. See inside, back cover of this manual for phone number.

B. BATTERY SYMBOL APPEARS ON DISPLAY

Probable Cause
1. Low Battery Voltage.
2. Intermittent Harness Short to Ground.
3. Poor Battery Connections.

Corrective Action
1. Recharge or replace battery.
2. Locate short and repair by splicing, soldering, and sealing the wire.
3. Clean and Tighten Battery Connections.

C. ERROR CODE E 020

Indicates sensor supply voltage is shorted to ground.

Probable Cause
1. Tractor or Planter Harness is pinched or cut.

Corrective Action
1. Locate Short or Cut and repair by splicing, soldering, and sealing wire.

D. ERROR CODE E 021

Sensor supply voltage is shorted to the battery.

Probable Cause
1. Tractor or Planter Harness is pinched.

Corrective Action
1. Locate Short or Cut and repair by splicing, soldering, and sealing the wire.

E. ERROR CODE E 060

Seed Smart™ sensor under-counted during self-test.

Probable Cause
1. Seed tube is dirty.
2. Self-test performed while planting.

Corrective Action
1. Clean seed tube with dry bottle brush.
2. Redo sensor self-test.

F. ERROR CODE E 062

Seed Smart™ sensor over-counted during self-test.

Probable Cause
1. Seed tube is dirty.
2. Self-test performed while planting.

Corrective Action
1. Clean seed tube with dry bottle brush.
2. Redo sensor self-test.

G. ERROR CODE E 063

The Seed Smart™ sensor tube is blocked.

Probable Cause
1. Seed tube is clogged.
2. Seed treatment build up on seed tube.
3. Wires under sensor sheath are cut or shorted.
4. Faulty sensor.

Corrective Action
1. Clean seed tube to remove any obstruction.
2. Clean seed tube with mild cleanser and wet bottle brush.
3. Repair wires by splicing, soldering, and sealing the wire.
4. Contact DlCKEY-john Service Department to replace sensor.

H. ERROR CODE E 064

No sensors are connected.

Probable Cause
1. Planter harness not connected to tractor harness.
2. Tractor harness not connected to console.
3. Harness not connected to first Seed Smart™ sensor.
4. Tractor and/or planter harness cut or pinched.
5. Console setup for sensors that are not installed.
6. Defective Console.

Corrective Action
1. Check tractor harness and planter harness connection.
2. Check Console tractor harness connection.
3. Check connection at sensor. Connect a Seed Smart™ sensor directly to P1 of the tractor harness and reapply power to console. If E 064 occurs again, the tractor harness or Console is defective.

4. Locate the fault and repair wires by splicing, soldering, and sealing wire.
5. Check customer setup constants and disable unused sensors.
6. Contact DlCKEY-john Service Department to replace sensor.

I. ERROR CODE E 065

More sensors connected than Console expects.

Probable Cause

1. Implement Type Configuration constant incorrect.
2. Console not setup correctly for installed sensors.

Corrective Action

1. Check Implement Type Configuration constant against Planter Configuration Instruction 11001-1107.
2. Check Customer Setup Constants and enable sensors.

J. ERROR CODE E 066

Fewer Seed Smart™ Sensors connected to Console than expected.

Probable Cause

1. Implement Type Configuration constant incorrect.
2. Seed Smart sensor harness disconnected.
3. Cut or pinched harness.
4. Defective sensor.

Corrective Action

1. Check Implement Type Configuration constant against Planter Configuration Instruction 11001-1107.
2. Check harness connection after sensor associated with NUMber of ROWS displayed with E 066.
3. Locate fault and repair wires by splicing, soldering, and sealing wire.
4. Exchange sensor after NUMber of ROWS sensor with an upstream sensor and reapply power. If same NUMber of ROWS displays, then sensor associated with NUMber of ROWS is defective. If NUMber of ROWS changes, then next sensor is daisy chain is defective.

The *Vanguard System*

The *Vanguard System*

SETUP RECORD SHEET

Parameter Name	Entered Value
ROW Status	_____
	_____
POPULATION HI LIMIT	_____
POPULATION LO LIMIT	_____
NUMber of ROWS	_____
ROW WIDTH	_____
IMPlement WIDTH	_____
Shaft Speed Constant	_____
RPM HI LIMIT	_____
RPM LO LIMIT	_____
Distance Calibration Constant	_____
IMPlement Type Configuration	_____
English/Metric	_____

Parameter Name	Entered Value
ROW Status	_____
	_____
POPULATION HI LIMIT	_____
POPULATION LO LIMIT	_____
NUMber of ROWS	_____
ROW WIDTH	_____
IMPlement WIDTH	_____
Shaft Speed Constant	_____
RPM HI LIMIT	_____
RPM LO LIMIT	_____
Distance Calibration Constant	_____
IMPlement Type Configuration	_____
English/Metric	_____

The Vanguard System

SETUP RECORD SHEET

Parameter Name	Entered Value
ROW Status	_____
	_____
POPULATION HI LIMIT	_____
POPULATION LO LIMIT	_____
NUMber of ROWS	_____
ROW WIDTH	_____
IMPlement WIDTH	_____
Shaft Speed Constant	_____
RPM HI LIMIT	_____
RPM LO LIMIT	_____
Distance Calibration Constant	_____
IMPlement Type Configuration	_____
English/Metric	_____

Parameter Name	Entered Value
ROW Status	_____
	_____
POPULATION HI LIMIT	_____
POPULATION LO LIMIT	_____
NUMber of ROWS	_____
ROW WIDTH	_____
IMPlement WIDTH	_____
Shaft Speed Constant	_____
RPM HI LIMIT	_____
RPM LO LIMIT	_____
Distance Calibration Constant	_____
IMPlement Type Configuration	_____
English/Metric	_____

DICKEY-john® WARRANTY

DICKEY-john warrants to the original purchaser for use that, if any part of the product proves to be defective in material or workmanship within one year from date of original installation, and is returned to DICKEY-john within 30 days after such defect is discovered, DICKEY-john will (at our option) either replace or repair said part. This warranty does not apply to damage resulting from misuse, neglect, accident or improper installation or maintenance. Said part will not be considered defective if it substantially fulfills the performance specifications. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. DICKEY-john neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said part and will not be liable for consequential damages. Purchaser accepts these terms and warranty limitations unless the product is returned within fifteen days for full refund of purchase price.

For DICKEY-john Service Deparment,
call 1-800-637-3302 in either the U.S.A. or Canada

DICKEY-john®

P.O. BOX 10 ▪ 5200 DICKEY-john Road ▪ Auburn, IL. 62615
Telephone: (217) 438-3371 ▪ Fax: (217) 438-6012