Population Monitor
Operation Manual 2005
New Update Features 5 new features

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Last Modified 01-01-05

Planter or Drill Monitor Operation: After connecting the 12 volt batteries, turn console on by the On/Off switch. All row indicator lights are turned on, the alarm sounds momentarily a number will appear such as 1.3 or 1.4 will, is the program version for that monitor. Then your serial number will appear next. If in Mode 1, all indicator lights should be flashing at approximately the same rate. If one of the lights is flashing at a slower rate, check for proper seed population. To check the population, press the row key until the row is selected. An alarm condition occurs, when the population density is outside of the set limits, no seeds going down the tube, or seed blockage. The indicator light will come on with a high intensity if there is an alarm condition. If all rows are not planting, the alarms will sound for a few seconds and all of the light indicators will remain flashing until normal planting occurs. Pressing the **ENTER** key can clear the buzzer. The buzzer will remain off until a new alarm condition is detected.

Population, Scan, Row Select, Acre/Speed, Mode 1&2:
SCAN: Push the **SCAN** button and the monitor will display the population for each of the rows one row at a time and then moves on to the next row. When the monitor is displaying a row's population, it is still checking the other rows for seed blockage. So if you are looking at row 1 and if row 4 stops planting, the monitors will indicate the failed row as a flashing light. The display will show **39.5** for 39,500 population

ROW SELECT: Push the **ROW SELECT** button to stop scanning. The monitor will display the population for the selected row until you press another function. To advance to the next row, press **ROW** SELECT again. After pressing Row Select the display will the population for that row.

0**ACRE/SPEED (Hectors/Speed):** The Acre/Seed button has many features to it. Total Acres, Field Acres. Speed and seed spacing. By pressing the **ACRE/SPEED** button and the monitor will show the Field Acres, Total Acres, Seed Spacing and speed. Press the key again to see the other.

For easy identification the speed is prefixed with a dashes Example **-4.5** is 4.5 miles per hour (KPM). The Total and Field Acres (hectors) are automatically turned off if the planter or drill is not planting. The display will stay on Total or Field acres (hectors) or speed until you press the acre/speed button again or the **SCAN** or **ROW SELECT** button. The display will then show four dashes until the monitor updates.
1
2**New Features**

3-- Symbol is the Speed = Symbol is the seed spacing, ≡ Symbol is the Field Acres, No symbol is the Total Acres
4

5**Zero out the Acres Counter: New Feature** To zero out the Field and Total Acres counter press the Acres/Speed counter button down for 5 seconds then Field Acres will zero out and if you continue to hold the Acres/Speed button in then the Total Acres will zero out.

6

MODE 1 & MODE 2: When the monitor is started up, it will default to Mode 1. In Mode 1, the lights will flash every time a seed passes through the tube sensors. In Mode 2, the lights will be off until the row is selected or a failure is detected. The indicator lights can be changed into Mode 1 or Mode 2 while planting.

Display Population, Acre (Hectors), & Speed: The monitor will display population in 1000 seeds per acre (hectors) (Example **23.5** is 23,500 seeds). The monitor will display Acres (hectors) in 0.1-Acre (hectors) steps. The monitor will display the speed in miles per hour (kilometer per hours) to the nearest 0.1Mph (KPH).

Row Failure: The monitor continuously checks for seed flow, as indicated by the flashing row indicator lights on the console. If any seed sensor is not detecting seeds, the alarm will sound continuously and the row indicator light corresponding to the planter row unit will flash. When this happens quit planting and check to see what is wrong with the planter unit.

All Row Failure: When you lift your planter at the end of the row and seed flow stops in all planter units, the alarm will sound and all row indicator lights will stop flashing and remain on. After approximately 2 to 4 seconds the alarm will stop sounding.

7**Zero out the Acres Counter: New Feature** To zero out the Field and Total Acres counter press the Acres/Speed counter button down for 5 seconds then Field Acres will zero out and if you continue to hold the Acres/Speed button in then the Total Acres will zero out. .
8
9**Average Population: New Feature** After the monitor scan the population for all the rows, the monitor will display the average population for all rows. The Average Population for the all the rows will flash for 5 seconds, before it start scanning each row.

Setup Calculations: There are 10 constants that must be entered for setup.

1: The number of sensors: Sensors installed on the planter or drill, **2: The number of rows:** Number of Drops on your planter or drill. This will is important to determine the implement width (row spacing **times** the number of rows = implement width **3:The Row Spacing:** Is the width of one row spacing in inches (centimeter) and is equal to the distance between any seed line and the seed line next over. **4: High Population Alarm Setting:** A value that alert you when the population goes over this set value. **5: Low Population Alarm Setting:** A value that alert you when the population goes under this set value **6: Population Gain:** The operator can display an increase value to his population if the sensor don't show the correct value **7:The Speed Constant:** Matches the console to the distance sensor. The speed constant is equal to the number of clicks or distance pulses in 200 feet (50 meters). The speed constant can be calculated by the operator or measured by the monitor. There are three types of distance sensors that can be used with this monitor: Radar, Universal Distance Sensor, or Press Wheel Sensors. If there's no distance sensor being used, then one can put the miles per hour (kilometer) in as a constant 1

through 20 miles (kilometers) per hour. When the value entered for the speed constant is 200 or less, the monitor will accept it as the speed you will be operating at. The monitor display will change to show MPH or KMH such as 3.2. You may set the mph to a value of 0.1 MPH to 20.0 mph. (kph) **8: Manual Speed Constant:** The operator can manually enter the value or fine tone the existing value. 9: **Light Intensity Setting:** Light intensity has a range of 1-10, Preset to 10, where 10 is the highest. **10: Hopper Level Sensors:** The hopper level sensor will display only if the hopper sensor fail. If the hopper level sensor failed, then seed much be added to the bin. If the hopper sensors fail then a **Hopp** will show on the display and an alarm will sound. Press enter to clear the alarm. Once you clear the alarm then the **HOPP** will not appear again until you reset the monitor or refill the hopper and it becomes empty again.

Program Version   Serial Number
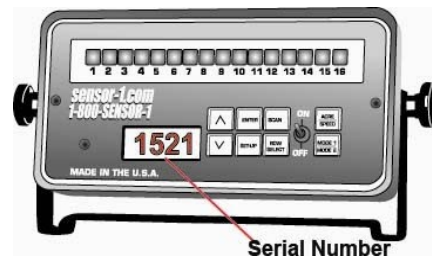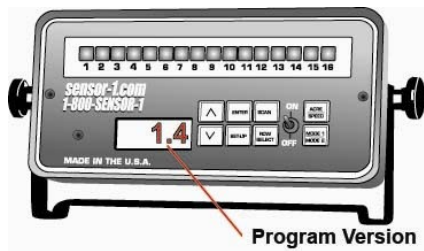
When you first start up the monitor you will see 1.4 this is the program version and then the serial number will appear.

Set-up Functions:

Light # 1 is on for "Number of Sensors"

(Setup function Setup 1)

Entering the number of sensors: Row 1 light should be on (if not press the **ENTER** button until only Row 1 light is on.). The display will read the current number of sensors from memory. Use the up and down arrow keys to change the number of sensors. Pre-set value is the maximum of rows of your monitor: 4, 6, 8, 12, 13, or 16 rows. Press the Enter key to store the value and advance to setup Set-up 2.
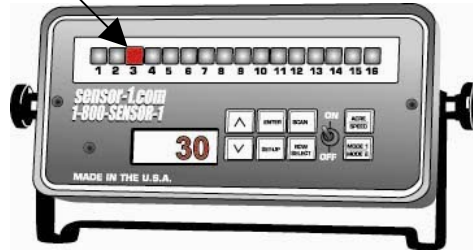
Light# 2 is on for the "Number of Row

(Setup 2 Function)

Entering the Number of Rows: Only row 2 light will be on. The display will read the current number of rows from memory. Use the **UP** and **Down** arrow keys to change the number of rows. The Pre-set value is the number of sensors inputted. Press the **Enter** key to store the value and advance to setup set-up 3**. Reset Acres (hectors) if you change Number of Rows**.

**Light #3 is on for
"Row Spacing"**

(Setup 3 Function)

Entering Row Spacing: Only row 3 light will be on. The display will read the current row spacing from memory. Use **UP** or **DOWN** arrow keys to set row spacing. Row spacing is entered in inches. Press the **ENTER** key to store the value and advance to setup set-up 4. The pre-set will be 48" row spacing (76.2 centimeter) . Reset Acres (hectors) to Zero if you change the number of Row Spacing.
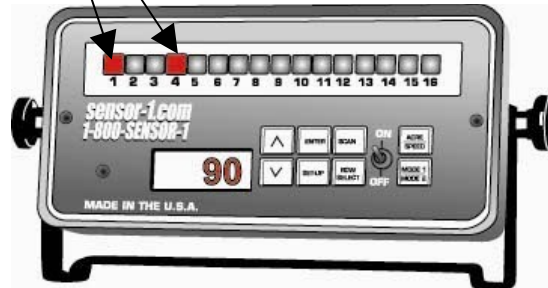
**Light# 4 is on for
"High Population"**
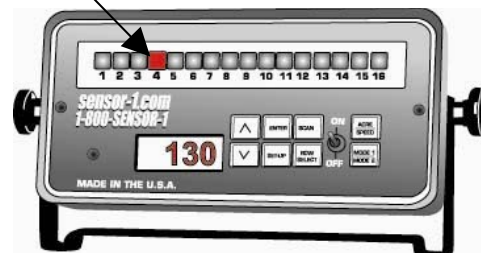
(Setup 4 Function)

Entering High Population Limit: Row 4 light will be on. The display will read the current high population limit from memory. Set the high population limit by using the **UP** and **DOWN** arrow keys. The display will read 1000 seeds per acre (Hectors). Example **42.5** is 42,500 seeds per acre (Hectors). Pre-set value is 300. Then press the **ENTER** Key to store the value and set to setup 5.

Lights# 1 & 4 is on for
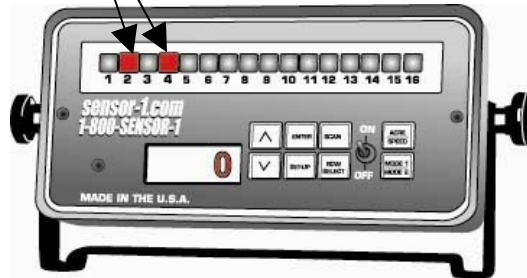**"Low Population"**

(Setup 5 Function)

Entering Low Population Limit: Row 1 and 4 lights will be on. The display will read the current Low Population limit from memory. Set the Low Population limit by using the **UP** and **DOWN** arrow keys. The display will read 1000 seeds per acre (Hectors). Example 22.0 is 22,000 seeds per acre (Hectors). Pre-set value is 1. Then press the **ENTER** button to store the value and set to Setup 6.

Note: For High and Low Population limits it should be set to at least +/-15% than the desired planting rate of your population value you want. This limit is a variable decided by the user. It should be kept in mind that setting too close to your limit would sound the HI or LOW warning alarm more often. Drills will need a higher margin of error. Use +/- 20% to +/- 30% depending on the type of drill you are using. The drill will drop many seeds at a time instead of dropping seeds constantly, as a planter does. For a drill, the population will jump up and down slightly because of more seed drops, unlike the constant drops of a planter.   If the low population is set to Zero (0), there will be no alarm sounding for Low, Hi Population or tube blockage. If you want the alarm to go off, you need to set the low population to at least greater than 1.0.

Lights# 2 & 4 is for "Population Gain"

(Setup 6 Function)

Setting Population Gain: New Feature The accuracy of a planter monitor system is determined by the seed sensor and how well it counts the seeds. The method of seed drop plays an important role in accurate seed counting. A sensor mounted on a planter the seeds drops one seed at a time this will count much more accurately (close to 100%) than a seed sensor that is mounted on a drill that has a fluted type of seed tube that distributes seeds several at a time. Different styles of seed sensors will also count differently. A Dickey-john ® infrared high count sensor will count more seeds than a Dickey-john ® normal count seed sensor that is used on many older planters. The Sensor-1 Monitor can be adjusted with the population gain by setting a population grain factor. An example would be a John Deere ® 750 drill setup to plant soybeans. These drills will have a typical error of 15% to 20%. This means that the seed sensor will miss 13 to 15 seeds for every 100 seeds planted. By programming 20% into the population gain, the Sensor-1 monitor will calculate population with the error correction and display a population value that is much closer to correct. To change the population gain number, set the value you want in the function note that "00%" to "99%" (NOTE!! 99% will almost double the value that is counted by the seed sensors. 00% will add no correction.)

Lights# 3 & 4 is on
**Measure Speed Constant**
200 Feet Set-up
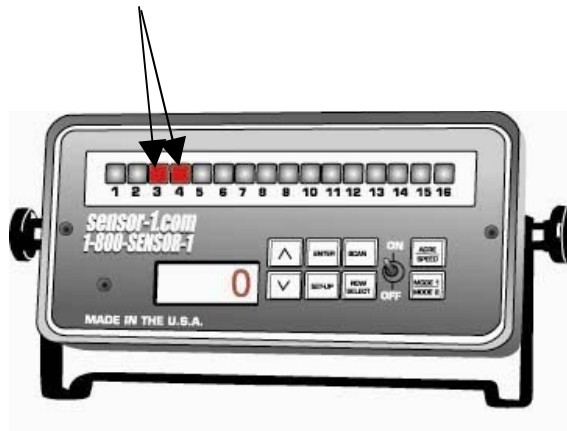
(Setup 7 Function)

Measure Speed Constant: Row 3 & 4 light will be on when measuring the speed constant. Press the **ENTER** button to skip this step if you are using a calculated speed constant. See the section on measuring the speed constant for instructions. Measuring the speed constant: When measuring the speed constant, try to match actual field conditions, and it should be simulated as close as possible.

1. Measure an accurate 200 feet (50 Meters) in field course, preferably on a level ground. Mark off the start and finish of the course, so it will be visible from the cab as you drive by the markers.
2. Press the **SET-UP** button. Press the **ENTER** button until only ROW 3&4 light is on, the display will show the current speed constant from memory.
3. Start planting. When passing the first marker push the **UP** arrow key. The display will start counting as you move your equipment.
4. When you're passing the finish marker press the **DOWN** arrow key. The display will stop counting and display your speed constant.
5. When the calibration procedure is completed, the constant established, the value should be written down and retained in the event of a memory loss. If this happens the constant must be re-entered manually using the Setup Set-up 8. The accuracy of the 200-foot (50 Meters) calibration should be as accurate as possible, as this will determine the population count accuracy. Record this number for future references.
6. Press the **ENTER** key to store the speed constant to memory and to advance to Setup 8 **Speed Constant reference_____.** The monitor is pre-set to 7773 (6375 metric) for speed constant. If the Speed Constant is equal to zero the monitor will count seeds instead of population. Using the GVS or the Philps Radar the Speed Constant should be 7773

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Lights# 1,3, & 4 is on
   **"Manual Speed Constant"**
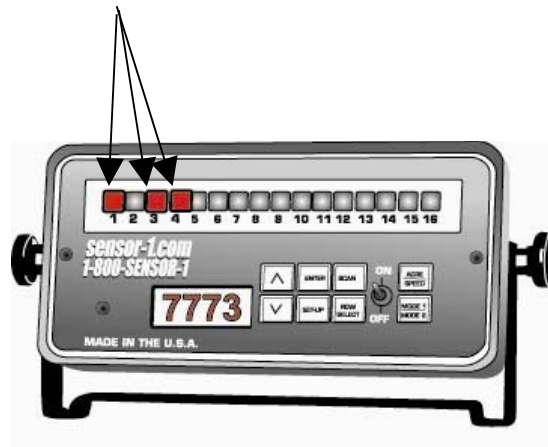
(Setup 8 Function)

Manual Speed Constant Calculated Value: Rows 1, 3, & 4 lights will be on. The display will read the current speed constant from memory. Set the calculated speed constant by using the **UP** and **DOWN** arrow keys. Then press the **ENTER** button to store the value and step to setup 8. For more information on calculating the speed constant, see the section on Setup Calculations.
 Changing a setup value.
1. Press the **SET-UP** key to get into the setup function.
2. Press **ENTER** key until you're in the setup function that you want to change.
3. Make the changes with **UP** and **DOWN** arrow keys.
4. Press **ENTER** button, to save, then it will advance to the next Setup function.
5. Press **SET-UP** button to return to operate function. Restart the monitor by turning it Off & On
6. If your Sensor-1 monitor and your speed is 8.0 mph and your true speed is 7.0 mph you need to increase your speed constant, to reduce the 8.0 mph to 7.0 mph. Explain, if your speed constant is 7773 and your speed on the Sensor-1 monitor is 8.0 mph and you want to reduce it to 7.0 mph. Increase the 7773 to 8000 and check the speed again. Use set-up 7 were lights 1, 3 & 4 are on to make your manual adjustments
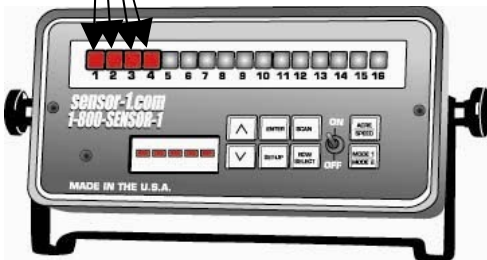
**Lights# 2, 3 & 4 is on
"Light Intensity"**
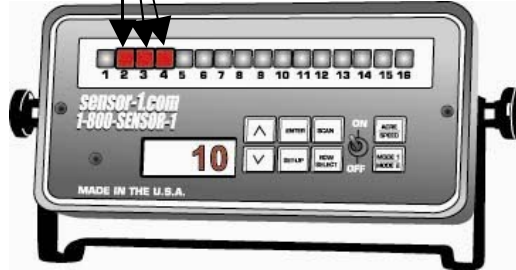
(Setup 9 Function)

Light Intensity: Row 2,3 & 4 lights will be on. Set the light intensity by using the UP and DOWN arrow keys. Intensity 1 is the dimmest and intensity 10 is the brightest. Pre-set value is 10.

**Lights# 1,2,3& 4 is on
Hopper Sensor**

(Setup 10 Function)

Hopper Level Sensor: New Feature Row 1, 2, 3 & 4 Lights will be on for this setup. Use the up or down arrow key to indicate if you have a hopper set up**. ----**   if there is no hopper and **HOPP** if you have a hopper.

Population Monitor Manual: Series S198P population monitor. It was designed to take the guesswork out of your planting operation. The console will monitor each row for seed flow and seed population density (seeds per acre)(seeds per hectors). When any row stops planting or the seed population drops below or above the pre set values or control limits, the console will sound an audio alarm and visually indicate the failed row with a flashing light. This monitor also provides the user with information on Population, Acreage (Hectors) planted, and Ground Speed. Sensor-1 population monitor consists of the following: a planter monitor console, a console cable that connects the monitor to the planter harness, tractor's battery, and radar leads. Sensors and ground speed can be purchased separately. The monitor cable connects to a planter or drill harness and the harness connects to the seed sensors, battery and ground speed units. The population monitor needs a distance sensor; this is strongly recommended but not required. A distance sensor consists of radar, universal distance sensor, press wheel, or manual speed settings. The seed sensor should be a population device that is installed in each planter or drill runner normally at the lower end of the seed delivery tube. These sensors are located close to the lower end of the planter runners to quickly detect seed flow stoppage to the ground. The series S198P monitor population or seed flow can be used on planters or drills, monitoring 1, or up to 16 rows. Since each Planter or Drill runner differs with each planter model, seed sensors are designed to fit specific planter types. This provides optimum seed sensing for each planter model.

Installation Console: The console should be mounted within easy view and access of the operator, and should not obstruct the operator's normal vision. The console can be mounted on the hood or fender of tractors without cabs, or within the cab on a cab frame member. The mounting bracket can be installed upright or upside down to suspend the monitor from the roof of the cab. The bracket can be secured with two bolts for a fixed horizontal angle or with one bolt in the center for a variable horizontal angle.

Console Battery Lead: Sensor-1 monitors operate on 12- Volts DC only. The console's battery lead has two wires. Each wire has a ring terminal. The red wire must be connected to the POSITIVE side of the tractor's battery regardless of whether the tractor is positive or negative ground. The black wire must be connected to the NEGATIVE side of the battery. If the tractor uses two 12-Volts batteries connected in series, connect the console's battery leads across the battery connected to the tractor's chassis. Do not connect the console across both batteries (2 multiply 12-Volts = 24V). If the tractor uses two 6V batteries make sure they are connected in series. If the positive battery terminal on one battery is connected to the negative terminal on the other battery the batteries **are** connected in series. If the positive battery terminal on one battery is connected to the positive battery terminal of the other battery, batteries are connected together in parallel; you have a six-volt system and the console will not work. If the two six volt batteries are connected in series, connect the console power leads across both batteries. Make sure the black wire is connected to the NEGATIVE on one battery and the POSITIVE terminal of the other battery. If the two six volt batteries are connected in parallel, connecting the red wire to the positive side and the black wire to the negative side, it will not damage the console but the voltage will be to low to power the console. You would need a separate twelve-volt source to use the console on a six-volt system. NOTE: The Battery, ignition, and electrical system of the tractor must be in good working order. If your tractor battery arrangement is different than those shown

above, or if there is any questions as to where to connect the battery cable, use a voltmeter to make sure you have from 11-volts to 14-volts across the Red and Black leads. On tractors using two 12-volt batteries, make sure console battery leads are connected directly to the grounded battery.

Console Cable Signal Cable: The signal cable from the console is terminated with a 37-pin connector at the planter end. Route this cable to the rear of the tractor near the hitch. Route the cable where it will not get pinched, cut, stepped on, or damaged in anyway. Also, choose a route away from the tractor's alternator and spark plugs. Make sure the planter can be unhitched without removing any tie wraps. Once the route is chosen, lay the cable in place and tie it down with plastic wire ties. The Sensor-1 monitor console cable signal cable is set up for a Dickey-john, Case-IH, and a Sensor-1 harness configuration. Power is on #24 (rows 1-8) & #25 (rows 9-16) Ground is on #26 (rows 1-8) & # 27 (rows 9-16). For John Deere monitors harness power is on #27 and ground is on #28. Make sure what type of harness configuration you have.

Planter or Drill Harnesses: Planter or Drill harness installation is not difficult, however you must use care to locate the A value that a harness where it will not get pinched, cut, stepped on, or damaged by moving parts during operation or transporting of your planter or drill. Start by connecting the tongue of the harness cable to the Console's Signal Cable. Tie the tongue of the harness cable to the planter's hitch. Be sure to leave enough slack to allow turning without stretching or breaking the cables. Tie the other end of the tongue cable to the other end of the hitch boom at the point it connects to the planter's tool bar. Tie down the rest of the tongue cable to the hitch boom, coil up any excess and tie it down to prevent damage during operation. Fan the harness cable along the planter's tool bar so that row one is on the far left, when facing the direction of forward travel. Make sure the cables are in order across the tool bar. Check to make sure the cables will not be damaged during operation. Tie all the cables down with plastic wire ties.

Sensor Installation: The sensors are mounted on each planter shank near the bottom of the seed delivery tubes. Route each sensor cable to the harness and tie it down to prevent damage to the sensor cable during operation.

Hardware Trouble Shooting:

Troubleshooting: The general procedure to use, if a problem occurs, is to isolate the cause to a sensor, sensor lead, planter harness, console cable, or the console, in that order. Make necessary repairs after problem has been isolated.

Seed Sensors: The Infrared (population sensor) or seed flow sensors are mounted in each planter shank, near the bottom of the seed sensors delivery tubes. This location enables the sensors to quickly detect plug-ups or absence of seed flow from the hopper. As seeds flow through the sensor, they interrupt the beam of light between the light emitting diode (LED) and the photo diode detector. Since planter or drill shanks differ with different planter or drill models, sensors are designed for specific planter models and are sometimes not interchangeable between planters. The infrared sensors will detect corn, soybean, cotton, beets, sorghum, peanuts and most other seeds normally planted.

Testing the Seed Sensors: When a row are failing move the sensor to another row and if the problem follows, the sensor on your console, the sensor is the problem. Check for excessive dirt inside the tube. In some cases, static electricity may cause dust and seed treatment to accumulate on the sensing elements in the sensor. Enough may accumulate to cause the sensor to malfunction, which can cause the monitor to indicate a failure condition. Low humidity and dry soil conditions tend to cause this condition. When this occur, one need to clean the inside of the sensors by using a dry bottlebrush. Check for cut or damaged wires. If the sensor leads are damaged, carefully cut away the cable covering of the damaged area. Repair damaged wire or wires by soldering wires together, being sure to match wire colors. Tape each repaired wire and the cable covering. Tie down the cable so that the same type of damage will not occur again. To test the sensor without a Sensor Tester, get a 9-Volt Battery. Connect the battery to the sensor, red to red (+) and black to black (-). Connect a 12-volt automotive test light between the Green wire and the black wire. You should get 5-8 volts between these two wires. When seeds are dropped down the tube, if the sensor is working the green wire goes to ground as the seed passes through the light beam. Be sure the sensor is shaded. If the sensor is flooded with sunlight or artificial light it will not be able to calibrate itself. If the sensor still does not work you need to replace it or have it repaired.

Planter Harness: Examine the planter or drill harness for damage. If the harness is cut or pinched, carefully cut away the cable covering. Repair damaged wire or wires by soldering wires together, being sure to match wire colors. Tape each repaired wire and the cable covering. If necessary, move and secure cable so that the same type of damage will not occur again.

Console Cable: Examine console cable for damage. If harness is cut or pinched, carefully cut away the cable covering. Repair damaged wire or wires by soldering wires together, being sure to match wire colors. Tape each repaired wire, and the cable covering. If necessary, move and secure cable so that the same type damage will not occur again.

Acres: If you go into setup and clear the acres (hectors) back to zero, after turning the monitor off and then back on, if the acre (hectors) count doesn't restart from zero, you will need to send the monitor back in to us for monitor repair. The problem is usually the memory chip in the unit.

Before you do this, make sure your speed is not off. **Zero acres Counter:** To zero out the acres counter press the acres counter button down for 5 seconds.

Function	Setup	Led 1	Led 2	Led 3	Led 4
Sensors	1	■			
Rows	2		■		
Spacing	3			■	
High Pop.	4				■
Low Pop.	5	■			■
Population Gain	6		■		■
Speed Counter (200 feet seup)	7			■	■
Speed Set (manual Set up)	8	■			■
Light Intensity	9		■	■	■
Hopper Level Sensor	10	■	■	■	■

Set-up Quick Chart

Acres/Speed Button. New Feature After pressing the Acres/Speed button these are the symbols that will show speed, seed spacing, Field and Total Acres

10 ▬▬ Symbol is the Speed

11 ═ Symbol is the seed spacing

12 ≡ Symbol is the Field Acres

13 No symbol is the Total Acres

14

15 SP= Speed Failed- The monitor has a speed constant and speed is equally to zero

16 SC= Speed Constant = 0- Tell the operator that the speed constant is equally to zero

17

Adjust Speed on the fly. **New Feature** If the farmer is displaying the speed -4.5 with speed constant of 8010 for explain by pushing the up and down arrow keys while planting this will adjust the manual speed setting by 10 each time the up arrow is pushed.

Before this work, The farmer must have the display the speed on the monitor, then when he press the up or down arrow key the speed constant manual or function will change. The farmer will be looking at the speed and can see the speed change as he enter a higher or lower value for the manual speed constant.

 This will help the farmer to adjust his speed on the fly verse going into setup and adding or subs tracking the manual speed constant. If the farmer is using fix speed such as F -4.5 then he can adjust his fix speed by .1 mile per hour.

Zero out the Acres Counter: New Feature **To zero out the Field and Total Acres counter press the Acres/Speed counter button down for 5 seconds you will heard two beep and the the Field Acres will zero out. If you continue to hold the Acres/Speed button in then the you will heard two beep and the Total Acres will zero out.**

Row Eliminator: The monitor has the capability to eliminate a row or rows. For example, a split row planter and the farmer has a 12 row monitor and he want to plant 6 rows and wants to show rows: 1, 3, 5, 7, 9 & 11 and want to eliminate rows 2, 4, 6, 8, 10 & 12, to do this press the setup key and press the row select button and all 12 lights comes on. Then press the up arrow key if you want row 1 to be on or down arrow if you want it to be eliminated; then row 2 will flash and press the up or down arrow key, to determine if you want row 2 to be on or off. Once after you press the up or down arrow key the led light will advance to the next row. Do these for all 12 rows. After you are done press enter and it will change your number of sensors to what ever you did not eliminated. The will work on monitor with 4, 6, 8, 12, 13, 16 row configurations.

Sensor-1 Warranty: Sensor-1 warrants to the original purchaser for use that, if any part of the product proves to be defective in material or workmanship within three years from date of original purchase. Sensor-1 will (at or option) either replace or repair said part. This warranty does not apply to damage resulting from misuse, neglect, accident, or improper installation and maintenance. **THE FOREGOING WARRANTY IS EXCLUSIVE AND LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILTY FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER WRITTEN EXPRESSED OR IMPLIED**. Sensor-1 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. Purchasers accept these terms and warranty limitations unless product is returned within thirty days for full refund of purchase if the product is not used, to the dealer that they purchased it from. Please send in the warranty card and copy of the receipt, before 30 days after date of sale to receive free update, extended warranty for service and technical support and update information.