Version 1.5
Operation Manual PM2005

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System Overview

The new Sensor-1 population monitor is designed to monitor the Population, Seed Flow and Seed/Area of your planter or drill. It can monitor up to 24-rows. The back-lit LCD screen features an easy to read bar graph and digital display that can be setup to show Total Population, Average Population, Seed Spacing, Seed, Total or Field Acres, Travel Distance, Alarm information, Row Select or Scan, High/Low Population Alarm, an Adjustable Alarm Volume, are just a few of the features of this new monitor.

Console Installation:

Population Monitor Manual: Series PM2005 population monitor. It was designed to take the guesswork out of your planting operation and give you more data at one time then any other monitor. The console will monitor each row for seed flow and seed population density (seeds per acre). 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 bar graph display. This monitor also provides the user with information on Population, Acreage 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 PM2005 monitor population or seed flow can be used on planters or drills, monitoring 1 or up to 24 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.

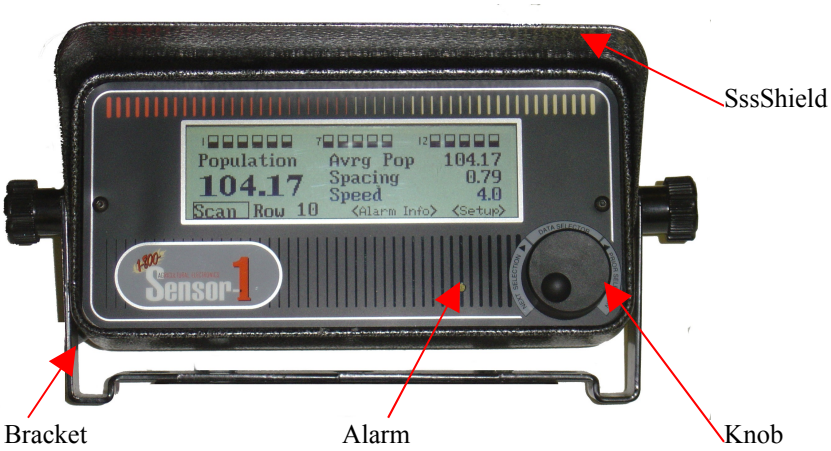
Console Cable Signal Cable: The signal cable from the console is terminated with a 37-pin connector at the planter end. Route this cable to the rear of the tractor near the hitch. Route the cable where it will not get pinched, cut, stepped on, or damaged in anyway. Also, choose a route away from the 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 1-12) & #25 (rows 13-24) Ground is on #26 (rows 1-12) & # 27 (rows 13-24). For John Deere monitors harness power is on #27 and ground is on #28. Make sure what type of harness configuration you have. (See page 18 for wire Diagram.)

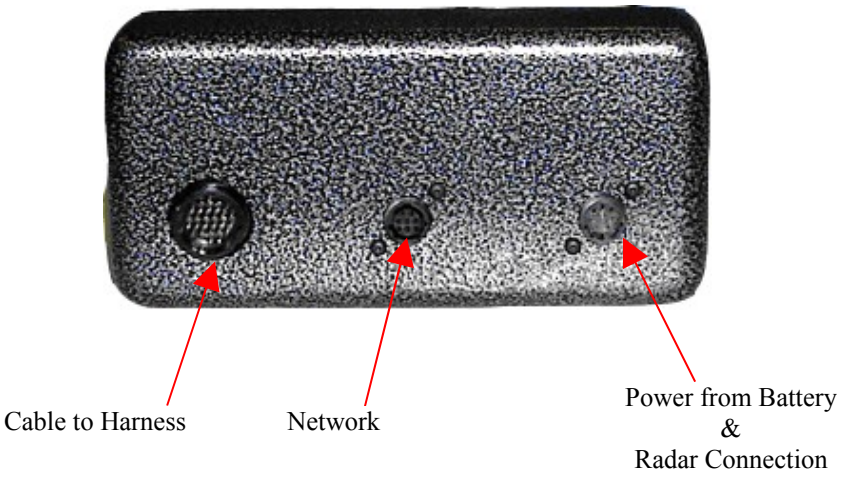
Planter or Drill Harnesses: Planter or Drill harness installation is not difficult, however you must use care to locate the A value that a harness where it will not get pinched, cut, stepped on, or damaged by moving parts during operation or transporting of your planter or drill. Start by connecting 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.

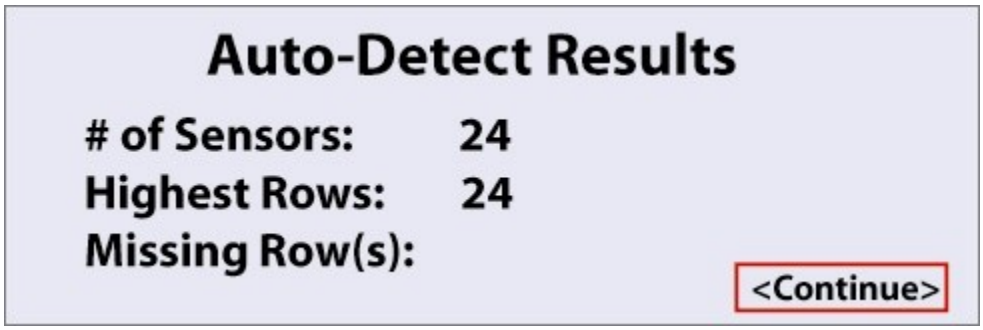
Monitor Overview: When starting the monitor press the knob in and release. If you hold the knob in for long then 10 seconds on start up you will reset to default values. To turn the monitor off press the knob in for 5 sensors and the monitor will turn off.





Personal Screen: Every Sensor-1 PM2005 is custom to the customer information, such as the Name, Address, and City, State and Zip. Also, display is the Serial Number and the Program Version.

Auto-Detection: The next screen that comes up is a Auto-Detect Results Screen. This screen informs the farmer how many sensors is attached to the monitor. It the number of sensors is different then the highest rows, then the monitor pause until you press the continue function.



If the number of sensors matches the highest Row(s) the monitor will Continue to the Main Screen.

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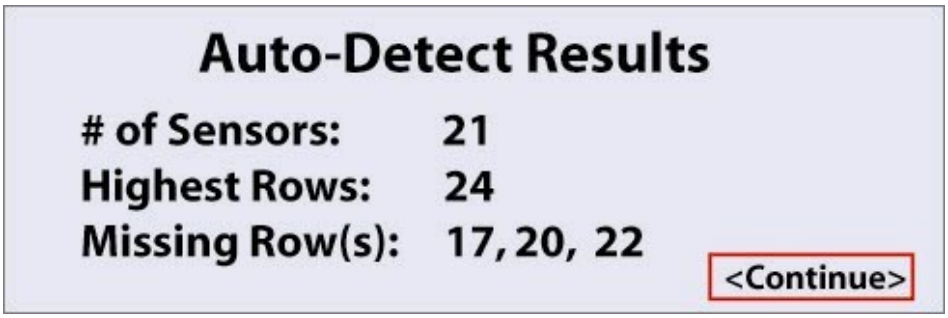
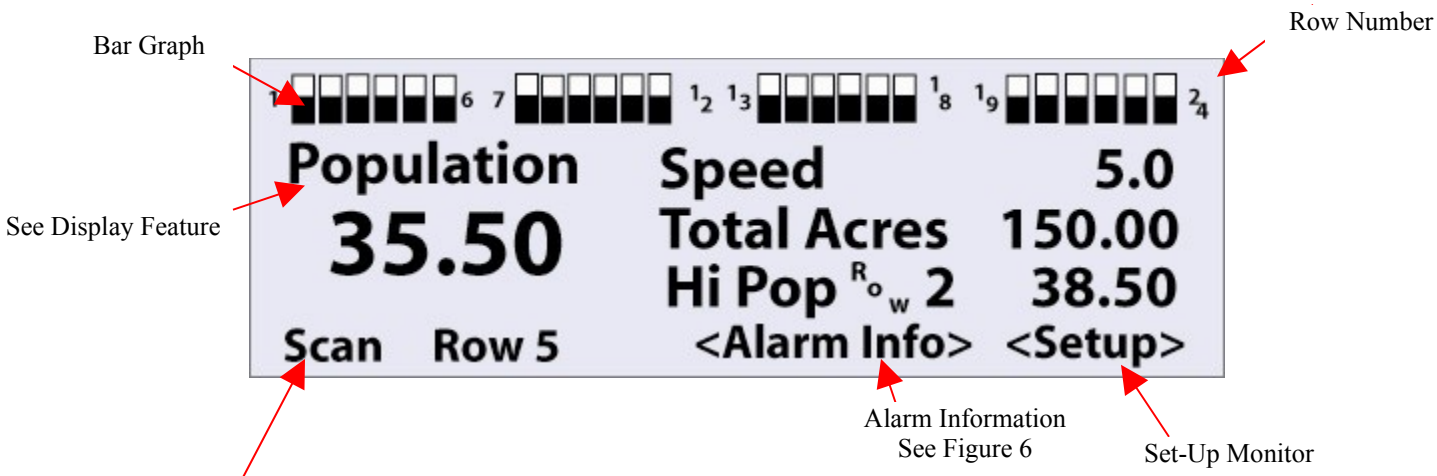


If the number of sensors does not match the highest row then the monitor will pause until you continue. This is to notify you of a different.

Main Screen: The main screen consisted of a Bar Graph for each row and the top of the graph is high population and the lower part of the bar graph is the low population setting. The middle is the average of both of them. The Main Screen has a Scan or Fix row monitoring. Alarm Information and a Setup Key. The monitor can display up to 4 different functions'

Bar graph for rows: The bar graphs
provide a graphical display for the seed flow of each row. When the bar graph is all dark, it indicates that the seed flow is at or near the high population setting. When the bar graph looks like an empty box, it indicates seed flow is at or near the low population setting. When the bar graph is half dark and half light, it indicates the seed flow is at or near the average of the high and low settings. For example, if the low population is set to 10 and the high population is set to 30, the average of the high and low population is 20. Therefore, the bar graph will be half dark and half light when the seed flow is at or near 20



Fixed Row and Scan: On the bottom left corner of the screen is the word "Fixed" or "Scan". When set to fixed, the population displayed will be the population of the row listed after "Fixed Row". When set to Scan, each row number will appear just after "Scan Row" which is pre-set in set-up The population shown will refer to the population of that row. The number of seconds that each row is shown is determined by the "Scan Delay" setting in the setup menu.

Display features in by turning knob clockwise are: Population, Total Acres, Field Acres, Seed Spacing, Speed, Average Population, High & Low Population, Distance, Clear T-Acres, Clear F-Acres, Speed +, Speed –

Display Features: The figure above shows the main screen. This monitor can display 4 types of information plus a Bar Graph that shows the High and Low Population for each row. The Display Features are as follows:

Population: This is the population of a single row. The row that the population is referring to is listed just after the "Scan" or "Fixed" in the bottom left corner of the main screen. Numbers given for population are always in thousands. For example, the display will show 21.50 for a population of 21,500. The population shown is calculated by taking the average of several population readings. Averaging is done so as to produce a more stable and accurate reading. The averaging does however slow down the response time of the population when there are abrupt changes in speed and/or seed flow. Therefore slow changes in the population during sudden changes in speed are normal

Total-Acres: Total Acres is the sum of all the Field Acres

Field-Acres: Field Acres is the acres the you are planting, needs to be zero after each field

Seed Spacing: Is measure in seeds per foot.

Speed The monitor will display speed to the nearest 0.1 miles per hour or kilometers per hour, depending on the English/Metric setting in the setup menu.

Avrg Pop The Average population: This will average all rows the row that you have sensors on. If a row failed and you keep on planting with that row fail, your Average Population for the planter will drop. This function will add the population for each row and divide by the number of sensors program in.

Lo Pop: Low Population: This setting will show which row has the lowest population. A few seconds after lecting **Lo pop** the word "row" will appear followed by a row number. The row shown is the row with the lowest population. The number given to the far right is the population for that row, given in thousands (ie, The number 23.4 indicates a population of 23,400).

Hi Pop: High Population: this setting will show which row has the highest population. A few seconds after selecting **Hi pop** the word "row" will appear followed by a row number. The row shown is the row with the highest population. The number given to the far right is the population for that row, given in thousands (ie, The number 23.4 indicates a population of 23,400).

Distance: Measured in miles the Distance is cleared when Total Acres is cleared. (They are clear by selecting "Clr T-Acrs" and pressing in on the control knob). .

Clr T-Acrs: **Clearing Total Acres**. Press and hold the selector knob in to clear the total acres. Total acres is similar to field acres (See below)

Clr F-Acrs: **Clearing Field Acres**. Press and hold the selector knob in to clear the field acres.

Speed+ & Speed-: The speed plus and speed minus are used to fine tune the speed if the speed shown is different than the actual speed. For example if the tractor is traveling at 5.0 mph and the speed shown is 4.9, the speed can be adjusted to 5.0 mph by pressing **speed+** one time. The speed will increase or decrease by 0.1 mph (or kph) each time **speed+** or **speed–** is pressed. The **speed+** and **speed-** feature is not available on the left display (Large font, screen position).

Speed+ and **speed-** only work when the method for sensor distance is set to "Calibrate over distance". (This setting can be found in the setup menu, on the screen titled "Distance Sensor Setup").

With the sensor distance method is set to "Calibrated over distance", a run of 400 feet is made to calibrate the distance. This results in a count given at the bottom right of the setup screen.. The **speed+** and **speed–** work by adding or subtracting from this count, so as to change the speed by 0.1 mph (or kph). Using the **speed+** or **speed-** on the main screen will effect the distance count on the setup screen.

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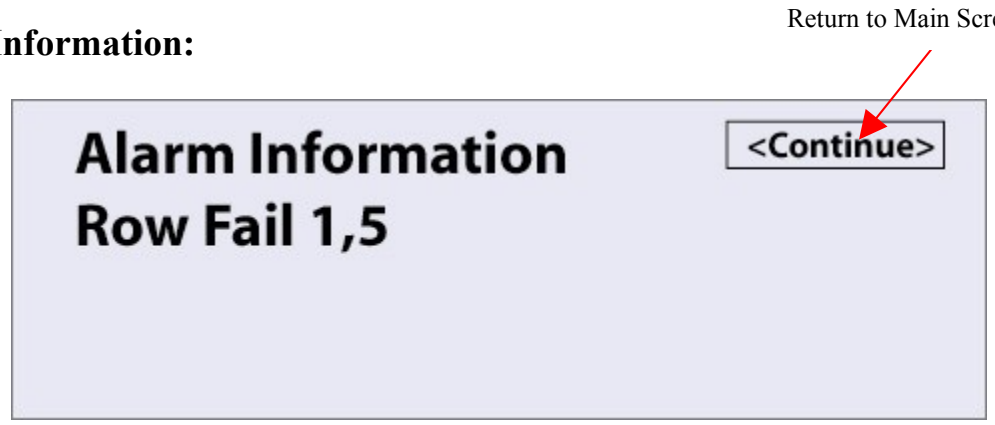
Alarm Information:



There different types of alarms: row fail, Low Population, and High Population and Hopper Failure. If seed flow stops on a row, the monitor will wait a few seconds then will turn on the alarm and display an error. The alarm volume and length of delay can be set in the setup menu, when the alarm sounds, an error message will blink in the bottom left corner. Pushing in on the control knob once will clear the alarm. Pressing it a second time will display the alarm screen. The alarm screen will list error(s), followed by the row numbers that have the errors.

Setup Options: To enter setup mode, select **<Setup>** from the main menu and push in on the control knob. There are several screens in setup. Select **Next-->** to advance to the next setup screen, or **←Back** for he previous screen. You may select **<Exit Setup>** from any of the setup screens to exit from setup and return to the main screen.

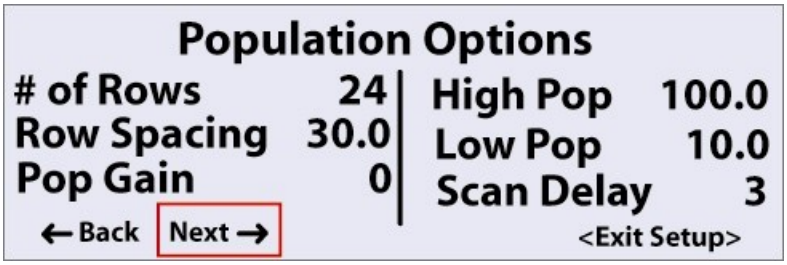
Type of monitor: Most of this manual covers features of the Sensor-1 PM2005 monitor in the population" mode. The S-1 can simulate two other types of monitors. The other two types are much simpler to use, but have fewer features. The other are Seed Flow and Speed Areas

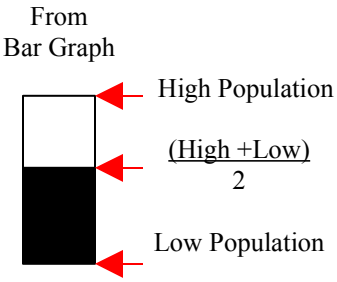
English/Metric: E = English Units (Inches, Acres, mph). M = Metric Units. Speed is in kilometers per hour, Distance is in kilometers, Row spacing is in centimeters, Area is in hectares

Hopper Type: Sensor-1 PM2005 monitor used the Case-IH Sensor from the Early Riser and Seed Flow II monitor. If the Hopper Type is Off that means that you have no hopper sensor, if it reads ER = Early Riser Hopper Sensor, this is the sensor that is used on an Early Riser monitor, if it reads SF = For the Seed Flow Hopper Sensor, this is sensor is used on the Seed Flow II monitor

Seed Fail Delay: This is the amount of time that seeds can stop dropping before the S-1 monitor detects an error and turns on the alarm. Having a longer delay causes the monitor to react slower. However, having the delay too short can cause "false alarms". The delay can be set from 1 to 9 seconds. The default is 4 seconds.

Population Options:





# of Rows: Number of Rows: on your planter or drill. The S-1 monitor multiplies the number of rows by the row spacing to determine the implement width.

Row Spacing: Row spacing is the distance in inches (or centimeters) between any two rows.

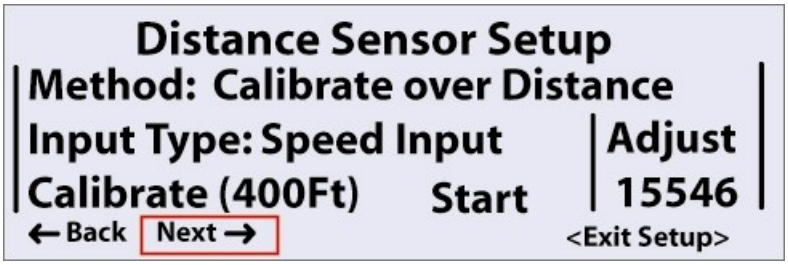
Pop Gain: Population Gain. The accuracy of a planter monitor system is determined by the accuracy of the seed sensor, which is dependent on the method of seed delivery. A seed sensor mounted on a planter or drill that can drop seeds one at a time is more accurate than a seed sensor mounted on a drill that has a fluted type of seed delivery that distributes several seeds at a time. Population gain is used to correct these errors in seed counting. A typical drill setup to plant soybeans can have an error of 13% to 15%. This means that for every 100 seeds planted, the seed sensor will miss 13 to 15 seeds. By programming 14% into the population gain the monitor will calculate population with the error correction and display a population value that is much closer to the true population being planted. The number given for population gain is a percent. For example 10 is 10%, 15 is 15%, and so on. The population gain can be set from -50% to 100%.

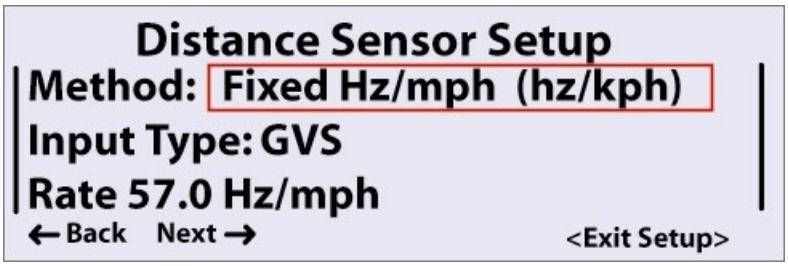
High Pop: High Population: The alarm will sound whenever the population goes above the number set for high population. This number also effects the bar graphs, which are located at the top of the screen of the main screen. A bar graph for a row will be filled (All dark) whenever that rows' population is at or near the high population setting. The number given for high population is in thousands. For example 63.95 refers to a population of 63,950. The S-1 monitor will not allow the high population to be set lower than the current low population setting.

Low Pop: Low Population: The alarm will sound whenever the population goes below the number set for high population. This number also effects the bar graphs. A bar graph for a row will be empty (All light) whenever that rows' population is at or near the low population setting. The number given for low population is in thousands. For example 12.47 refers to a population of 12,470. The low populations cannot be set to a value higher than the current setting of the high population.

Scan Delay: This delay is used when the monitor is set to scan rate. The row number will appear just after the word **Scan**. When scanning, the population shown will always be the population of a single row. For example, if the display shows **Scan Row 1**, the population will be for row 1. The scan delay setting determines the length of time that a row's population is shown.

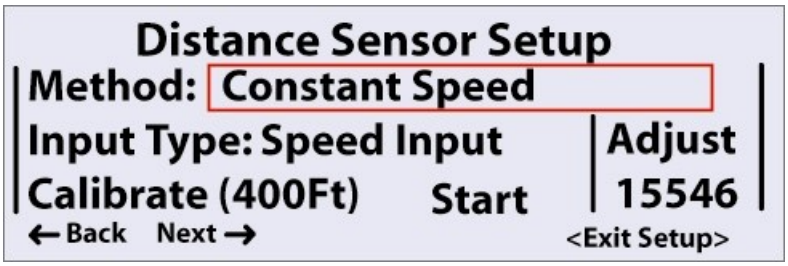
Distance Sensor Setup:



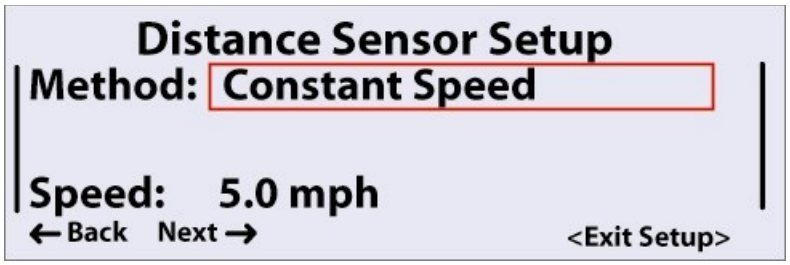


Fixed Hz/mph: When set to **Fixed Hz/mph** this indicates that a speed sensor is being used. Speed sensors generate a pulse, or frequency, for each mph they are reading. For example, a speed sensor might generate 57 pulses per second, or 57 Hz for every mph that the tractor is traveling. At 2 mph the frequency is 2 x 57Hz, or 144 pulses per second. At 3 mph the requency is 3 x 57 or 171 pulses per second, and so on. This setting allows the user to calibrate the S-1 monitor to match any type of frequency speed sensor that the operator wants to use.

Constant Speed: The constant speed can be used if the tractor does not have a speed sensor. If the operator knows what speed the tractor will travel in a particular gear and a particular rpm, the speed can be entered here and a speed sensor is not needed. It should be noted that **constant speed** is the least accurate speed setting, as it does not account for wheel slippage, or changes when the tractor is going up and down hills. The computer uses this count to calculate speed as well as distance, area, seed spacing, and several other calculations. If the distance count is off, then the speed as well as many other readings will be off. It is important to set the speed accurately, as the accuracy of most all other readings are dependent on the accuracy of speed

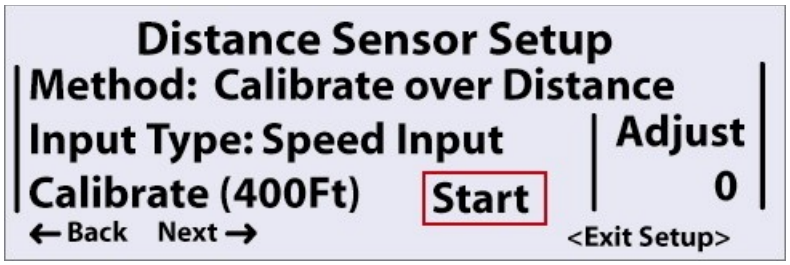


Under Method press Constant Speed, and move the cursor to the speed and press the knob in and rotate the knob until your speed is dialed in.



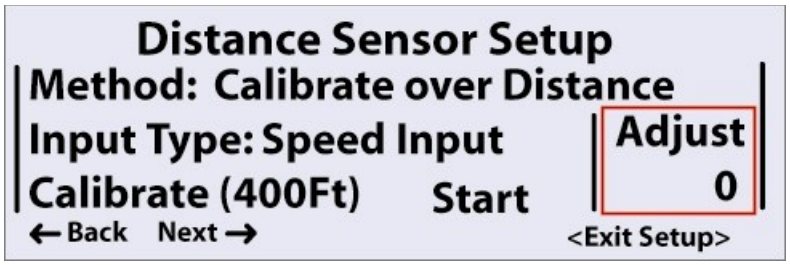
Calibrate Distance over 400 Feet: After selecting the "Calibrate over a Distance" move the cursor over the "Calibrate (400FT) and press the knob in.

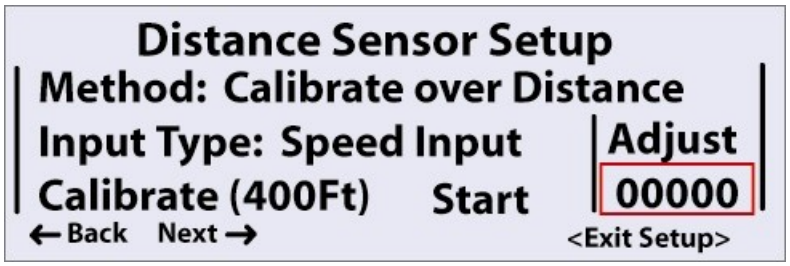
Press "Start" when you are ready to start your 400 feet.



Press "Stop" when you are finish your 400 Feet.

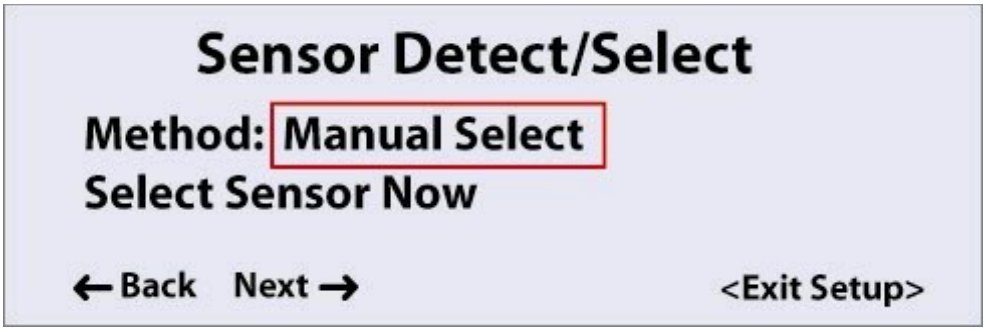
Adjust: Manual Adjust: The operator can manually enter the value or fine tune the existing value. When the sensor distance method is set to "Calibrate over distance" a run of 400 feet needs to be made to calibrate the distance. During the 400 foot run, the speed sensor will put out a series of pulses. This number is a count of pulses that were made during the 400 foot run. This number is used to calculate speed, as well as many other calculations, such as distance, area, etc. The **Adjust** feature allows the count to be adjusted for more accuracy. The default value is 15544.

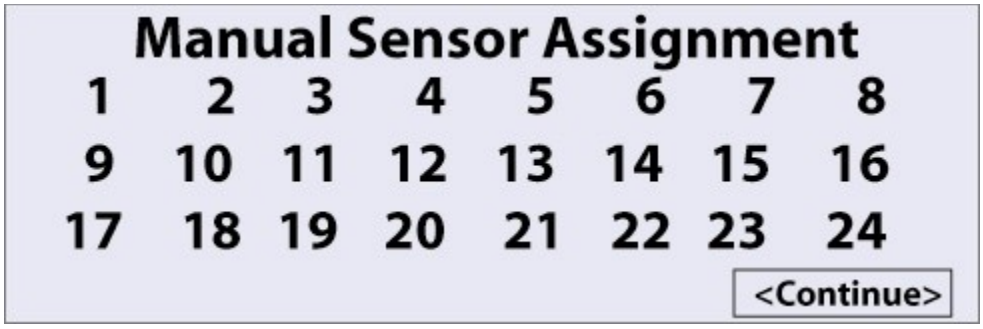


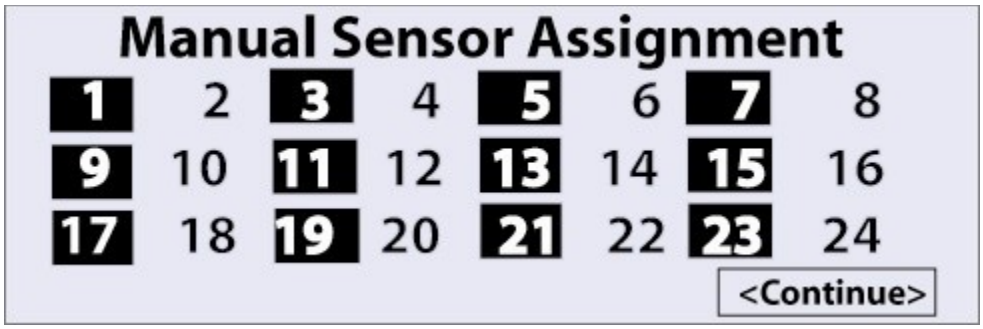


To manual adjust your speed constant, press the Adjust feature and a box will appear just around the numbers rotate the knob clockwise or counter clockwise to the desire number and then press enter. To manual adjust your speed that your monitor is displaying, go to the main screen to the feature Speed + or Speed – and adjust your know speed for what is. See page 8 and 9 for more details. This function will change your speed constant number corresponds to your speed adjustment.

Automatic Seed Sensor Detection: Automatic seed sensor detection, or auto-detect, is a mode that can be turned off and on. When auto-detect is on and the PM2005 monitor is first turned on, the monitor will pause for a few seconds to scan for sensors, then display the results (See figure 6 below). Auto detection is done whenever the monitor is turned on and auto detect is set to on. Auto detect can be turned off or on in the setup menu. If a seed sensor is not working, then the number of rows and number of sensors will not match. For example, if there are 24 rows with 24 sensors, but one of the sensors is not working, the Display will show 24 rows and 23 sensors (See figure 7). The row(s) with the bad or missing sensor will be displayed after "Missing rows(s): If auto detect is turned off, then the seed sensors can be turned off and on manually. Rows that are displayed in reverse print (Light lettering with a dark background) are disabled. Rows that are disabled will not alarm then there isn't any seed flow and are not used in the average population calculation.

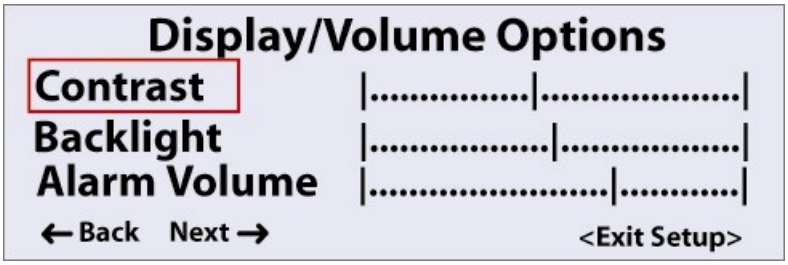






Rows Eliminator: Before making changes to some of the numbers in setup mode, it's important to know how to use the knob to change the settings. When a number is being edited and the knob is first turned, it will adjust the least significant digit of the number (The number farthest to the right). Adjusting the number, then pausing, will cause the digit to the left to be adjusted when the knob is turned. Turning the knob to adjust this digit, then pausing, will cause the next digit to the left to be adjusted, and so on. If it is desired to adjust a digit to the right again, push in on the control knob to temporary save the setting, then press in on the knob again to edit the setting. When the monitor starts to edit a number, it will always start with the right most digits. The numbers in black are the rows that are eliminator until you deselected it or run Sensor auto Detection.

Display/Volume Options:



The Sensor-1 PM2005 monitor provides a method of controlling the contrast and brightness of the display, along with the volume of the alarm. Each of these settings is stored in memory and will not change when the monitor is turned off, or when power is disconnected from the monitor. **Contrast:** Moving the indicator to the right will cause the lettering, and eventually the background, to be darker. Moving the indicator to the left will cause the lettering to be lighter. Usually a setting in the middle will work best. **Be careful when adjusting the contrast too far to the left**. When adjusting to the left the lettering will be as light as the background causing the whole screen will be too light. If the screen turns all light while adjusting the contrast do not panic. Just keep turning the contrast in the same direction and the screen will eventually come back. When turning the contrast all the way to the left it will "roll around" to the far right; making the display go from all light to dark. Turning the contrast all the way to the right will "roll around" to the left. **Do not turn off the monitor if the display cannot be read while adjusting the contrast.** Turning off the display will save the settings. The monitor will remember the settings even if the monitor is turned off and disconnected from a power source. The only way the contrast can be set back to it is default value is to reset all settings back to their default. This can be done by turning the monitor off, then pushing in on the control knob and holding it in as the monitor turns itself on. Holding the control knob in for approximately 10 seconds as it is being turned on will reset all save settings to their factory default value.

Backlight: This allows the operator to adjust the brightness of the backlight. Brightest is when the indicator is to the far right and the dimmest is when the indicator is to the far left.

Alarm Volume: This allows the operator to adjust the volume of the alarm. Moving the selector to the right will turn up the volume. Moving the indicator to the left will turn the volume down. The very last setting on the far left will turn the alarm off.

Automatic Sensor Detection: How does it works, some may wonder exactly how does auto detection work. There are three wires connected to each seed sensor. Two of the wires are power and ground (usually red and black wires) that provide 8 volts of DC needed to power the sensors. The third wire is a signal wire, usually a green or white wire. This wire will briefly connect to ground each time it detects a seed.

When auto-detection is run, the power supplied to the sensors will fluctuate from 8 volts to some lower voltage; pulsing between a higher and lower voltage, usually 1 to 2 times per second, causes lights inside the sensor to vary in brightness. The electric eye in the sensor that detects changes in the light level is "fooled" into thinking that the changes in light are due to seeds

dropping and it sends out a pulse on the signal wire. The Sensor-1 PM2005 Monitor detects these "fake" signals and determines that a sensor must be present.

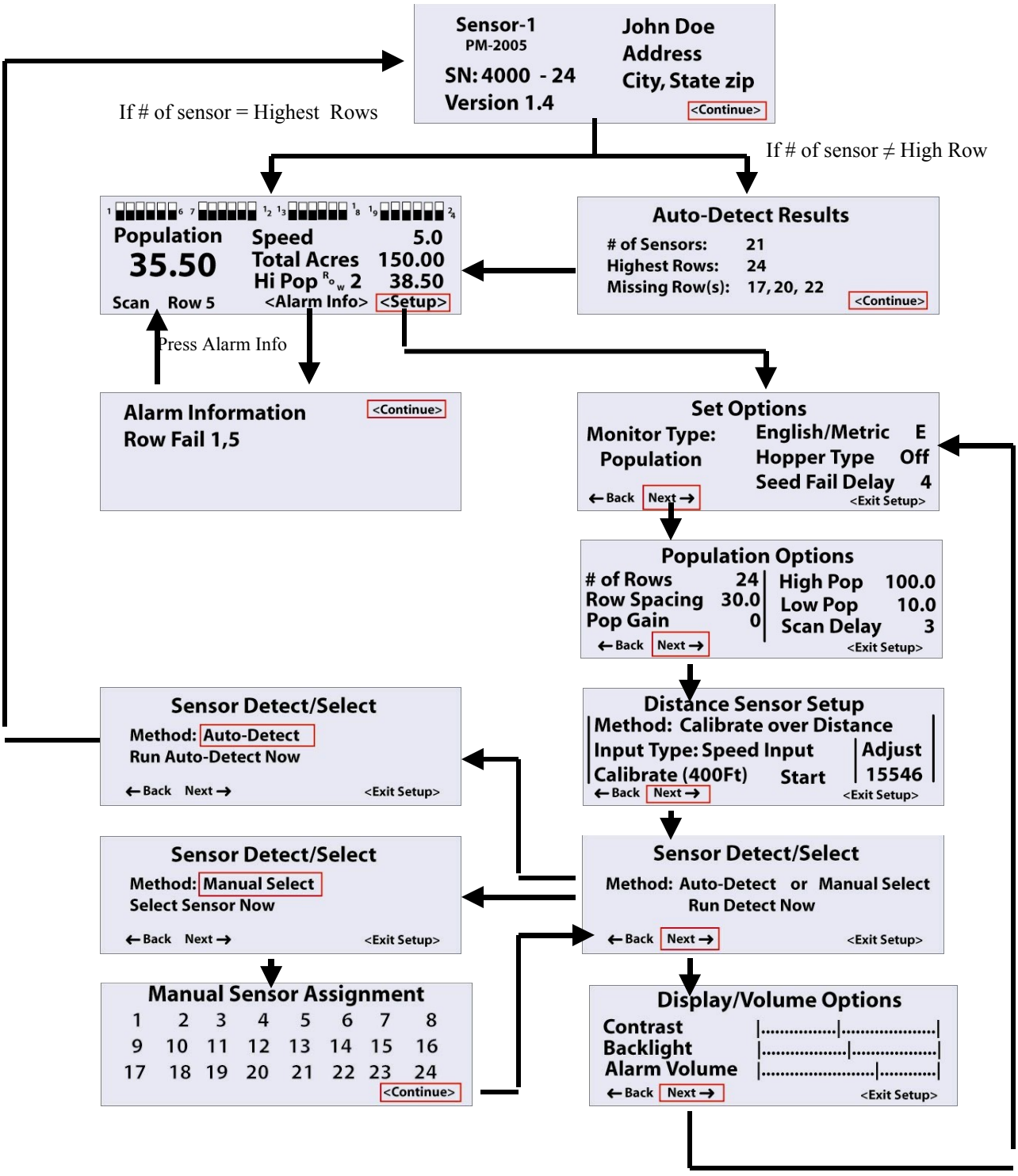
If a sensor is not connected to a row, or if a sensor is not working, it's signal line will not change as the power on the supply line fluctuates. The monitor will check if is or isn't a signal and assumes that either a sensor is not present, or a sensor is present but is not working.

Note that this method of sensor detection works with all types of seed sensors, including radar sensors. At the writing of this manual, this method of seed sensor detection is used by most manufacturers that have auto-detection capability.

Reference Section:

Signal Name	28 Pin Amp Connector	Connect To 37 Amp Connector
Sensor Input 1	Pin #1	Pin #1
Sensor Input 2	Pin #2	Pin #2
Sensor Input 3	Pin #3	Pin #3
Sensor Input 4	Pin #4	Pin #4
Sensor Input 5	Pin #5	Pin #5
Sensor Input 6	Pin #6	Pin #6
Sensor Input 7	Pin #7	Pin #7
Sensor Input 8	Pin #8	Pin #8
Sensor Input 9	Pin #9	Pin #9
Sensor Input 10	Pin #10	Pin #10
Sensor Input 11	Pin #11	Pin #11
Sensor Input 12	Pin #12	Pin #12
Sensor Input 13	Pin #13	Pin #13
Sensor Input 14	Pin #14	Pin #14
Sensor Input 15	Pin1 #15	Pin1 #15
Sensor Input 16	Pin1 #16	Pin1 #16
Sensor Input 17	Pin # 17	Pin # 17
Sensor Input 18	Pin #18	Pin #18
Sensor Input 19	Pin #19	Pin #19
Sensor Input 20	Pin #20	Pin #20
Sensor Input 21	Pin #21	Pin #21
Sensor Input 22	Pin #22	Pin #22
Sensor Input 23	Pin #23	Pin #23
Sensor Input 24	Pin #24	Pin #28
Hopper Input	Pin #25	Pin #36
Sensor Ground	Pin #26	Pin #26 and 27
Sensor +8V	Pin #27	Pin #24 and 25
Distance Sensor	Pin #28	Pin #37
Signal Name	**9 Pin Amp**	**Connector:**
+12Volts from Battery	Pin #1	Battery Red Lead
Ground	Pin #2	Battery Black Lead , & 4 Amp Pin #1
Radar Signal	Pin #3	4 Amp Pin #2
SW+12	Pin #4	4 Amp Pin #3 & #4
Network 1 Power+	Pin #5	For Network Sensors
Network 1 Power-	Pin #6	For Network Sensors
Network 1 Signal+	Pin #7	For Network Sensors
Network 1 Signal-	Pin #8	For Network Sensors
Network 1 Chain	Pin #9	For Network Sensors
Signal Name	**8 Pin Amp**	**Connector:**
Network 2 Power-	P3-1	For Network Sensors
Network 2 Power+	P3-2	For Network Sensors
Network 2 Chain	P3-3	For Network Sensors
Network 2 Signal-	P3-4	For Network Sensors
Network 2 Signal+	P3-5	For Network Sensors
Serial Com	P3-6	DB9F-5 For Program use only
Serial RxD	P3-7	DB9F-3 For Program use only
Serial TxD	P3-8	DB9F-2 For Program use only

Program Set-Up Flow Chart



Making Comments: Please call or write to us on any comment you may have on this monitor or any of Sensor-1 product or service. Sensor-1 will make any changes to improve the operation or fix any errors the monitor might have. Please mail any comment to Sensor-1, 202 South Main Street, Princeton Kansas 66078 or call us at 1-800-736-7671 that's 1-800-SENSOR-1. EMAIL: info@sensor-1.com subject "Monitor Comments".

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.

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.

What is a GPS? The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 orbiting satellites and their ground stations. By using a process of triangulation from several GPS satellites, it is possible to determine your position on the ground very accurately. GPS works everywhere on the earth, 24 hours a day, making it an ideal technology for use in agriculture.
How accurate is GPS? Depending on the exact time of day and the number of GPS satellites available, a position generated from a GPS receiver may be 40 feet from truth, although most positions are within 15 feet. There are several reasons for this range of values, mostly stemming from GPS signal delays in the ionosphere.

What is WAAS? WAAS is the Wide Area Augmentation System, a source of differential corrections designed primarily for commercial aeronautical applications within the United States. However, because this system broadcasts signals from geo-stationary satellites, farmers can take advantage of this system for parallel swathing, WAAS is currently a fully functional test signal, due for formal release in 2003. Information Regarding Satellite Based Augmentation Systems: Please Note that Satellite Based Augmentation Systems (SBAS) are currently (& independently) under various stages of development. They are not considered fully operational yet.

How do I know if WAAS is available in my area? The WAAS signal is available in the USA and southern Canada. Because the WAAS satellites are in equatorial orbits, reception improves the closer you are to the equator. The further north you are, the more chance that obstructions to the south of your field may block the WAAS signal, such as buildings or lines of trees.

When installing the GVS-18 speed sensor, plug in the GVS sensor in the back of the montior, just like you are installing a radar. Once you are plug in and your monitor is on, then you will see a Red LED light. This means that you have power to the unit and when the green light comes on you have GPS signal. This will take 5 to 15 minutes the first time you are locating the satellites. Make sure you have the correct speed constant in you monitor. Check you Monitor manual for you setup for you speed constant.

Mounting Options and Considerations:
The GPS antenna should be mounted in a location that has a clear view of the sky. Avoid overhead metal construction that block the sky or satellite signals and avoid mounting in areas with excessive vibration. If the antenna moves or sways , this will cause a ground speed. The GVS-18 has a build in Magnetic mount and can be mounted inside the cab with Suction Mounts or Top of the cab with a Panel Mount that screws in on the outside of the cab, double side tape is available with the Panel Mount