



Agricultural Instruction Manual
Tungsten E2 Series

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Thank you for purchasing the Sensor Wireless System.

For Technical Support call (Hours of Operation are 8:30-4:30 AST):

Toll Free (in North America) 877-626-3952 or ++902-626-3952

Email: tech@sensorwireless.com

Website: www.sensorwireless.com

Getting Started

The SWI Agricultural Systems includes:



Carrying case



Sensor & Urethane Casings



Palm handheld (with software installed)
Stylus pen (located on the right side of Palm)



Communications Box (one 9V battery installed)



AC Adaptor



HotSync cable



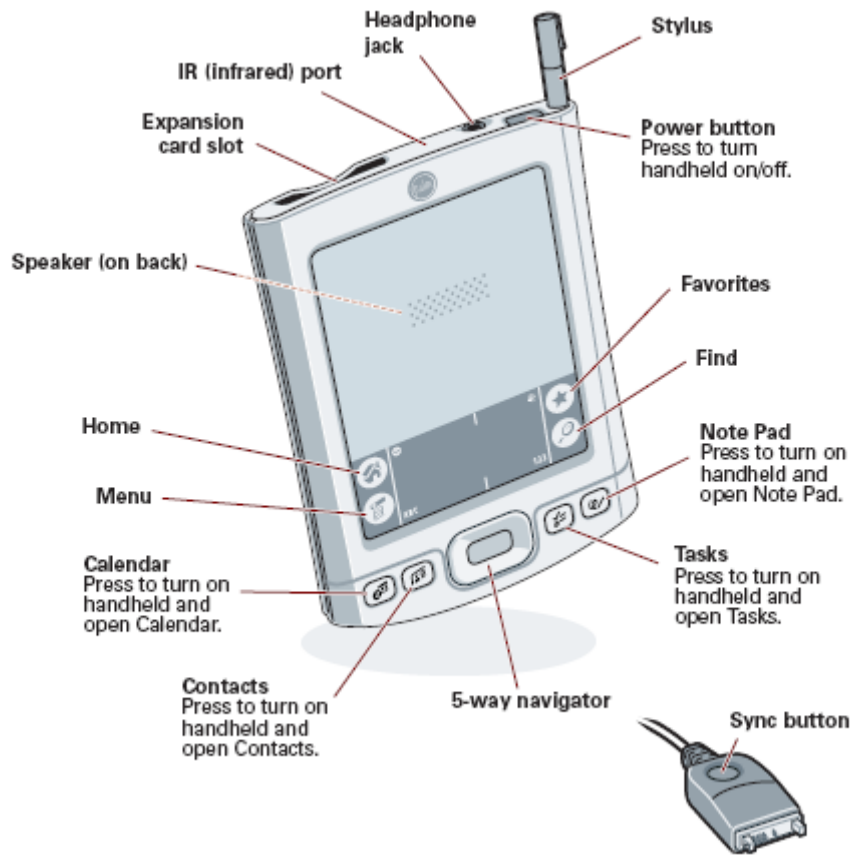
Download Cable (with serial end)



USB to Serial Converter

- Disk including backup files, AQC Desktop Software, Produce Wizard Instruction Manual, Palm manuals and Palm desktop software.

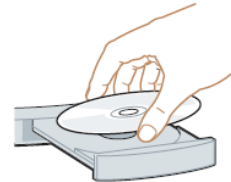
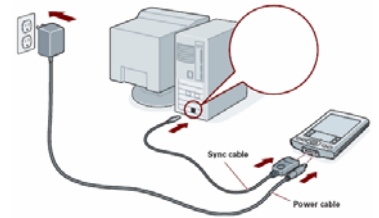
Tungsten E2 Handheld



Initial Set-Up

Your product has been made 'field' ready at our facility. For best results, however, we recommend that you do the following:

1. Charge the Palm. To charge the Palm, attach the Charger cable to the bottom of the Handheld, then plug adapter into the wall. Even though we pre-charge every Palm, you should charge it before your first use for a minimum of three (3) hours.
2. Installing Palm Desktop Software – CD is located in red Palm Box. Insert correct CD for your operating system into CD Rom. Follow the installation instructions as they appear on your screen.
3. Perform a HotSync. The HotSync process automatically synchronizes — that is, exchanges and updates — data between your handheld and Palm Desktop software. Changes you make on your handheld or Palm Desktop software appear in both places after a HotSync operation.



Performing your first HotSync.

1. Plug your Handheld into the HotSync Cable, attach HotSync Cable to blue USB Serial Cable, plug into empty USB port on computer.
2. Press the HotSync button on the cable (small black button).
3. When the Users dialog box appears, select the user name you entered when you installed Palm Desktop software.
4. Wait for a message on your handheld indicating that the process is complete.



4. Install the SWI Desktop Software, located on the Back Up CD. Insert CD in CD Rom, open QC Toolbox folder. Run *Agent_QC_Desktop_Suite_Setup* (must install this file first) and *SWI_3_Impact_Definition_Setup*.
5. Install USB to Serial Cable Driver. File is located on SWI Back Up disk. Ensure that the cable is plugged into open USB port, and ensure that you use the same port every time.
6. Install battery in Sensor (CR2 battery included). The positive end should point towards the power switch in the sensor.
7. Install battery in white communications box (9V) battery included, take back panel off box and install battery.



Important: If your battery drains and you have the unit in an uncharged state for an extended period of time, you can lose all of the stored data including the SWI software.

How to Use Your Sensor Wireless System

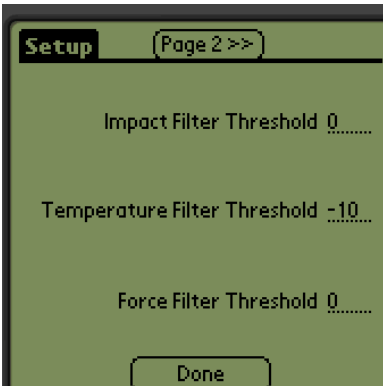
- Ensure the Palm is fully charged. Your handheld contains a Lithium-ion polymer battery that is recharged each time you place the handheld in the cradle. Plug the Palm into the charging cable and plug adapter into outlet for a few minutes each day to recharge the battery to full capacity. If the battery gets low, your handheld displays a warning message. If this occurs, perform a HotSync operation and then recharge the battery as soon as possible. If you fail to recharge the battery, you risk losing all the current files on the handheld, including the AQC software.
- Ensure the battery is properly installed in the back of the communications box.
- Install battery in SWI sensor. Unscrew capsule and press power button to turn system on. LED's will indicate the unit is powered down and powered up.
- Attach Palm to communications box by attaching the download cable to Palm (connection at bottom of the Palm Handheld) and the serial end to the connection on the communications box. Turn switch to the on position (switch is located in battery compartment) blue light will turn on in the SWI logo on front of box to indicate power.
- Turn the Palm on by depressing the button on the top right hand corner of the Palm. If the unit has gone into sleep mode this action will wake up the device to return to the last screen it was operating in prior to enacting the sleep function.
- Touch the IQA icon with the Palm Stylus; you will see the Main Menu.



Navigating the Sensor Wireless Software



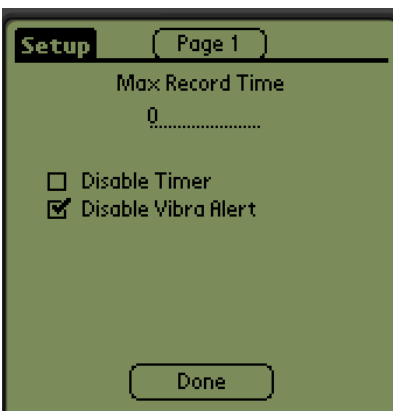
Clicking on the setup button will bring you through to the main set up screen. This screen will allow you to set your vibra alert threshold and data filter threshold.



Threshold Settings – The threshold setting will only allow you to see impacts above that threshold you have chosen.

Clicking Page 2 at the top of the screen will bring you through to the second page of the set up.

Tap Done to bring you back to the main menu.

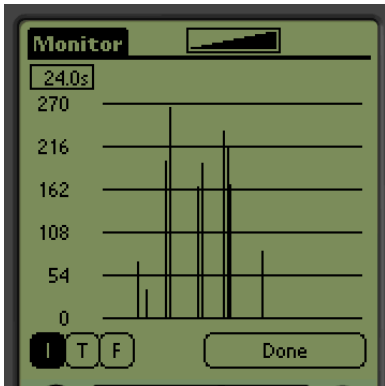


The Max Record time determines how long your monitoring file will be. To change, click on the amount and enter your desired time. If left at 0, the clock will run until you click done while monitoring a file.

How to Begin Monitoring



To begin monitoring with your system, tap the monitor button to bring you through to the main monitoring screen.



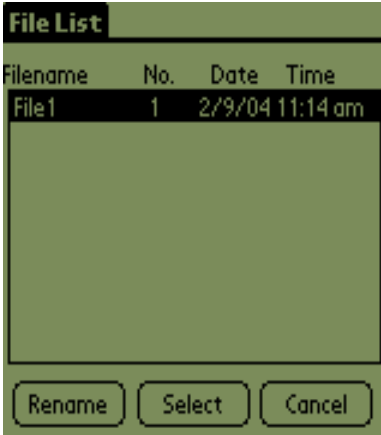
- Signal Strength
- The Main Monitoring Screen
- Tap on the screen in monitor mode to create event flags (see glossary for definition).
- The numbers on the left hand side of the screen represent the G force (see glossary for definition).
- The I, T, F on the bottom represent Impact, Temperature (measured in degrees Celsius) & Force (measured in Newtons). Tap on each to view different parameters.
- The clock at the top records the time of your file.
- Tap Done to return to the main menu.



Displaying a Single File



The Display feature allows you to view all the files that you had created while your system was in-line.



Tapping Display brings you through to your file list. Choose the file you would like to view from the list. Tap Select to bring the file up. You also have the option to rename the file in this screen. To open the keyboard to rename:

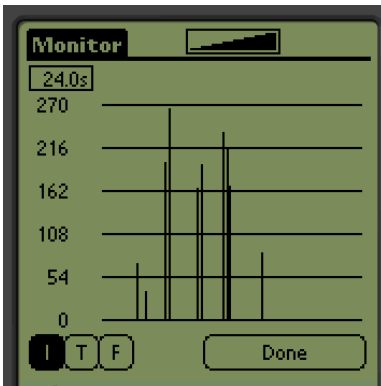
Tap one of the following to open an onscreen keyboard:

ABC Opens the letter keyboard.

123 Opens the number keyboard.



Letter keyboard Number keyboard



Your file is now displayed for your analysis. Tap on the I, T, or F at the bottom of the screen to view the data on the different parameters (not available on all models).

Tap Done to return to the Main Menu.

To Install the Desktop Software

1. *Install Agent_QC_Desktop_Suite_Setup found on the SWI Backup CD (must install this file first),*
2. *A pop up box will appear, please choose the Run option.*
3. *Continue to follow the instructions throughout the Wizard Set Up*
4. *Install SWI_3_Impact_Definition_Setu, also on SWI Backup CD (If you have a temperature unit ensure you also download the Temperature Definition file)*

**Ensure you have downloaded USB driver. Please ensure that you use the same USB port at every download.*

**Before downloading files, ensure that you have closed your Palm Desktop software and HotSync Icon is not showing in the bottom right hand side of your screen.*

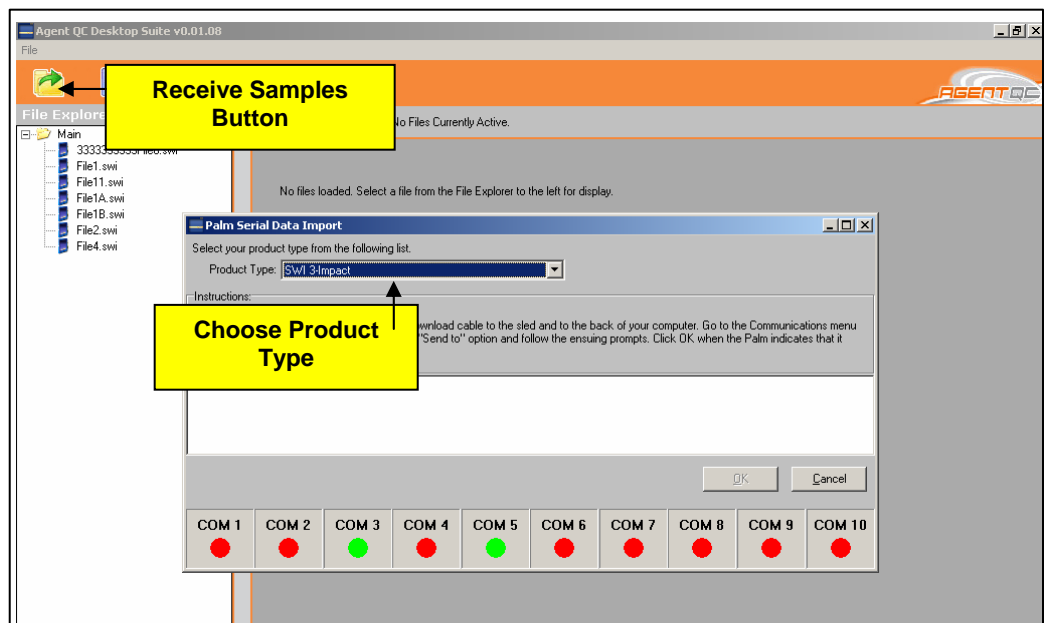


To Download Files

1. Attach the download cable to blue serial converter cable, and insert the USB end into empty port on your computer.



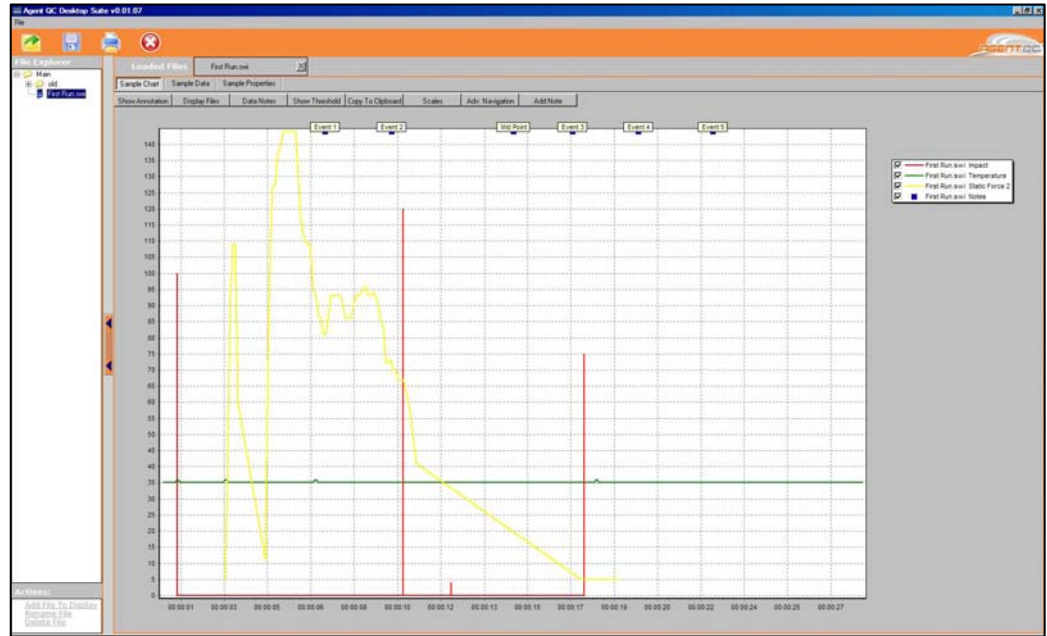
2. Click on *Receive Samples* button on toolbar or click *File - Receive Samples*.



3. Select type of SWI product from drop down menu at the top of the screen.
4. Go to the Communications menu in the Palm application. Select the appropriate "Send to" option and follow the ensuing prompts. Click OK when the Palm indicates that it has completed the download.
5. After the Palm indicates all files have been sent, click OK on the desktop software.
6. After you click OK a form will appear that will allow you to rename the test files.

How to View a File

1. All files will be displayed on the left hand side of the screen in the *File Explorer*.
2. To view the file, double click on the desired file. This will display the file on the main screen. (Please note you can only have two files open at a time.)



3. To remove a file from the display click on the displayed next to the file name, at the top of the screen marked Loaded Files.
4. To rename the file click on the Rename File option on the bottom right hand side under the Actions bar.
5. Clicking *Show Annotation* will allow you to see the actual values of each point in the graph by placing the mouse over the graph.
6. *Sample Chart* will show you the data in a graph form.
7. *Sample Data* will show you the data in a table form. Click on the file which you would like to view from the list at the top of the screen.
8. *Sample Properties* will give you general information on the entire file.
9. Clicking *Display Files* will show the list of currently displayed files. The check mark indicates which file(s) is currently displayed. To scroll left or right, hold right mouse button and drag left to right. Checking or unchecking the Axes boxes on the right hand of the screen will turn them off or on.
10. *Data Notes* displays the events that were placed in the file while it was recorded. This option will also allow you to edit the event markers.
11. *Copy to Clipboard* will allow you to copy the current chart. This will allow you to paste it into a Word or WordPerfect document.
12. *Scales* allow you to change the minimum and maximum values of the axes.

Glossary

Threshold Settings – The threshold setting will only allow you to see impacts above that threshold you have chosen.

Axis – The three Axes are horizontal, end, and combined. The end is the impacts that occur on the end of the egg, the horizontal occur on the sides of the egg, and the combined is a vector addition of the two.

Event Flags – The event flags can be placed when in monitoring mode by touching the screen. The purpose of these flags is to make note a specific event.

G – G is 1 gravitational force 9.8 MPS^2 (meters per second). Those are the number represented on the left-hand side of the graph. These numbers are used to reference the magnitude of impact associated with everyday handling of produces and other fresh fruits and vegetables.

Pressure/Static Force – measures sidewall pressure in Newtons.

Troubleshooting

Q. There is no signal to the Palm

A. **Step 1. Is the SENSOR turned on, with batteries installed properly?**
There are status LEDs that will flash when batteries are installed correctly, and the device is turned on. And that the sensor is within 20 feet of the user.

Step 2. Is the battery in the communications box installed correctly?

If the batteries are installed correctly in the sled, you should see a blue light on the front of the box is illuminated.

If these steps fail to work, try replacing the batteries in the sled and the sensor.

Q. What if I see consistent black lines across the palm screen when monitoring?

A. *The battery in the sensor is getting low and should be replaced.*

Q. The Palm freezes during operation?

A. *Like any computer sometimes this can occur. Reset the Palm by depressing the reset button on the back of the palm. This action may cause you to lose your data files. (Please see below for reinstalling software.)*

Q. The unit was left uncharged and now my software is gone?

A. *Refer to the section in the manual called 'installing backup files'.*

Q. An error message is provided on the Palm screen during operation?

A. *Contact technical assistance (1-902-626-3952) and describe the error message.*

Q. Signal strength is inconsistent and seems weak?

A. *This can occur in certain environments. The unit has been tested prior to shipping to conform to our 50 ft. transmission standards. Try replacing batteries in both sensor and Palm. If extremely low performance distances (less than 10 ft) are occurring consistently, then contact SWI technical assistance.*

Q. When downloading files from Palm to AQC Desktop it shows communication on the Palm, however, the files aren't transferring to the PC.

A. *Ensure you are connected to the same USB port every time you download.
Ensure that you have downloaded the USB driver included on the SWI Back Up CD.*

Q. I have followed all of the instructions; installed the Desktop Software, the product definition file, and the serial to USB adapter drivers and I still can not download the files, what do I do next?

A.

1. Go to "Control Panel"
2. Go to "System Properties"
3. Go to "Hardware" Tab
4. Click on "Device Manager"
5. Double click on "Ports"
6. Select appropriate port (Double click)
7. Under "Port Settings" tab make sure that the Flow control is set to "None"
8. Click "OK" and exit out of everything

Helpful Hints:

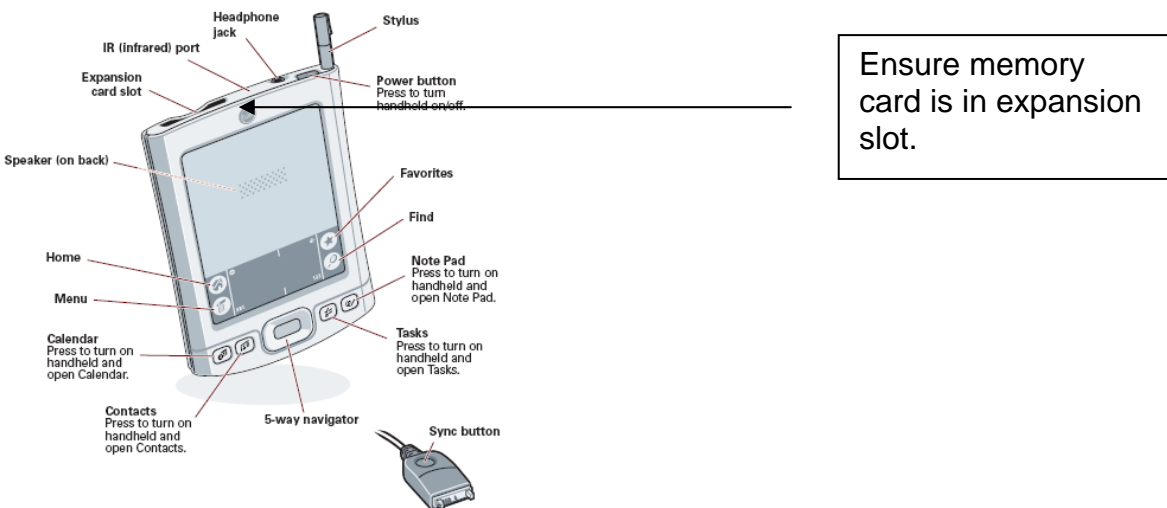
- To access the home screen in the Main Menu of the SWI Program, or to go into any of the other screens and press the home button on the bottom left of the Palm.
- Pressing the Back or Done buttons will return you to the Main Menu screen.
- When viewing a list of files, drag your Palm stylus down the list to scroll up or down to files that are not in view.
- On the Palm Handheld, simply press the on/off button once to “wake up” the monitor and return to your last screen. If the monitor fails to “wake up” then the battery is low and must be recharged.
- We suggest using the Palm for other applications and programs (such as day planner, calculator, expenses, etc. You can download other programs from www.palm.com) this will give you the full benefit of the handheld.

Loading the Back-Up Files


Note: In order for this function to work correctly you must first have installed the Palm Desktop Software, which came with your SWI Kit.

If your battery drains and you have the unit in an uncharged state for an extended period of time, you can lose all of the stored data including the IQA software. To reinstall the software:

1. If you had previously performed a HotSync operation on your Sensor Wireless Palm, the information should be stored on your PC. Performing the HotSync function will automatically reload the IQA software.
2. To install back up files from the previously installed memory card please do the following:



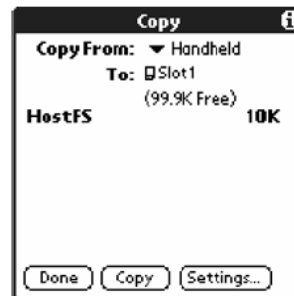
To copy an application from an expansion card:

1. Tap the Home icon . 

2. Tap the Menu icon . 

Tap on **Copy** on the applications drop down menu. Ensure you are set to Copy from: **CARD** to **HANDHELD**. You can change this by tapping the down arrow next to the selection.

Select Copy on the App menu.



Tap on the **IQA file**, then tap on **Copy** (this may take a couple of seconds to transfer all the files). Then repeat these steps with the **remaining** files. Tap **Done**. This will bring you back to the main menu where you will be able to view the IQA **Icon**.

Note: If your Palm Handheld does not have a memory card installed, please see the following instructions for installing software. In order for this function to work correctly you must first have installed the Palm Desktop Software, which came with your Agent QC Kit.

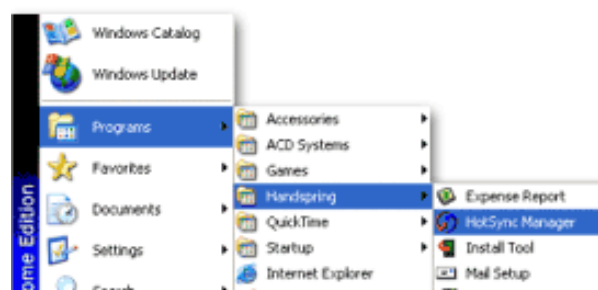
3. If you have not previously performed a HotSync operation on your Sensor Wireless Palm or you do not have a blue memory card, you must:

a) Connect the HotSync Cable to the computer and to the Palm Handheld.

b) Open HotSync Manager

1. Look for the HotSync icon in the system tray.

If the HotSync manager is not running, start it: On the desktop, click Start, and then choose Programs. Navigate to the Palm or Handspring software program group and choose HotSync Manager.



- b) Open Palm Desktop, in top right hand corner click on Edit Users, Create New, and click Ok.
- c) Click Done.
- d) On the bottom left-hand column select Quick Install, this will open the Quick Install dialogue box.
- e) Look in upper right hand corner and ensure username is correct. Click Add in the bottom left-hand corner.
- f) In the following dialogue box, use the pull-down menu to select CD Rom Drive.
- g) Open Backup Files folder. Select all files.
- h) Click Done.
- i) Perform HotSync.

CrackLess Egg Technical Information

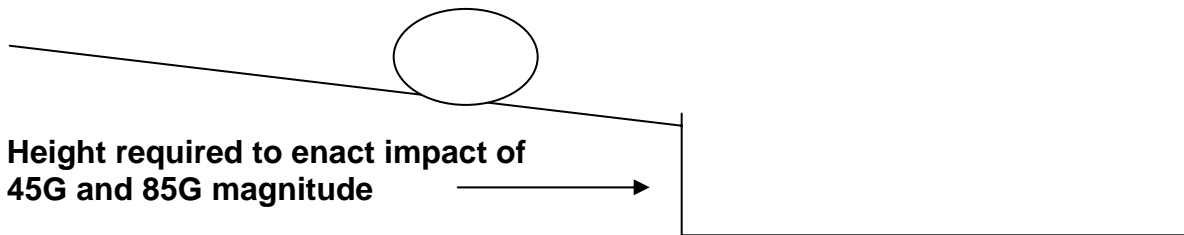
Since releasing CrackLess Egg in January 2003, we have at numerous times, confirmed the threshold values for shell damage or shell crack as an average value over a known impact magnitude. Table grade eggs of average large size (60 grams) at ambient temperature were rolled and dropped onto plastic, metal and padded surfaces from a height respective of the target impact threshold (45G and 85G) and visually inspected for shell damage. It was determined that the CrackLess Egg can accurately determine problem points in egg handling and packing operations that would consistently damage a shell egg. Utilizing the wireless device users can pinpoint the location and magnitude of impact associated with these transfer points. Tests performed over the period indicate the following:

- ✓ At an impact magnitude of **45G** (screen value) eggs of average large size and weight **WILL NOT FAIL** to the point of shell crack after receiving one impact of this magnitude.
- ✓ At an impact magnitude of **85G** (screen value) eggs of average large size and weight **WILL FAIL** to the point that the eggs shell is visibly cracked or damaged.

However:

- ✓ Where one egg is impacted **more than 3 times at a level of 45G** tests revealed that this egg will consistently fail on the fourth impact, thus we recommend that equipment be adjusted to operate at impact levels below **45G** to ensure the least chance of shell failure in egg handling.

Method



Notes

- The age of the flock was not considered. Eggs collected were from multiple locations.
- Nutrition of the flock was not considered.
- Drop height changes as drop surface changes, depending on target impact magnitude.
- Test performed at ambient (room) temperature of approximately 20 degrees Centigrade or 70 Fahrenheit.
- The red light indicates vertical axes impact (ends) and green light indicates horizontal axes impact. One flash indicates an impact of 30g, two flashes indicate an impact of 60g, and three flashes indicate an impact of 90g.

Smart Spud Technical Information

Significant positive correlations have been established that indicate at a range between 10-15 Gs bruising will consistently occur in potatoes.

In certain instances low pulp temperature at harvest was directly associated with an increase in bruising, thus indicating that the threshold level above needs to be adjusted as temperature fluctuates. We the manufacturer, recommend that all users attempt to attain and retain threshold levels less than 10 Gs for optimal results under normal handling conditions. Due to changes in operating practices, machinery and harvesting conditions the 10 G threshold may not be appropriate for some users.

Smart Spud Reality Check #1

“How can I make my current harvester operate as good as a brand new one?”

Even though you may have experienced operators, many people can only see and hear so much. Most times bruising is not the result of an old harvester. New doesn't necessarily solve the problem. I have often heard how something “looked alright” but in reality was causing significant preventable damage. The **Smart Spud** helps remove the guesswork.

The **Smart Spud**'s instantly displayed handling profile usually reveals unexpected bruise information as the device moves through each chain. If the graph shows locations that are exceeding a Smart Spud reference point of 10-15 then adjustments should be made to those locations.

First thing to do is check laminar flow. Tractor forward speed can be one of the most crucial adjustments; second to it is chain speed. If high impact values are occurring, a minor increase or decrease in forward speed can sometimes reduce or eliminate bruise zones. Of course, this changes with yield, moisture and even tractor and harvester. Make small changes first and then run your Smart Spud to verify improvements using the compare files feature. Afterwards, enjoy the results.

Smart Spud Reality Check #2

“I'm seeing a lot of cracked and scrapped potatoes on the secondary chain. I think they are rolling on the sides of the belted chain. What can I do”?

This is pretty common, especially since most guys have gone with belted chain. The best solution is rolling some old conveyor belt and bolt it (bolt through one side only) on an angle just below the primary chain. This will gently guide the potatoes away from the digger walls and away from the sides of the chain, preventing roll back. If you place the **Smart Spud** along the side of the digger or windrower it can give you a good indication if these changes were positive.

Smart Spud Reality Check #3

“I've made some changes to ground and chain speed, but I am still getting higher than allowable impacts on the secondary. What could be causing that”?

Usually this can result from 1 of 3 issues, or a combination. If you're digging potatoes that are not totally separating from the vines, the shaking on the divider may eventually cause the tuber to drop off and bruise. If this is common you may be digging too premature. Adjusting the divider roller may allow these potatoes to drop sooner. The next issue could be that your potatoes are dropping onto the rails of the divider and then bouncing to the secondary chain. This slight hesitation and following drop can cause damage. By reducing the height of the divider chain or laying it down on

the front of the secondary (done easily by removing the front roller guides) you can usually correct this. The third possibility is that both the secondary and divider are moving at different speeds. Be careful to make sure the divider and secondary chains are operating at the same speed, otherwise scrapping can occur. This is especially the case if you have dropped the front roller guides. Make sure to run your **Smart Spud** to verify results.

Smart Spud Reality Check # 4

“My harvester has a blower unit. I’ve adjusted the chains with my Smart Spud and everything runs really good. I just got word from the plant however, that my bruise was 20%, what’s the problem? ”

First I’d use my Smart Spud just to be sure I didn’t miss a crucial adjustment such as the pitch on the nose roller or digger plate. If that were fine I would then turn my attention to the blower itself. In some cases this can cause considerable damage. If the pitch of the blower is not adjusted properly it can sometimes blow the smaller or lighter potatoes directly into the back wall of the harvester. You want to be sure to also look at the blower speed. All you want is a blower speed that will help to clean vines and dirt, not “float” potatoes.

Smart Spud Reality Check # 5

“I have heard that it is important to make sure the rear cross chain is running at optimum speed. My windrower works fine but it doesn’t seem to load up the cross chain under any condition. ”

This is really important. The rear cross is really the only transfer area on both harvesters and windrowers where potatoes drop a good distance, change speed and direction, and have a significant opportunity to roll and bounce without any dirt or vines to cushion them. The speed of this chain must be adjusted to accommodate varied field conditions such as moisture, volume, and variety. Different speeds are required for different harvesters and especially between that of a windrower and a harvester. A good point to remember is that a harvester is for separation and cleaning and the windrower is only used to lift and move over. You do not need to have extremely clean potatoes being placed in a windrow. There are also changes in speed between two and four row windrowers. The **Smart Spud** can help to gauge optimum chain speeds in this area. You want a condition where by potatoes are dropping on other potatoes, moving away from the secondary chain and moving slow enough that little bouncing and space between potatoes can be seen. In a windrower, where the potatoes are falling to the ground, make sure they fall the shortest distance possible and that they are almost touching each other in a “chain link” fashion. Potato on potato is a good thing.

Smart Spud Reality Check #6

“I’m digging a big crop of potatoes and I’ve noticed that there are some whole and chopped up potatoes behind the harvester and windrowers. What can I do? ”

Just as you need to change speeds when digging a big crop, sometimes there are many other issues that can develop. Even when you’re not into heavy volumes you may occasionally see this happen throughout the harvest period. Most time this can be caused by roll back or “push back” on the rear cross chain. Sometimes potatoes rolling between the primary and secondary, as well, also cause it. Adjustments recommended in **Smart Spud** Reality Check # 3 would help prevent this problem in that area. If the problem exists at the cross chain then different things can be done to prevent this. First, it is always a good idea to install a cross bar under the secondary about 1 inch outside the edge of the rear cross chain. This can be something as simple as a metal rod covered in a PVC tube. Make sure it does not interfere too much with the secondary chain. Often some

guy's may even extend the secondary over the cross chain a few more inches, but this is not necessary. These adjustments will prevent roll back and push back. I would then suggest that the speed of the rear cross chain be looked at. Many times this chain is the cause of significant bruise damage in harvesters and especially windrowers.

Smart Spud Reality Check # 7

“I have a new AirVac harvester and I think I’m getting some bruising in the vacuum area. What should I do? ”

These are good harvesters but like anything else need to be adjusted under varied conditions. The **Smart Spud** will move the same as a regular potato through these areas and can provide all sorts of information on what’s happening inside the vacuum. If you were seeing impacts over threshold, I would look at a couple of things. First, don’t be scared to let a little dirt build up inside the blower. This rounds out the corners and some even say makes these units more efficient. Second, look at padding the bar running horizontally across the intake at the hood itself (any area where impact is occurring is typically characterized by a “shined” appearance). A piece of conveyor belt may be just what the **Smart Spud** ordered.

Smart Spud Reality Check # 8

“I’m already maximizing my bruise free incentives, so why do I need to use a Smart Spud?”

Smart Spud identifies areas that can be attributed to bruise damage, but it is also a great efficiency and awareness tool. Maximizing bruise free incentives is a great way to increase crop value and is probably one of the only real variables that you as a producer can control and directly improve upon. Remember that **Smart Spud** is a performance-monitoring tool not just an impact detection device. Using the technology as only an impact detection device is under utilizing its full value and potential. The instant real time functionality of the **Smart Spud** allows users to view all aspects of handling during potato harvest and maximize harvester and operator efficiency, as well. By evaluating your equipments performance you can maintain bruise free incentives to a high level and get the most out of your equipment while eliminating the guesswork. This can be responsible for reducing harvest period, reducing downtime and helping to determine maintenance requirements before problems can develop. Best of all it can provide you peace of mind that you are doing all you can to get the best return from your potato crop.



Thank you for purchasing the Sensor Wireless System.

If you have any questions, or require technical support, please contact:

Toll Free (in North America): (877) 626-3952

Telephone: (902) 626-3952

Fax: (902) 626-3303

Email: tech@sensorwireless.com

Web: www.sensorwireless.com