

Packing House Services, Inc.

Red Pearl® Operations Manual

Red Pearl® User Interface

PHS, Inc.
9/15/2010

Contents

| | |
|--------------------------------|----|
| Operations | 4 |
| Information Bar | 4 |
| Grader Selection | 5 |
| Machine Information | 5 |
| Setup Controls..... | 5 |
| Loading and Saving Setups..... | 5 |
| Load a Setup..... | 6 |
| Save a Setup | 6 |
| Class Settings..... | 6 |
| Size | 7 |
| Color..... | 8 |
| SoftSort | 8 |
| Drop Settings..... | 8 |
| Creating Products..... | 9 |
| Assigning Drops..... | 10 |
| Naming Drops | 10 |
| Accounting | 10 |
| Starting a Run..... | 11 |
| Stopping a Run | 12 |
| Viewing Old Runs | 12 |
| Filler Settings..... | 13 |
| More Settings..... | 13 |
| Configuring..... | 13 |
| Connecting to Grader..... | 13 |
| Multiple Graders | 14 |
| Slave Mode..... | 14 |
| Splitting Graders | 14 |
| Filler Setup | 14 |
| Effective Sorting..... | 15 |
| Infeed | 15 |
| Singulation | 15 |

Roll Turning 15

Stem Separation..... 15

Air Pressure 16

Basic Maintenance 16

 Air System 16

 Valves 16

 Testing 16

 Timing..... 17

 Cleaning..... 17

 Lubrication 17

Troubleshooting 17

Daily Startup and Shutdown 18

 Start-up 18

 Shutdown 18



Introduction:

The Red Pearl® is designed to provide fast, accurate size and color sorting of small fruit, with the ability to detect and sort soft fruit. The feed and roll turning system is designed to increase the accuracy of sizing and color sorting. The vision system detects the widest point of the fruit, the ratio of green to red, and the intensity of red and near infrared.

Operations

Information Bar

EasySort User Interface

| | Machine | Editing Setup | Last Sent Setup | Status | rps | fill |
|----------|-----------|---------------|--------------------|---------------------------------|-----|------|
| Grader 1 | machine 1 | Rainier 2.GRD | Lapin No color.GRD | Network/network drive not found | | |
| | machine 2 | | | Network/network drive not found | | |
| Grader 2 | machine 3 | droptest.GRD | droptest.GRD | Disabled | | |
| Grader 3 | machine 4 | unknown setup | unknown setup | Disabled | | |

Activate your changes or undo them

Save and Send Changes Undo (pull in all Grader Settings) Load or Save Setup Feature Unlock More Settings

The information bar at the top of the screen displays information about the sizer function, setups, and allows the user to select which sizer is to be controlled.

Grader Selection

The ESUI program allows for control of up to four Red Pearl® sorters at one time. This could be either four physical machines or four logical machines. Logical machines allow for more than one setup to be run on a sorter. Logical machine setup is covered under the Configuration section.

To select a grader or logical machine, click on the button at left. If two machines are configured to run as one (master/slave), they will both appear as “Grader 1”. A single grater split into two logical will be identified as “Grader 1” corresponding with “machine 1a” and “Grader2” corresponding with “machine 1b”.

Machine Information

The information bar lists, for each grader or logical machine, the following: Machine ID, Editing Setup, Last Sent Setup, Status, speed (rps), and fill percentage. The “Editing Setup” column lists the name of the current open setup. If changes are made to the current setup, this square will turn red. The “Last Sent Setup” column lists the name of the setup last sent to the sorter. This may be different from the setup currently being edited, and allows the user to edit setups without affecting operations, as well as knowing what the sorter is currently running.

The “Status” column lists the network status of each machine. This is useful for troubleshooting when the sorter does not respond to commands. Under normal operations, the status should always be “Connected”.

Sorter speed and fill percentage are given in the last column. The speed is given in rollers per second, listed as “rps”. The fill percentage for each sorter is also listed. These numbers can be used to maximize the amount of fruit packed.

Setup Controls

Setup controls are the buttons located beneath the Information Bar. These buttons are used to send the setup to the sorter, retrieve a setup, and save or load setups.

Save and Send Changes

This button is used to transmit the current setup to the sorter. Pressing this also saves the latest changes made to the hard drive. **Any changes sent to the sorter take effect immediately.**

Undo (Pull in all Grader Settings)

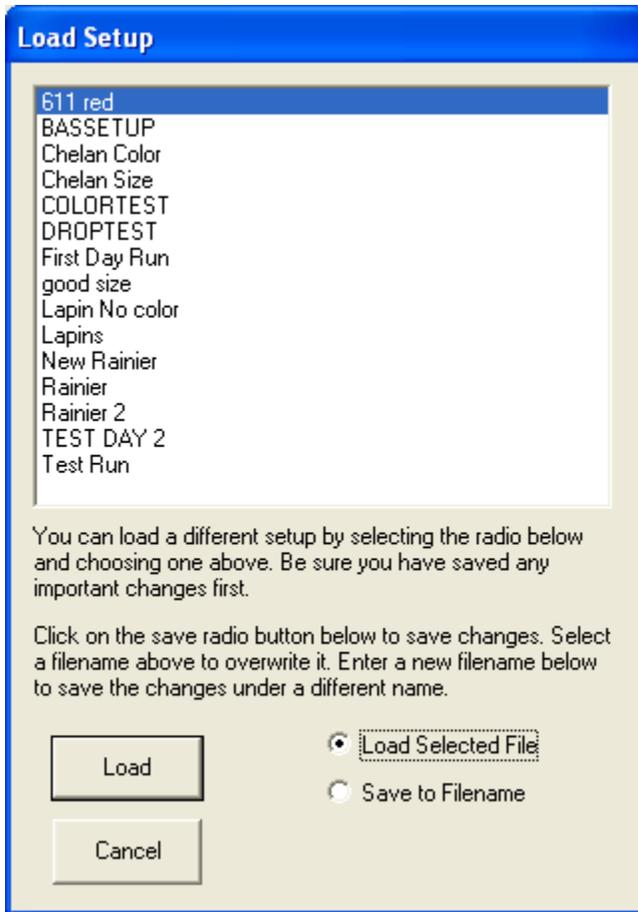
Use this button to retrieve the setup from the sorter. This is useful when changes have been made on accident, and need to be recovered. This also retrieves all of the configuration settings on the sorter. These settings are retransmitted every time a setup is sent, to avoid changing any critical settings.

Load or Save Setup

This button opens the Load/Save dialog, where the user can either load a new setup or save the current one.

Loading and Saving Setups

To load or save a setup, click on the “Load or Save Setup” button. This opens the Load/Save Dialog box.



Load a Setup

To load a setup, select the “Load Selected File” radio button on the dialog. Highlight the desired setup, and click on the “Load” button. The selection window may be scrolled down if there are a large number of setups.

Save a Setup

A setup that has been modified may be saved without sending to the sorter with this dialog. Select the “Save to Filename” button on the dialog, and highlight the setup name. The setup name will be shown in the text box. If a new name is desired, enter the new setup name. Click “Save” to save the setup to the hard drive.

Class Settings

The Class Settings screen is used to adjust size and color settings. These settings are the diameter in hundredths of an inch, the average color, and the softness (on SoftSort enabled machines).

View/edit the selected setup

Class Settings Drop Settings Accounting Filler Settings

Diam x100 **Avg Color** **Black Min**

0.00 - 10.00 **0 - 300** **0 - 256**

| Level Name | Max Level | Est Tally |
|------------|-----------|-----------|
| Under | 92 | 0 |
| 11r | 99 | 0 |
| 10 1/2r | 104 | 0 |
| 10 r | 110 | 0 |
| 9 1/2r | 119 | 0 |
| 9r | 133 | 0 |
| 8 1/2r | 140 | 0 |
| Oversize | 1000 | 0 |

| Level Name | Max Level | Est Tally |
|------------|-----------|-----------|
| Export | 80 | 0 |
| Domestic | 200 | 0 |
| White | 300 | 0 |

| Level Name | Max Level | Est Tally |
|------------|-----------|-----------|
| Soft | 35 | 0 |
| Good | 256 | 0 |

Add Class Add Class Add Class

Remove a Class Remove a Class Remove a Class

Size

The typical size measurement is “Diam X 100”, meaning the largest diameter in hundredths of an inch. The sizes are measured from the previous size (or zero) up to the maximum for a ring size. For instance, a 10 ½ row cherry sorted with a size ring must have a **minimum** size of 1 inch (100 hundredths). On the Red Pearl®, an 11 row cherry has a maximum size of 99 hundredths, and a 10 ½ row fits within the range of 100 to 105 hundredths. The “Max Level” for a 10 ½ row cherry would then be 105.

Sizes must be determined by testing, as different varieties may read in different ways. Fruit orientation under the cameras is important, since the shoulder diameter needs to be the measurement taken for size.

Adjusting Size

Adjust the sizes by increasing or decreasing the max level between them. If cherries designated as 10 ½ row are undersized, increase the max level of the 11 rows. This will move more small fruit into the 11 row. It is usually best to fine tune the sizes by sampling from smallest to largest. This way undersize can be eliminated without increasing the oversize percentage. The target is to have less than 5% under or oversized in any sample.

Adding or Removing a Class

To add or remove a class, select the appropriate button below the list of classes. These buttons either add a class to the bottom of the list, or remove the last one from the list. If the desired class is not at the end of the list, the classes may need to be renamed. To rename a class, double click on its name and type in the new name. Make sure that the measurements correspond with the correct class names.

Color

Color is determined by the ratio of green to red. The average of this ratio over the entire fruit is used to determine color. The roll turners must be adjusted properly in order for good color sorting on blotchy cherries, especially rainier. The color scale ranges from 0 to 300, with 0 being complete red and 300 being complete green. There may be two to three (or more, if desired) color classes, depending on the variety.

Color Values

Color classes vary by cherry and packing requirements. The most common classes for red cherries are Export, Domestic, and Brine. The most common classes for Rainier cherries are Export, blush, and yellow. These names can be changed by clicking on the name and typing in a new one.

Adjusting Color

Color is adjusted in much the same way as sizes. To eliminate lighter cherries from a premium color, decrease the max level. To reduce the amount of cherries going into the brine category, increase the level between domestic and brine. Always be sure to list the class with the most red at the top, and the least red at the bottom. The max level for the bottom class is always 300.

SoftSort

SoftSort allows the user to eliminate soft fruit due to rot, bruising or maturity. It does not eliminate surface defects, such as cracks, bird pecks, or limb rub. This feature requires a password to be enabled, which is provided by the technician. There are typically two classes for this, Soft and OK.

Adjusting SoftSort

SoftSort uses the measurement “Black Min” to evaluate the fruit. This measurement looks at the darkest ten percent of the infrared image. If this area is below a certain threshold, the fruit is graded as “soft”. To adjust this threshold, start with a low number, around 25. Raise this number up until the desired fruit quality is reached. If too much good fruit is going into the culls, decrease this number.

Drop Settings

The drop settings screen displays the grid of all possible fruit combinations (products) and the drops they are assigned to. This screen is used to create products and distribute them on the sorter. Extra columns provide an easy reference for Direct-to-Pack® filler settings.

Activate your changes or undo them

Save and Send Changes Undo (pull in all Grader Settings) Load or Save Setup

Feature Unlock More Settings Configure Quit Proc

View/edit the selected setup

Class Settings Drop Settings Accounting Filler Settings 12:02 08/25/10 Label Globals Send to all Fillers

| Diam x100 | Under | 12r | 11 1/2 | 11 | 10 1/2 | 10 | 9 1/2 | 9 | 8 1/2 | 8 | Batch | Weight | Filler Pkg | Variety | undefine | BoxType |
|------------|-------|-----|--------|----|--------|----|-------|---|-------|---|-------|--------|------------|---------|----------|---------|
| OverTheEnd | | | | | | | | | | | | | | Sent | | |
| Filler1 | | | | | | 1 | 1 | 1 | 1 | | | 5.00 | | | | |
| Filler2 | | | | | 1 | 1 | | | | | | 2.00 | 2 lb bags | Chelan | | Litho |
| Filler3 | 1 | | | | | 1 | 1 | 1 | 1 | | | 5.00 | | | | |
| Filler4 | | | | | 1 | 1 | | | | | | 5.00 | | | | |
| #2 | | | | | | | | | | | | | | | | |
| #3 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |
| #4 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |
| #5 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |
| #6 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |
| #7 | | 1 | 1 | | | | | | | | | | | | | |
| #8 | | 1 | 1 | | | | | | | | | | | | | |
| #9 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |
| #10 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |
| #11 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |
| #12 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |

Creating Products

Products are simply a combination of classes (size, color, softness) grouped together. Products can range from general culls to a single size/color/softness combination. To create a product, double-click on one of the top three rows. This will open the product selection box, and place that product into the selected column.

Product Selection

Specify Classes For Rule

| Diam x100 | Avg Color | Black Min |
|-----------|-----------|-----------|
| Under | Export | Soft |
| 11r | Domestic | Good |
| 10 1/2r | White | |
| 10 r | | |
| 9 1/2r | | |
| 9r | | |
| 8 1/2r | | |
| Oversize | | |

Select/highlight one or more classes for each measure or the rule will be disabled.

To select classes for a product, highlight the desired combination of size, color, and softness. In the example shown, 10 ½ row and larger with either export or domestic color would be selected. It is important to cover all possible combinations, as anything left unselected may go off the end.

A good practice is to list products from the most exclusive to the most general, going left to right across the screen. That is, 9 row export cherries with good maturity should be to the right of any size, any color, soft fruit. This will ensure that there are no errors in assigning the fruit to the right category.

Assigning Drops

Products are assigned to drops by putting a “1” in the row of the desired drops. A product can be split between multiple drops, or assigned to a single drop. To remove the product from the drop, put a “0” in the appropriate box.

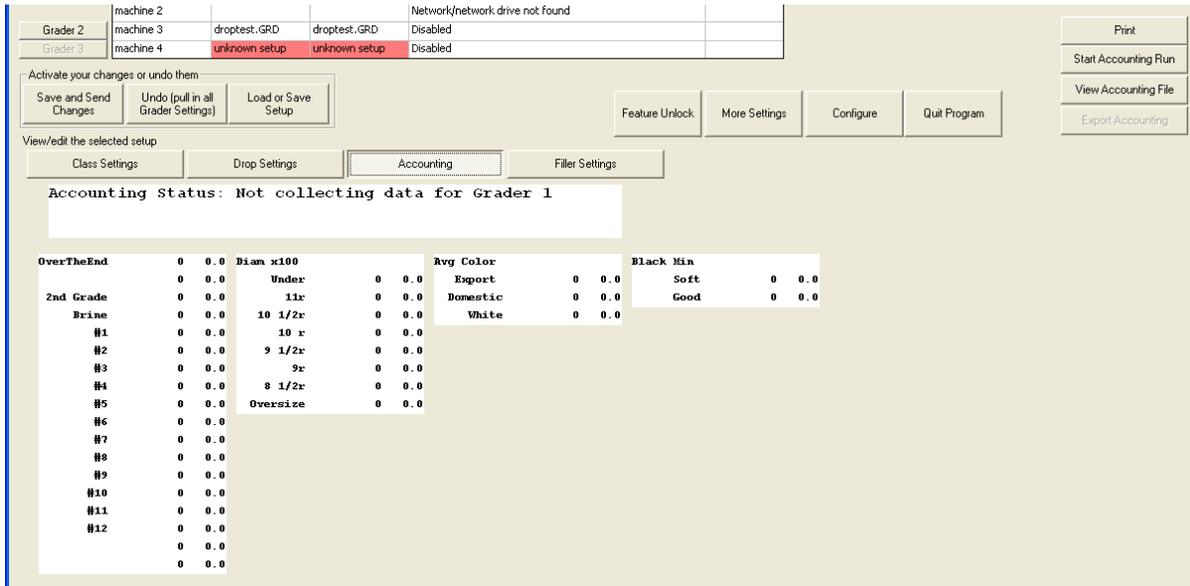
Multiple products can be assigned to the same drop. Simply put a “1” for each product in the drop. A ratio between products in a drop cannot be set, since it is dependent on the size ratios coming onto the sorter. Mixing multiple sizes on the drop grid may be preferred to mixing them in a product, as it allows for easy and quick splitting of the sizes should the need arise.

Naming Drops

Drops can be renamed in the same manner as the classes. Double click on the drop name, and type in the new name. This feature is useful to distinguish drops with set features, such as culls, fillers, and brine drops.

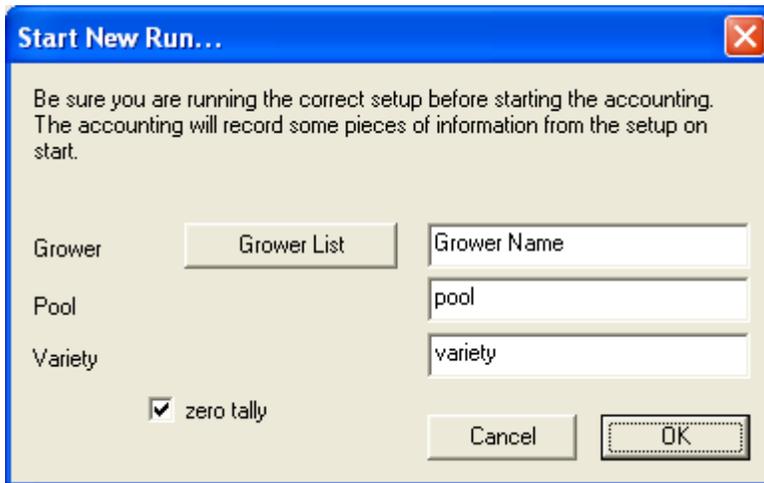
Accounting

The accounting screen is used to track the fruit by drop, size, color, and softness. Each accounting run can be saved by grower and date. Accounting tracks each piece, as well as the percentage of pieces in each category.



Starting a Run

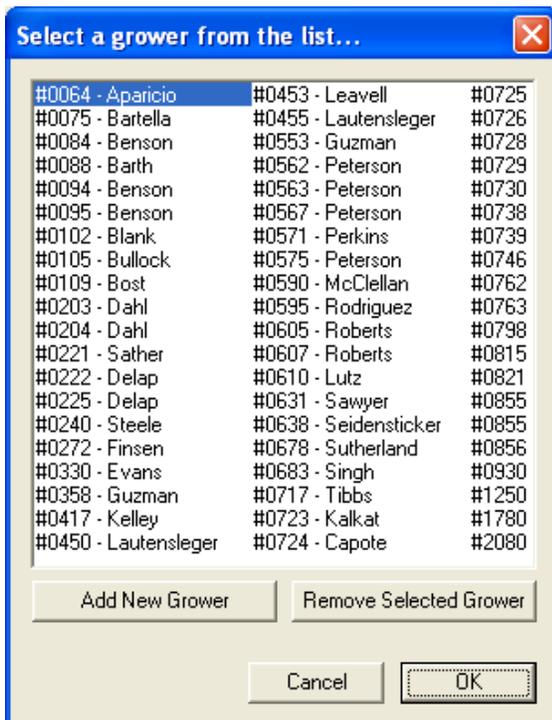
To begin gathering information, an accounting run must be started. To do so, click on “Start Accounting Run”. This will bring up the Start New Run dialog.



From this dialog, the user can enter grower, pool and variety information. There is a check box to zero the tally from the last run. Grower information can be input on this screen or pulled from the Grower List.

Grower List

The Grower List can hold up to 300 entries. Growers are listed in alphanumeric order. If grower numbers are listed before the name, they will be displayed in order of the numbers. To select a grower, simply highlight the name in blue. Use the arrow keys to navigate left or right through the list.



Adding Growers

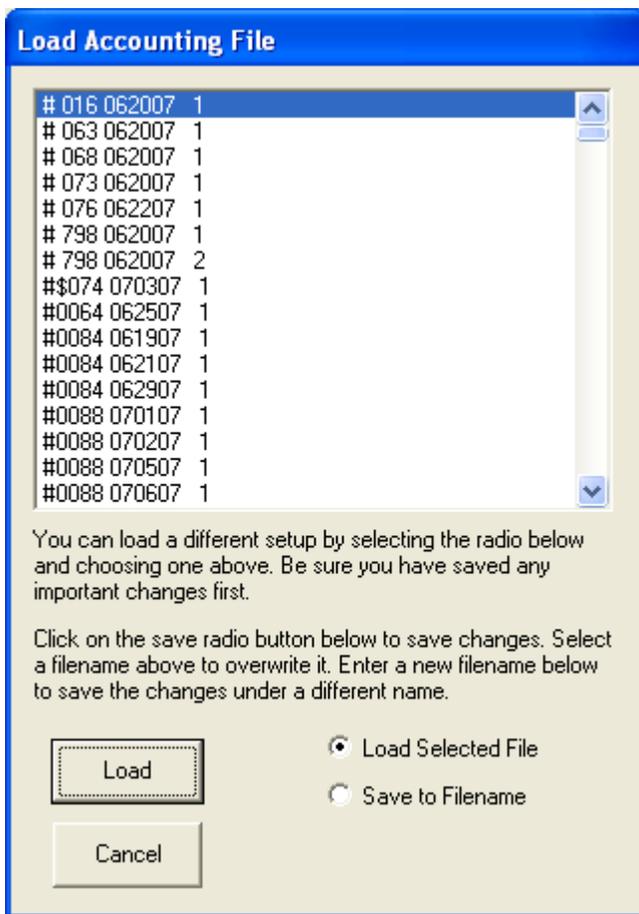
Growers may be added or deleted at any time when the Grower List is open. To add a grower, click on “Add New Grower”. This will open a new window to type in the grower name.

Stopping a Run

To stop a run, click “Stop Accounting Run”. The program will give an option to print the run immediately. Runs are saved by date and grower name.

Viewing Old Runs

Old productions runs may be opened while an accounting run is in progress. These may be printed or exported to excel. To select a run, select the date and grower name. If there is more than one from the same day and grower, they will have a “1” or “2” to distinguish them.



Printing

Viewed accounting runs may be printed by selecting “Print”. A printer must be connected in order for this to work.

Exporting to Excel®

Accounting files may be exported to Microsoft Excel® using .csv format. To do so, open an accounting run, and click “Export”. A box will open with the options of where to save the file and what to name it.



To open the file in Excel®, set the file type to “Text Files”. The imported files will automatically fill in the appropriate columns.

Filler Settings

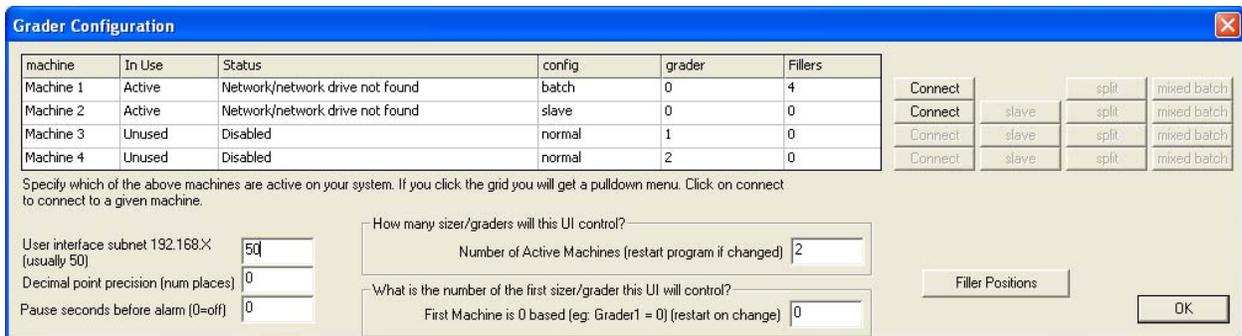
The Filler Settings screen is used to control the Direct-to-Pack® fillers from one central interface. It allows the user to select package sizes, pack styles, and set up printed label information. This feature must be unlocked by a technician. For more information, refer to the *Direct to Pack Manual*.

More Settings

The “More Settings” button is used to configure batch fill by weight. These settings are used to configure the batch fill by weight option. Do not adjust these, as they have been set for each individual system.

Configuring

The “Configure” button opens the grader configuration menu. This menu allows the user to set up how many graders are connected, how they are used, test communications, and set up filler options.



Connecting to Grader

The configure menu may list the machine status as “Connected”, “The Grader is not Responding”, “Network/network drive not found”, or “Disabled”. When the ESUI loads, it connects to the network

drive used to transfer information to and from the sorter. After a connection is made, it says “Connected”. If it does not connect, push the “Connect” button, and wait for a connection to be found. If the grader does not connect this way, it may need to be restarted.

Multiple Graders

Multiple graders are set up by selecting how many graders the UI will control. The machine number of the first grader controlled must also be set. The Red Pearl®’s internal machine number is one less than the UI’s number. Machine 1 on the UI would be machine 0.

Slave Mode

Two Red Pearls® may be controlled as one machine using the Slave mode. To set up a sorter as the slave, click “Slave”. The sorters will now operate as one machine, using the same setup for both.

Splitting Graders

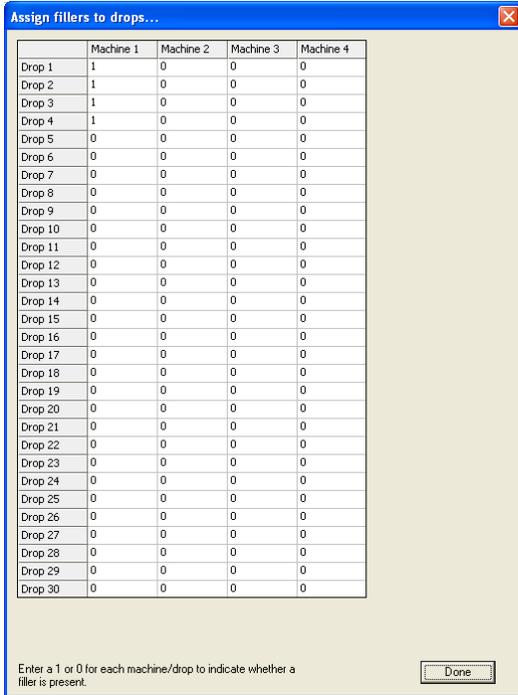
A sorter may be split into two logical machines, capable of running two separate setups on the same physical machine. This is useful for running a downgrade setup. To split a grader, select “Split”. A window will open asking which lanes will belong to which logical machine. Logical machines are indicated on the main screen as “machine 1a” and “machine 1b”.

Filler Setup

There are several filler setup options on this screen. In order to communicate with the filler heads, the UI needs to know what subnet they belong to. The usual range for fillers is 192.168.50.xxx, so the subnet number would be 50. Decimal point precision is set in this screen as well. This value is used for calculating decimal placement in the Filler Settings screen. This number must match the decimal point precision on the fillers as well.

Filler Positions

Fillers may be assigned to any drop on any grader. They will be numbered according to their drop position, starting from 1. To assign fillers, select the “Filler Positions” button. Enter a “1” in the box corresponding to each filler.



Effective Sorting

Effective sorting requires knowledge of how the cherries feed onto the rollers, as well as setting the proper size and color. Improper feed, hung up stems, and low air pressure are the most common reasons for poor sorting.

Infeed

The infeed of the sorter should be set up so that the fruit speed coming onto the rollers is the same or slightly slower than the fruit. This helps settle the fruit and eliminates doubled cups. If water is used to feed the sorter, the flow should be the minimum required to move the fruit.

Singulation

The Red Pearl® is equipped with singulator belts under the feed area. These belts turn slower than the speed of the conveyor, causing the fruit to rotate backwards. This settles the fruit with the stems back, and forces doubled fruit to fall off. The belts then carry the fruit into the fall-off flumes.

Roll Turning

A system of belts rotates the cherries under the cameras. These belts are known as the roll turner. The speed should be set so that the cherries rotate between 90 and 180 degrees, with the stems moving forward as the cherry travels. Excessive turning will cause the cherries to “hop” forward into the next pocket. These cherries will go off the end of the machine.

Stem Separation

Stem separation is critical on the Red Pearl®. Clusters of cherries can clog the infeed, causing poor fruit flow and water flooding. If one cherry falls off the rollers at the singulator, it may become trapped in the

roll turning belts. This will crush the cherry and create a juicy mess. Un-separated cherries may also affect sorting quality, as the grader will eject both cherries into the same drop.

Air Pressure

The Red Pearl® requires at least 110 psi to run effectively. This should be an average pressure. A loss of air pressure will cause fruit to go off the end. Proper air volume should be established during sale and installation of the sorter.

Basic Maintenance

Performing planned, basic maintenance will prolong the life of the sorter and prevent costly down time. Simple checks will also help determine if sorting errors are due to mechanical or electrical malfunction.

Air System

The air system requires clean, dry air to operate effectively. An air dryer should be installed on the line, as well as a water trap and drain. Water in the lines will greatly reduce valve life. Do not use air tool oil in the line, it will displace the grease in the solenoids.

Valves

The Red Pearl® air ejection system provides a gentle means of delivering fruit to the drops. These valves must be capable of hitting a small target moving very fast. Sticky valves will cause fruit to go off the end of the sorter. It is important to know how to troubleshoot and adjust the valves in order to have the best performance.

Valves are operated with by a 24 volt signal running through digital output modules mounted in the camera box. Both the power supply and the output modules are mounted on the opposite side of the monitor. The lights on the output modules should turn on when the valve is activated.

Testing

The valves are tested with the screen inside the camera box. They can be tested individually or as a group. To test the valves, stop the sorter and select [Technician Settings] from the main menu. Select [Static Kicker Test]. Select the desired drop (or all) and lane (or all). Use the left arrow to set “Cycle Selected Valves” to on. The valves will cycle in order across each lane, then down the drops. Listen for valves that stick or cycle slowly. Replace stuck valves as needed.

If the valves do not fire, follow this table to troubleshoot and repair:

Valve troubleshooting

| Symptoms | Check | Resolve |
|-----------------------|------------------|--|
| No valves fire | Power Supply | Replace fuse / reset breaker |
| 1 valve not firing | Valve stuck | Push plunger on solenoid to test, replace if necessary |
| 1 valve not firing | Wiring | Reconnect wires at terminal strip or on I/O panel |
| Group of 4 not firing | Opto fuse | Replace fuse on Opto-22 module |
| 2 drops not firing | Ground at header | Re-connect ground |

| Symptoms | Check | Resolve |
|-------------------------|------------------------|---|
| Large number not firing | Outputs don't light up | Check ribbon cable. Press firmly into socket. |

Timing

Test valve timing from the Technician Settings screen. Select [Drop Distance Timing] to enter the test mode. Run the sorter at operational speed. Use the left and right arrow keys to select which drop should be tested. Use the arrow keys to set “Kick Test” to “All”. Every piece of fruit run on the machine will now be ejected at the selected drop. Detailed directions for adjusting drop timing are given in *Calibration Procedures for the Red Pearl® Sizer*.

Cleaning

Clean the camera box lighting periodically to ensure good lighting. Use a mild commercial glass cleaner to remove juice and water stains from the lighting panels.

Lubrication

Lubricate the conveyor chain periodically to prevent undue wear. All of the bearings on the Red Pearl® are self-lubricating bearings, and require no maintenance. The main drive gearbox should be checked periodically, and filled as needed.

Troubleshooting

Sometimes simple troubleshooting will solve problems without requiring a service call or repairs (and lost time). Use this table for basic troubleshooting:

| Symptom | Probable Cause | Check |
|----------------------|-------------------------------------|---|
| Valves don't operate | Blown Fuse | 24V Fuse |
| | Cameras not on | Turn on camera power |
| | No air | Check compressor |
| | No power | Check breaker |
| Fruit off End | Valve Failure | See above |
| | Setup not sent | Push "Save and Send" |
| | Fruit not assigned to a drop | Be sure all size and color breaks are assigned a combination and a drop |
| | Roll turner too fast or slow | Adjust speed on touch panel until the rollers under the camera box are not rotating |
| No Connection | Camera box not on | Turn on cameras |
| | Network cable un-plugged or damaged | Check cable and switch, re-plug or repair |
| | Connection not established | Push “Configure” button and push “Connect” next to machine that is not connected |
| | Still no connection | Cycle power on camera box |

| Symptom | Probable Cause | Check |
|-----------------------|-----------------------------|------------------|
| Cameras won't turn on | No AC power | Call electrician |
| | Camera computer not booting | Call for service |

Daily Startup and Shutdown

Start-up

- Turn on lights a minimum of 20 minutes before startup.
- Turn on camera system.
- Turn on Windows XP® system. ESUI Should start automatically.
- Check for “Connected” status.
- Change setup for the run that needs packed and push “Save and Send”.
- Start accounting run.

Shutdown

- Stop sorter
- Make sure setup is saved by pushing “Save and Send”.
- Shutdown ESUI by pushing “Exit and shutdown”.
- Shutdown Windows®. Computer will turn off automatically
- Turn off both switches on the camera box, lights and cameras.