PC-SORT 967

LUMBER SORTING MEMORY

OPERATOR MANUAL

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1 INTRODUCTION

PC-SORT 967 is a Lumber Sorter Memory System designed to meet the requirements of most bin sorters. Highly modularized in design, it is suitable for new sorter installations as well as for retrofitting existing installations. The system contains many parameters, making it possible to adapt to a large number of applications without changing the design. This guarantees quick start-ups with minimum interference in mill production.

PC-SORT 967 is built around the PC. The input and output circuits are all OPTO 22, assuring easy access to service and spare parts during the life span of the system. Operator and maintenance training are greatly simplified if mill personnel are familiar with the PC standard.

PC-SORT 967 may be used for green sorters as well as for planer mill sorters. It can be set up to use both imperial and metric units. Switching between metric and imperial units, as well as switching between different sort tables, is done with one keyboard command.

Several options are available to expand the number of functions that the system performs.

Customized versions of this system are available if the PC-SORT 967 specifications do not meet the requirements of a specific installation.

2 HARDWARE DESCRIPTION

PC-SORT 967 consists of the following physical units:

2.1 Computer

The computer is a PC with the following extras running Windows XP:

- Encoder Card to interface to the Chain Encoder, the Width Photocell (when used), and the Thickness Gauge Encoder (when used). This card also handles some discrete Inputs and Outputs.

- Interface Card (AC-28) for the OPTO 22 Remote Racks for Input and Output Modules (only used in larger systems).

- Serial ports for various optional devices such as a production display or a ticket printer. A serial port may also be used for communication with a central computer running PC-REPORT 999 for Millwide Management Reporting.

2.2 Sense Zone Panel

The Sense Zone Panel must be located in the Computer Room within 10' of the computer. It contains OPTO 22 Input Circuits for the Chain Encoder and the Thickness Gauge Encoder (when required). The Sense Zone Panel also contains OPTO 22 circuits for interfacing to various Sensors, Pushbuttons, Actuators, and Status Lights. Light Emitting Diodes show the status of each channel.

2.3 Encoder Assembly

This assembly consists of a heavy-duty 500 pulses-per-revolution encoder. The encoder has two pulse trains (A and B channels or quadrature output) plus an index channel. The encoder is connected to the chain shaft via a direct coupling, sprockets and a chain, or pulleys and a timing belt. The encoder turns one revolution per lug space.

2.4 Bin Panel(s)

Each Bin Panel supports 24 bins. It contains OPTO 22 I/O circuits with terminal blocks to support the following devices:

- BIN FULL Light. This light shows that the bin is full, i.e. the number of boards in the bin is equal to a predetermined value, and the bin should be emptied.

- BIN RESET Pushbutton. This pushbutton is activated by the "bin chaser" when a bin has been emptied and it is ready to receive new boards again.

- BIN DIVERTER Solenoid. Either a 24V DC signal or a 115V AC signal is provided to actuate diverter solenoids.

- BIN FLOOR Control Circuit. The floors of the bins may be automatically lowered by the system, replacing the photocells that are commonly used for this purpose.

The actual BIN FULL lights and the BIN RESET pushbuttons are located in separate panels.

Note that systems with less than 25 Bins and no Bin Full Logic do not use Bin Panels. The output modules are located in the Sense Zone Panel in these systems.

2.5 J-bar Lock-out Panel

This optional panel is used for disabling J-Bars that are malfunctioning. It contains one J-BAR LOCK-OUT Pushbutton and one J-BAR LOCK-OUT Light.

3 SENSE ZONE

Thickness, Width and Length of each board is determined when the board passes through the sense zone. This information, combined with possible Grade Inputs, determines to which sort the board is assigned. Note that the various sensors may be located in any configuration relative to each other.

3.1 Thickness

The Thickness of the board is determined using one of two main types of Thickness Gauges:

A. Thickness Gauges with Discrete Outputs

The most common type of this group is one (or several) Limit Switch(es). They are used if there are only two or three thicknesses, provided the spread between the minimum and the maximum thickness is not too large. One Limit Switch is typically used for mills that process only 1" and 2" boards. It is installed in such a way that thin boards will pass underneath without activating any switch, while thick boards will actuate one or two switches. Below is a more complete list of Thickness Gauges of this type:

- Mechanical Limit Switches
- Proximity Switches
- Cam Switch
- Ultrasonic Gauge making the actual thickness classification
- Laser-based Gauge making the actual thickness classification

B. Encoder-Based Thickness Gauge

An Encoder-based Thickness Gauge is used for applications with more than two or three thicknesses. A shoe rides on top of the boards and an encoder is used to measure the deflection of the shoe. The angular deflection is converted to a thickness applying a special conversion formula. The resolution of the device is typically 0.020" and the accuracy is typically within +/- 0.1" due to mechanical limitations.

Note that no Thickness Gauge is required for applications where batches of boards with the same thickness are being processed, e.g. a planer mill installation.

A maximum number of 16 Thickness Classes is allowed.

3.2 Width

The width of the board is measured at one point along the board using the Width Photocell and the Chain Encoder. The Chain Encoder runs in synchronism with the sorter chain and generates equidistant pulses, i.e. each pulse corresponds to a certain distance traveled by the chain (or a board on the chain). The encoder pulses are counted while the board blocks the beam of the width photocell. The pulse count is multiplied with a scale factor to arrive at the width of the board. The resolution is typically 0.035" and the accuracy for a typical installation is within +/- 0.1" due to mechanical limitations.

No width photocell is required for applications where batches of boards with the same thickness are being processed, e.g. a planer mill installation.

A maximum number of 16 Width Classes is allowed.

3.3 Length

The length classification of the board is done with help of Mechanical Limit Switches installed across the chain. One limit switch per length class is required, plus one extra (the Reference Switch) to verify that the board is properly even-ended. Non-contact Photo-electric Limit Switches may be used instead of the mechanical version.

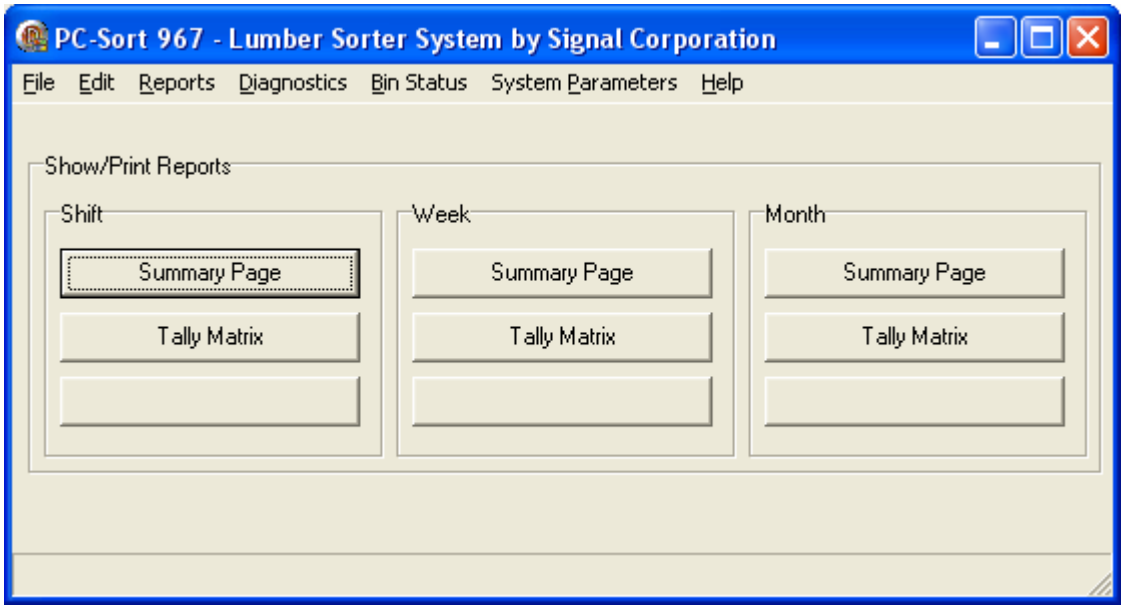
A maximum number of 23 lengths is allowed.

3.4 Grade

A grade may be assigned to each board through the manual actuation of one of the Grade Pushbuttons as the board travels through the Grade Entry Zone or through an interface to an automatic grade reader.

A maximum number of 16 Grades is allowed.

4 MAIN MENU



The main menu makes it easy to view and print reports. After once being setup, the reports are easy to access from here. The buttons at the lower part of the window are programmed from the Reports/Report Utilities/Define Report Printing menu. The different menu items are described as follow:

File is used to read and save parameters and to exit the program.

Edit makes it possible to edit report pages.

Reports is used to program parameters that are related to the reporting functions. Normally there is no need to enter this menu during regular operation.

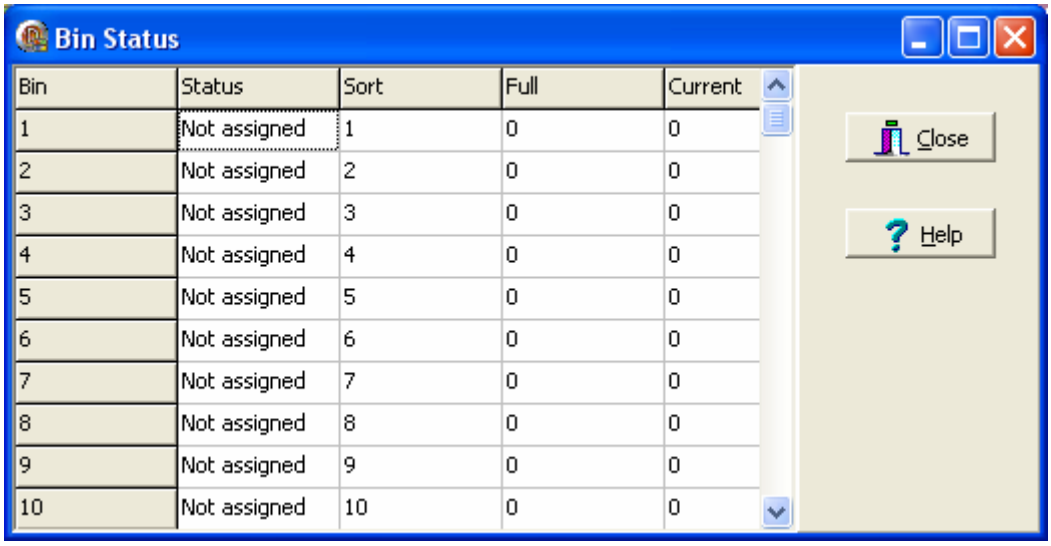
Diagnostics shows important system information.

Bin Status shows current bin count and more.

System Parameters is used to program parameters related to the sorting process.

Help gives access to the documentation.

5 DISPLAY BIN STATUS



The **Status** column shows one of four status messages, *Sort Assigned, Not Assigned, Full* and *Out of Service*. The *Full* message will show in red when a bin is full to alert the operator. The **Sort** column shows the sort that is assigned to each bin. The **Full** column shows the bin-full piece count, i.e. how many boards form a package. Note that this number is programmed in the **Sort Table.** The **Current** column shows the current piece count in the bin, i.e. the number of boards that have accumulated in the bin since it was emptied the last time.

6 SYSTEM PARAMETERS

Below is a short description of each menu item. Please refer to each particular menu description for a more detailed description of the various features.

Operational Parameters selects the current Sort Table, i.e. it tells the system which sort table to use. Note that most systems will only use one Sort Table.

Encoder Parameters shows parameters specific to the pulse encoder.

General Parameters 1 & 2 are used for programming various parameters that relate to the sorting process.

Sort Tables are where the thickness, width, length, and grade classes are defined for each bin.

Thickness Tables is where the thickness values of each thickness class are programmed. There are eight different tables that may be individually programmed.

Width Tables is where the width values of each width class are programmed. There are eight different tables that may be individually programmed.

Length Tables is where the length values of each length class are programmed. There are eight different tables that may be individually programmed.

Bin Parameters defines the distance to each bin as well as backup bins. This is also where loops of self-seeking bins are created and a bin may be declared to be out-of-service.

Dropout Gate Parameters programs the distances to the three Drop Out Gates. Processing of abnormal boards is also defined.

Sense Zone Parameters defines the physical location along the chain of various sensors and manual entry points.

Lug Loader Parameters defines the timing of the Lug Loader.

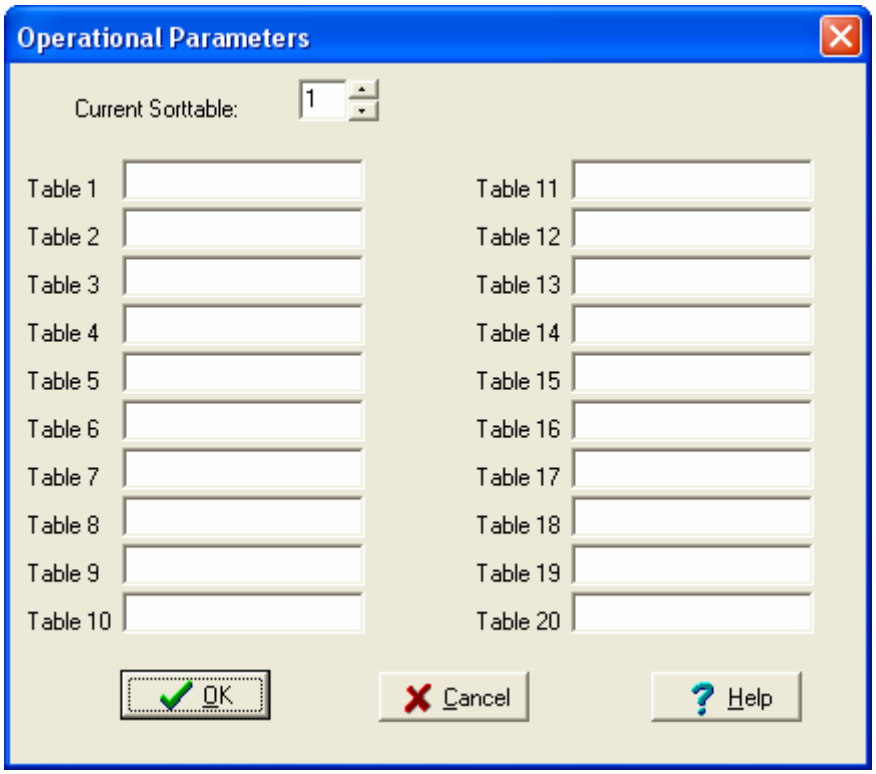
Trimmer Parameters defines all functions that are related to the optional trimmer control functions.

Thickness Gauge Calibration is only used in systems that have an encoder-based Thickness Gauge.

Ticket Editing is only implemented in systems with this feature.

Ticket Formatting is only implemented in systems with this feature.

6.1 OPERATIONAL PARAMETERS

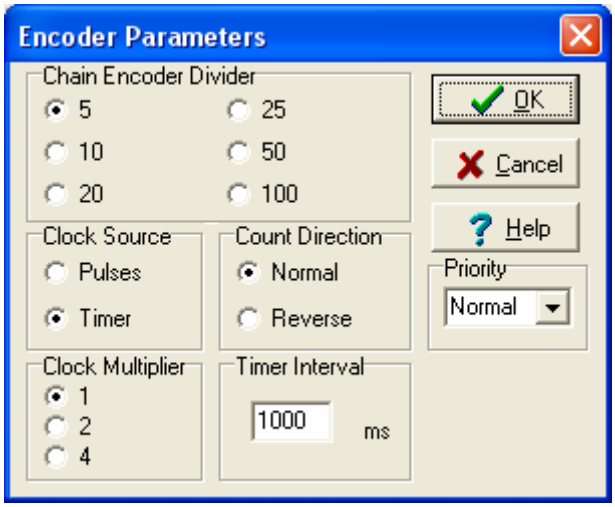


The **Grader** and **Species** fields are only filled in systems with Ticket Printing implemented.

Current Sort Table selects the (one out of twenty) Sort Table that is used by the system when it is sorting the lumber.

The numbered fields (1 - 20) are "scratch pads" to help you remember which table is which.

6.2 ENCODER PARAMETERS



Chain Encoder Divider: The system counts a certain number of pulses from the encoder between chain interrupts. A number of functions are performed in each chain interrupts, such as monitoring of photocells and pushbuttons and activation of kickers. This parameter defines this number of pulses, i.e. how often these functions are performed. A "5" means that these functions are performed 100 times per encoder revolution assuming that the encoder generates 500 pulses per revolution; a "10" means 50 times per encoder revolution, etc.

Legal values of this parameter are: 5, 10, 25, 50, and 100.

For example, this parameter defines the resolution (accuracy) of the kick points. For this reason you want to program a low value, however this loads the computer more. You have to find a value that gives an acceptable chain resolution without overloading the computer.

Fortunately, it is usually easy to find a value that does not compromise the accuracy of the system without overloading the computer. "5" or "10" are values that will make most systems run well, assuming the encoder turns approximately one revolution per pulley revolution and that the pulley diameter is roughly 15 to 20 inches. "20" or "25" should only be used for unusually large and/or fast systems. It should never be necessary to use larger values than these.

Always restart the program after having changed this parameter!

Clock Source: Instead of using the encoder, interrupts can be generated by a build in timer. This parameter is only used for debugging purposes.

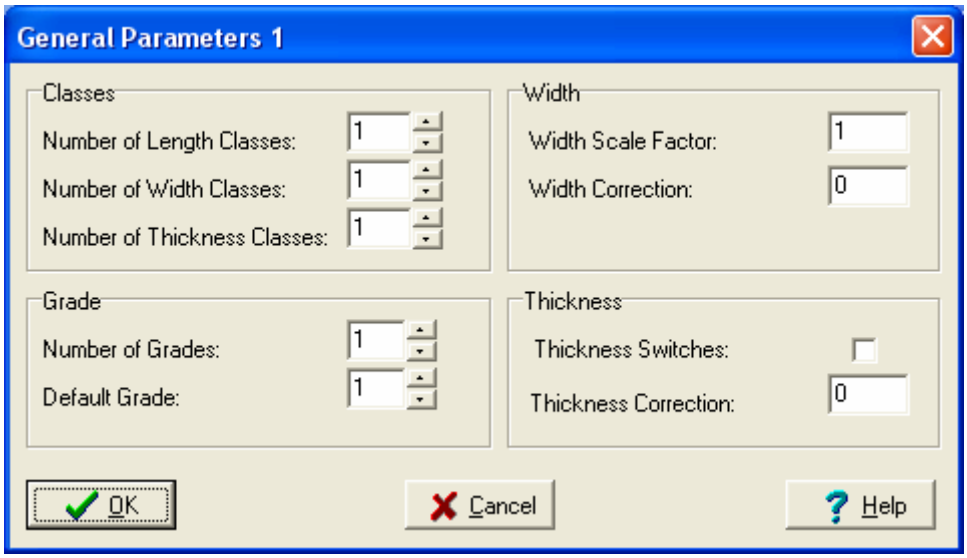
Count Direction: This parameter can be used to check if the encoder has been connected correctly.

Clock Multiplier: Used to increase the number of interrupts. Normally not used.

Timer Interval: Sets the interrupt interval when the timer is used as source.

Scale Factor: The standard encoder generates 500 pulses per revolution. Calculate how far the chain travels per encoder revolution (centimeters or inches). Divide 500 by this value and enter the result. Note that the selection of either centimeters or inches determines how all distances will be expressed in the system.

6.3 GENERAL PARAMETERS 1



Number of Length Classes: Self-explanatory.

Number of Width Classes: Self-explanatory.

Number of Thickness Classes: Self-explanatory.

Number of Grades: Self-explanatory.

NOTE THAT THE PRECEDING FOUR PARAMETERS MUST BE PROGRAMMED BEFORE THE SORT TABLES ARE PROGRAMMED.

Default Grade: This grade is automatically assigned to the board if no Grade Pushbutton has been pushed. Note that all boards will be assigned this grade if the system is not equipped with the optional grade buttons. In this case, it is recommended that it be set to "1".

Width Scale Factor: The standard encoder generates 500 pulses per revolution. Each flank of both pulse trains is counted. Therefore, 2,000 counts are generated per Lug Space (Encoder Revolution). Measure the lug space at the Width Photocell in either inches or centimeters. Divide 2,000 by this value and enter the result. Note that the selection of either centimeters or inches determines how all widths will be measured. Enter "0" if there is no Width Photocell.

Width Correction: This value is added to, or subtracted from, the width that is measured. This parameter is used to correct constant measuring error that is about the same for every board (regardless of the width) due to, for example, the width of the photocell beam.

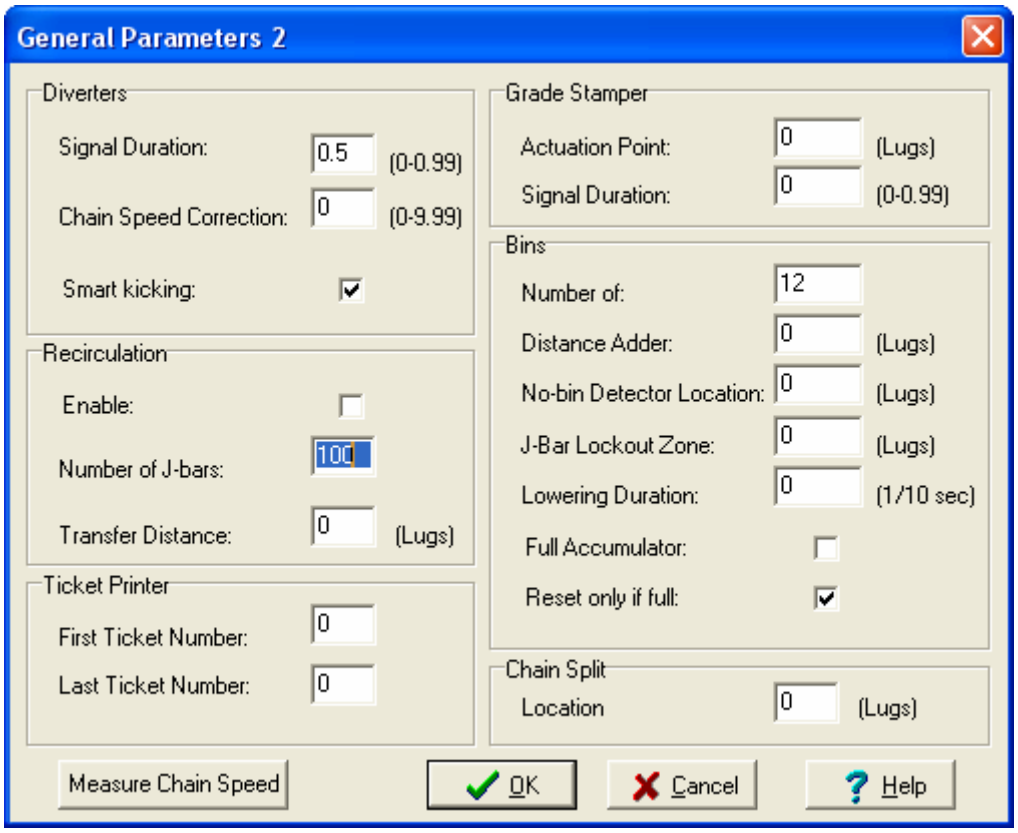
Thickness Switches: Check this parameter if one of the following types of thickness measuring device is used:

- Mechanical Limit Switches
- Proximity Switches
- Cam Switch
- Ultrasonic Gauge making the actual thickness classification
- Laser-based Gauge making the actual thickness classification
- Any other Thickness Gauge with discrete outputs

Uncheck this parameter if an Encoder-based Thickness Gauge is used or if no Thickness Gauge is used.

Thickness Correction: This value is added to, or subtracted from, the thickness that is measured by an Encoder-based Thickness Gauge. This parameter is used to correct constant measuring error that is about the same for every board regardless of the thickness. Note that the first step is always to go through the **Thickness Gauge Calibration** procedure if there is a problem. This parameter is used to correct whatever error that might remain.

6.4 GENERAL PARAMETERS 2



6.4.1 Diverters

Diverter Signal Duration: This parameter defines the distance, expressed in lugs, that the chain travels while the Diverter Output is actuated. Normally, the parameter should be set to approximately "0.50".

Chain Speed Diverter Correction: A reference speed is established when the *Measure Chain Speed* (in this table) button is pressed. The speed of the sorter is continuously measured during normal operation. Every time a diverter is fired, the speed of the sorter is compared to the reference speed. The diverter is fired earlier than the firing point (as defined by the *Bin Distance Parameters*) if the speed is higher than the reference speed; it is fired downstream of the firing point if the speed is lower than the reference speed. This parameter determines the size of the correction. As a matter of fact, the size of the correction is proportional to this parameter and proportional to the difference between the sorter speed and the reference speed.
This feature is normally not needed if the sorter speed is less than roughly 75 lugs per minute. Set this parameter to "0" to disable the feature. Proceed as follows if the Speed Correction is needed:

- Run the sorter at roughly half the normal speed when the *Measure Chain Speed* command is given.

- Start out by setting the *Chain Speed Diverter Correction* parameter to 1.5 and use the "trial-and-error" method to fine tune the parameter through watching the diverter timing at different chain speeds.

Smart Kicking: If checked, keeps the kicker activated if two consecutive J-bars are addressed to the same bin.

6.4.2 Re-circulation

Enable: Check if the system re-circulates boards that are addressed to a bin that is full.

Number of J-Bars: The correct setting of this parameter is essential for systems with recirculation. Count the number of J-Bars that are circulating and enter this number. For systems with no recirculation, for example, just enter "50".

Transfer Distance: This is the distance from the *Board Ready* point as defined in *Sense Zone Parameters* to the point where boards are transferred to the J-Bars. It is only in systems with recirculation that it is important to program the correct distance. Enter "1.0" for other systems.

6.4.3 Ticket Printer

First Ticket Number: This feature is only implemented in systems that prints tickets.

Last Ticket Number: This feature is only implemented in systems that prints tickets.

6.4.4 Grade Stamper

Actuation Point: This parameter defines the physical location along the chain where the Grade Stamper Outputs are fired. The distance is referenced from the very beginning of the infeed chain (not from the *Board Ready* Point).

Signal Duration: This parameter defines the distance, expressed in lugs, that the chain travels while the Grade Stamper output is actuated. Normally, the parameter should be set to approximately "0.50".

6.4.5 Bins

Number of: Self-explanatory.

Bin Distance Adder: This feature adds this distance to each Bin Distance as programmed in the *Bin Parameters* Table. The idea behind this feature is that you should be able to easily adjust the Diverter Actuation Point for every bin the same distance to compensate for, for example, varying air pressures or changing temperatures effecting the diverter response time. This parameter must always be a positive value. Therefore, it is recommended that it is set to, for example, "0.50" before the *Bin Parameters* are programmed. This allows you then to change it up or down to move the Diverter Actuation Points backward or forward along the chain as required.

No-bin Detector Location: (Lost-piece Detector Location): The Lost-piece Detector is a Limit Switch that is located downstream of the last bin. It detects boards that were not diverted to a specific bin because of a misfiring diverter. The system will not load a board into a lugspace feeding into an already occupied lugspace. Further, this feature allows the system to identify a misfiring diverter. The *No-bin Detector Location* is referenced from the *Board Ready* point.

J-Bar Lock-out Zone: This feature allows broken J-Bars to be locked-out, i.e. the lug loader will not load boards into a lugspace that feeds a locked-out J-Bar. The parameter defines the beginning of a window along the chain that is one lug-space long. The window defines the J-bar that is locked-out when the J-Bar Lock-out Pushbutton is pushed. Note that associated with this function is the *J-Bar Lock-out Light* that lights up every time a locked-out J-Bar passes through the *J-Bar Lock-out Zone*. The *J-Bar Lock-out Zone* is referenced from the *Board Ready* point.

Lowering - Duration: This parameter defines the Time Duration during which the Bin Floor Lowering Outputs are actuated. The time is the same for every bin. However, the Sort Tables allow you to specify how often the output for each bin is actuated, i.e. how many boards that are accumulated per occurrence. The time unit is 0.1 seconds. For example, enter "10" for one second.

Bin Full Accumulator: Checking this parameter causes the system to immediately reset the piececount to 0 and to continue to sort to this bin when a "Bin Full Condition" is reached and the Bin Full Light has been lit. This feature is useful for sorters that have a mechanical device that allows boards to continue to be sorted to a full bin and still be separated from the completed package. Typically the device is a mechanical arm that is raised, either manually or pneumatically, and collects a limited number of boards while the bin is emptied. It is then lowered and the accumulated boards fall down into the bin and the sorting continues.

Reset Bin Only if Full: Makes it possible to protect the bin from being reset if the bin is not full.

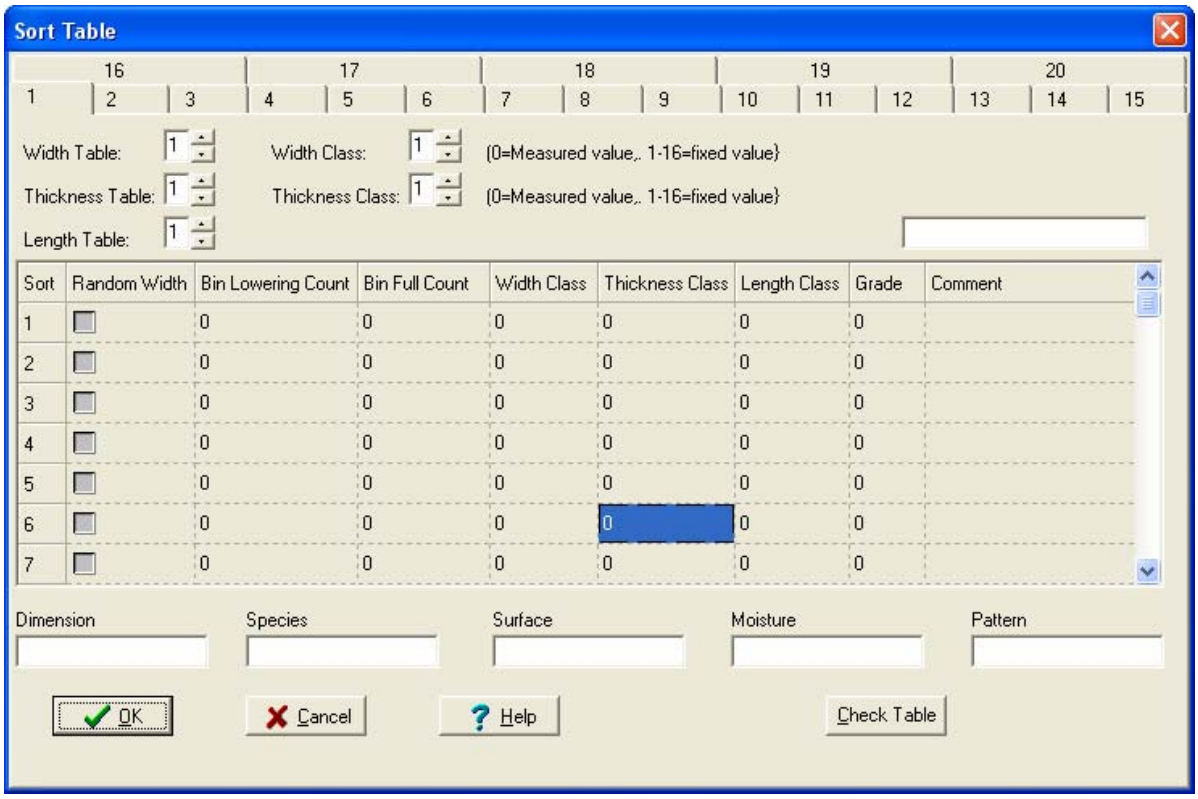
6.4.6 Chain Split

Chain Split Point: Is used in systems with two graders where boards are physically separated (up/down). This parameter defines the location of the boards when the up/down signal is issued.

6.4.7 Measure Chain Speed

Measure Chain Speed: Pressing this button causes the system to measure the current Chain Speed to establish a reference speed. This reference speed is used in conjunction with the *Chain Speed Diverter Correction* parameter to adjust the diverter firing for various chain speeds.

6.5 SORT TABLES



6.5.1 Table Selection

Use the tabs at the top to select a sort table.

6.5.2 Table Definition

The **Width, Thickness** and **Length Table** fields at the top left are used to define tables that are used for specifying the Width, Thickness and Length Classes. Note that only Class *Numbers* are programmed in the Sort Table. Class *Limits*, Actual Dimensions, and Nominal Dimensions are programmed in the Thickness, Width, and Length Tables.

Width Class is either set to **0** or **a number 1 - 16**:

- **0** tells the system that the width of each board is measured by the Width Photocell.
- **A number 1 - 16** defines a *fixed* Width Class for *every* board, i.e. the width is not measured (no Width Photocell). One of these 16 settings is typically used for a Dry Sorter when batches of boards with the same width are run. The appropriate Width Class is then keyed into this table for every run.

Thickness Class is either set to **0** or a number **1 - 16**:

- **0** tells the system that the thickness of *each* board is measured by a sensor.

- **A number 1 - 16** defines a *fixed* Thickness Class for *every* board, i.e. the Thickness is not measured (no sensor). One of these 16 settings is typically used for a Dry Sorter when batches of boards with the same thickness are run. The appropriate Thickness Class is then keyed into this table for every run.

A sort with **Random Width** accumulates "width inches/centimeters" to determine when a bin is full. A sort with *no* Random Width accumulates pieces for the same purpose.

Bin Lowering Count is only set when the Automatic Bin-floor Lowering feature is used. The parameter defines the number of boards that are sorted to a bin before the bin floor is lowered. The time duration during which the output is ON is programmed in **General Parameters 2**.

Bin Full Count is the number of boards (or width inches/centimeters if Random Width) that constitutes a full package. This parameter may be set to 9999 in order to disable the Bin Full Count Function, i.e. the system will just continue to sort to the same bin without keeping track of the number of boards that have been sorted to this bin. The Bin Full Light will never be lit.

The **Thickness Class, Width Class**, and **Length Class** columns are used for programming the respective *classes*. Note that the class limits, actual dimensions, and nominal dimensions are programmed in the respective tables.

The **Grade** column is used for programming the Grade. Insert a "1" here if this optional feature is not implemented.

Note that if more than one class is programmed, they are separated with a ",". For example: 1,3,5.

A range is entered with a "-". For example 1-3 means classes 1,2, and 3.

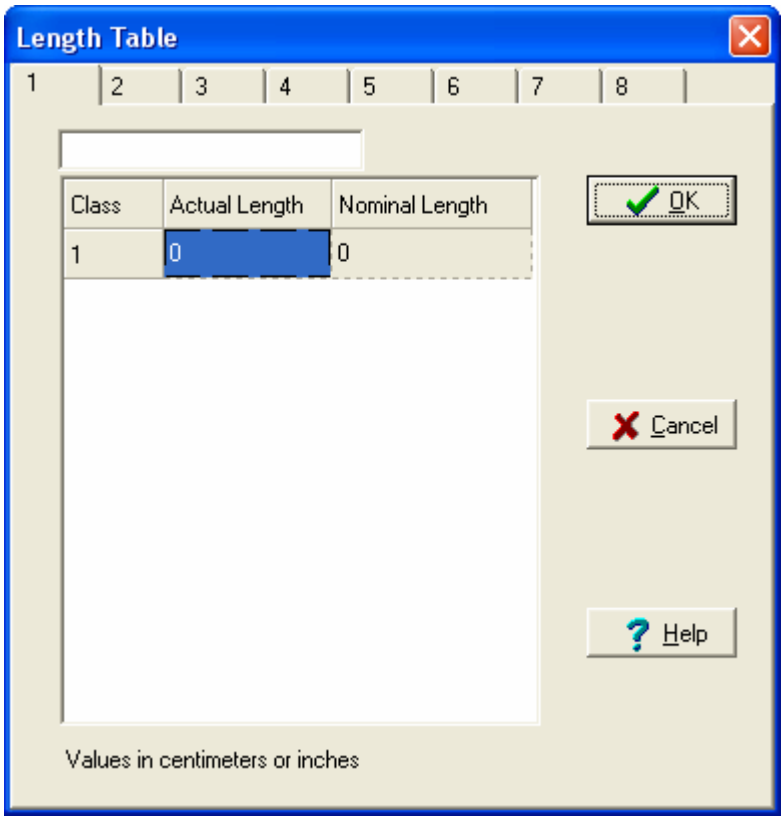
Note that the Sort Table will not accept class numbers that exceed the respective parameters (**Number of Thickness Classes** etc.) in **General Parameters 1.**

The text in the **Dimension, Species, Surface, Moisture** and **Pattern** fields are printed on the optional ticket printer.

6.5.3 Automatic Sort Table Verification

The Sort Table can be checked for "gaps" by clicking the Check Table button. A "gap" means that a certain board, as defined by thickness, width, length, and grade, has no sort defined. The undefined-board data are shown on the screen and printed out on the printer (optional) when this check is being performed.

6.6 LENGTH TABLES



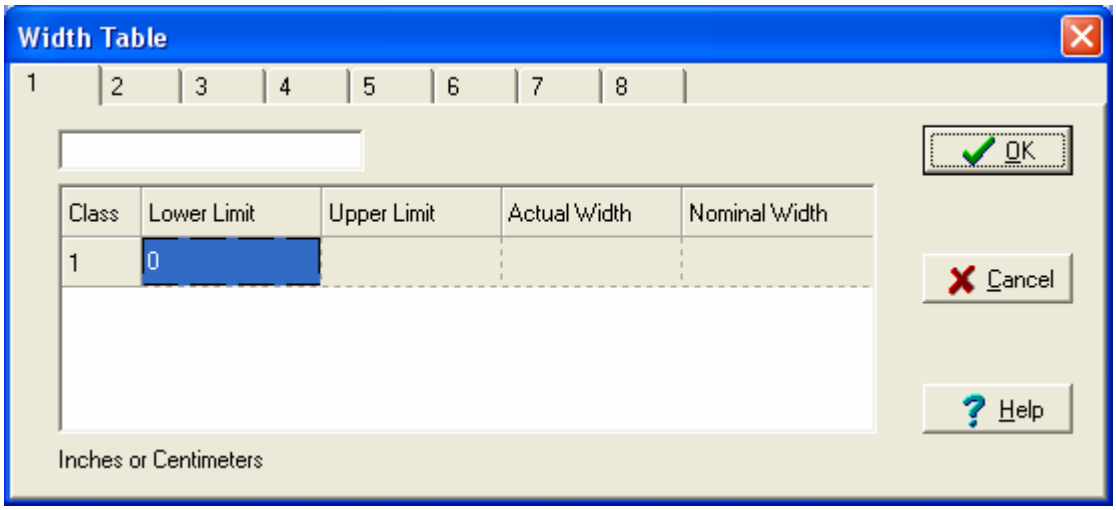
6.6.1 Table Selection

Use the tabs at the top to select a thickness table.

6.6.2 Table Definition

The Actual Length and Nominal Length columns may be programmed in either inches or centimeters.

6.7 WIDTH TABLES



6.7.1 Table Selection

Use the tabs at the top to select a thickness table.

6.7.2 Table Definition

The system determines width in two different ways. This table is programmed differently depending upon the one that is used. The two alternatives are:

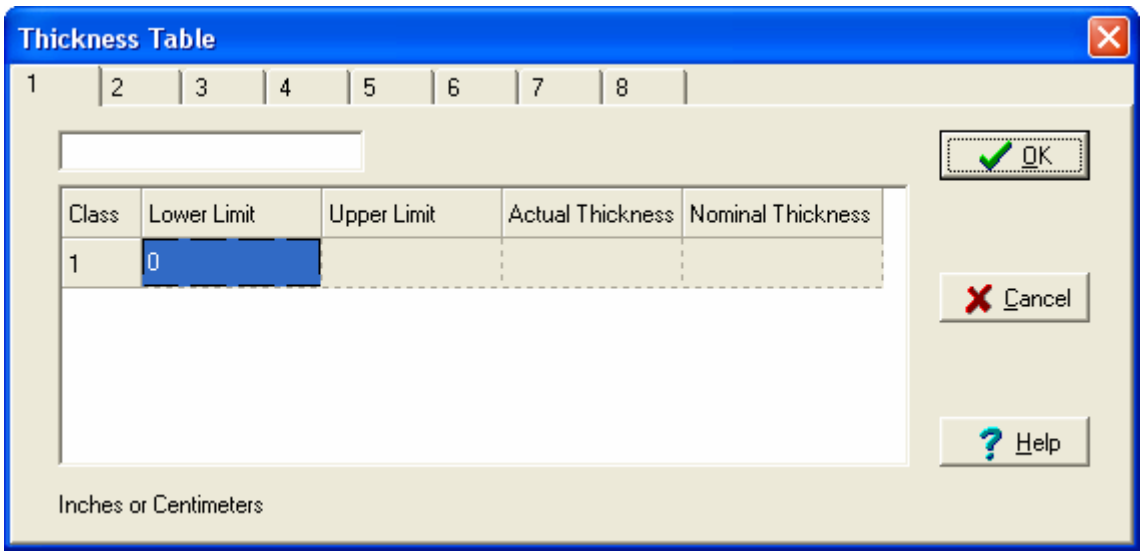
- Width is measured with a Width Photocell.
  In this case, you need to program the **Lower Limit** and the **Upper Limit** for each Width Class. You may choose to program the table with or without "gaps" between the different classes. Boards falling in between classes (when a table is programmed with gaps) are classified as **Width-out-of-range** boards. The processing of those boards is determined by a parameter setting in the **Dropout Gates Parameters Table**.

- Width is not measured; instead the Width Class is keyed into the Sort Table. In this case, you need to program the **Actual Width** column for each class.

The **Nominal Width** column should always be programmed.

The **Lower Limit** and **Upper Limit** must always be programmed in the same unit (inches or centimeters) that was used for the **Width Scale Factor** in **General Parameters 1**. The **Actual Width** and **Nominal Width** may be programmed in either inches or centimeters.

6.8 THICKNESS TABLES



6.8.1 Table Selection

Use the tabs at the top to select a thickness table.

6.8.2 Table Definition

The system determines thickness in two different ways. This table is programmed differently, depending upon the one that is used. The two alternatives are:

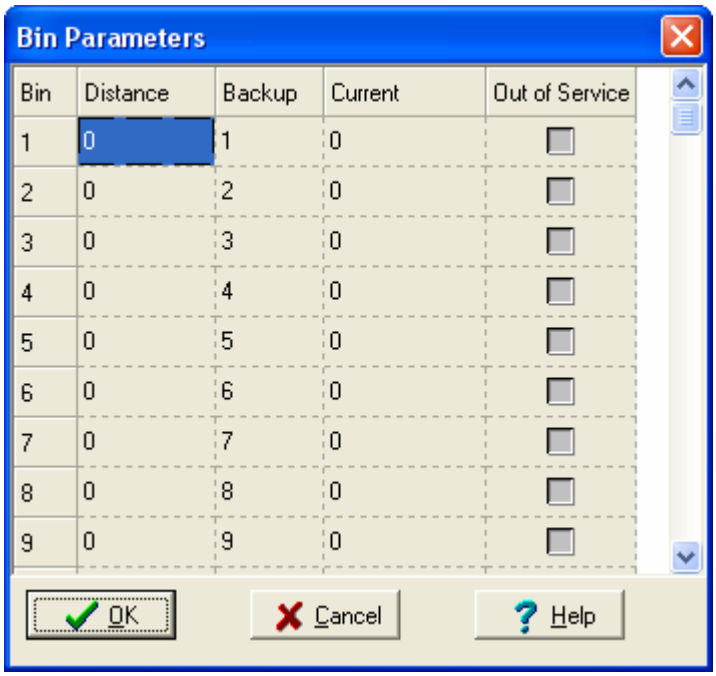
- Thickness is measured with an Encoder-based Thickness Gauge. In this case, you need to program the **Lower Limit** and the **Upper Limit** for each Thickness Class. You may choose to program the table with or without "gaps" between the different classes. Boards falling in between classes (when a table is programmed with gaps) are classified as **Thickness-out-of-range** boards. The processing of those boards is determined by a parameter setting in the **Dropout Gates Parameters Table**.

- Thickness is classified by a device with one discrete output per class (limit switches, cam switch, etc.) or thickness is not measured at all (Thickness Class keyed into the Sort Table). In this case, you need to program the **Actual Thickness** column for each class.

The **Nominal Thickness** column should always be programmed.

The **Lower Limit** and **Upper Limit** must always be programmed in the same unit (inches or centimeters) that was used during the Thickness Gauge Calibration Procedure. The **Actual Thickness** and **Nominal Thickness** may be programmed in either inches or centimeters.

6.9 BIN PARAMETERS



Distance: Program the distance from the **Board Ready** point to each Diverter Point expressed in lug spaces (and fractions thereof).

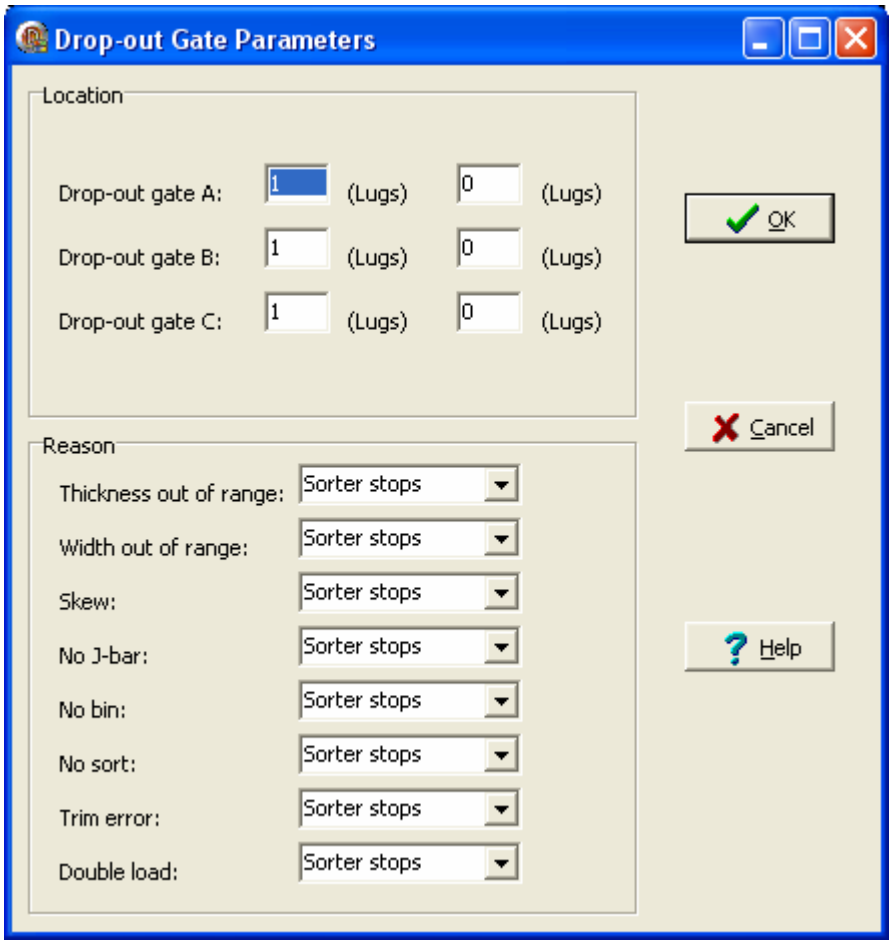
Backup: This feature allows you to create loops of self-seeking bins, i.e. a sort is automatically reassigned to another, empty bin, in the loop when a bin is full. To program a loop you program the second bin in the loop as the backup to the first bin, etc. You have total flexibility to select number of loops, the selection of bins, and the number of bins in each loop. However, each loop must be closed, i.e. the backup bin of the last bin must be equal to the first bin in the loop.

Note that "1" must be the backup to bin 1; "2" must be the backup to bin 2, etc if the self-seeking feature is not used.

Current: The current piece counts for each bin are shown here. Further, you may change these counts at any time. This feature is used when, for some unknown reason, the actual number of boards in a bin does not correspond to what the system shows. In this case just enter the proper piece count in this column and continue to sort.

Out of Service: A bin should be declared to be out of service when there is a malfunction making it impossible to use this bin such as a diverter valve failure. The system will not attempt to sort boards to such a bin. The bin will be treated as a full bin when self-seeking loops are used. Otherwise, the **No Bin** status will be assigned to the board. Please refer to **Dropout Gate Parameters** to find out how this board is processed.

6.10 DROP-OUT GATE PARAMETERS



The top half of the screen is used to program the **Location** of the three Dropout Gates as referenced from the **Board Ready** point. The locations are expressed in lug spaces and fractions thereof. The **Signal Duration** column defines the chain travel distance during which the diverter signal is actuated.

Note that these Dropout Gates are typically used for Rejects and Reman Boards.

The bottom half of the screen allows you to decide how abnormal boards should be processed by the system. Please refer to **System Diagnostics** under **Diagnostics** for definitions of the different abnormal conditions.

A **Thickness Out-of-Range** Board changes the tally data as follows:

- The "Thickness Out-of-Range" byte is set to "1".
- The "Produced Volume" bytes are set to the Actual Volume.
- The "Sorted Volume" bytes are set to "0".

A **Width Out-of-Range** Board changes the tally data as follows:

- The "Width Out-of-Range" byte is set to "1".
- The "Produced Volume" bytes are set to the Actual Volume.
- The "Sorted Volume" bytes are set to "0".

A **Skew** Board changes the tally data as follows:

- The "Skew" byte is set to "1".
- The "Produced Volume" bytes are set to the Actual Volume.
- The "Sorted Volume" bytes are set to "0".

A **No J-Bar** Board changes the tally data as follows:

- The "No J-Bar" byte is set to "1".
- The "Produced Volume" bytes are set to the Nominal Volume.
- The "Sorted Volume" bytes are set to "0".

A **No Bin** Board changes the tally data as follows:

- The "No Bin" byte is set to "1".
- The "Produced Volume" bytes are set to the Nominal Volume.
- The "Sorted Volume" bytes are set to "0".

A **No Sort** Board changes the tally data as follows:

- The "No Sort" byte is set to "1".
- The "Produced Volume" bytes are set to the Nominal Volume.
- The "Sorted Volume" bytes are set to "0".

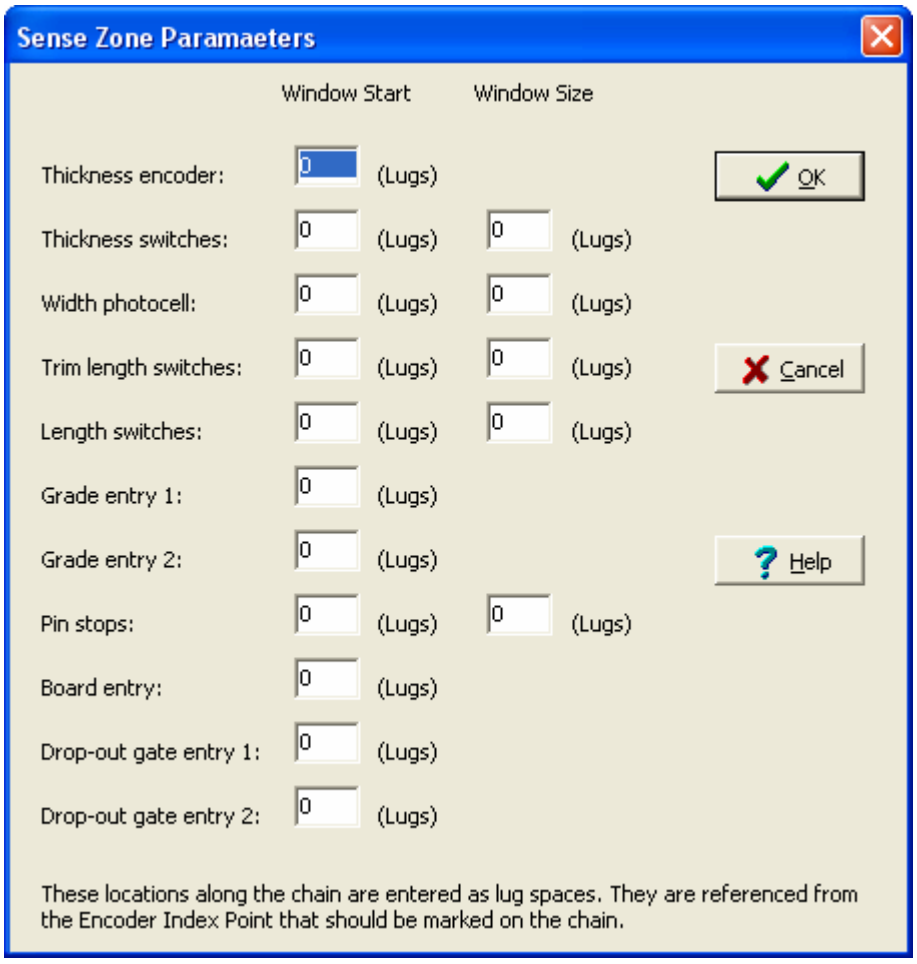
A **Trim Error** Board sets the "Trim Decision" byte to "4".

A **Double Load** Board does not affect the tally data.

Stopping of the chain takes priority over all the other possible actions if more than one abnormality is detected for the same board. Next comes diversion to any one of the drop-out gates. The lowest priority is to let the board run through the sorter to the "Catch-all Bin."

Note that entering a "4" sends the board down to the end of the sorter and this value should only be used when there is a real "Catch all Bin."

6.11 SENSE ZONE PARAMETERS



Below is first a general description of how various device locations are referenced and how the system is timed. This is followed by descriptions of the various **Sense Zone Parameters**.

There are two Reference Points along the chain. The first one is an imaginary point located an arbitrary distance (minimum 1 Lug Space) upstream of the first device along the chain. For example, if the system has a Lug Loader, it is recommended that you use "1.xx" as the Lug Loader Location. The second Reference Point is the **Board Ready** point which in turn is referenced from the first Reference Point. All devices between the first Reference Point and the second one (**Board Ready)** are referenced from the first reference point. All devices downstream of the **Board Ready** point are referenced from this point.

However, there is one exception to this general rule. The Grade Stamper Location is always referenced from the first Reference Point regardless of its location.

Distances are entered as "xx.yy" where "xx" is the number of whole lug spaces from the reference point and "yy" is centilugs (hundreds of a lug space). Note that if "xx" is wrong, boards will still be measured and actuators will move. However, it will be for the wrong board. If "yy" is off, the timing within the lug space will be wrong.

At time of start-up always stop the chain on the index pulse (Channel 41 on Card "A" in the Sense Zone Panel). Verify that the Pulse Counter on the **System Diagnostics** screen under **Diagnostics** is close to "00" or "99". Then make a mark on the chainway where one of the lugs is (choose any lug at a convenient location). This is now the "Timing Mark." If for any reason the chain gets out of synchronism with the encoder the procedure is as follows:

- Stop the chain with one lug (any lug will do) on the "Timing Mark."

- Loosen the Encoder Coupling and turn the Encoder Shaft until the index pulse and tighten the coupling down.

Note that the **Window Size** must always be less than 1.00. Further, note that the Pulse Counter in **System Diagnostics** under **Diagnostics** is a valuable tool to determine the exact location of various sensors and devices. Just move a lug (leading edge) to a position and the Pulse Counter will tell you what the fractional lug space value is ("yy").

Thickness Encoder: This parameter is only used in systems with an Encoder-based Thickness Gauge. It defines exactly where the system reads the Thickness Encoder Counter on the Encoder Interface Card. This means that this is the location where the thickness shoe rests on top of the board about two inches from the edge against the lug. Stop the chain when the leading edge of the lug is approximately 2" downstream of the shoe position. Calculate the approximate reference distance. Use the Pulse Counter in **System Diagnostics** under **Diagnostics** to get the exact decimals. Enter this corrected value as **Window Start**.

Thickness Switches: These two parameters are only used in systems with a Thickness Gauge with discrete outputs (Limit Switches, Cam Switches, etc.). The parameters define a window during which the Thickness Inputs are read. Any input channel that went high (or contact that closed) while the leading edge of the lug passed through this window will be recorded as a set input (inputs are latched). Note that it is the highest input set that determines the Thickness Class. If no input is set, the system assumes Thickness Class "1". Move the chain to a position where the thickness inputs are firmly set. Subtract 0.30 from this position and enter as **Window Start**. Enter 0.60 as **Window Size**.

Width Photocell: The parameters define a window during which pulses are counted off the Chain Encoder while the Width Photocell is blocked. Note that the distance between the photocell beam and the upstream limit of the window as defined by **Window Start** must exceed the width of the widest board. Further, the distance between the photocell beam and the downstream limit of the window as defined by the sum of both parameters must exceed the width of the widest board. Consequently, determine the location of the photocell beam. Subtract the width of the widest board plus 60% expressed in lug spaces. Enter this value as **Window Start**. Multiply the board width expressed in lugs paces by 2 and add 60%. Enter this value as **Window Size**. Note that this value must be less than "1.00". You need to use a lower add-on than 60% in both calculations if **Window Size** is larger than "0.96".

Example:

Photocell Beam Location: 5.60
Lug Spacing: 36"
Widest Board Width: 7.75"

7.75" = 7.75/36 lug spaces = 0.22 lug spaces

Window Start: 5.60 - 1.6 x 0.22 = 5.25
Window Size: 2 x 1.6 x 0.22 = 0.70

As an extra precaution, it is recommended that you verify that the Width Window only covers one lug space. Put a board of the widest width in a lug space with empty lug spaces surrounding it. Run it through the sense zone and monitor the **Width Count** on the **System Diagnostics** screen. It should only show a count for the *one* lug space which contains the board.

Trim Length Switches: The two parameters define a window during which the Trimmer Length Switches are read. Any switch that was actuated by the board while the leading edge of the lug passed through this window will be recorded (latched inputs).
Determine the position of the Trimmer Length Switches. Subtract 0.5 from this position. Set **Window Start** to this value. Calculate the maximum board width expressed in lug spaces. Subtract this value from 1.40. Set **Window Size** to the smallest of this value and 0.90.

Example:

Switch Location: 6.50
Lug Spacing: 36"
Widest Board Width: 7.75"

7.75" = 7.75/36 lug spaces = 0.22 lug spaces

Window Start: 6.50 - 0.50 = 6.00
Window Size: 1.40 - 0.22 = 1.18. Enter 0.90!

Length Switches: The two parameters define a window during which the (Sorter) Length Switches are read. Any switch that was actuated by the board while the leading edge of the lug passed through this window will be recorded (latched inputs). Determine the position of the Length Switches. Subtract 0.5 from this position. Set **Window Start** to this value. Calculate the maximum board width expressed in lug spaces. Subtract this value from 1.40. Set **Window Size** to the smallest of this value and 0.90. Please refer to the previous section for an example.
Set this parameter to 1.00 if length is measured only by the trimmer.

Grade Entry 1: The system will assign the Grade that corresponds to the last pushbutton pushed to the board that is within one lug space *upstream* of the position that is defined by this parameter. Mark a zone (the Grade Entry Zone) along the chain that is 0.8 lug spaces long. Add 0.10 to the location that corresponds to the *downstream* end of the zone and enter this into **Window Start**.

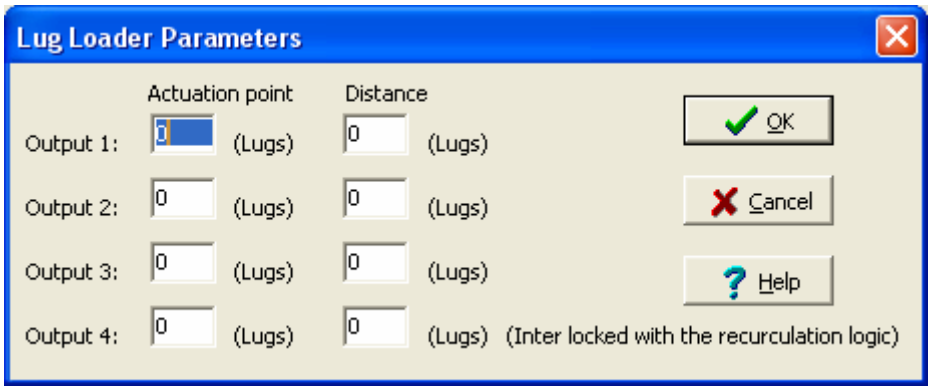
Grade Entry 2: Same as **Grade Entry 1** in systems with two graders. If not two graders, set parameter to "1.00".

Board Ready: This is a point along the chain where the sort determination is done by the system. Therefore, all data that effects the sort selection must be available when a board reaches this point. It also means that all (Sorter) Dropout Gates and Bins must be located downstream of this position. Enter a position approximately 2 lug spaces downstream of the last sensor in the Sense Zone, or if the first Bin or Dropout Gate is close to the Sense Zone just enter a position roughly halfway in between the last sensor and the first diverter.

Dropout Gate Entry 1: The system will address a board to the Dropout Gate that corresponds to the last pushbutton pushed. This applies to the board that is within one lug space *upstream* of the position that is defined by this parameter. Mark a zone (the Dropout Gate Entry Zone) along the chain that is 0.8 lug spaces long. Add 0.10 to the location that corresponds to the *downstream* end of the zone and enter this into **Window Start**. Note that these Dropout Gates are typically used for Rejects and Reman Boards.

Dropout Gate Entry 2: Same as **Dropout Gate Entry 2** in systems with two graders. If not two graders, set parameter to "1.00".

6.12 LUG LOADER PARAMETERS



The Lug Loader Function may be used to control Lug Loaders in systems with or without recirculation. It is optional in systems with no recirculation and it is mandatory in systems with. It is also required if the J-Bar Lock-out Function is implemented.

Four Signals are available for different Lug Loader Functions:

1: This signal is set only for lugs that should *not* be loaded and is usually used for controlling some lug loaders that require a signal when they should not load a board or a J-BAR FULL Light. This makes it possible to manually load boards or to verify the operation of an automatic lug loader. The actuation point for this signal is the same as for Output #4.

2: This signal is set once every lug space.

3: This signal is set once every lug space.

4: This signal is set for every lug space except for those that should *not* be loaded. This is the signal that is used to control Lug Loaders in systems with recirculation. Note that this output *or* output #1 is set at the actuation point.

Actuation Point: Set these parameters to "3.yy" where "yy" determines where in the lug space the signals are actuated. The "3" may then be incremented or decremented in order to properly synchronize the recirculation.

Distance: This parameter determines the chain travel distance during which the signals are set. The unit is lugs and fractions thereof. Always enter a value less than 1.00.

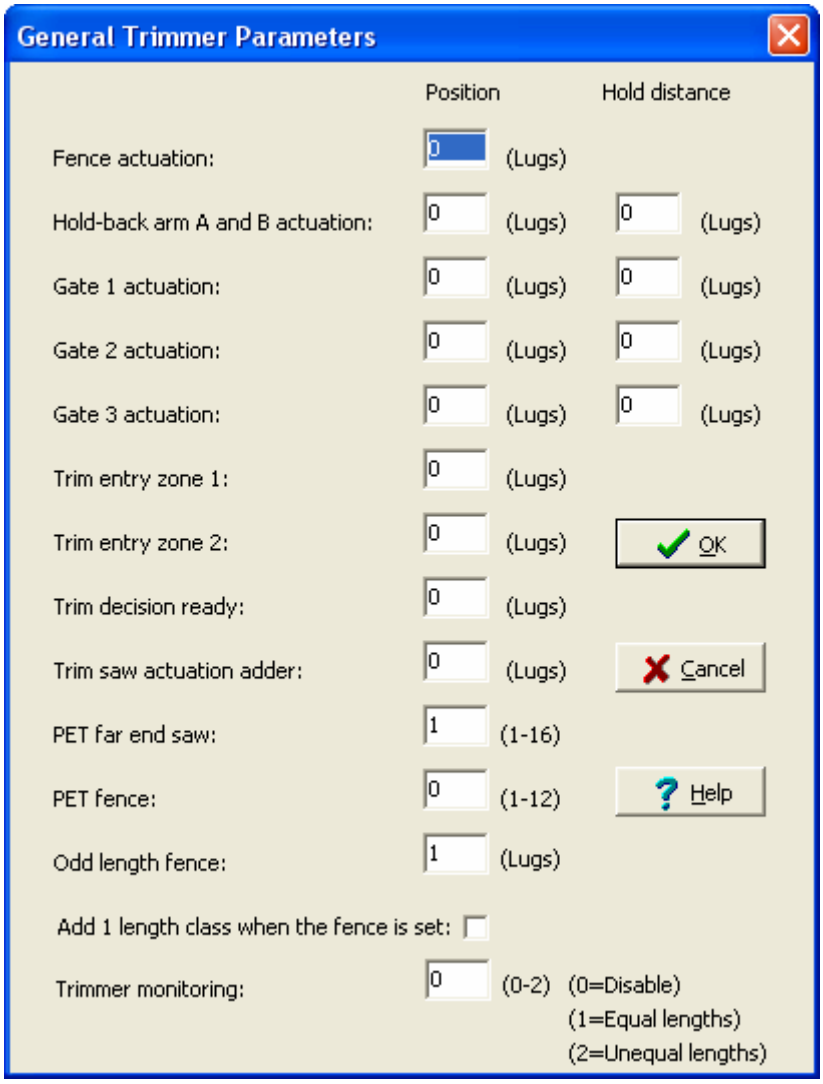
6.13 TRIMMER PARAMETERS

General Trimmer Parameters define general functions associated with the Trimmer Control Function.

Trim Saw Parameters define the timing of the up and down movements of each saw individually.

Trim Length Switch Configuration defines which saw corresponds to which limit switch. This information is only required for reporting purposes and does not effect the control functions.

6.13.1 General Trimmer Parameters



Fence Actuation Position defines the position of the chain when the fence is moved.

Hold-back Arm A and B Actuation Position defines the position of the chain when the Hold-back Arms are moved. The Hold-back arms are used for board splitting to move one of the board halves to the next lug space.

Gate 1, 2, 3 Position defines the location of the Trimmer Dropout Gates downstream of the Trimmer but before the Sorter Sense Zone. The addressing of a board to one of the Trimmer Dropout Gates is done in the **Trim Entry Zone.** Note that these Trimmer Dropout Gates are different from the ones previously mentioned that are located downstream of the Sorter Sense Zone. The Trimmer Dropout Gates are labeled "1", "2", and "3". The Sorter Dropout Gates are labeled "A", "B", and "C".

Trim Entry Zone 1: This is where the manual trim decisions are entered and/or information is received from an automatic Grade Reader. The entered information effects the board that is within one lug space *upstream* of the position that is defined by this parameter. Mark a zone (the Grade Entry Zone) along the chain that is 0.8 lug spaces long. Add 0.10 to the location that corresponds to the *downstream* end of the zone and enter this value into **Trim Entry Zone 1**.

Trim Entry Zone 2: Same as **Trim Entry Zone 1** in systems with two trimmer operators. If not two operators, set parameter to "1.00".

Trim Decision Ready Point: This is a point along the chain where the trim decisions are made by the system. Therefore, all data that effects the trim decision must be available when a board reaches this point. Enter a position approximately one half lug space upstream of the **Trim Saw Actuation Point.**

Trim Saw Actuation Position Adder: This feature adds this distance to each Trim Saw position as programmed in the **Trim Saw Actuation Positions** Table. The idea behind this feature is that you should be able to easily adjust the Actuation Point for every Saw the same distance to compensate for, for example, varying air pressures or changing temperatures effecting the response times. This parameter must always be a positive value. Therefore, it is recommended that it is set to, for example, "0.50" before the **Trim Saw Actuation Positions** are programmed. This allows you then to change it up or down to move the Actuation Points backward or forward along the chain as required.

PET Far End Saw: This parameter defines which saw that should be used at the far end when Precision End Trimming is being done. The saws are numbered starting with 1 on the fence side, up to a maximum of 16.

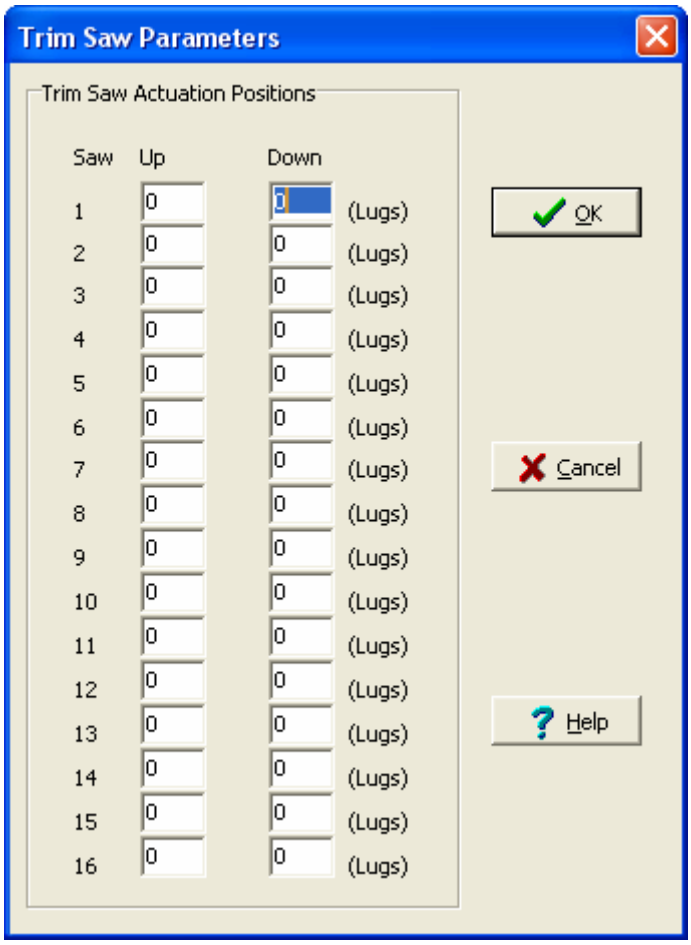
PET Fence Position: This parameter defines which Fence Position that should be used when Precision End Trimming is being done. The Fence Positions are numbered starting with 1 closest to the chain, up to a maximum of 12.

Odd Length Fence Position: This parameter defines the Fence Position that should be used when an odd length is being trimmed.

Add 1 Length Class when the Fence is set: Each saw increment represents two Length Classes when this parameter is checked. Further, the length class is incremented by one when the fence is set. This information is only required for reporting purposes (correct Length Classes) and does not effect the control functions.

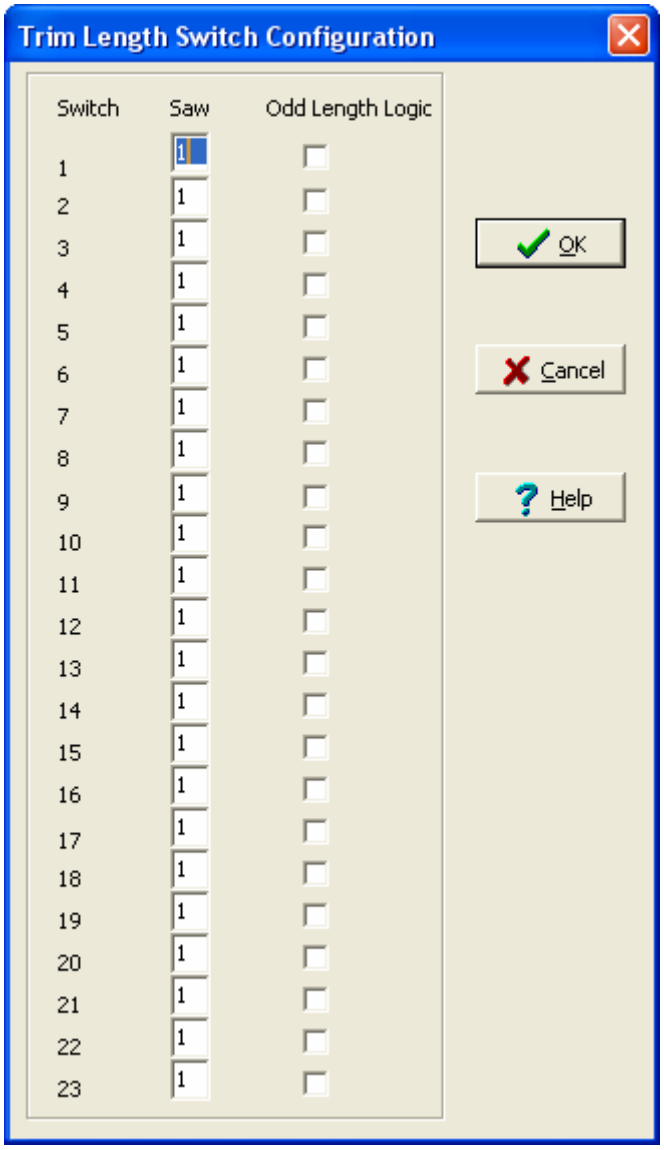
Trimmer Monitoring: This feature verifies that the length of the board as measured at the Sorter Sense Zone matches what it should have been as derived from a combination of the length at the Trimmer Sense Zone and the trimmer commands that were issued. This function works for all Standard Trimmers. However, the **Disable** option allows you to switch off this function should it cause problems because of non-standard Trimmer Functions. Please refer to **Dropout Gate Parameters** to find out how a "Trim Error Board" is processed.

6.13.2 Trim Saw Actuation Positions



These parameters define the chain positions for the movement of the different Trim Saws. These positions *must* be within one lug space downstream of the **Trim Decision Ready Point**. If necessary, move the **Trim Decision Ready Point** to meet this requirement.

6.13.3 Trim Length Switch Configurations



This table defines which saw corresponds to which limit switch. The Saws and the Limit Switches are numbered starting with 1 on the "even-ending side" up to a maximum of 16 for the Saws and 23 for the Limit Switches.

The table also defines which lengths that should be processed as odd lengths. The Odd Length Logic is defined as follows:

- Raise the 0' Saw
- Set the "Odd Length Fence Position"

6.14 THICKNESS GAUGE CALIBRATION

6.14.1 Calibration Procedure

A: Select the "Calibration Thickness Gauge" item from the Main Menu.

B: Enter the correct thicknesses of the three calibration blocks.

C: Walk out to the sense zone and verify that all status lights and the GRADE light are lit. Note that these are all optional lights and they are not necessary for this procedure.

D: Verify that the position of the index pulse is correct (see next section).

E: Insert Calibration Block 1 (small size) into the thickness gauge. Momentarily actuate Length Switch #1 (the first length switch not including the switch at the lumber line). Verify that the status lights momentarily go dark.

F: Insert Calibration Block 2 (medium size) into the thickness gauge. Momentarily actuate Length Switch #2 (the second length switch not including the switch at the lumber line). Verify that the status lights momentarily go dark.

G: Insert Calibration Block 3 (large size) into the thickness gauge. Momentarily actuate Length Switch #3 (the third length switch not including the switch at the lumber line). Verify that the status lights momentarily go dark.

H: Return to the computer and verify that the three Calibration constants are reasonably close to their previous values. It is recommended that a written log be kept of these constants.

I: Return to the Main Menu.

6.14.2 Thickness Gauge Adjustment

The timing belt pulley should be turned in such a way that the index pulse occurs when the arm is below the top surface of the thinnest board that will be measured. However, the index pulse must occur above the resting position of the arm. In other words, the encoder will generate an index pulse every time the arm is on its way up from the resting position and before it reaches the top surface of the thinnest board. This index pulse is used to reset the thickness counter.

Another index pulse will, of course, be generated when the arm is on its way down. This one is of no significance. Note, that sometimes the arm may not reach the "index position" in between boards due to large board thicknesses and close spacing between the boards. This is acceptable.

6.15 TICKET EDITING

This feature is only implemented in systems with Ticket Printing.

6.16 TICKET FORMATTING

This feature is only implemented in systems with Ticket Printing.

7 DIAGNOSTICS

7.1 Selection of Diagnostics

This menu is used to select which diagnostic screen you want to display.

System Diagnostics shows information pertaining to the encoder and others. It also shows the data that are generated for a particular board. Displaying **System Diagnostics** is normally the first step taken when a malfunction of an unknown nature occurs.

Local I/O Diagnostics pertain to the OPTO 22 OPTOMUX mounting racks for solid state input and output modules. The OPTOMUX racks each contain 24 single channel I/O modules. These racks are used in all systems. The diagnostic function allows the monitoring of input channels and also allows you to force outputs on or off.

Remote I/O Diagnostics is only used in systems that have OPTO 22 PAMUX mounting racks for the solid state input and output modules. The PAMUX racks each contain eight 4-channel modules. This type of rack is only used in larger Lumber Sorting Systems (more than 24 bins or Bin Full Logic) or in systems with very special functions. The Diagnostic Function allows you to monitor the input channels. It also allows you to force outputs on or off.

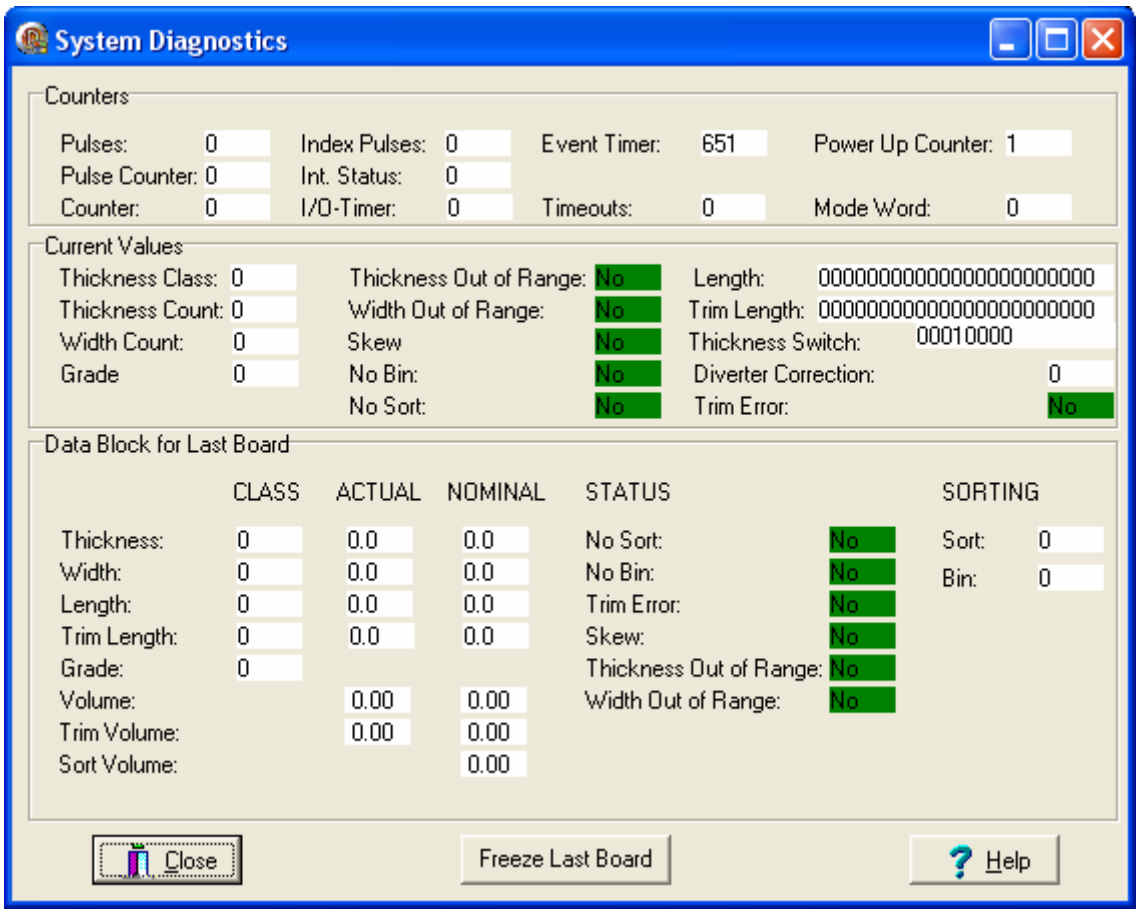
Diverter Test fires the kickers in sequential order. This feature is used to test the diverter output modules in the OPTO 22 racks and the diverter solenoids.

Display Data displays or prints internal variables and buffers to help installation personnel during start-up.

Display Errors displays or prints time-stamped error information.

Display Interrupt Information is for internal use only.

7.2 System Diagnostics



System Diagnostics shows information pertaining to the encoder and other system functions. It also shows the data that are generated for a particular board. Displaying Main Diagnostics is normally the first step taken when a malfunction of an unknown nature occurs.

7.2.1 COUNTERS

Pulses shows the number of times that the program "looks at the chain" per encoder revolution. This is also called a chain interrupt. The number is equal to the number of encoder pulses per revolution divided by the *Chain Encoder Divider* parameter. For example, with an encoder generating 500 pulses per revolution and the *Chain Encoder Divider* parameter set to 10 will generate a value of 50.

Pulse Counter should count upwards as the encoder turns forward. It actually counts the pulses that the encoder is generating. The counter rolls over from setting of the *Chain Encoder Divider* parameter to zero.

Counter shows the counters latch register.

Index Pulses increments by one for each encoder revolution.

Int. Status shows the content of Interrupt Status Register 3 of the 626 board.

I/O-Timer counts up each time the timer controlled i/o thread is activated. This thread mainly controls PAMUX cards.

Event Timer counts up each time the main thread is activated.

Timeouts counts the number of time outs from the scanner. This number should normally be zero.

Power Up Counter is incremented once every time the program is started. This number should not make big increases during a shift. (This would indicate a problem with the AC power that should be corrected.) Note that the number is also incremented once when the program is restarted manually. Also note that this number is never reset before it gets to 65,535.

Mode Word shows the mode word of the 626 board.

7.2.2 CURRENT VALUES

Thickness Class is only valid when a Thickness Gauge with discrete outputs (limit switches, cam switch, etc.) is used. Note that the *Thickness Switch* parameter in *General Parameters 1* must be checked for this kind of Thickness Gauge.

Thickness Count is only valid when an Encoder-based Thickness Gauge is used. Note that the *Thickness Switch* parameter in *General Parameters 1* must be *unchecked* for this kind of Thickness Gauge. The count shown is the actual pulse count that the system reads when the board (lug) is in the position that is defined by the *Thickness Encoder* parameter in *Sense Zone Parameters*. Note that the flanks of both pulse train are counted, i.e. a 500 pulses-per-revolution encoder generates 2,000 counts per revolution (lug-space).

For verification purposes, you may compare this value to the values that are shown in the *Thickness Gauge Calibration* routine (compare the Pulse Counts and the manually-entered dimensions with this count).

Width Count is only valid when a Width Photocell Gauge is used. The count shown is the actual pulse count that the system reads when the board (lug) clears the end of the *Width Photocell* window as defined in the *Sense Zone Parameters*. The Width Counter counts pulses from the Chain Encoder while the board is blocking the Width Photocell. Note that the flanks of both pulse train are counted, i.e. a 500 pulses-per-revolution encoder generates 2,000 counts per revolution (lug-space).

For verification purposes, you may divide the *Width Count* by the *Width Scale Factor* in *General Parameters 1*. The result should be equal to the actual board width corrected for the *Width Correction* in the same parameter table.

Grade (optional feature) shows the number of the last Grade Pushbutton that was pushed before the board (lug) reached the *Grade Entry* point as defined in *Sense Zone Parameters*. Note that the *Default Grade* as programmed in *General Parameters 1* should be shown here if no pushbutton was pushed.

Thickness Out of Range is set to "Y" if the measured thickness value (only Encoder-based Thickness Gauges) falls in between the Class Limits as programmed in the *Thickness Table*.

Width Out of Range is set to "Y" if the measured width value falls in between the Class Limits as programmed in the *Width Table*.

Skew is set to "Y" if only one of the Reference switch and the first Length switch is actuated in the *Length Switches* window. Please refer to *Drop-out Gate Parameters* to find out how such a board is processed.

No J-bar is set to "Y" if an attempt is made to load a board onto a lug that is either already occupied by a re-circulated board or a lug that has been declared to be Out-of-Service. Please refer to *Drop-out Gate Parameters* to find out how such a board is processed.

No Bin is set to "Y" if the system cannot find an available bin for this board. Possible reasons for this is that the assigned bin is full and there is no recirculation or no backup bin. Please refer to *Drop-out Gate Parameters* to find out how such a board is processed.

No Sort is set to "Y" if the system cannot find an assigned sort in the Sort Table, i.e. there is a "gap" in the programmed classes. Please refer to *Drop-out Gate Parameters* to find out how such a board is processed.

Trim Length shows the momentary status (not related to the last board) of all Trimmer Length Limit Switches (optional). A "0" means that the switch is not actuated while a "1" shows that it is actuated.

Length shows the momentary status (not related to the last board) of all Length Limit Switches. A "0" means that the switch is not actuated while a "1" shows that it is actuated.

Thickness Switch shows the momentary status (not related to the last board) of the Thickness Switches (if used in the system). A "0" means that the switch is not actuated while a "1" shows that it is actuated.

Diverter Correction shows the current speed correction used for the diverters.

Trim Error is set to "Yes" if the length of the board, as measured at the Sorter Sense Zone, does not match what it should have been as derived from a combination of the length at the Trimmer Sense Zone and the trimmer commands that were issued. This Trimmer Verification feature is, of course, only valid if the optional Trimmer Control Package is installed. Note that this feature may be disabled by the *Trimmer Monitoring* parameter in *Trimmer Control Parameters/General Trimmer Parameters***.** Please refer to *Dropout Gate Parameters* to find out how a "Trim Error Board" is processed.

7.2.3 DATA BLOCK FOR LAST BOARD:

Classes shows how the board was classified with regards to Thickness, Width, Length, and Trimmer Length (optional) utilizing the corresponding Tables for the different Class Limits. The *Grade* number shows the number of the grade pushbutton that was pushed or the default value (*General Parameters 2*) if no pushbutton was pushed or the system does not have any Grade Pushbuttons.

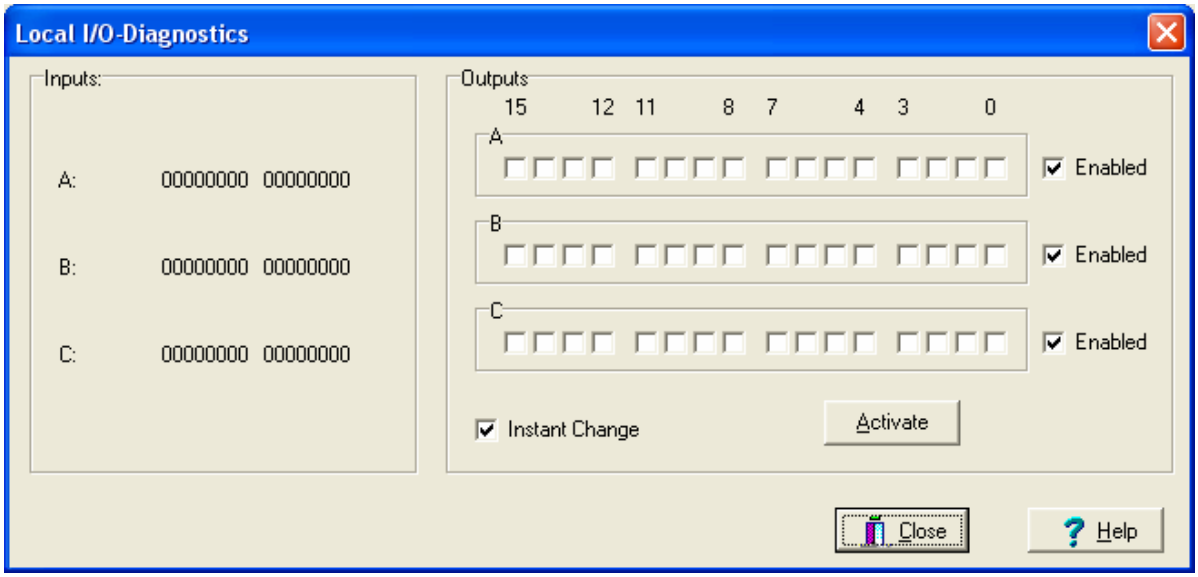
Actual displays the actual measurements for the board either as actually measured (first priority) or as programmed in the *Actual* column in the *Thickness, Width, and Length Tables*.

Nominal displays the Nominal Dimensions for the board as programmed in the *Nominal* column in the *Thickness, Width, and Length Tables*.

Status shows special information relating to this board. Please refer to the previous page for definitions of these status data.

Sorting: *Sort* shows the sort that was selected for this lug. *Bin* shows the bin that was assigned. Note that boards addressed to one of the Dropout Gates is assigned numbers consecutive to the highest bin number as defined by *Number of Bins* in *General Parameters 2*. For example, if the *Number of Bins* is set to 25, Dropout Gate A would be shown as 26; B as 27; C as 28.

7.3 Local I/O Diagnostics

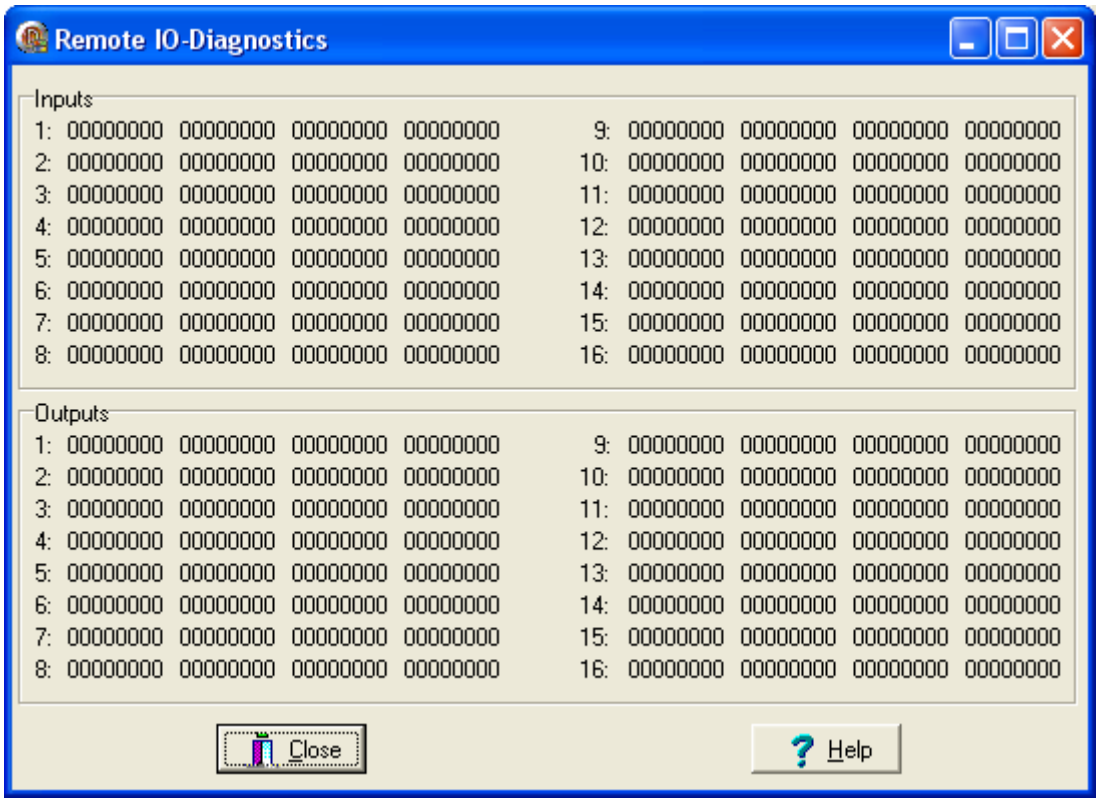


A "1" in the left panel indicates that an input is ON and a "0" indicates that it is OFF.

A checked box in the right panel will set an output to ON, unchecked to OFF. If *Instant Change* is unchecked, the change will not execute until the *Activate* button is clicked.

Please refer to the I/O-Map for a definition of the different input/output channels.

7.4 Remote I/O Diagnostics



The top half of the screen refers to inputs, the Input Area; the bottom half refers to outputs, the Output Area.

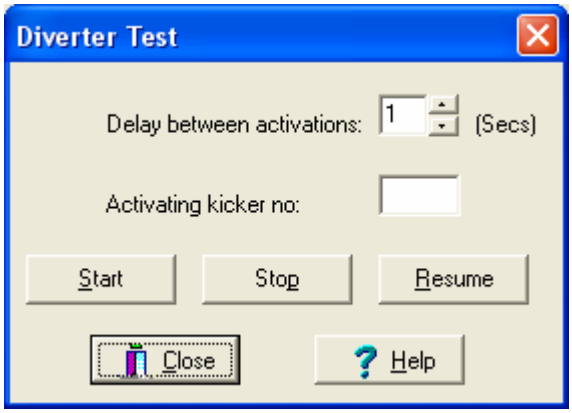
Note that there is a maximum of 16 PAMUX cards in a normal system. Each PAMUX card has 32 channels which may contain any mixture of inputs and outputs. All 32 channels are shown on the screen in both the input and output areas. Of course, it is only meaningful to look at those channels that are inputs in the input area and outputs in the output area. Please refer to a separate document showing the Input and Output maps.

A "1" indicates that an input or an output is ON; a "0" indicates that it is OFF.

The cursor may be moved to any output position with the "arrow" keys. The output is toggled on or off with the "1" and "0" keys or, more conveniently, with the "I" and "O" keys.

NOTE THAT SETTING AN INPUT IN THE OUTPUT AREA CAUSES THAT INPUT TO BE ON UNTIL THE WHOLE PROGRAM IS RESTARTED.

7.5 Diverter Test



This test feature fires the diverters in sequential order, allowing you to walk down the sorter to verify the proper operation of all diverters.

8 BOARD DATA-BLOCK FORMAT

The following information is generated for every board being processed by the system:

Byte	Config.	Description	
1-7		Misc. Control Bytes	
8	Byte 1	Thickness Class	
9	Byte 1	Width Class	
10	Byte 1	Trim Length Class	
11	Byte 1	Sorter Length Class	
12	Byte 1	Grade	
13	Byte 1 - L	Actual Thickness	(inches or cm x 100)
14	Byte 2 - M	Actual Thickness	
15	Byte 1 - L	Actual Width	(inches or cm x 100)
16	Byte 2 - M	Actual Width	
17	Byte 1 - L	Actual Trim Length	(feet or dm x 10)
18	Byte 2 - M	Actual Trim Length	
19	Byte 1 - L	Actual Sort Length	(feet or dm x 10)
20	Byte 2 - M	Actual Sort Length	
21	Byte 1 - L	Nominal Thickness	(inches or cm x 100)
22	Byte 2 - M	Nominal Thickness	
23	Byte 1 - L	Nominal Width	(inches or cm x 100)
24	Byte 2 - M	Nominal Width	
25	Byte 1 - L	Nominal Trim Length	(feet or dm x 10)
26	Byte 2 - M	Nominal Trim Length	
27	Byte 1 - M	Nominal Sort Length	(feet or dm x 10)
28	Byte 2 - L	Nominal Sort Length	
29	Byte 1 - L	Actual Trim Volume	(Cubic inches/12 or Cubic Centimeters/10)
30	Byte 2	Actual Trim Volume	
31	Byte 3 - M	Actual Trim Volume	
32	Byte 1 - L	Actual Produced Volume	(Cubic inches/12 or Cubic Centimeters/10)
33	Byte 2	Actual Produced Volume	
34	Byte 3 - M	Actual Produced Volume	
35	Byte 1 - L	Nominal Trim Volume	(Cubic inches/12 or Cubic Centimeters/10)
36	Byte 2	Nominal Trim Volume	
37	Byte 3 - M	Nominal Trim Volume	
38	Byte 1 - L	Nominal Produced Volume	(Cubic inches/12 or Cubic Centimeters/10)
39	Byte 2	Nominal Produced Volume	
40	Byte 3 - M	Nominal Produced Volume	

41	Byte 1 - L	Nominal Sorted Volume	(Cubic inches/12 or Cubic Centimeters/10)
42	Byte 2	Nominal Sorted Volume	
43	Byte 3 - M	Nominal Sorted Volume	
44	Byte 1	Lug Status	(0 = Empty; 1 = Board)
45	Byte 1	Thickness Out-of-Range	(0 = Not True; 1 = True)
46	Byte 1	Width Out-of-Range	(0 = Not True; 1 = True)
47	Byte 1	Skewed Board	(0 = Not True; 1 = True)
48	Byte 1	"No J-Bar" Board	(0 = Not True; 1 = True)
49	Byte 1	"No Bin" Board	(0 = Not True; 1 = True)
50	Byte 1	"No Sort" Board	(0 = Not True; 1 = True)
51	Byte 1	Dropout Gate A	(1 = Diverted to Gate A; Otherwise = 0)
52	Byte 1	Dropout Gate B	(1 = Diverted to Gate B; Otherwise = 0)
53	Byte 1	Dropout Gate C	(1 = Diverted to Gate C; Otherwise = 0)
54	Byte 1	"Catch All" Bin	(1 = No Address; Otherwise = 0)
55	Byte 1	Sort	(Sort Number assigned to the board)
56	Byte 1	Bin	(Bin Number assigned to the Board)
57	Byte 1	Short Piece Trim Decision	0: 0' 1: 2' 2: 4' 3: 6' 4: 8' 5: 10' 6: 12'
58	Byte 1	Trim Decision	1: Auto Trim 2: PET 3: Pass 4: Trim Error
59	Byte 1	Current Sort Table	
60	Byte 1	Number of 4's	
61	Byte 1	Number of 6's	
62	Byte 1 - L	Volume of 4's	([60] x [21/22] x [23/24] x 4)
63	Byte 1 - M	Volume of 4's	(Cubic inches/12)
64	Byte 1 - L	Volume of 6's	([61] x [21/22] x [23/24] x 6)
65	Byte 1 - M	Volume of 6's	(Cubic inches/12)

66	Byte 1 - L	Nominal Trim Loss	(([25/26] - [27/28]) x [21/22] x [23/24])
67	Byte 2	Nominal Trim Loss	(Cubic inches/12)
68	Byte 3 - M	Nominal Trim Loss	
69	Byte 1	Trimmer Lug Status	(1 = Board Entering Trimmer) (0 = Empty Lug)
70	Byte 1	Sorted Board	(1 = Lug Filled) (0 = Empty Lug or Dropout)

Note that [xx/yy] means the content of bytes xx and yy.

9 TROUBLESHOOTING

Below is a list of various troubleshooting hints. It is not a complete and systematic troubleshooting guide. You must use your own knowledge of the system and your own judgment in most cases. However, these hints should give you some ideas.

All Systems:

- Turn the power OFF and ON to the computer and all other system units.
- Do the Chain Encoder signals look normal on the **System Diagnostic Screen**?
- Are the LED's for Channel 10 and 11 on Card A lit when the Chain Encoder is turning?
- Do you get the index pulse once per encoder revolution on Channel 12 on Card A?
- Stop the chain on the Encoder Timing Mark. Does the Centi Lug Counter on the **System Diagnostic Screen** show close to 100 or 0?
- Verify the voltage across the 24V Power Supply.
- Check the fuses on the **Sense Zone Panel/I/O Panel** door. Are the lights on?
- Do non-encoder data look normal on the **System Diagnostic Screen**?
- Try to print **Snap-shot Reports**.
- Can inputs be monitored and outputs be set from the **Local I/O Diagnostic Screen**?
- Run the Diverter Test.

Systems with Remote I/O:

- Is the 5V LED lit on each card?
- Can inputs be monitored and outputs be set from the **Remote I/O Diagnostic Screen**?

10 INPUT AND OUTPUT MAPS - LOCAL CARDS

10.1 I/O Card A - Encoders & Misc. I/O

Ch.	Sign.	Com.	I/O	Description	
0	1	2	I	Reserved	(20CH)
1	3	4	I	RUN Reset	
2	5	6	I	J-Bar Lock-out	
3	7	8	I	Lost Piece	
4	9	10	I	Reserved	
5	11	12	I	Reserved	
6	13	14	I	Reserved	
7	15	16	I	Reserved	
8	17	18	O	OK Light	(210H)
9	19	20	O	THICKNESS Light	
10	21	22	O	WIDTH Light	
11	23	24	O	SKEW Light	
12	25	26	O	RUN Light	
13	27	28	O	Reserved	
14	29	30	O	J-BAR LOCK-OUT Light	
15	31	32	O	HORN	
16	33	34	-	Reserved	
17	35	36	I	WIDTH Photocell	
18	37	38	I	CHAIN ENCODER, Channel A (always IDC5B)	
19	39	40	I	CHAIN ENCODER, Channel B (always IDC5B)	
20	41	42	I	CHAIN ENCODER, Index Ch. (always IDC5B)	
21	43	44	I	THICKNESS ENCODER, Channel A	
22	45	46	I	THICKNESS ENCODER, Channel B	
23	47	48	I	THICKNESS ENCODER, Index Channel	

Note 1: +5 V is fed to the card through Wire 49 in the ribbon cable. Verify that the 5V Fuse is in the position closest to the ribbon cable connector.

Note 2: The WIDTH Photocell LED should be lit when the beam is broken by the board.

Note 3: Observe the LED's on the I/O Module A while the encoder is turning very slowly in the forward direction. The encoder is connected properly if the sequence, starting with both LED's dark, is as follows: No. 19 goes light; No. 18 goes light; No. 19 goes dark; No. 18 goes dark. Just switch the wires on Terminal 37 and 39 if the sequence is incorrect.

10.2 I/O Card B - Length Limit Switches and Thickness

Ch.	Sign.	Com.	I/O	Description	
0	1	2	I	Reference Switch	(206H)
1	3	4	I	Length Switch 1	
2	5	6	I	Length Switch 2	
3	7	8	I	Length Switch 3	
4	9	10	I	Length Switch 4	
5	11	12	I	Length Switch 5	
6	13	14	I	Length Switch 6	
7	15	16	I	Length Switch 7	
8	17	18	I	Length Switch 8	(207H)
9	19	20	I	Length Switch 9	
10	21	22	I	Length Switch 10	
11	23	24	I	Length Switch 11	
12	25	26	I	Length Switch 12	
13	27	28	I	Length Switch 13	
14	29	30	I	Length Switch 14	
15	31	32	I	Length Switch 15	
16	33	34	I	Reserved	(208H)
17	35	36	I	Thickness 2	
18	37	38	I	Thickness 3	
19	39	40	I	Thickness 4	
20	41	42	I	Reserved	
21	43	44	I	Reserved	
22	45	46	-	Not Used	
23	47	48	-	Not Used	

Note 1: +5 V is connected to Wire 49 in the ribbon cable.

Note 2: All even wires in the ribbon cable are grounded.

10.3 I/O Card C - Extended Length and Trim Length Switches

Ch.	Sign.	Com.	I/O	Description	
0	1	2	I	Length 16	(209H)
1	3	4	I	Length 17	
2	5	6	I	Length 18	
3	7	8	I	Length 19	
4	9	10	I	Length 20	
5	11	12	I	Length 21	
6	13	14	I	Length 22	
7	15	16	I	Length 23	
8	17	18	I	Trim Length Switch 16	(20AH)
9	19	20	I	Trim Length Switch 17	
10	21	22	I	Trim Length Switch 18	
11	23	24	I	Trim Length Switch 19	
12	25	26	I	Trim Length Switch 20	
13	27	28	I	Trim Length Switch 21	
14	29	30	I	Trim Length Switch 22	
15	31	32	I	Trim Length Switch 23	
16	33	34	I	Reserved	(20BH)
17	35	36	I	Reserved	
18	37	38	I	Reserved	
19	39	40	I	Reserved	
20	41	42	I	Reserved	
21	43	44	I	Reserved	
22	45	46	-	Not Used	
23	47	48	-	Not Used	

Note 1: +5 V is connected to Wire 49 in the ribbon cable.

Note 2: All even wires in the ribbon cable are grounded.

10.4 I/O Card D - Diverters 1 - 24

Ch	Sign.	Comm.	I/O	Description	
0	1	2	O	Diverter 1	(20DH)
1	3	4	O	Diverter 2	
2	5	6	O	Diverter 3	
3	7	8	O	Diverter 4	
4	9	10	O	Diverter 5	
5	11	12	O	Diverter 6	
6	13	14	O	Diverter 7	
7	15	16	O	Diverter 8	
8	17	18	O	Diverter 9	(20EH)
9	19	20	O	Diverter 10	
10	21	22	O	Diverter 11	
11	23	24	O	Diverter 12	
12	25	26	O	Diverter 13	
13	27	28	O	Diverter 14	
14	29	30	O	Diverter 15	
15	31	32	O	Diverter 16	
16	33	34	O	Diverter 17	(20FH)
17	35	36	O	Diverter 18	
18	37	38	O	Diverter 19	
19	39	40	O	Diverter 20	
20	41	42	O	Diverter 21	
21	43	44	O	Diverter 22	
22	45	46	O	Diverter 23	
23	47	48	O	Diverter 24	

Note 1: +5 V is connected to Wire 49 in the ribbon cable.

Note 2: All even wires in the ribbon cable are grounded.

10.5 Remote Card 1 - Bin Functions - Bin 1 - 8

Jumper Config.: oooooxxoo Location: Bin Panel 1 Card Address: 00

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Bin Full Light 1
1	2			Bin Full Light 2
2	3			Bin Full Light 3
3	4			Bin Full Light 4
4	5	2	O	Bin Full Light 5
5	6			Bin Full Light 6
6	7			Bin Full Light 7
7	8			Bin Full Light 8
8	9	3	O	Diverter 1
9	10			Diverter 2
10	11			Diverter 3
11	12			Diverter 4
12	13	4	O	Diverter 5
13	14			Diverter 6
14	15			Diverter 7
15	16			Diverter 8
16	17	5	I	Bin Reset Pushbutton 1
17	18			Bin Reset Pushbutton 2
18	19			Bin Reset Pushbutton 3
19	20			Bin Reset Pushbutton 4
20	21	6	I	Bin Reset Pushbutton 5
21	22			Bin Reset Pushbutton 6
22	23			Bin Reset Pushbutton 7
23	24			Bin Reset Pushbutton 8
24	25	7	O	Bin Lowering 1
25	26			Bin Lowering 2
26	27			Bin Lowering 3
27	28			Bin Lowering 4
28	29	8	O	Bin Lowering 5
29	30			Bin Lowering 6
30	31			Bin Lowering 7
31	32			Bin Lowering 8

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.6 Remote Card 2 - Bin Functions - Bin 9 - 16

Jumper Config.: xoooxxoo Location: Bin Panel 1 Card Address: 04

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Bin Full Light 9
1	2			Bin Full Light 10
2	3			Bin Full Light 11
3	4			Bin Full Light 12
4	5	2	O	Bin Full Light 13
5	6			Bin Full Light 14
6	7			Bin Full Light 15
7	8			Bin Full Light 16
8	9	3	O	Diverter 9
9	10			Diverter 10
10	11			Diverter 11
11	12			Diverter 12
12	13	4	O	Diverter 13
13	14			Diverter 14
14	15			Diverter 15
15	16			Diverter 16
16	17	5	I	Bin Reset Pushbutton 9
17	18			Bin Reset Pushbutton 10
18	19			Bin Reset Pushbutton 11
19	20			Bin Reset Pushbutton 12
20	21	6	I	Bin Reset Pushbutton 13
21	22			Bin Reset Pushbutton 14
22	23			Bin Reset Pushbutton 15
23	24			Bin Reset Pushbutton 16
24	25	7	O	Bin Lowering 9
25	26			Bin Lowering 10
26	27			Bin Lowering 11
27	28			Bin Lowering 12
28	29	8	O	Bin Lowering 13
29	30			Bin Lowering 14
30	31			Bin Lowering 15
31	32			Bin Lowering 16

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.7 Remote Card 3 - Bin Functions - Bin 17 - 24

Jumper Config.: oxooxxoo Location: Bin Panel 1 Card Address: 08

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Bin Full Light 17
1	2			Bin Full Light 18
2	3			Bin Full Light 19
3	4			Bin Full Light 20
4	5	2	O	Bin Full Light 21
5	6			Bin Full Light 22
6	7			Bin Full Light 23
7	8			Bin Full Light 24
8	9	3	O	Diverter 17
9	10			Diverter 18
10	11			Diverter 19
11	12			Diverter 20
12	13	4	O	Diverter 21
13	14			Diverter 22
14	15			Diverter 23
15	16			Diverter 24
16	17	5	I	Bin Reset Pushbutton 17
17	18			Bin Reset Pushbutton 18
18	19			Bin Reset Pushbutton 19
19	20			Bin Reset Pushbutton 20
20	21	6	I	Bin Reset Pushbutton 21
21	22			Bin Reset Pushbutton 22
22	23			Bin Reset Pushbutton 23
23	24			Bin Reset Pushbutton 24
24	25	7	O	Bin Lowering 17
25	26			Bin Lowering 18
26	27			Bin Lowering 19
27	28			Bin Lowering 20
28	29	8	O	Bin Lowering 21
29	30			Bin Lowering 22
30	31			Bin Lowering 23
31	32			Bin Lowering 24

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.8 Remote Card 4 - Bin Functions - Bin 25 - 32

Jumper Config.: xxooxxoo Location: Bin Panel 2 Card Address: 12

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Bin Full Light 25
1	2			Bin Full Light 26
2	3			Bin Full Light 27
3	4			Bin Full Light 28
4	5	2	O	Bin Full Light 29
5	6			Bin Full Light 30
6	7			Bin Full Light 31
7	8			Bin Full Light 32
8	9	3	O	Diverter 25
9	10			Diverter 26
10	11			Diverter 27
11	12			Diverter 28
12	13	4	O	Diverter 29
13	14			Diverter 30
14	15			Diverter 31
15	16			Diverter 32
16	17	5	I	Bin Reset Pushbutton 25
17	18			Bin Reset Pushbutton 26
18	19			Bin Reset Pushbutton 27
19	20			Bin Reset Pushbutton 28
20	21	6	I	Bin Reset Pushbutton 29
21	22			Bin Reset Pushbutton 30
22	23			Bin Reset Pushbutton 31
23	24			Bin Reset Pushbutton 32
24	25	7	O	Bin Lowering 25
25	26			Bin Lowering 26
26	27			Bin Lowering 27
27	28			Bin Lowering 28
28	29	8	O	Bin Lowering 29
29	30			Bin Lowering 30
30	31			Bin Lowering 31
31	32			Bin Lowering 32

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.9 Remote Card 5 - Bin Functions - Bin 33 - 40

Jumper Config.: ooxoxxoo Location: Bin Panel 2 Card Address: 16

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Bin Full Light 33
1	2			Bin Full Light 34
2	3			Bin Full Light 35
3	4			Bin Full Light 36
4	5	2	O	Bin Full Light 37
5	6			Bin Full Light 38
6	7			Bin Full Light 39
7	8			Bin Full Light 40
8	9	3	O	Diverter 33
9	10			Diverter 34
10	11			Diverter 35
11	12			Diverter 36
12	13	4	O	Diverter 37
13	14			Diverter 38
14	15			Diverter 39
15	16			Diverter 40
16	17	5	I	Bin Reset Pushbutton 33
17	18			Bin Reset Pushbutton 34
18	19			Bin Reset Pushbutton 35
19	20			Bin Reset Pushbutton 36
20	21	6	I	Bin Reset Pushbutton 37
21	22			Bin Reset Pushbutton 38
22	23			Bin Reset Pushbutton 39
23	24			Bin Reset Pushbutton 40
24	25	7	O	Bin Lowering 33
25	26			Bin Lowering 34
26	27			Bin Lowering 35
27	28			Bin Lowering 36
28	29	8	O	Bin Lowering 37
29	30			Bin Lowering 38
30	31			Bin Lowering 39
31	32			Bin Lowering 40

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.10 Remote Card 6 - Bin Functions - Bin 41 - 48

Jumper Config.: xoxoxxoo Location: Bin Panel 2 Card Address: 20

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Bin Full Light 41
1	2			Bin Full Light 42
2	3			Bin Full Light 43
3	4			Bin Full Light 44
4	5	2	O	Bin Full Light 45
5	6			Bin Full Light 46
6	7			Bin Full Light 47
7	8			Bin Full Light 48
8	9	3	O	Diverter 41
9	10			Diverter 42
10	11			Diverter 43
11	12			Diverter 44
12	13	4	O	Diverter 45
13	14			Diverter 46
14	15			Diverter 47
15	16			Diverter 48
16	17	5	I	Bin Reset Pushbutton 41
17	18			Bin Reset Pushbutton 42
18	19			Bin Reset Pushbutton 43
19	20			Bin Reset Pushbutton 44
20	21	6	I	Bin Reset Pushbutton 45
21	22			Bin Reset Pushbutton 46
22	23			Bin Reset Pushbutton 47
23	24			Bin Reset Pushbutton 48
24	25	7	O	Bin Lowering 41
25	26			Bin Lowering 42
26	27			Bin Lowering 43
27	28			Bin Lowering 44
28	29	8	O	Bin Lowering 45
29	30			Bin Lowering 46
30	31			Bin Lowering 47
31	32			Bin Lowering 48

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.11 Remote Card 7 - Bin Functions - Bin 49 - 56

Jumper Config.: oxxoxxoo Location: Bin Panel 3 Card Address: 24

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Bin Full Light 49
1	2			Bin Full Light 50
2	3			Bin Full Light 51
3	4			Bin Full Light 52
4	5	2	O	Bin Full Light 53
5	6			Bin Full Light 54
6	7			Bin Full Light 55
7	8			Bin Full Light 56
8	9	3	O	Diverter 49
9	10			Diverter 50
10	11			Diverter 51
11	12			Diverter 52
12	13	4	O	Diverter 53
13	14			Diverter 54
14	15			Diverter 55
15	16			Diverter 56
16	17	5	I	Bin Reset Pushbutton 49
17	18			Bin Reset Pushbutton 50
18	19			Bin Reset Pushbutton 51
19	20			Bin Reset Pushbutton 52
20	21	6	I	Bin Reset Pushbutton 53
21	22			Bin Reset Pushbutton 54
22	23			Bin Reset Pushbutton 55
23	24			Bin Reset Pushbutton 56
24	25	7	O	Bin Lowering 49
25	26			Bin Lowering 50
26	27			Bin Lowering 51
27	28			Bin Lowering 52
28	29	8	O	Bin Lowering 53
29	30			Bin Lowering 54
30	31			Bin Lowering 55
31	32			Bin Lowering 56

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.12 Remote Card 8 - Bin Functions - Bin 57 - 64

Jumper Config.: xxxoxxoo Location: Bin Panel 3 Card Address: 28

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Bin Full Light 57
1	2			Bin Full Light 58
2	3			Bin Full Light 59
3	4			Bin Full Light 60
4	5	2	O	Bin Full Light 61
5	6			Bin Full Light 62
6	7			Bin Full Light 63
7	8			Bin Full Light 64
8	9	3	O	Diverter 57
9	10			Diverter 58
10	11			Diverter 59
11	12			Diverter 60
12	13	4	O	Diverter 61
13	14			Diverter 62
14	15			Diverter 63
15	16			Diverter 64
16	17	5	1	Bin Reset Pushbutton 57
17	18			Bin Reset Pushbutton 58
18	19			Bin Reset Pushbutton 59
19	20			Bin Reset Pushbutton 60
20	21	6	I	Bin Reset Pushbutton 61
21	22			Bin Reset Pushbutton 62
22	23			Bin Reset Pushbutton 63
23	24			Bin Reset Pushbutton 64
24	25	7	O	Bin Lowering 57
25	26			Bin Lowering 58
26	27			Bin Lowering 59
27	28			Bin Lowering 60
28	29	8	O	Bin Lowering 61
29	30			Bin Lowering 62
30	31			Bin Lowering 63
31	32			Bin Lowering 64

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.13 Remote Card 9 - Bin Functions - Bin 65 - 72

Jumper Config.: oooxxxoo Location: Bin Panel 3 Card Address: 32

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Bin Full Light 65
1	2			Bin Full Light 66
2	3			Bin Full Light 67
3	4			Bin Full Light 68
4	5	2	O	Bin Full Light 69
5	6			Bin Full Light 70
6	7			Bin Full Light 71
7	8			Bin Full Light 72
8	9	3	O	Diverter 65
9	10			Diverter 66
10	11			Diverter 67
11	12			Diverter 68
12	13	4	0	Diverter 69
13	14			Diverter 70
14	15			Diverter 71
15	16			Diverter 72
16	17	5	I	Bin Reset Pushbutton 65
17	18			Bin Reset Pushbutton 66
18	19			Bin Reset Pushbutton 67
19	20			Bin Reset Pushbutton 68
20	21	6	I	Bin Reset Pushbutton 69
21	22			Bin Reset Pushbutton 70
22	23			Bin Reset Pushbutton 71
23	24			Bin Reset Pushbutton 72
24	25	7	O	Bin Lowering 65
25	26			Bin Lowering 66
26	27			Bin Lowering 67
27	28			Bin Lowering 68
28	29	8	O	Bin Lowering 69
29	30			Bin Lowering 70
30	31			Bin Lowering 71
31	32			Bin Lowering 72

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.14 Remote Card 10 - Trimmer Optimizer Interface

Jumper Config.: xooxxxoo Location: Bin Panel 3 Card Address: 36

Ch	Terminal	Module	In/Out	Description
0	1	1	I	Grade 1
1	2			Grade 2
2	3			Grade 3
3	4			Grade 4
4	5	2	I	Reman
5	6			Reject
6	7			Size Control
7	8			Auto
8	9	3	O	Grade 1
9	10			Grade 2
10	11			Grade 3
11	12			Grade 4
12	13	4	O	Reman
13	14			Reject
14	15			Size Control
15	16			Auto
16	17	5	I	Optimizer ACK
17	18			Optimizer NAK
18	19			Reserved
19	20			Optimizer Strobe
20	21	6	O	PC ACK
21	22			PC NAK
22	23			PC Parity
23	24			PC Strobe
24	25	7	I	Checksum 0
25	26			Checksum 1
26	27			Checksum 2
27	28			Checksum 3
28	29	8	O	Checksum 4
29	30			Checksum 5
30	31			Checksum 6
31	32			Checksum 7

Note: The first four jumper positions are for the card address and are numbered 1 - 4 on the card.

10.15 Remote Card 11 - Basic Sorter Functions

Jumper Config.: oxoxxxoo Location: Sense Zone Card Address: 40

Ch	Terminal	Module	In/Out	Description
0	1	1	I	Dropout Gate A
1	2			Dropout Gate B
2	3			Dropout Gate C
3	4			Chain Moving
4	5	2	O	NO J-BAR Light
5	6			NO SORT Light
6	7			NO BIN Light
7	8			NEW RUN Light
8	9	3	O	Dropout Gate A/Pull Chain Gate
9	10			Dropout Gate B
10	11			Dropout Gate C
11	12			Grade Entry Light
12	13	4	O	Lug Loader 1 (interlocked)
13	14			Lug Loader 2
14	15			Lug Loader 3
15	16			Lug Loader 4 (interlocked)
16	17	5	I	Grade 1
17	18			Grade 2
18	19			Grade 3
19	20			Grade 4
20	21	6	I	Grade 5
21	22			Grade 6
22	23			Grade 7
23	24			Grade 8
24	25	7	O	Grade Stamper 1
25	26			Grade Stamper 2
26	27			Grade Stamper 3
27	28			Grade Stamper 4
28	29	8	O	Grade Stamper 5
29	30			Grade Stamper 6
30	31			Grade Stamper 7
31	32			Grade Stamper 8

10.16 Remote Card 12 - Extra Grades and Thicknesses

Jumper Config.: xxoxxxoo Location: Card Address: 44

Ch	Terminal	Module	In/Out	Description
0	1	1	I	Grade 9
1	2			Grade 10
2	3			Grade 11
3	4			Grade 12
4	5	2	I	Grade 13
5	6			Grade 14
6	7			Grade 15
7	8			Grade 16
8	9	3	O	Grade Stamper 9
9	10			Grade Stamper 10
10	11			Grade Stamper 11
11	12			Grade Stamper 12
12	13	4	O	Grade Stamper 13
13	14			Grade Stamper 14
14	15			Grade Stamper 15
15	16			Grade Stamper 16
16	17	5	I	Thickness 1
17	18			Thickness 2
18	19			Thickness 3
19	20			Thickness 4
20	21	6	I	Thickness 5
21	22			Thickness 6
22	23			Thickness 7
23	24			Thickness 8
24	25	7	I	Thickness 9
25	26			Thickness 10
26	27			Thickness 11
27	28			Thickness 12
28	29	8	I	Thickness 13
29	30			Thickness 14
30	31			Thickness 15
31	32			Thickness 16

10.17 Remote Card 13 - Basic Trimmer Functions

Jumper Config.: ooxxxxoo Location: Trimmer Panel Card Address: 48

Ch	Terminal	Module	In/Out	Description
0	1	1	I	Pass
1	2			Slash
2	3			Auto
3	4			Reserved
4	5	2	I	2' Slash
5	6			4'/6' Slash
6	7			PET
7	8			PET Override
8	9	3	I	Hold-back Arm A
9	10			Hold-back Arm B
10	11			Near End Slash
11	12			Far End Slash
12	13	4	I	Near End 2' Trim
13	14			Near End 4' Trim
14	15			Near End 6" Trim
15	16			Near End 8' Trim
16	17	5	I	Near End10' Trim
17	18			Near End12' Trim
18	19			Far End 2' Trim
19	20			Far End 4' Trim
20	21	6	I	Far End 6' Trim
21	22			Far End 8' Trim
22	23			Far End 10' Trim
23	24			Far End 12' Trim
24	25	7	I	Fence 1
25	26			Fence 2
26	27			Fence 3
27	28			Fence 4
28	29	8	O	Fence 1
29	30			Fence 2
30	31			Fence 3
31	32			Fence 4

10.18 Remote Card 14 - Trim Saw PB's & Length Solenoids 1 - 15

Jumper Config.: xoxxxxoo Location: Trimmer Panel Card Address: 52

Ch	Terminal	Module	In/Out	Description
0	1	1	I	Trim Saw 1 (0')
1	2			Trim Saw 2
2	3			Trim Saw 3
3	4			Trim Saw 4
4	5	2	I	Trim Saw 5
5	6			Trim Saw 6
6	7			Trim Saw 7
7	8			Trim Saw 8
8	9	3	I	Trim Saw 9
9	10			Trim Saw 10
10	11			Trim Saw 11
11	12			Trim Saw 12
12	13	4	I	Trim Saw 13
13	14			Trim Saw 14
14	15			Trim Saw 15
15	16			Trim Saw 16
16	17	5	O	Trim Saw 1 (0')
17	18			Trim Saw 2
18	19			Trim Saw 3
19	20			Trim Saw 4
20	21	6	O	Trim Saw 5
21	22			Trim Saw 6
22	23			Trim Saw 7
23	24			Trim Saw 8
24	25	7	O	Trim Saw 9
25	26			Trim Saw 10
26	27			Trim Saw 11
27	28			Trim Saw 12
28	29	8	O	Trim Saw 13
29	30			Trim Saw 14
30	31			Trim Saw 15
31	32			Trim Saw 16

10.19 Remote Card 15 - Trim Saw PB's & Length 1 - 15

Jumper Config.: xxxoxxoo Location: Trimmer Panel Card Address: 56

Ch	Terminal	Module	In/Out	Description
0	1	1	O	Hold-back Arm A
1	2			Hold-back Arm B
2	3			Secondary GRADE ENTRY ZONE Light
3	4			TRIMMER MALFUNCTION Light
4	5	2		Reserved
5	6			Reserved
6	7			Reserved
7	8			Reserved
8	9	3	I	Trim Length Ref
9	10			Trim Length 1
10	11			Trim Length 2
11	12			Trim Length 3
12	13	4	I	Trim Length 4
13	14			Trim Length 5
14	15			Trim Length 6
15	16			Trim Length 7
16	17	5	I	Trim Length 8
17	18			Trim Length 9
18	19			Trim Length 10
19	20			Trim Length 11
20	21	6	I	Trim Length 12
21	22			Trim Length 13
22	23			Trim Length 14
23	24			Trim Length 15
24	25	7	I	Gate 1
25	26			Gate 2
26	27			Gate 3
27	28			Reserved
28	29	8	O	Gate 1
29	30			Gate 2
30	31			Gate 3
31	32			Reserved

10.20 Remote Card 16 - Extended Fence I/O

Jumper Config.: xxxxxxoo Location: Trimmer Panel Card Address: 60

Ch	Terminal	Module	In/Out	Description
0	1	1	I	Fence 5
1	2			Fence 6
2	3			Fence
3	4			Fence 8

4	5	2	I	Fence 9
5	6			Fence 10
6	7			Fence 11
7	8			Fence 12
8	9	3	O	Fence 5
9	10			Fence 6
10	11			Fence 7
11	12			Fence 8
12	13	4	0	Fence 9
13	14			Fence 10
14	15			Fence 11
15	16			Fence 12
16	17	5		Reserved
17	18			Reserved
18	19			Reserved
19	20			Reserved
20	21	6		Reserved
21	22			Reserved
22	23			Reserved
23	24			Reserved
24	25	7		Reserved
25	26			Reserved
26	27			Reserved
27	28			Reserved
28	29	8		Reserved
29	30			Reserved
30	31			Reserved
31	32			Reserved

11 INPUT AND OUTPUT DEFINITIONS

The exact functions of some inputs and outputs are defined in this section.

11.1 Remote Card 13 - Basic Trimmer Functions

The last entered trim command will be implemented if more than one key of the same type is pushed.

Pass - Channel 0

All saws corresponding to actuated Trim Length Switches are raised. In other words, the board passes straight through with no trimming.

Slash - Channel 1

All saws corresponding to actuated Trim Length Switches are lowered. In other words, the board will be cut into pieces equal to, or shorter than, the saw spacing in the trimmer.

Automatic Mode - Channel 2

The 0' Saw and the saw corresponding to the highest actuated Trim Length Switch are lowered. All saws in between are raised. In other words, both ends of the board are trimmed.

Manual Mode - If not Channel 1 & 2 & 3

All saws corresponding to actuated Trim Length Switches are raised. Manual commands may be superimposed. In other words, the board passes straight through with no trimming unless a manual trim entry is made.

Near/Far End Trimming - Channels 4 - 23

A certain length is trimmed off the near or far end, or different or the same lengths are trimmed off both ends when one or two Near/Far End Key(s) are pushed. There are three alternatives regarding the trimmed off piece(s) depending upon the status of the "2' SLASH" and the "4'/6' SLASH" inputs:

- None is set: The trimmed off section is left in one piece regardless of its actual length.
- "2' SLASH" input is set: Each saw between the 0' saw and/or the saw corresponding to the highest actuated Trim Length Switch is lowered making the trimmed off piece to be cut into 2' sections.
- "4'/6' SLASH" input is set: The trimmed off piece(s) will be cut into 4'and 6' sections. The longer section(s) will be closest to the center of the board.

Manual Saw Actuation - Channels 0 - 31 (Card 14)

The saw corresponding to the key(s) pushed is lowered. All other saws from the 0' saw (including) and the saw corresponding tho the highest actuated limit switch (including) will be raised. These inputs are labeled "Trim Saw X" in the I/O map. More than one saw will be lowered if more than one key is pushed.

Fence Control - Channels 24 - 31 (Card 13) and Channels 0 - 15 (Card 15)

The gate configuration corresponding to the gate key pushed will be set when the board reaches the Gate Actuation Point.

Board Splitting

This function is a combination of two other functions: Manual Saw Control in the Auto mode and the Hold-back Arm feature.

Hold-back Arm Control - Channels 8 - 9 (Card 13) and Channels 0 - 1 (Card 15)

One Hold-back Arm, or both, will be actuated when the board reaches the Hold-back Arm Actuation Point.

Precision End Trimming (PET) - Channels 6 - 7 (Card 13)

Setting of this input will cause the 0' saw to be raised and one other saw (parameter selectable) to be lowered. One gate configuration will be set (parameter programmable). The following other commands may be superimposed:

- Slash
- Pass
- PET Override: The PET functions are disabled and any other trim command may be given.

Trimmer Monitoring - Channel 3 (Card 15)

The SORTER RUN output will be reset and the TRIMMER MALFUNCTION light will come on if an illegal board length is detected at the Length Switches. Note that the extreme fence position must be less than the saw spacing for this feature to work.

Gate Control - Channels 24 - 30 (Card 15)

Boards may be diverted to any one of three gates through an operator command.

12 SPECIFICATION SUMMARY

Maximum Number of Thicknesses:	16
Maximum Number of Widths:	16
Maximum Number of Lengths:	23
Maximum Number of Grades:	16
Maximum Number of Bins:	120
Maximum Number of Lugs/Min.:	150
Dropouts:	3 (Reject, Reman, Overflow)
Lug Loader Control:	Yes
Skew detection:	Yes
Multiple Sort Tables:	Yes
Automatic Sort Table Verification	Yes
Recirculation:	Yes
Automatic Bin Seeking:	Yes
Random Width:	Yes
Extensive Diagnostics:	Yes
Factory Tested Software:	Yes
Automatic Bin Lowering:	Optional
Ticket Printing:	Optional
Production Display:	Optional
MIS Compatibility:	Optional
Trimmer Control:	Optional
Grade Stamper Control:	Optional