Bakery Systems, Inc.
DoughSaver
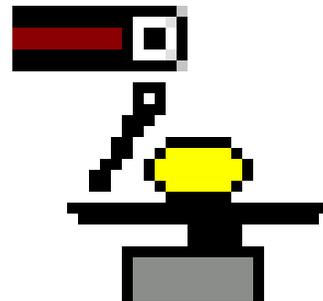
Trademark Notice

Bakery Systems, Inc.
CREATIVE AUTOMATION
5404 Jedmed Court, St. Louis, MO 63129
(314) 845-7778 FAX (314) 845-7779
www.bakerysys.com

System Overview

The DoughSaver is a dough piece scaling/divider control system that transports dough pieces from divider to scale, weighs each piece and controls the divider to produce the correct weight pieces. Doughsaver also rejects and recycles out-of-tolerance dough pieces, and stores text data files on disk with the weights of the dough pieces. One file is stored for each variety run made.

Mechanical components

(2) 4' belt infeed conveyors
(2) 7 Kg capacity strain gauge load cells
(1) 920i Scale CPU board
(2) Weigh platters
(2) Servomotor-operated paddles
(2) Servomotor-operated dough piece guides
(2) 10' belt reciprocating reject conveyors
(1) 10' belt recycle conveyor.

Control Components:

(1) Allen-Bradley VersaView Industrial Touchscreen Computer
(2) Allen-Bradley Control-Logix PLC
(3) Allen-Bradley Variable Frequency AC Motor Drives
(4) Allen-Bradley Kinetix Servo Motor Drives

The brain of the system is the Allen-Bradley VersaView Industrial Touchscreen Computer, which runs the DoughSaver software and the ControlLogix PLC, which runs the Doughsaver ladder logic and servo instruction code. The computer has an ethernet network interface card that is used to connect to a local area network for communication with the PLC and CheckManager. Any Validators in the system will also be on this network. (See the Validator operation manual for more information.) The computer reads the scale output from the 920i through the serial port COM1 and communicates with the ControlLogix PLC through the Ethernet port. If the system is a double-scale system, an dual scale card is installed on the 920i. Each of the 920i scale interface boards is attached to one scale platter. COM3 is used for the touchscreen interface.

The ControLogix processor has an independently running program that controls the kick whenever it receives a discrete output command from the 920i. When the command is received, the paddle quickly "kicks" the dough piece onto the takeaway conveyor. The motion of the paddle needs to be fast and minutely proscribed; hence need for the servo-controller. The PLC also controls pressure applied to the doughball from the guide paddle, which is controlled by another servo.

Dual Lane Dough Saver with reject conveyors
Weigh Platter

44" EL.
42" EL.
42" EL.
39" EL.
76 1/16"
39" EL.
36" EL.
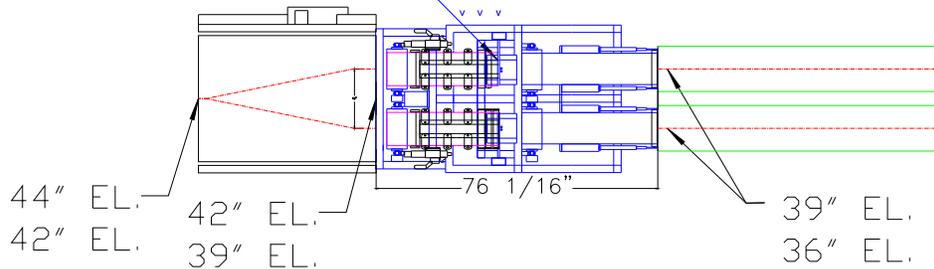
Operation

The layout drawing above shows a top view of the Doughsaver machine. The divider (RAM/SHEAR or extrusion knife type) places dough pieces on the 2 conveyors, which travel along through the rounding table and flouring booth until they arrive at one of the two Doughsaver entry conveyors (left side of the picture above).

When in RUN mode, the approach conveyor moves the dough pieces from the entry to the edge of the scale platter, where the pressurized guide directs the piece onto the load cell platter. It stays on the platter for a very short time, during which it is weighed, and is then ejected by the paddle onto the takeaway conveyor. The computer stores each piece weight in memory and uses the averaged weights to determine the adjustment for the divider.

Knife Divider: An analog output from 0-10 Volts is generated by the PLC and input to the divider's metering pump control. This signal controls the size of the dough pieces. In the more advanced installations, instead of a hardwired analog signal, the signal is applied by writing a number to the AMF divider PLC register. The AUTO/MAN switch is also connected to an input, which tells the PLC when to use the register from Doughsaver. If the switch is in MAN, the operator can set the divider metering pump speed using the AMF interface screen.

Ram/Shear Divider: an additional Servo (sircos) module in the PLC controls the pocket size if this option is installed. This servo runs a motor which turns a crank in and out, adjusting the size. The computer tells it when the pockets should be larger or smaller.)

When in BYPASS mode, the guide paddles move up out of the way and the conveyor runs at fast speed, throwing the dough pieces over the scale, directly onto the takeaway conveyor.

Operator Instructions

Select the ![DoughSaver icon] icon from the Windows ![Start] menu to start the program. The main screen looks like this:
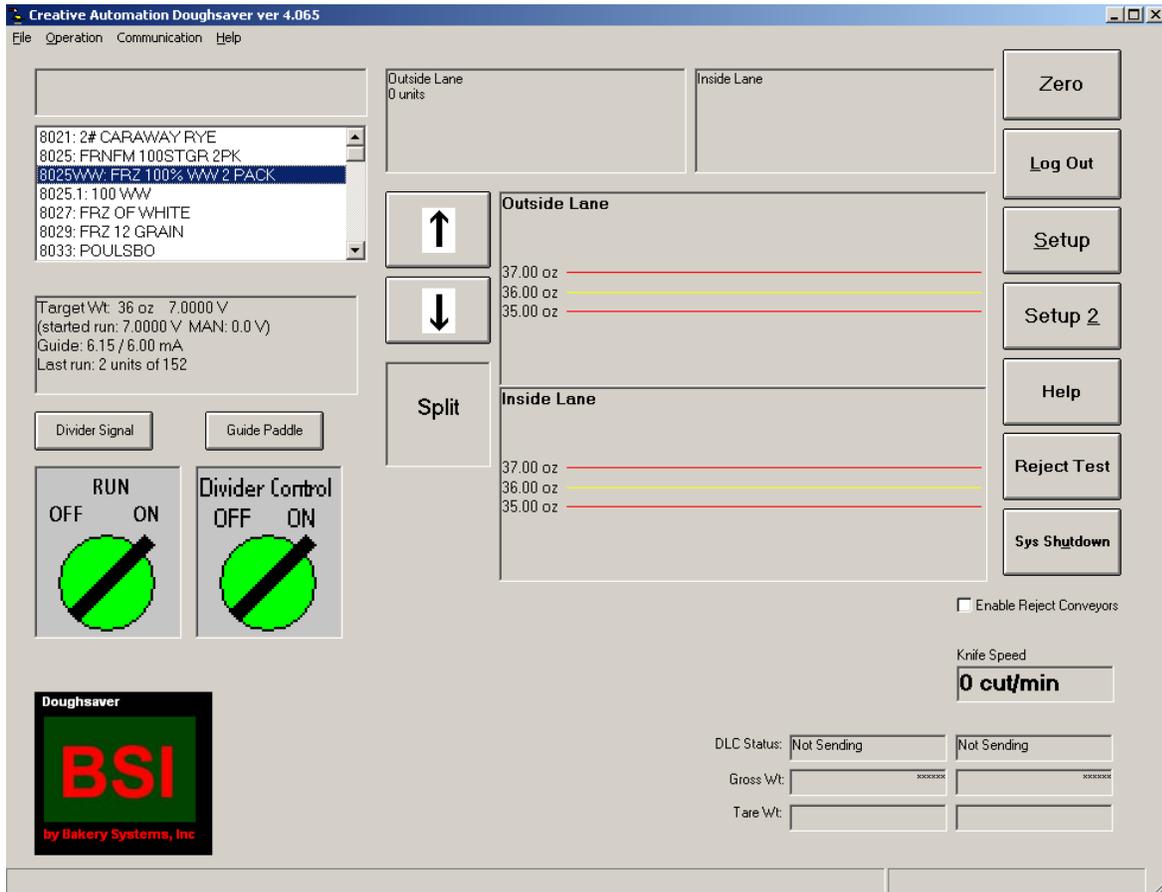
Switches: The two green buttons on the left side of the screen are shown in their ON, or right-hand positions. These buttons reflect the state of the physical switches located in the door of the electrical panel.   So when you flip the switch on the panel from OFF to ON, you should see the screen change. If this is a double-scale system, the RUN screen switch will be ON if *either* BYPASS/RUN switch is ON (ON=Run).

Login: Some screen options are disabled when the program starts up, like SETUP. To access these options, click the **Login** button, and then type the password on the popup keypad. If correct, the options will be enabled. The passwords are changed in SETUP. There are two passwords: an operator password and a supervisor password. The Supervisor password enables more options in SETUP than the operator password. A third, administrator password exists, which changes daily and must be obtained from Creative Automation. Parameters available under this password generally are specific to the physical installation and do not need to be changed.

Graph: To the right of the switches you will see two graphs, each with a center line showing the

target weight and an upper and lower control limit line. You can set the scale of the graph in setup. The upper and lower boundaries (the red lines) are set in the database file. As each dough piece is weighed on the scale, it will be plotted on the graph, producing a real-time picture of the last 200 pieces, or the last approximately 2-3 minutes of production.

If this is a double-scale system, the button to the left of the graph chooses between displaying scale 1 or scale 2, or a split screen with both graphs.

Product List: The list of products from the database is shown in the upper left corner. The highlighted one is running. Below the list you can read the product's target weight, voltage output to the divider and guide pressure signal level in mA. Touch the UP and DOWN arrows to select a different product, or touch the list itself. The product should be selected before starting the divider. You will not be able to change the list once pieces are running across the scale.

Setup: Click this button to setup program options. If you are not logged in, the button will be grayed out and disabled.

Setup 2:   More program setup options. If you are not logged in, the button will be grayed out and disabled.

Help: Displays some help information about general operation and navigating the main screen.

Shutdown: Click to exit the program.

Divider Signal: The DoughSaver system automatically adjusts voltage to the metering pump freq. drive to produce the correct weight pieces. However, at certain times may want to manually change speed with this button, which will pop up a keypad so you may type in the new desired value. If this product is run on the Ram/Shear Divider, instead of the knife divider, the legend will say "threads" and the data value represents thread position, not voltage. The data entry still works the same way.

Any new divider setting entered will take effect immediately. Then the system will use it as a new starting point and continue to adjust as before. If you don't want the system to adjust at all, you can put the switch on the panel in HAND, and then use the AMF divider interface panel to manually control dough piece size. If you want to use the computer to control voltage (or thread position) but you don't want the computer to adjust automatically, you can check a box on the gain screen to disable   That's found under SETUP → Time/Weigh Parameters → gain.

Average Piece Weight: In the upper left corner of the screen, this box shows in large numbers the average weight of the last sample group of dough pieces. If this is a two-scale system, the average is actually an average of the two groups.

Status: Each line's status is shown to the right of the average piece weight box. Various items of information will be displayed here, including the run status, i.e., whether the machine is waiting, kicking, weighing, or waiting for the piece to exit, the piece count, average weight for a sample group, and voltage change. One of the messages on the screen is *ball count* or *inhibit count*. In setup, you tell the computer how many balls to average before adjusting, and how many balls to inhibit before starting the next average. (We inhibit, because, after an adjustment, we have to wait a few balls before balls that were produced after the new adjustment start showing up at the scale.)

This box also shows a unit count and percent of unweighed balls. If balls arrive spaced too close together, Doughsaver may have to kick a ball off the scale before it has had time to weigh. In this case, the ball is considered unweighed. An unweighed ball will not (generally) be rejected since we

don't know if it's out of tolerance or not. There are 2 exceptions to this rule, described under the **Setup 2** screen's **Calibration Factors** tab.

Reject Test: Push this button to test the reject mechanism. Scale 1 will reject the next ball it weighs and display the weight on the bottom of the screen.

If this is a two-scale system, two status boxes will be displayed, one for each scale.

Other Status Labels: In the lower portion of the screen, more system information is displayed (only if you are logged in).

1. The input states (for the discrete inputs: Run Mode Switch, Divider Control Switch, etc.) are shown at the bottom of the screen, in the right hand panel. One 8-bit input word and one 8-bit output word is shown. The input bits reflect:

   Inputs:
   1: E-STOP
   2: Bypass/Run switch Line A
   3: Bypass/Run switch Line B
   4: MAN/AUTO Switch (ON=AUTO)
   5: Remote E-STOP
   6: Line A Remote STOP (optional)
   7: Line B Remote STOP (optional)

2. DLC Status. If the scale is connected and sending correctly, this box will show the Hz rate, which is the number of A/D updates per second recorded by the 920i.   Otherwise, it will show "Not Sending". If the scale is not sending, it may have a bad cable, it may be configured for the wrong COM port, or it may need to be initialized. See **Setup**.
3. Gross and tare weight. Gross weight shows a live weight from the scale. Tare weight shows the current tare, or weight of the empty scale (including flour buildup). Immediately after each dough piece is kicked off the platter, the computer saves the empty weight of the scale as the tare weight. The difference between the gross weight just before ejection and tare is the weight of the dough piece. (Constant flour buildup on the scale platter makes it necessary to always get a tare weight.) The tare age is also displayed. Occasionally, the scale may not have enough time to return to zero before the next dough piece arrives. In this case, the computer will use the previous tare, and the tare age will increase by 1. If tare age doesn't stay close to 1, it might indicate a problem with the load cell (a bad mV signal might be causing a high weight variation).

Alarm: When an alarm condition occurs, the alarm siren will turn on, and an alarm icon
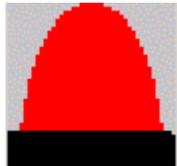
shows on the screen. Below the alarm icon is a yellow message box with a description of the error. To turn off the alarm, touch the light. The message will change to **Error Override in Place,** and the siren will turn off. Once the error condition is corrected, touch the icon again to turn off the override. A list of error messages may be found in Appendix C at the end of the manual.
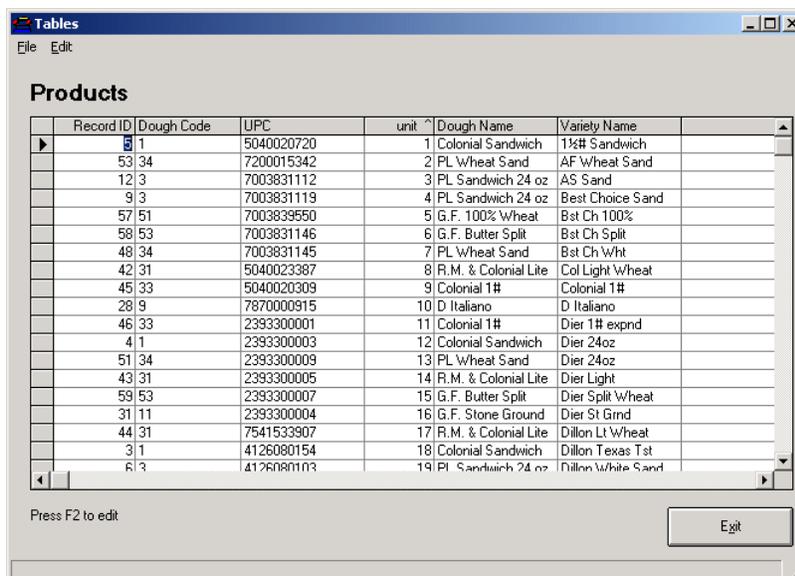
Tables:

If you want to edit/add/delete products, CheckManager is generally the easiest way to do it. However, you can also edit the product table using DoughSaver To edit products, select

from the main screen Much of the data you see in this table is the same data you can change in the **Setup** screen.

The tables window will come up:

One record should be entered in the product table for each variety. There will be some fields in the record that pertain to the dough from which that variety is made. Since one dough can be made into several varieties, the result is that some records will have redundant information. In the example above, 1 ½ oz sandwich, Texas Toast, Dier 24oz and Dillon Texas Toast are all made from dough code 1, Colonial Sandwich. The raw target weight, which is the target weight for the divider, will be entered in all four records. It's OK to have the information appear in more than one record. Just make sure that it's the same in all four places.

From this screen, use the mouse or the cursor keys to move around from field to field.

Deleting: Delete old records by selecting the ~~Operators~~ option from EDIT or by pressing ctrl-D. You can delete multiple records by selecting them on the screen. To select a range of records, click in the grey area to the left of the first record, then hold down the shift key and click on the last record. The screen will look like this:

Products

	Product ID	Product Description	tare	Target Weight
	1	Gallon Whole	0.568	280
	2	Half Gallon Whole	0.832	240
▶	3	Gallon 2%	0.984	200
	4	Half Gallon 2%	0.983	180
	5	Gallon Skim	0.334	300
	6	Half Gallon Skim	0.155	305
*				

Then click delete to delete the range.

Adding: Add a new record by first positioning the record pointer on a dough record and then clicking the [Create New Product] button. Doughsaver will ask you, for examle:
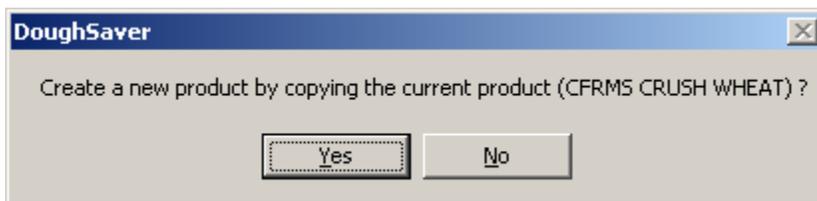
All parameters from the current record will be copied, so pick a dough most like the one you will be adding. Make sure you type in the new Dough Code, Dough Name, Variety Name, UPC (Variety Number) and Target Weights.

Edit existing records by positioning the record pointer (using the mouse or arrow keys) and just typing over the old data.

To change table sorting, click on a field name, and the table will be re-sorted by that field.

Each record (line) represents one type of finished product. Each field contains a piece of information about the product as follows:

Record ID: You can't edit this field. It just gives the record a unique number.

Dough Code: User-generated code identifying the type of dough. There is a record for each type of finished product. Since the same dough code may be packaged under multiple names, some product records share the same dough code, but have different UPC's. If you have not Validators in your system, you can just enter one Dough Code for each product you run, and not worry about UPC codes, or any fields that pertain exclusively to the validator.

UPC: UPC code for the product. This should be a 10-digit number. The actual UPC code on the packaged bread is 12 digits, but the validator strips off the first and last digit. When the Validator's bar code scanner reads a bar code number, it searches the table for the record whose UPC field matches the number from the scanner.

Unit: An ordering field for display. Currently used as the lookup number corresponding to the AMF PLC product number.

Dough Name: Names the dough made at the divider.

Variety Name: A unique name for the variety. The Dough Name is associated with the dough code and will be repeated for each each variety record with that Dough Code, whereas Variety Name is unique to the record and only occurs once.

Tare: This field used by the validator software. It represents the weight of the empty bag.

Gross PKG Weight: This field used by the validator. This is the target weight of the finished, packaged product.

Raw Target Weight: Target weight for the raw dough piece coming out of the divider. This field determines the weight the Doughsaver will try to maintain.

Raw Low Tolerance: Subtract this number from raw target weight to determine the lower boundary line on the doughsaver on-screen graph.

Raw High Tolerance: Add this number to raw target weight to determine the upper boundary line on the doughsaver on-screen graph.

Processing Time: Not used by DoughSaver.

Dough Size: Not used by DoughSaver.

Speed in LPM: Not used by DoughSaver.

Min Accept: Minimum acceptable value. Any single bread loaf under this weight, the validator will alarm and reject the loaf. Enter an absolute value here, not an offset.

Max Accept: Maximum acceptable value. Any single bread loaf over this weight, the validator will alarm and reject the loaf. Enter an absolute value here, not an offset.

Knife Speed: Currently unused field.

Divider Voltage: Used by DoughSaver. Saves the voltage signal to the divider, which tells the divider to increase or decrease auger pump pressure, which in turn changes the size of the dough piece. Not overwritten when using secure file transfer.

GuideMAmps: Used by DoughSaver. Pressure adjust signal for the guide paddle. Not overwritten when using secure file transfer. GuideMAmps2 if the signal for scale 2, if present.

TargetLandingPosition: Used by DoughSaver. Targets where we want the dough piece to land on the scale platter. Not overwritten when using secure file transfer.

High Tolerance: Used by Validator. Bread Loaves over this value are not rejected, but count as overweights for alarming purposes. The Validator allows you to select a fraction of overs and unders allowed before the alarm is activated. Enter a relative weight here. It is added to target to determine actual comparison weight.

Low Tolerance: Used by Validator. Bread Loaves under this value are not rejected, but count as underweights for alarming purposes. The Validator allows you to select a fraction of overs and unders allowed before the alarm is activated. Enter a relative weight

here. It is subtracted from target to determine actual comparison weight.

Weigh Time: Used by DoughSaver. This field is the time DoughSaver waits between detecting an impact on the scale, and kicking the dough piece. Not overwritten when using secure file transfer.

Motor Speed: Used by DoughSaver. A number from 0 to 10. Higher = faster. This is the speed of the conveyor that transports the dough pieces from the divider to the scale. MotorSpeed2 is the speed for scale 2, if present.
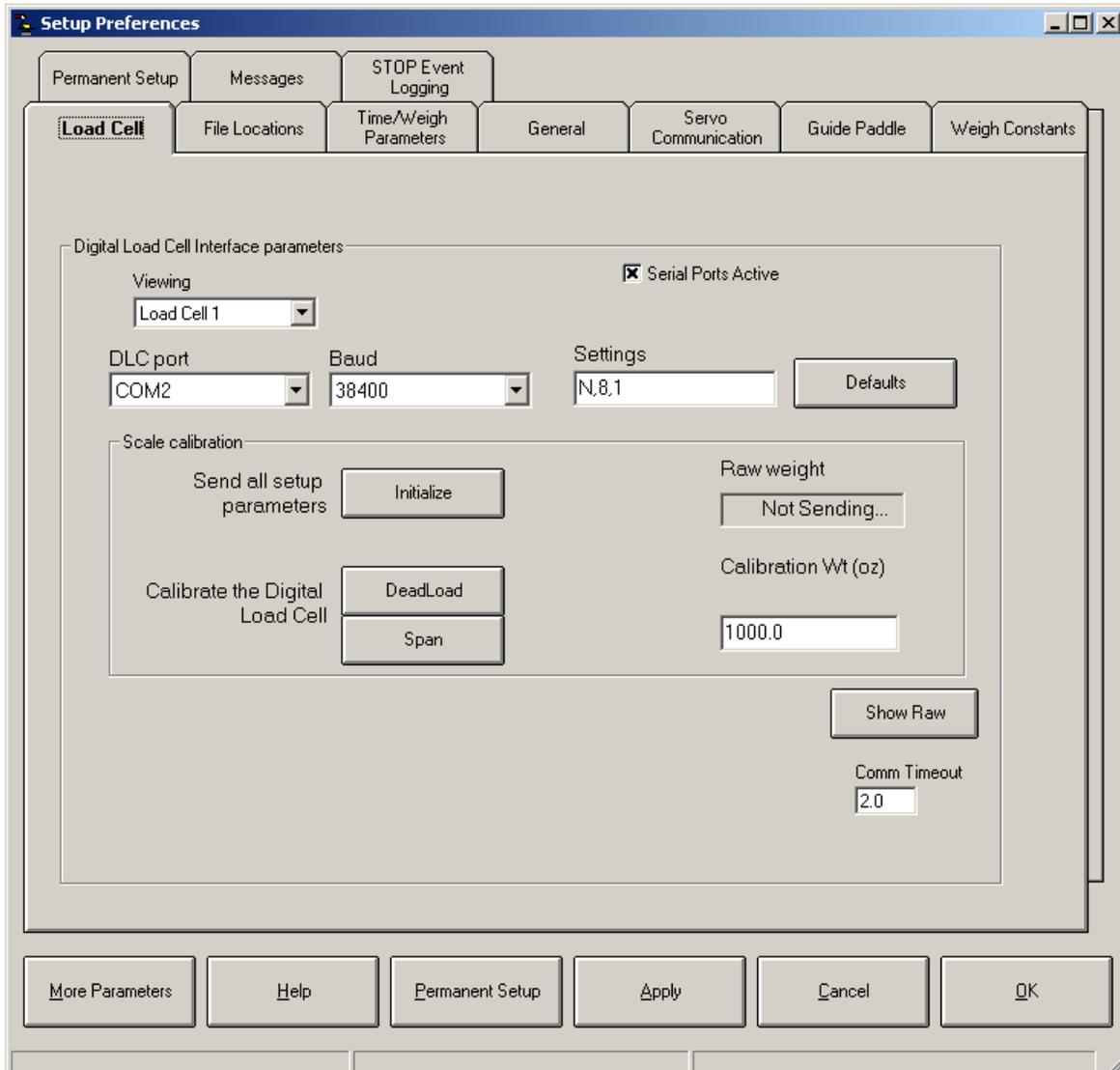
Updated, Inkjet Code, InkJetDate, Days To Add, erase, Notes: Currently unused fields or used internally by the software.

Setup

Click on [Setup] to change program options. You will see the Setup Preferences screen. Click on the Scales tab to setup communication parameters and station number. You must be logged in as supervisor to see this tab.

Load Cell

This tab only appears when logged in using the special administrator password. The top left list box lets you pick the active digital load cell, if this is a 2-scale system. The port list box allows you to select the serial port to be used for communication to the DLC. COM1 should be used as the

default. The default communication parameters for the 920i are 38400 baud and N,8,1.
The first number represents the baud rate, the second entry is the parity, followed by data bits and stop bits.

Below these list boxes is the scale calibration frame. These controls are used for non-analog load cell types. To calibrate a 920i, use the iRev software, which should be installed on your Doughsaver computer.

File Locations Tab

The DoughSaver software uses a Microsoft Access format database file to store the product table. A default database file is loaded when you install the software in C:\Doughsaver. If you want to store the file somewhere else, you have to copy the file (Package.mdb) to the new path, and then change the path on this screen. The Creative Automation CheckManager software may also be used to make changes to the database file.

The path/file entered in this box must be the same file CheckManager is using, or your changes to CheckManager will not affect DoughSaver.
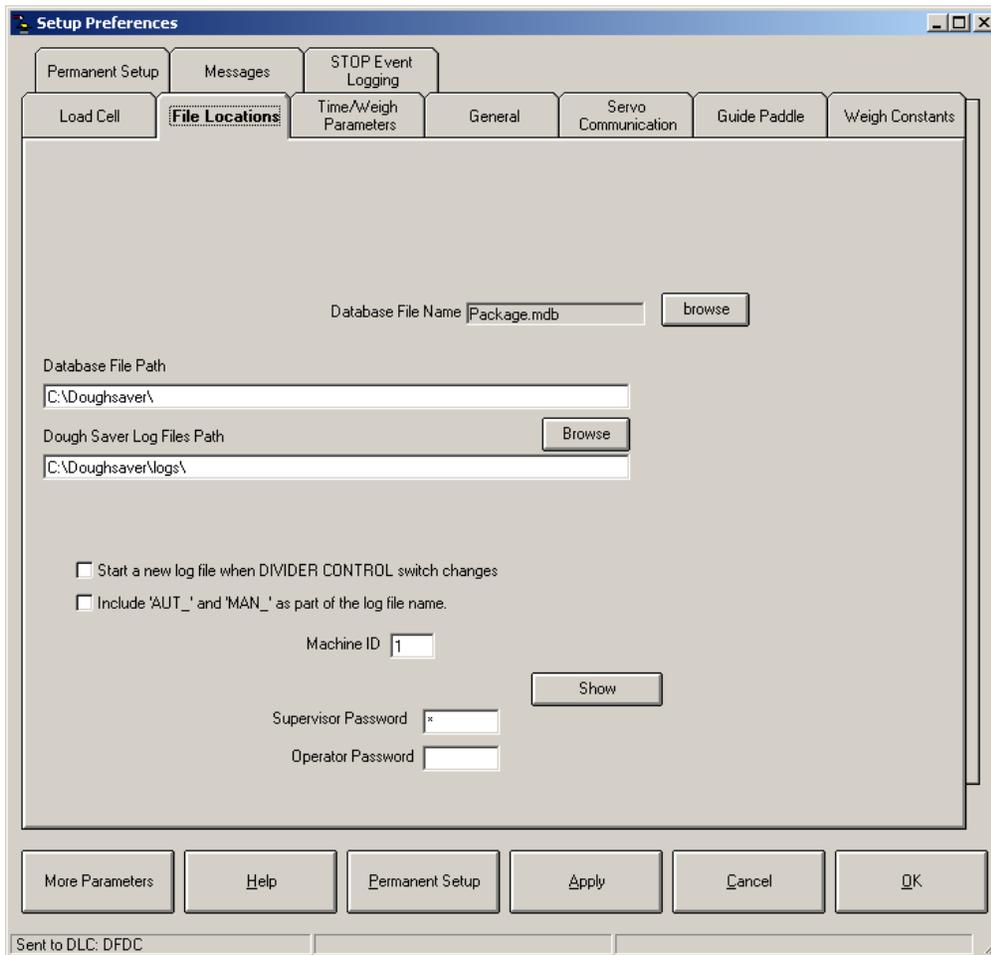
The second text box tells the software where to store the weight log ASCII files that are created and

updated whenever a new dough piece is weighed. These files are named based on the dough code, start date/time of the run, and end date/time of the run.

If you are not using secure file transfer, this path must be the same path specified for this unit in CheckManager. This means you need to make sure this folder is shared.

Below the log files box is a check box for AUTO and MAN. If you check this box, the DoughSaver will start a new file whenever you switch from AUTO to Manual control mode while running. The second check box lets you select the option to attach a prefix to the file name (AUT_ or MAN_) that will indicate the state.

Also shown on this screen are the two passwords, supervisor and operator. The operator password allows you to change manual voltages, weigh time, gain, and a few other parameters. The Supervisor password allows you to do everything else. You can set it to whatever you want, but you can only enter numbers on the touchscreen. For letters you need a keyboard.

Time/Weigh Parameters

These parameters affect the operation of the scale and ejection paddle, and should only be changed with care, if you understand completely the effect of each one on the system, so please read this entire section before changing anything.

Weigh Time: Each doughball lands on the scale, weighs, and is then kicked off by the servo paddle. Doughsaver tries to leave the ball on the scale as long as possible, to let it settle. The kick happens when the next ball breaks the upstream proximity switch, indicating the current doughball has to leave to make room. Thus, the amount of time each doughball spends on the scale is constrained by the spacing. If another doughball is coming up fast behind, we won't have much time on the scale. If the next doughball is far back, we will. The weigh time you enter here is a

cutoff value. Any doughball that spends at least this much time on the scale will be considered *weighed* (although it is also subject to the in-motion constraint – see **Setup 2 → Calibration Factors → Minimum Standard Deviation**). Any doughball that does not spend this much time is an *unweighed* doughball and is not recorded on the graph. The percent of unweighed doughballs is shown in the top status box. If that percent is too high, you can reduce weigh time. Keep in mind a certain minimum weigh time is needed for the ball to stop moving.

Target Weight: Doughsaver will try to adjust the divider to produce dough pieces of this weight. The yellow line on the graph show the current target weight. Reject weights are always *referenced* to the target weight. I.e., if you change target, high and low tolerance change automatically.

Average this many balls for analog determination: The system averages multiple pieces before adjusting, instead of, say, adjusting after each individual piece. One reason is the natural variation in piece size, even when the divider is running at a constant voltage level. It's better to look at a multiple piece sample than a single dough piece. The second reason is the delay between the time an adjustment is made at the divider, and the time we can begin to weigh pieces at the scale made after that adjustment was applied. If *n* pieces can be on the belt between the divider and weigh platter, after applying an adjustment we have to *inhibit*, or let *n* pieces go by before we start averaging again, to make sure we are weighing pieces made after our adjustment.

If we applied our adjustment after weighing only one doughball, say, we would then have to wait n doughballs before we could weigh again, and thus would only be figuring the weights of 1/(n+1) doughballs in our calculation. By averaging m doughballs, however, where m=n, we use m/(n+m) or one half the doughballs for our calculation.

Inhibit after adjust for this many balls: The number of balls on the conveyor at one time during normal operation between the knife and the weigh platter. See above.

Gain: Gain is the sensitivity of the system to weight error. Gain represents the number of volts by which we will change our analog signal to the divider because of a weight error of 1 unit weight (ounce, gram, etc.) A higher gain will make the system react faster to changes, but if too high, the system may overreact. Default: 0.25 v/oz.

If this product is run on a Ram/Shear divider, this value will be in units of **threads/weight unit** instead of **volts/weight** unit.

If a two-stage gain is enabled, a smaller gain is used if the average weight is close to target. This allows us to quickly correct a large error without overcorrecting when close to target. If two-stage gain is enabled, you'll get a gain screen when you touch the gain number here. The gain screen will allow you to change the main (outside band) gain, as well as the multiplying factor (usually 0.3) that reduces the inside band gain, and the band range (in weight units).

The gain screen:

This System is set up to use 2 different gains. One when average weight is inside the DeadBand and one when outside.

Inside deadband gain = OUTSIDE X MULTIPLIER.

Decrease the multiplier to decrease the inside deadband gain.

Outside the DeadBand Gain (threads/oz) `0.2`

Multiplier (0-1) `0.3`

Inside the DeadBand Gain (threads/oz) `0.06`

Low Gain Band Range (oz) `2.0 oz`

☐ Disable Automatic Divider Adjustment (Leave Divider at current setting)

Cancel   Apply   OK

The top number (gain) is the gain the system will use in case of large error (> 2 oz). I.e., if the measured weight of the balls (average) differs from target by more than 2 oz.

If the error is smaller than 2 oz (the range shown in the bottom box) a smaller gain will be used, specifically, the gain multiplied by the fraction shown in the second box.

If you want to stop the system from making adjustments and keep the voltage output (or thread position) the same, check the **disable** box. *This is different than setting the switch to MAN mode.* The Doughsaver electrical signal will still control the divider metering pump; it just won't ever change, unless you change it. When the switch is in MAN mode, the Doughsaver signal does not control. You have to set the speed at the AMF panel.

Weigh Constants

Look back n samples before paddle kick: The 920i indicator keeps a running queue of the last 600 weight readings from the A/D converter. Weight readings are taken at about 90 per second or so, so this represents a little over 6 seconds of weight readings. Thus, the 920i can look back in time to see what the weight was 10 samples ago. The number n, entered in this box, represents the number of samples we want to look back before the paddle kick, on the assumption that the weight just before the paddle kick will be the most settled weight. For example, setting this parameter to 20 and the next one, Average Samples, to 17, will cause the computer to average samples i - 20 to i - 3, where i = the sample where the kick starts. The higher your weigh time, the more samples you can average. But don't increase this number too high, or you will end up averaging samples taken before the scale is completely recovered from the impact.

Average samples for final weight: This number represents the number of samples after lookback to average for the dough piece weight. See the previous description.

Look back t samples before impact for tare: In addition to grabbing a gross weight just before the paddle kick, the scale must also take a tare weight just before the dough piece impacts the scale. This weight represents the weight of flour buildup on the scale that should not be considered part of the dough piece weight. The actual dough piece weight, or net weight, is gross minus tare. To determine tare, we look back t samples before impact and then forward s (next parameter) and find the minimum of all these samples, and then average around the minimum sample.

Search s samples: See above

Trigger Weight: Trigger weight is used by 920i to detect a dough piece arrival. If scale weight

increases by this amount in a short period, the 920i assumes a dough piece hit the scale and begins the weigh time.

Maximum Tare: The computer will not tare a weight greater than this value.

Weight increase due to paddle kick: After sending an eject command to the PacSci, the computer waits for a small weight increase, indicating the paddle has kicked. The increase that it looks for is this number. If no kick is seen before the max cycle time, an error is generated.

Max Voltage Change: If the error (difference between average weight and target) is such that, after multiplying by gain, the system determines a voltage change greater than this amount is needed, the change will not be applied. The system will reset inhibit count and try again. *Be careful with this setting.* If it is too small, your divider signal will never adjust.

General Parameters
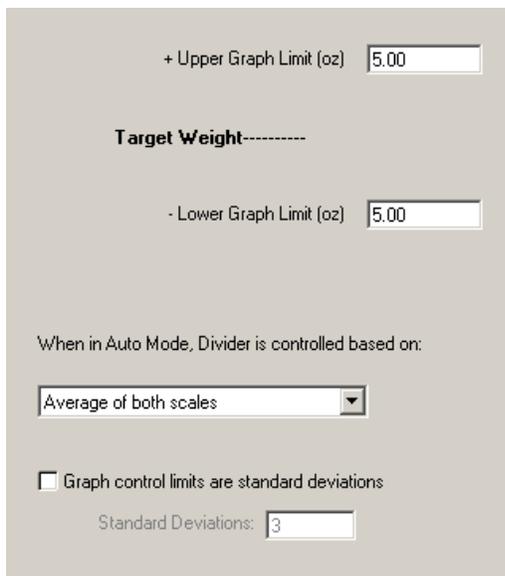
Upper and Lower Limits: These parameters control the scale of the graph on the main screen. The yellow line on the graph is always the target weight, read from the database. The upper and lower edges of the graph, in weigh units, are the numbers for the **upper** and **lower graph limits**, respectively.

Graph control limits are standard deviations: The red upper and lower control limit lines you see on the main screen graph are set in the product data table. These are the *Raw High Tolerance* and *Raw Low Tolerance* fields. However, instead of fixed values, these red lines can, if desired, indicate the level of 1 or more standard deviations from the average of all the data on screen. This makes these values dynamic, since they are recalculated from the existing data every time a new data point is added. If you want to do this, check the box and enter your standard deviations in the box below. As the system runs, you'll see the red lines move slightly as the data changes.

Servo Communication

This tab controls some communication to the kick paddle servos. All communication to the Kinetix drives are through RSLinx, so the top boxes, as well as other options that don't apply to the Kinetix drives are grayed out.

Kick Speed: Speed of the paddle when kicking the dough piece off the scale. The number is unitless, representing quadrature pulses. The Kick Speed applies to the current product. If you would like to apply this speed to all products, use the SET ALL button. Be careful using this button. If the system is set up for a single global kick speed, this box is grayed out.

Guide Paddle

Local Variables: Specific to the product running now.

Target Landing Position (0-100): [0]   Set All (Guide)   Set All (Motor)

Pressure signal 1 (0-10): : [4.0]   Motor speed signal (0-10 Volts): [0.0]

Pressure signal 2 (0-10): : [6.0]   Motor 2 speed signal (0-10 Volts): [0.0]

This tab controls parameters relating to the guide paddle, which is the paddle at the end of the conveyor the dough piece pushes past before dropping onto the weigh platter. A small amount of servo motor pressure holds the guide paddle against edge of the conveyor, slowing the dough piece slightly as it moves by and causing it to flip over. With more pressure, the dough piece lands closer to the kicker paddle. With less pressure, the dough piece lands farther from the kicker paddle.

Target Landing Position: Currently unused.

Pressure Signal (in mA): Increase this number to cause the dough piece to land further back.

The SET ALL button applies the 2 parameters above to every product in the database. Otherwise you are just changing the currently running product.

Motor Speeds: These are the speeds for the infeed conveyors and can only be set with an administrator password. Changing the infeed speed necessitates changing several other permanent setup timing parameters. If you need to change this speed, we recommend consulting with Bakery Systems first.

Secure File Transfer

☐ Using a Lantronix UDS-10 on the DoughManager computer for secure file transfer

IP Address: [192.168.0.158]

Unit Name: [DS]

Unit Name above should match the unit name entered for this line on the Dough Manager software.

If you are using a Lantronix UDS-10 for secure file transfer, check the box on this tab. Enter the same IP Address here as you have entered on the Dough Manager setup screen. This number will not be the same as your DoughSaver's Windows Networking TCP/IP address. This is the address of the device you *want to* communicate with for secure file transfer, i.e., the Lantronix UDS-10. The unit name should be the same as the name entered for this unit in CheckManager. If the names do not match, the files will not transfer.

Only one file is sent from CheckManager to DoughSaver. Package.mdb is sent once every 30 minutes. It is saved in a temporary directory and the records copied into the local copy of Package.mdb (not overwriting the reserved fields).

The log files are copied from DoughSaver to CheckManager. As soon as a new log file is created and CheckManager is running, DoughSaver will upload the file. Once upload is complete, the file is moved into a *sent* folder. This keeps the log folder empty except of files that are ready to be uploaded.

The log file in progress, i.e., the log file which is currently being written, is kept in the application folder, not the log files folder, so you won't see it in there until the dough changes (or an hour goes by since the last dough piece).

Messages

There are several debugging messages that you can activate on this screen. Generally, you only want one of these boxes checked at a time, since the messages will overwrite each other. The messages will appear on the main screen in the very bottom panel. Many of the messages will also write entries to the error.log file.

Guide paddle: Shows the raw message coming over from the Pacific Scientific 950 controller. Does not apply to Kinetix Drive systems.

Tare Messages: Shows when tare cannot be applied because it is exceeding max. Also shows tare creep limitations.

Voltage Message: Shows an error when voltage change is too large.

Raw Weight: Shows underranges from the Tedea DLC and any weight messages without an appropriate prefix header.

DLC Wakeups: If the DLC stops sending for over 200 ms, a wakeup message will be sent. If the wakeup messages box is checked, a message is shown.

Knife Message: Shows the calculated speed, target speed and voltage adjustment each time knife speed is calculated. Only applies when knife speed is being adjusted automatically.

Lantronix Messages: Shows when secure file transfer is happening over the network. Only applies when Lantronix secure file transfer is installed.

Write Pressure/Knife Speed to data.log: If desired, a log file (data.log) can be written showing the average knife speed and auger pressure for each product run.

There are several other debugging messages mostly for use by Bakery Systems programmers.

The other error messages appear in yellow when the alarm light is on. To disable these messages, uncheck the box corresponding to each message.

More Parameters – Rejecting

Click the More Parameters button to see the Rejecting tab. You can also get here directly from the main screen by hitting **Setup 2**:

Rejecting	Histograms	Divider Runout	Calibration Factors

☐ Enable Reject Conveyors

Reject OFF Time (sec) `2.0`   High Tolerance (oz): `1.00`   [Set All]

Reject ON time (sec) `0.7`   Low Tolerance (oz): `1.00`   [Set All]

[Test Reject 1]   [Test Reject 2]

Recycle Conveyor State

Off
Forward
Backward

☒ Shut off, then reverse Recycle Conveyor when Dough conveyor is inactive.

Inactive Time (sec): `30`

Max Doughballs to inactive Recycle Conveyor before reversing: `8`

☐ Shut off Recycle Conveyor After Timer
Shut Off After (s) `600`

[Help]   [Clean]   [Apply]   [Cancel]   [OK]

This screen allows you to configure the Reject conveyors, which retract after an under- or over-weight. If the Enable box is unchecked, the conveyors will never retract.

The Reject OFF Time specifies the time delay after kicking that the conveyor retracts. This time value should give a dough piece time to travel from the platter to the edge of the reject conveyor (when retracted).

The Reject ON Time specifies the amount of time the conveyor stays retracted. This should be enough time to dump one dough piece but not enough time to dump the one behind it.

The High and Low Tolerance values are the weights above and below target outside of which rejection occurs. These are specific to the product.

The Recycle conveyor state is shown in the lower window. You can set it to **Off**, **Forward** or **Backward**. If the conveyor is set to **Off** or **Backward**, the elevator and overhead conveyors will be off. There are two other control options you can set on this screen which affect the recycle conveyors.

Shut off Recycle Conveyor after Timer: If this option is checked, the recycle conveyor will turn on (in the direction specified on the list box) whenever a dough ball is rejected. It will stay on for the recycle time and then turn off. You can also make it turn on by touching **Forward** or **Backward** on the list box and it will stay on for the recycle time.

Shut off, then reverse Recycle Conveyor when Dough Conveyor is inactive: This option will only appear when an RSLinx topic is configured for communication with the AMF Divider control PLC. If it is, Doughsaver will read the item **DD1_BIDIRECTIONAL_CONVEYOR_RUN_FWD** to determine if the Divider hopper's dough feed conveyor is turned on. (We don't want to dump too much dough on this conveyor when it is off). When the dough feed conveyor turns off, Doughsaver's elevator and overhead conveyors will keep running for 30 seconds (the inactive time above) and then stop. The recycle conveyor itself will keep running forward until 8 doughballs (Max Doughballs specified above) are rejected. Then the recycle conveyor will reverse. Once the divider dough feed conveyor comes back on, all the conveyors will run forward again.

If both options above are unchecked, the conveyor will just run all the time in the direction you specify by touching the list box.

More Parameters – Histograms

This tab lets you set the number and width of bars for the histogram which can be displayed on the main screen. If you want to see the histogram, touch the box where the scatterplot graph normally appears to cycle through the 3 options: graph, list and histogram. The histogram shows totals for various weights zones around the target weight. I.e., if you have 10 zones set up for 0.1 oz each, and a target weight of 23 oz, you will see a bar in the middle of your histogram showing the number of balls between 23.0 and 23.1 oz. This tab also shows a confirmation message from the 920i indicator that will let you know if communication exists between the 920i and computer.

More Parameters – Divider Runout

This tab lets you configure checking for divider runout. If the divider runs out of dough, the last group of doughballs will often be very small, which can cause Doughsaver to overcorrect the voltage up, so the next batch of dough balls will start out too heavy. If you check this box, Doughsaver will observe the weights before a break (no dough balls) of 45 seconds or more. If weights are low before a break, Doughsaver will reload the divider voltage from the middle of the run and start the next batch with this voltage, instead of its too-high voltage caused by the runout. You can set the number of low weight doughballs and the percent below target weight cutoff on this tab.

More Parameters – Calibration Factors

This tab shows several parameters which should be changed only with caution.

Calibration Factors: The calibration factors for scales 1 and 2 are span factors which apply *in addition to* the normal scale calibration. Generally speaking, it's a good practice to leave these values set at 1.0000. If your scale weights are off, use the iRev software to calibrate your scale with

test weights. However, if you don't want to stop running but you need to make a small adjustment to the weight, use these factors. Entering 1.005 for scale 1 will make scale 1 read 0.5% higher for the same weigh dough ball.

Prox Switch Delay from detect to kick: This value affects the amount of time the scale spends empty between the kicking of one doughball and the arrival of another. A prox switch mounted just under the metal cowling over the entry conveyor on each lane detects a dough piece as it passes under, just prior to dropping onto the scale platter. Once a dough piece clears the prox switch, Doughsaver waits the prox delay time (this parameter) and then kicks the doughball that's already on the scale, if there is one. This time is generally around 0.05 seconds. If you set this time too high, the new doughball will drop onto the scale before the old dough ball has been moved off. If you set the time too low (not a big danger) doughballs may not have enough weigh time. Even if the new doughball doesn't actually hit the old one, if prox delay time is too high it can interfere with getting good tare weights. If the new ball hits before the scale has recovered from the ejection of the old ball, tares could be too high.

In-motion Standard Deviation maximum: This parameter is important for determining if a ball is *weighed* or *unweighed*. A ball that spends at least the **weigh time** (see above) on the scale is tentatively classed as a *weighed* ball. However, Doughsaver then checks a standard deviation calculation of the A/D samples immediately preceding (about 50 mSec) the sample that becomes this dough piece's weight. This standard deviation tells Doughsaver how much motion was on the scale just before the weight was grabbed. If the number is low, it indicates a steady scale. If high, it indicates the dough piece may still be rolling over and the weight cannot be trusted. A number in the 0.8 – 1.2 g range is usually acceptable here. SD is always in grams, even if your Doughsaver is otherwise set up to read in ounces.

Keep in mind that weigh time is also used to class a dough piece as *unweighed*. If you have a high weigh time, you may have very few *in-motion* dough pieces, but a lot of *unweigheds*. If your weigh time is low, the in-motion calculation may come into play more. The main screen status box (at the top) shows you the percent of dough pieces *unweighed* for the run, as well as the percent that were *in-motion*.

Check for Suspected Blowback: During Divider blowback, the dough piece weights can drop briefly. If this box is checked, Doughsaver will try to detect this phenomenon by comparing piece weights to the *previous* average, and throwing out samples that err by too much. Administrator password is required to set specifics of how much error is too much, and how many samples may be thrown out.

Disable Line 1 (and 2): Check box lets you turn off one line if it is not to be used. The conveyors for that line will not run.

Reject Test Button Visible on Main Screen: Check box if you want this feature available. The test button allows you to manually reject a dough piece when pressed.

Unweighed Balls Reject if previous 3 balls rejected: Since unweighed dough balls, i.e., dough balls that don't have time to weigh, don't get rejected, it's possible for a bad weight ball to slip through without being rejected. In the case, at the start of a run, say, where the balls are consistently underweight, this option may be useful. If 3 weighed balls in a row reject, Doughsaver will change its default option to reject any unweighed balls. The first good dough piece sets the default back to not rejecting.

Appendix A: ASCII Files

Each time a dough piece is weighed on the DoughSaver, an entry is added to the ASCII file for that run. A new ASCII file is started each time the product changes. The rules for naming the ASCII file are as follows:

While in use, the ASCII file is named by the dough code followed by the .wts extension, so the file for DELI TEXAS TOAST (Dough code 2039) is called

2039.wts

and is stored in the application directory, in our case C:\DoughSaver\

Once a new run starts, i.e. a different dough code is selected by the operator and the first dough piece weighs, a new file is started and the old file is renamed to reflect the start date/time and end date/time. The format is

"AUT_" + DOUGH CODE + "_"+ START DATE + "_"+ START TIME + "_"+ END DATE + "_"+ END TIME + ".wts"

So our new file name would be:

AUT_2039_11072000_0557_11092000_1527.wts

If the DoughSaver was in manual mode "AUT" is replaced with "MAN"
If the box is unchecked in setup for this option, the AUT_ or MAN_ prefix will not be included.

This file is stored in the log file folder, in our case C:\DoughSaver\logs\

Appendix B: Troubleshooting

1. **Problem: The system is in bypass, but dough pieces are not being thrown far enough over the scale. They are getting stuck on the lip.**
Increase the flour sifter speed. More flour will keep the pieces from sticking. Also, the motor speed in bypass can be changed in the panel. It is one of the setup parameters in the variable speed drive. If you have an AB model 160, it's parameter 58.

2. **Problem: The system is in RUN and AUTO, but is making the doughballs too heavy/too light.**
The wrong product may be selected on the screen. The target weight is shown under the product list. The selected product is highlighted in blue.

3. **Problem: The System is in run mode but the paddle won't kick. Check:**
The prox switch that detects the dough piece arriving just before the scale may not be oriented correctly. The switch may be bad. Check DIO3 and DIO4 inside the panel. These are the Opto input modules for line 1 and 2. DIO3 should flash whenever a ball goes by for line one, DIO4 for line two.

4. **Problem: Weights are erratic.**
    a. Make sure the ball is not landing against the paddle. Guide paddle pressure in setup may need to be set to land farther out (lower number).
    b. Make sure the weigh/time parameters are set correctly. If weigh time is too short, weights will be less accurate. If weigh time is too high, very few weights will be recorded.

5. **Problem: I would like to save/restore a previous configuration.**
All configuration information, other than that stored in the database, is stored in a file C:\DoughSaver\Doughsaver.ini
If you want to save a copy of your configuration, make a copy of this file. The database file is:
C:\DoughSaver\Package.mdb

If you have a copy of these two files, you have a complete backup of your Doughsaver parameters.

Appendix C: Error Messages

Several problems can cause the system to error out and shut down or go to bypass. When this happens, the alarm light on the screen will be energized. Under the light one of several messages will be displayed:

1. Communications timeout
    The Load Cell has stopped sending data. Check the communications parameters. They should be set to 19200,N,8,1 and COM1 for scale 1 and COM2 for scale 2. If a 520i or 920i board is replaced, it needs to be re-configured and calibrated using the Revolution software. A configuration file with .rev extension will be stored on the Doughsaver. This file needs to be downloaded to the X20i board before it will output continuously. See the revolution software manual for details.

2. Kicking: Cycle Long
    The computer executed a kick paddle command, but the weight never dropped back below trigger weight before the maximum cycle time ran out. Max cycle time is set in SETUP. The dough piece may not be clearing the scale. A harder kick may be indicated. Or, the guide paddle pressure may need to be increased so the piece lands closer to the kick paddle.

3. Error Override in Place
    If you want to disable error reporting, a menu option on the operation menu lets you continue running in spite of errors. No error messages will be displayed and the alarm light will not turn on.

4. Large weight change. No adjust.
    The computer won't adjust to an extremely large change in average dough piece weight (> 3 oz). This is to prevent the system from reacting to the first, sometimes tiny pieces that drop out at the start of a run. If 3 adjustments are made where the average weight changes by a large amount, the system will error out.

5. Divider out of control.
    The system is adjusting voltage output to the divider but the weights are not getting closer to target weight. Gain may be too small.

6. Conveyor drive fault
    The conveyor drive is faulted. Reset using the circuit breakers on the right side inside the control panel.

7. Servo fault
    One of the servos for the kick or guide paddle has a serious hardware fault. Pressing E-STOP in and back out will reset servos. If this does not reset the error, try powering down the servos using the 3-phase disconnect. A cable or motor problem could be indicated.

8. Divider signal at minimum (or maximum). The computer has lowered (raised) the divider output signal until reaching its minimum (maximum) value. However, dough pieces are still heavy (light).

9. Guide Paddle at minimum (or maximum). The computer has lowered (raised) the guide paddle output signal until reaching its minimum (maximum) value. However, dough pieces are still landing too close to the paddle.
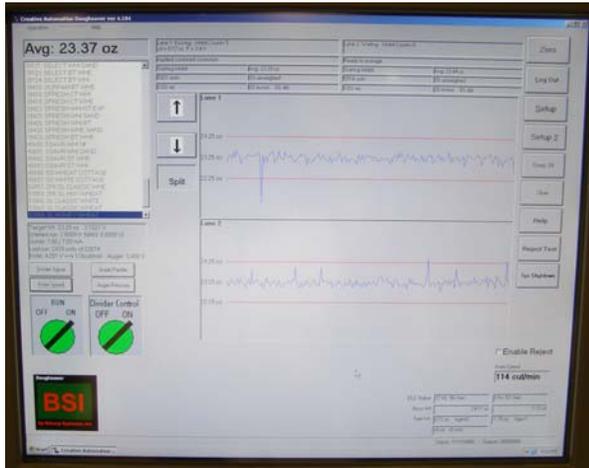
Appendix D: Pictures

1. Dual-lane complete Doughsaver (mechanical)

2. Control Panel

3. Weigh Platter and kick paddle.

Bakery Systems, Inc.
CREATIVE AUTOMATION
5404 Jedmed Court, St. Louis, MO 63129
(314) 845-7778 FAX (314) 845-7779
www.bakerysys.com

Appendix E: Electrical Drawings