

Owner's Software User Manual

Frank Control PC Program

ABOUT THIS MANUAL

This section describes the contents of this manual and how to use this manual effectively. It was designed for a wide range of different types of users.

MANUAL OVERVIEW

This manual is divided into the following sections:

Section 1.0 – ***Getting Started*** very basic instructions on getting start with the Software.

Section 2.0 – ***Current Values*** describes each value on the three windows in detail.

Section 3.0 – **Kiln Control** describes the Auto Control window in detail.

Section 4.0 – **Kiln History** describes the Kiln History window in detail.

Section 5.0 – ***System Set-up*** brief description of the different types of set-up available.

Section 6.0 – **Other Functions** description of extra functions.

Section 7.0 – **Debug** describes in detail the debug windows that might be used by
Kiln maintenance people.

HOW TO USE THIS MANUAL

Your Frank Control Computer System Software Manual is a reference book to assist in using the Frank Control Software to its full potential.

This manual has been divided up into seven easy to follow sections. Use the Table of Contents as a quick reference in finding answers to your questions.

TABLE OF CONTENTS

1.0 Getting Started

- 1.1 Starting the Program
- 1.2 Main Menu Bar
- 1.3 Kiln Buttons
- 1.4 Access Control
- 1.5 Logging On
- 1.6 Auto Log Off

2.0 Current Values

- 2.1 All Kilns
- 2.2 Bulb Temperatures
- 2.3 Current Kiln

3.0 Kiln Control

- 3.1 Manual Control
- 3.2 Auto Control
- 3.3 Mode
- 3.4 Alarm Reset
- 3.5 New Charge
- 3.6 Start
- 3.7 Stop
- 3.8 Run Process

4.0 Kiln History

- 4.1 File
- 4.2 View

5.0 System Setup

- 5.1 Program Setup
- 5.2 Schedule parameters
- 5.3 Process parameters
- 5.4 Kiln parameters
- 5.5 Setup parameters

6.0 Other Functions

- 6.1 Auxiliary Functions
- 6.2 Memo Pad
- 6.3 User Setup

7.0 Debug

- 7.1 I/O's
- 7.2 VFD Outputs
- 7.3 Digital Bulb Data

GETTING STARTED

Thank you for purchasing a Frank Control Computer System. You made an excellent choice for performance, reliability, and value. The Frank Controller software works with Win95/98, Win2000, WinNT, and WinXP. The software is installed by default to the Program Files folder unless you specify otherwise.

STARTING THE PROGRAM

1. Click on the Start Menu in the lower left hand corner of the screen.
2. Use the mouse to point to Programs.
3. Then click the left hand mouse button once and the program should start.

MAIN MENU BAR

The main Menu bar is at the top of the screen. The Menu items are File, Current Values, Kiln Control, Alarm Display, Auxiliary Functions, Kiln History, System Setup, & Help. See section on Screen Displays for details.



Figure 1 Main Menu Bar

KILN BUTTONS

Down the left side of the screen are the Kiln # buttons. Selecting a button will show specific information for that Kiln based on the main Menu selection. The currently selected Kiln # will show its Kiln # in large Bold letters. The Kiln button colours indicate the current status of the Kiln as follows.

Grey	-currently selected kiln, or Kiln is not running.
Green	-Kiln is running
Green-Flashing	-Kiln is Starting
Red	-Kiln has stopped
Red-Flashing	-Kiln is stopped, or Kiln is in an Alarm condition.
Orange	-Kiln is in Low Fire mode.
Blue	-Drying is done

There are two lights near the top left corner. They show a T & R within a circle. These should flash alternately bright green, indicating that the PC program is talking to the Frank Control Computer System.

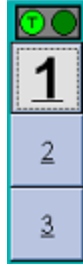


Figure 2 Kiln Selection Buttons (Normal Operation)

ACCESS CONTROL

Your supervisor will assign a Password for each person to have access to the program. Each person is given a selection of functions that they can access. The needs of the Kiln Operator may vary from the Maintenance personnel and Supervisors.

LOGGING ON

1. Select File → Log On from the Main Menu.
2. Type your assigned Password in the box provided. (Password is not case sensitive)
3. Press ENTER on the keyboard or click the Log On button.

LOGGING OFF

1. Select File → Log Off from the Main Menu.

Note: If no operator activity for 15 minutes the program will automatically log off

CURRENT VALUES

This section explains in detail the three types of screens that can be selected from the Main Menu Bar under Current Values.

ALL KILNS

This screen shows a summary of each Kiln in a column. It is updated every two minutes. The summary consists of nineteen properties for each Kiln.

Kiln Properties

Process – The current Process that is running

Run Time – The amount of time the Kiln has been running

Avg. M.C. – The average moisture content of the lumber in %

Last M.C. – The last moisture content of the lumber calculated in %

Target M.C. – The moisture content that the Kiln will shut down at %

FWD Side – The average temperature on the Forward Side in ° F

Center – The average temperature in the Center in ° F

REV Side – The average temperature on the Reverse Side ° F

Outside Temperature – Outside Temperature in ° F

Z80 Temp. – Temperature Sensor on the Digital Temperature Card in ° F

Cont. Mode – Mode that the Kiln is running (See Kiln Control section for details)

Charge # - The charge # for the charge in the Kiln

Fans Dir. – The direction the fans are turning

Dwell Tm. – The time left before the Kiln fans start

Steam Injection - If the Kiln has Steam Injection shows if it is On or Off

TDAL – High Side temperature – Low Side Temperature in ° F

Wet Bulb – The Wet Bulb temperature in ° F

Kiln Temp. – The Highest Side temperature in ° F

Re-fire Time – The amount of time the Kiln has been running in Refire Mode.

Kiln #	1	2	3
Process	2x4 SPF	2x4 SPF	2x4 SPF
Run Time	0.00	0.00	0.00
Avg. M.C.	0.0	0.0	0.0
Last M.C.	0.0	0.0	0.0
Target M.C.	0.0	0.0	0.0
FWD Side	0.0	0.0	0.0
Center	0.0	0.0	0.0
REV Side	0.0	0.0	0.0
Outside Temp	-17.5	17.9	17.9
Z80 Temp	0.0	0.0	0.0
Cont. Mode	PC Manual	PC Manual	PC Manual
Charge#	2802	2802	2802
Fans Dir.	0.0	0.0	0.0
Dwell Tm.	0.0	0.0	0.0
Steam Inj.	0.0	0.0	0.0
TDAL	0.0	0.0	0.0
Wet Bulb	0.0	0.0	0.0
Kiln Temp	0.0	0.0	0.0
Refire Tm.	0.00	0.00	0.00

Figure 3 All Kilns Screen

BULB TEMPERATURES

This screen displays the temperature in ° F of every bulb in your system for the Kiln that is selected. Temperatures of 265 or larger indicate an error code for that bulb. See

Hardware manual for troubleshooting bulbs. The bulbs are numbered with the first bulb being in the top left hand corner. This screen is updated every two seconds.



Figure 4 Bulb Temperatures Screen

CURRENT KILN

This screen displays current values for the current Kiln that is selected. The screen is divided into five sections; Timers, Control Loops, Moisture Readings, Other Temperatures, and Other Information. This screen is updated every two seconds.

Timers

Run Time – Current running (elapsed) time from when the Kiln was started

Refire Time – The amount of time left. Only displayed if running Refire Mode

Control Loops

Control Zones – The zone number up to a maximum of 12 zones

Dry Bulb Set Point – The Dry Bulb temperature in ° F should never exceed this limit. This limit can be modified in the Process Parameters.

Dry Bulb Temp – The Highest Side temperature in ° F

Heat Flow – The heat flowing into the Kiln measured in %

Relative Humidity – The % Relative Humidity in the Kiln

VFD Speed – Feedback speed in Hz from the VFD

VFD Output – Output % of VFD motors maximum current

Wet Bulb Set Point – The Wet Bulb temperature in ° F should never exceed this limit. This limit can be modified in the Process Parameters.

Temperature – The lowest Wet Bulb temperature in ° F

Kiln Vents – The vent position in %

Moisture Readings

The Moisture content of the lumber does not start calculating until the Kiln approaches the desired operating temperature. Typically the desired operating temperature is 180 ° F. When the average MC achieves the Target MC, the Kiln drying is done. The Kiln Operator can fine tune this calculation for each Process based on the results of the moisture check. (See System Set-up for details on tuning this calculation)

Average M.C. – The average moisture content of the lumber in %

Last M.C. – The last moisture content of the lumber calculated in %

Target M.C. – The moisture content of the lumber in % when the Kiln will shut down

Other Temperatures

Side 1 – The average temperature in ° F on side 1

Side 2 – The average temperature in ° F on side 2

Outside – The outside temperature in ° F double click on it for ° C

Z80 – The temperature sensor on the Digital Temperature Card in ° F

Other Information

Control Mode – The Mode the Kiln is running (See Kiln Control for Mode Types)

Run Process – The process that the Frank Control Computer System is using

Charge Number – The charge # for the lumber in the Kiln

Relative Humidity – The % Relative Humidity in the Kiln

K-Fan Direction – The current direction the Kiln fans are turning

Dwell Timer – The time left for the Kiln fans to start up

Live Steam Injection – If the Kiln has Steam Injection shows if it is On or Off

Temp Drop – Highest Side Temperature – Lowest Side Temperature in ° F

Parameter #20 – (See section System Set-up Process Parameter 20 of this manual)

Parameter #21 – (See section System Set-up Process Parameter 21 of this manual)



Figure 5 Current Kiln Screen

KILN CONTROL

This section will explain in detail how to use all the controls (buttons). Certain buttons will not be visible unless they are applicable. This is to prevent interruption of the drying accidentally. The user will be in Auto Control unless PC Manual Mode is selected from the Auto Control screen.

MANUAL CONTROL

If PC Manual Control has been selected the operator can individually control things. The desktop PC will only enter this Mode if the Frank Control Computer System confirms the Kiln is not running. This Mode is useful for maintenance to check for starting contactors, running in new bearings, fan blades etc. and when access to the PLC program is unavailable. The Manual screen shows a Start / Stop button for each motor & the Burner. The burner can only be started onto Low fire. The Heat output can be increased 5% at a time with the heat control.

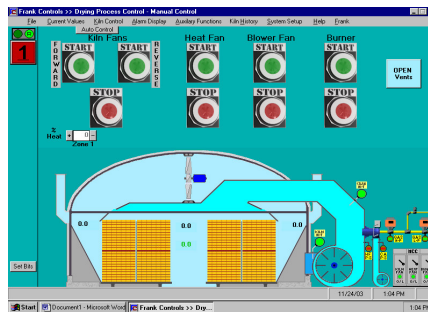


Figure 6 PC Manual Control Screen

AUTO CONTROL

The user is in Auto Control in all *Modes* except *PC Manual*. The most used *Mode* in Auto Control is *Run Process*.

Starting a Kiln with a New Charge

1. Click the *Mode* button and select *Run Process*
2. Click the Run Process button
3. Select the Process you want to run and click *Send to FC*
4. Click the *New Charge* button
5. Click the *Start* button

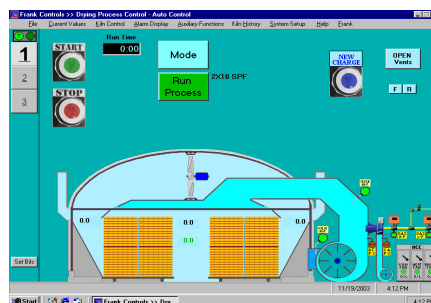


Figure 7 Auto Control screen while running a Process

MODE

When clicking on the Mode button a list of six different Modes will pop up that the user can choose from to run the Kiln.

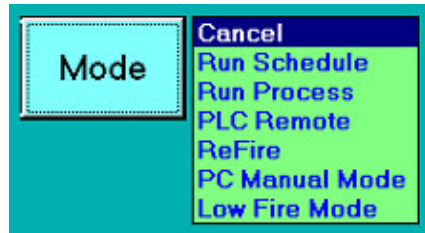


Figure 8 Mode Button

Run Schedule (Mode 1)

Future use, to allow time based, non-process control

Run Process (Mode 2)

Dynamic Process Control meaning the Kiln dries depending on what the lumber is doing. This is the Mode for Normal Operation of the Kiln. Once this Mode has been selected a button labelled *Run Process and New Charge* will appear. When the Run Process button stops flashing and is solid green the Frank Control Computer Systems Mode has been change successfully. (See Auto Control in this section for instructions on starting a Kiln with a New Charge)

PLC Remote (Mode 3)

Allows operation of Kiln from each Kilns MCC and manual controller. Cannot be activated unless the Kiln is not running. Once the Manual/Auto switch at the Kiln is in Manual Mode, you cannot switch to any other mode at the PC until the switch at the Kiln is back in Auto.

Re-fire (Mode 4)

This Mode is used to further dry lumber at the completion of a drying charge. If the Kiln Operator's Moisture Content check comes back to wet then the charge will require Re-firing for a set amount of time. DO NOT PRESS NEW CHARGE BUTTON instead press the Mode button & select Re-fire. Time values can be entered in the Re-fire frame that appears. The amount of time required in each direction will depend on the MC readings on each side of the Kiln. Typically a rate of 1.5% MC per hour can be used to estimate the time required. To start the Kiln again simply click the Start button. The Kiln will first start in the Reverse direction, cycle thru the time entered then switch to Forward direction. The Current Kiln and Auto Control screens will show the time as it counts down.

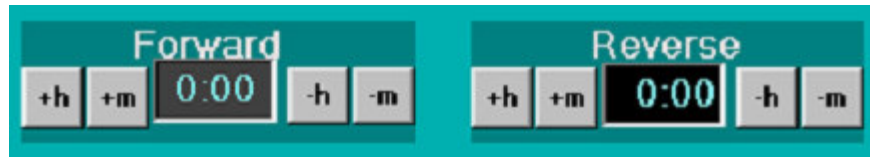


Figure 9 Re-fire Frame

PC Manual Mode (Mode 5)

Selecting this will allow the user to view the Manual Control screen.

Low Fire Mode (Mode 6)

Keep the burner on low fire to keep the Kiln warm.

ALARM RESET

An Alarm reset button will show up next to the Stop button for conditions that require the Operator's attention. The Kiln button will flash red. On a Gas Kiln the Burner may be on low fire or turned off depending on the Alarm. From the main Menu select the Alarm Log. This will display the alarm message. Once the Alarm condition is resolved press the Alarm Reset button to reset it. The Kiln will restart if required. If the Alarm button returns, then another Alarm has occurred or the original Alarm has not been resolved. Recheck the Alarm Log.

Note: After looking at the Alarm Log, the Alarm Log is cleared. It only shows the most current Alarms. A permanent record can be viewed in Kiln History, View, and Alarm Log.



Figure 10 Alarm Reset Button

NEW CHARGE

This button resets the Run Time counter and lets the Frank Control Computer System know to start a New Charge. A new Graph is also started. This button is not available while a Charge is running, unless the Kiln is stopped after 5 hours. The New Charge label above the button will be visible for a while to let you know a new charge has just been started

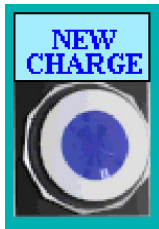


Figure 11 New Charge Button

START

In Auto Control clicking on this button will start the Kiln. The sequence which things start up will depend on some of the Kiln Parameters.

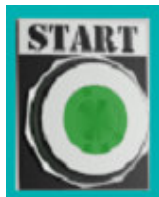


Figure 12 Start Button

STOP

When the Kiln is running pressing Stop once will shut down everything except the blower. Hit the Stop button a second time and the blower will shut down.

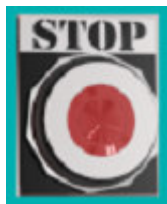


Figure 13 Stop Button

RUN PROCESS

Clicking on this button will open a frame allowing the user to select a process and send it to the Frank Control Computer System. (See the section on System Set-up to make your own Process)

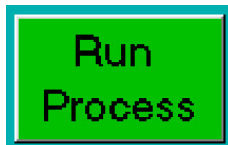


Figure 14 Run Process Button

KILN HISTORY

Kiln History allows the user to view the graphs of any current charge or previous charges. During each charge the desktop PC records information from the Frank Control Computer System every 2 minutes. The current charge's graph is shown on the screen. To select which Kiln's graph to view use the small Kiln buttons at the bottom of the screen. If the entire graph cannot be shown on the screen, a scroll bar is available at the bottom of the graph. Move the scroll bar with the mouse to view the remainder of the graph. The Kiln History has its own Menu items separate from the rest of the program. The remainder of this section will describe the Kiln History Menu Items.

Note: A printer must be installed on the computer to enter the Kiln History. The printer doesn't have to be physically hooked up.

FILE

This menu's main functions are to view saved data from previous charges and change the data that is displayed on the graph.

Load Main

Available charges for each are shown in a list. The list shows the charge's date, and charge #. The user can select a different Kiln by using the combo box above the buttons. To open a specific charge and view its data, select the Charge → click the Open button.

Main Color and Scale / Overlay Color and Scale

This Menu item allows the user to change the color of specific data and choose which data will be displayed on the graph. To change the colors of for example Dry-Bulb Set Point simply double-click on it. To allow it to display on the graph check off the box beside it. The Hour Interval control at the bottom of this Menu item can be changed to adjust the size of the graph beginning displayed. The Line Width control can be changed to adjust the thickness of the lines displayed.

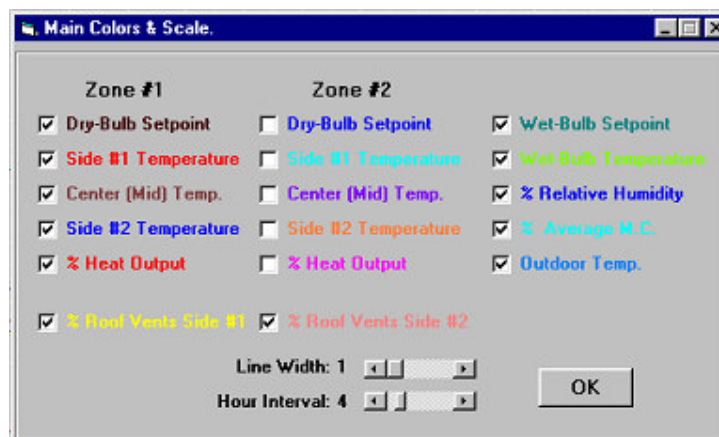


Figure 15 Main Colour and Scale

Load Overlay

This Menu Item works the same as Load Main. The difference is a charge opened using this Menu item will be overlaid onto the existing graph for comparison. A separate scroll bar is shown for control of the overlay's position.

Print

Sends the graph on the screen to the printer.

VIEW

This Menu Item allows the user to view data that has been saved to the hard drive.

Reports

At the completion of a Charge, a Report is collected from the Frank Control Computer System. Selecting this Menu item will display a Report on the data saved for the particular graph that the user is looking at on the display. The Report A displays information about a specific charge. Clicking print on the Menu at the top will print it.

Report A

This Report shows the most detail of what happened in the Kiln during the elapse of the charge. It shows the user times of when certain things happened, temperatures, information about heat-up, re-fire, kiln fan reversals, tally, and the process parameters used during the charge. After the Kiln Operator checks the Moisture Content of the lumber he/she can enter M.C. readings to the report. There is also a Memo button so that the user can add additional notes to the report about the charge.

Report B

This Report shows the Kiln temperatures during the elapse of the charge. The amount of time it took to reach those temperatures, the fan direction, and if applicable the fan speed.

Change Log

Changes made to the Parameters are recorded here. The date & time of the change will be saved so it can be used to review the changes versus the quality of drying to determine which changes responded well.

Activity Log

Program activity is recorded here. When a Kiln Operator does something like logging on or starting a new charge it is recorded here.

Alarm Log

The date & time of when alarms occur are recorded here.

SYSTEM SETUP

Individual characteristics of the PC program, each Kiln, and each species, size, and grade to be dried can be set from the System Setup. This section explains in detail the Menu items available in the System Setup.

PROGRAM SETUP

This area is normally not used by anyone other than Frank Controls personnel. It is used to initially set up the Frank Control Program to your specific Kiln & Computer requirements. The PC program can control up to 10 Kilns maximum.

Note: Only used by the personnel installing the Frank Control Computer System

SCHEDULE PARAMETERS

No longer used. It may be offered in the future as an option.

PROCESS PARAMETERS

These parameters relate specifically to the type of wood, size, and desired grade. It is this data that is loaded to the Frank Control Computer System when the user selects a Process in the Auto Control screen.

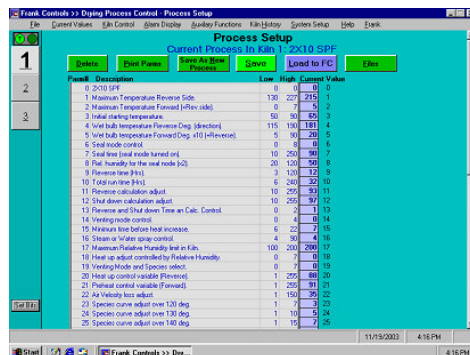


Figure 16 Process Parameters Screen

Here is a list of Process Parameters used to set up each species of wood.

Process Parameter 1

Maximum dry bulb temperature (°F) in the reverse fan direction. The lumber will dry faster if this is set higher, provided there is enough heat available to achieve this before the main reversal.

Process Parameter 2

This value (°F) is added to the maximum dry bulb temperature in the reverse fan direction (process parameter 1) to give the maximum dry bulb temperature in the forward direction.

Process Parameter 3

This is used to control the dry bulb set point at start up, (°F) using this parameter and the outside temperature a higher value will result in more heat being used at the beginning of the drying cycle, to lower relative humidity in kiln.

Process Parameter 4

Maximum wet bulb temperature (°F) in the reverse direction. Venting should occur above this temperature unless the computer is set to disable venting. (See process parameter #14)

Process Parameter 5

This value (1/10 °F) is added to the maximum wet bulb temperature in the reverse direction (process parameter #04) to give the maximum wet bulb temperature in the forward direction. When drying in value added mode (see process parameter #19) it is used to raise the wet bulb set point in the form of a percentage of dry bulb temperature rise after mid temperature (see process parameter #40). A value of 65 would indicate that if the dry bulb set point were raised 10 degrees 65% or 6.5 degrees would raise the wet bulb set point.

Process Parameter 6

The shell mode option is used after drying is completed. It produces a hardened shell around the lumber by venting. The shell is desirable to, limit the amount moisture re absorbed, and improve MSR yields. The following options are available.

- 0= seal mode is off
- 1= high temperature side relative humidity
- 2= high temperature side relative humidity
- 3= center relative humidity
- 4= center relative humidity
- 5= low temperature side relative humidity
- 6= low temperature side relative humidity
- 7= constant venting during seal time
- 8= Conditioning

An odd number selection forces the seal mode to run the time set in process parameter 7 at the end of the drying cycle. Even number selection forces the seal mode to wait until the relative humidity is close to the value set in process parameter 8. The seal mode should only be used on lumber less than 6 inches wide.

Process Parameter 7

Length of seal mode cycle in minutes. Start with 30 minutes then examine the lumber to determine if more-less time is needed before the next charge.

Process parameter 8

This value (R/H x 2) equals the R/H for shutdown in seal mode. For example 65 would be a 32.5%

Process Parameter 9

Timer to reverse fans (hours). This is used as a safety in case the wet bulb goes dry and the computer can not calculate the MC properly. It is usually set slightly higher than the average time taken for the calculation to reverse the kiln. This is also the time for reversing the fans for PASTEURIZATION. The timer runs in minutes in this mode. (See process parameter #19 to select mode)

Process Parameter 10

Timer to shut down the drying cycle. This is used as a safety, in case the wet bulb goes dry and the computer can not calculate the MC properly. It is usually set slightly higher than the average time taken for the calculation to shut down the kiln R/H setting.

Process Parameter 11

This is a base number used to calibrate the MC calculation for reversing. Reversal will occur at 1.4 times the final (target) MC., at approximately half to two thirds into the drying cycle. After reversal the MC will read higher because one side of the kiln will be dryer at this point. Setting this is done by manually measuring the MC of the lumber after the drying cycle. If the lumber is too dry raise this number, if too wet lower this number. You can calculate the amount of change by multiplying this Parameter value with Parameter #51 then multiplying with the target MC time 1.4 and then divide with the measured MC.

Process Parameter 12

This is a base number used to calibrate the MC calculation for shutdown. Raising this will raise the lumber moisture content, lowering will decrease the lumbers' moisture (drier). You can calculate the amount of change by multiplying this Parameter, value with Parameter#51 then multiplying with the target MC and dividing with the measured moisture content.

Process Parameter 13

This parameter controls the use of the timers and the MC calculation. The options are as follows:

0= disables timers. Normally used when heat source is unreliable.

1= reverse and shutdown, by calculation or timer which ever occurs first.

2= disables calculation, reverse and shutdown by timers only.

Process Parameter 14

This parameter is used to control the vent and has the following options.

0= disables venting.

1= normal wet bulb venting.

2= enables proportional venting. The vents start to open 6 °F under the wet bulb setting,

and the closer the wet bulb is to the setting the wider the vents open.

3= enables the fixed venting program (see Kiln Parameters #06,07,08) with wet bulb venting.

4= enables fixed venting only.

Note: Fixed venting is used with kilns that have a low air velocity.

Process Parameter 15

If the heat up variable (Process Parameter#20) is not set properly this Parameter is used to make sure the kiln heats up, starting this many hours after the preheat reversal. Used mainly as a safety feature to insure drying takes place.

Process Parameter 16

This is used to control the humidifying spray some kilns are equipped with. A value of 4 will shut this option off. All other values represent tenths of a degree. When set above 4 this equals the temperature difference, between the wet bulb set point and the wet bulb temperature, needed to activate the spray. If the value set in this parameter is odd, the spray will activate all the time. If this value is an even number, the spray will only come on if the kiln temperature is within 2 degrees of the maximum dry bulb temperature setting in Process Parameter #01 and 02. (Not the temp. in the kiln) A value of 0 set in parm#59 will control the wet bulb. (See Parameter #59)

Process Parameter 17

Maximum relative humidity, before venting. This is used when the heat source is not large enough to maintain control over relative humidity, otherwise set to 200. A setting of 130 would mean that if the R/H in the kiln reaches 65% the kiln would vent.

Process Parameter 18

Used only when process parameter #43 is set to 1. Set to zero this function is shut off. Setting it to a number will adjust the heat if under or over 44 percent R/H. The adjustments are on a scale from 1 (small) to 7 (large). On the average this is set to 02. With the dry bulb heat up this would be set to zero.

Process Parameter 19

Select the type of drying required.

0= Normal drying. Used on species that are easy to dry.

1= Wet bulb venting with water spray (see process parameter #16)

2= Wet bulb venting with water spray (see process parameter #16)

3= Dry bulb venting only on the finish side.

4= Dry bulb venting both sides.

5= Value added drying. Used on species that are difficult to dry or high grades.

6= Hemlock drying.

7= Pasteurization. (See process parameter #09)

Process Parameter 20

This controls the speed of the heat-up and is normally set by the computer (see process parameter #43) for each charge at 125 degrees. A larger number will result in a faster heat-up. For more information see "fine tuning" help section. This value reflects the amount of water in the lumber.

Process Parameter 21

This parameter controls the speed of the temperature change in the forward direction and is normally set by the computer (see process parameter #43) for each charge at 115 degrees. A larger number will result in a faster pre-heat. For more information see "fine tuning" help section.

Process parameter 22

As the kiln heats up the air becomes thinner, the circulating fans will be less efficient and a loss in air velocity will occur. The heat is now cutback by the computer. Adjusting this value can compensate for this loss in air velocity. (With low air velocity this number would be higher). When a VFD controls the circulating fans the parameter works opposite to the description above.

Process Parameter 23

Species curve adjusts starting at 120 degrees to compensate for the flow of water. Raising this value will increase the heat. Use values of 03 to 07 on the average.

Process Parameter 24

Species curve adjusts starting at 130 degrees to compensate for the flow of water. Raising this value will increase the heat. Use values of 04 to 09 on the average.

Process Parameter 25

Species curve adjusts starting at 140 degrees to compensate for the flow of water. Raising this value will increase the heat. Use values of 05 to 12 on the average.

Process Parameter 26

Species curve adjusts starting at 150 degrees to compensate for the flow of water. Raising this value will increase the heat. Use values of 06 to 15 on the average.

Process Parameter 27

Species curve adjusts starting at 160 degrees to compensate for the flow of water. Raising this value will increase the heat. Use values of 09 to 20 on the average.

Process Parameter 28

Species curve adjusts starting at 170 degrees to compensate for the flow of water. Raising this value will increase the heat. Use values of 12 to 30 on the average.

Process Parameter 29

Species curve adjusts starting at 180 degrees to compensate for the flow of water. Raising this value will increase the heat. Use values of 15 to 40 on the average.

Process Parameter 30

This is the heat output limit for the thaw out program from start-up to 60 degrees.

Process Parameter 31

This is the heat output limit for preheat, from 60 degrees to 115 degrees.

Process parameter 32

Maximum displayed heat output available in the reverse fan direction from 155 degrees. If process parameter #19 is set to Added Value Drying then this is the maximum heat output available up to the mid point temperature (Process parameter #40).

Process Parameter 33

Maximum displayed heat output available in the forward direction. If process parameter #19 is set to Added Value Drying then this is the maximum heat output available from the mid point temperature to the end of the drying cycle. Value Added Drying

Process Parameter 34

Temperature drops across the load in the reverse direction. Used in Value Added Drying to control the rate of drying above mid temperature (see process parameter #40).

Process Parameter 35

Temperature drops across the load in the forward direction. Used in value added drying to control the rate of drying above mid temperature (see process parameter #40).

Process Parameter 37

This parameter controls the vents after reset or shutdown.

Set to -00- the vents will open or close depending on the vent switch position.

Set to -01- the vents will be forced open after reset or shutdown

Process Parameter 38

This is the plus / minus range that the computer can set process parameter #20 and process parameter #21 within. If process parameter # 43 is set to 1, 2 or 3 then this is a safety to prevent Parameters #21 or #22 from being set too low or high as result of a heat problem below 125 degrees.

Process Parameter 40

In Hemlock drying mode there are 3 reversals in the heat up and this is the temp. where the second reversal is. The third reversal is calculated from this temp. plus max. dry bulb set point. It is also the point where the computer starts using process parameter #34 to control the drying rate in value added mode.

Process Parameter 41

This sets the heat up control.

0= Heat up is based on the temperature drop from side to side

1= Heat up is based on the temperature drop from side to center bulbs. (If there is no

center dry bulb set to 00)

Process Parameter 42

This sets the temperature (°F) to start calculating the lumber moisture content.

Process Parameter 43

Sets the method used to control the heat-up (The setting of the process parameter #20 and process parameter #21).

0= process Parameters #20 and process parameter #21 must be set manually

1= heat-up is controlled by relative humidity (Wet bulb). Process parameter #45 and process parameter #46.

2= heat-up is controlled by the dry bulbs. Process parameter #44, process parameter #45 and process parameter #46 (most common).

3= same as 2 but with dry bulb calculation.

4= same as 3 but with no wet bulb

Process Parameter 44

Used to control the speed of the heat-up in the summer months when process parameter #43 is set to dry bulb control.. If process parameter #45 and process parameter #46 have been set properly during the winter and this set properly during the summer further changes will not have to be made as a result of weather.

Process Parameter 45

Used to set the speed of the pre-heat when process parameter #43 is set to dry bulb control. Each species and dimension will be set differently. For more information see fine tuning help section.

Process Parameter 46

Used to set the speed of the heat-up when process parameter #43 is set to dry bulb control. Each species and dimension will be set differently. The computer uses this value to control the heat up from 110 degrees to 125 degrees. For more information see fine tuning help section.

Process Parameter 47

The dry bulb venting will start under this value of heat output. Operates only if process parameter #38 is set to 3 or 4.

Process Parameter 48

This is the TARGET or final moisture setting for shutting down (times 10).

Process Parameter 49

If process parameter #06 Seal Mode is set to 00 this is shut off. If process parameter #06 is set to a value, then this parameter #49 functions as follows. Set to 0 = MSR function is turned off. When set to a value, the value is subtracted from the current temperature and that will be the new temperature set point. At the time the kiln goes into the seal mode

the circulating fans will reverse from Reverse to Forward and will run the same seal time (Process Parameter #07) before shutting down.

Process Parameter 50

This controls the calculation for one track or two tracks.

0 = Calculate both tracks (outside to outside)

1 = Calculate one track (outside to center)

Process Parameter 51

The MC of the lumber is calculated by multiplying this value with Process Parameter #11 and #12

Process Parameter 52

This parameter is used to adjust the MC calculation to reflect the actual MC of the lumber through out the drying cycle. This only adjusts the starting point and will have no effect on the calculation at 8%.

Process Parameter 54

Allows conditions in the kiln to settle for a more accurate calculation. The time after a fan reversal or drying cycle interruption the computer waits to start re-calculating the moisture content.

Process Parameter 55

The delay (minutes) before the temperature set increases after a fan reversal to allow the temperature to settle.

Process Parameter 56

Used to cutback the heat for 1.5 minutes at 180, 200 and 220 degrees. This causes the moisture in the lumber to come to the surface.

Process Parameter 57

Pre-Steam conditioning - Set to 00 there will be no Steam at start for pre-conditioned. Set to a value (hours) the steam will be on from the start, the flame will be on, but there is no heat output. The steam will run for the length of time set in this parameter (hours)

Process Parameter 58

Steam conditioning at re-fire. Set to 00 there will be no Steam conditioning after re-fire time runs out. Set to a value (hours) the Steam conditioning will run this length of time.

Process Parameter 59

Controls steam or spray mode. Set to 00 the steam or the wet bulb controls spray. Set to 01 the steam or spray is controlled by Relative Humidity.

KILN PARAMETERS

Items found in here relate to timer values used in sequencing various stages of the startup / shutdown, control outputs, alarm trigger limits, etc.



Figure 17 Kiln Parameters Screen

Here is a list of Kiln Parameters used to set up each kiln.

Kiln Parameter 1

After the output signal is sent to the circulating fans (output 7 or 8) the computer waits this many (seconds) for an input signal (inputs-2: 1 or 2) from the circulating fans before it activates an alarm.

Kiln Parameter 2

After the output signal is sent to the heat fan (output 6) the computer waits this many seconds for an input signal from (inputs-3: 3) the heat fan, before it activates an alarm.

Kiln Parameter 3

After the out put signal is sent to the gas (output 5) the computer waits this many seconds for an input signal from (inputs-2: 5) the gas, before it activates an alarm.

Kiln Parameter 4

After the input signal from the circulating fans (inputs-2: 1 or 2) is received, the computer delays this many seconds before sending a signal to the heat fan (output-1: 3).

Kiln Parameter 5

After the input signal from the heat fan (inputs-2: 3) is received, the computer delays this many seconds before sending a signal to the gas (outputs-1: 5).

Kiln Parameter 6

After this set temperature is reached the fixed venting program will start provided process parameter #14 is set to 3 or 4.

Kiln Parameter 7

The vents will stay open this many seconds per vent cycle when the fixed venting program (See process parameter #14) is operating.

Kiln Parameter 8

The vents will stay closed this many seconds per vent cycle when the fixed venting program (See process parameter #14) is operating.

Kiln Parameter 9

This is the pulse width for electric motor heat control if Frank Control has outputs. Usually set between 20 and 30.

Kiln Parameter 10

This is the pulse width for pneumatic modulating heat control if Frank Control has outputs. Usually set between 10 and 15.

Kiln Parameter 11

This controls the heat fan after drying is complete.

0= shut down when drying is complete

1= run with the circulating fans until the kiln drops the value in kiln parameter #19.

Kiln Parameter 12

This controls low fire operation. Used to keep the kiln warm in the winter after the drying is completed.

0= Same as 1.

1= Gas is turned on when the kiln temperature drops below the value set in kiln parameter #13. The gas is turned off 25 degrees above set point. Can be used in the summer to keep the gas valve dry.

2= Same as 1 but will re fire the kiln after a power failure.

3= The gas is not shut off, stays on all the time, this should NOT be used if the kiln is empty.

Kiln Parameter 13

This is the temperature setting for low fire operation.

Kiln Parameter 14

This controls the regulating valves on a heat exchanger.

0= closed during fan reversals and shutdown.

1= held in position allowing hot oil or steam to flow during reversals and shutdown.

Kiln Parameter 15

No longer used. Now moved to Process Parameter #54.

Kiln Parameter 16

This is the time in seconds the hot oil valve will open to prevent the system from over heating when the kiln is not in use.

Kiln Parameter 17

This is the time in seconds the computer waits for the fans to stop turning before restarting, during a fan reversal.

Kiln Parameter 19

This is the temperature the circulating fans shut down at, after drying has been completed.

Kiln Parameter 21

This is used to control the temperature set point during initial set-up of the controller. This should be set to 0 during normal operation.

Kiln Parameter 22

This controls whether there will be a time delay (See Set Up Parameter #14) after a heat adjustment so the temperature can have time to settle.

0 = No delay. Used with direct-fired kilns.

1 = single delay. Used with steam heat exchangers.

2 = double delay. Used with hot oil heat exchangers.

Kiln Parameter 23

This sets the amount the hot side temperature can drop during the drying cycle, before an alarm is activated. The value represents tenths of a degree. A value of 30 disables this alarm.

Kiln Parameter 24

This controls the thaw out program. If the kiln temperature does not reach 84 degrees before the time set in kiln parameter #25 expires the circulating fans are reversed. The fans will run in this direction until the time set in kiln parameter #25 expires or the temperature reaches 94 degrees then the fans will change back to the forward direction.

Kiln Parameter 25

This is the time in minutes between fan reversals in the thaw out program (See kiln parameter #24).

Kiln Parameter 26

This limits the amount of heat obtained from the heat source.

Kiln Parameter 27

This prevents the displayed heat output from dropping below this value. Prevents the kiln temperature from oscillating.

Kiln Parameter 29

This controls the vent position with the power if the Frank Control has outputs.
0= power off to close vents.

1= power on to close vents.

Kiln Parameter 30

This inverts the gas signal if the Frank Control has outputs.

0= used to run analog output.

1= flame signal is off with flame on. Hot oil system / or test direct fired kiln with no heat on.

Kiln Parameter 31

This controls the number of times the computer will try to start the flame before generating an alarm.

Kiln Parameter 32

This is the time in minutes the heat fan will stay on after the drying cycle is complete. A value of 9 will shut off the heat fan when drying is complete. Pulling out the stop button and pushing it back in can stop the heat fan.

Kiln Parameter 33

This controls the heat output when the kiln goes over temperature. Do NOT change.

Kiln Parameter 34

This controls the heat output when the kiln is under temperature. Do NOT change.

Kiln Parameter 35

This controls the time an electric motor heat controller takes to open from a closed position if the Frank Control has outputs or not used with PLC I/O. This should not be changed.

Kiln Parameter 36

This controls the temperature change based on relative humidity of the kiln at the start of a REFIRE. Used with kiln parameter # 37. Value = RH / 2.

Kiln Parameter 37

This is the interval of the dry bulb set point change after the minimum RH is achieved during a REFIRE. It takes this many minutes to change the set point one tenth of a degree.

Kiln Parameter 38

For steam kilns only.

0= valve will close during reversals and shut down.

1= valve will stay open to setting in kiln parameter #27 during reversals.

2= valve will stay open to setting in kiln parameter # #27 during reversals and shut down.

Kiln Parameter 39

Adjust transducer pressure or modulating valves heat control.

0 = OFF

1 = ON - Sets the timer, you are required to input 00 before it will work. Example, set this parameter to 01, 10 minutes are in the Timer to allow the testing and or adjusting the current out put Channel A and Channel B. Using the Vent switch you can open or close the heat.

TO OPEN HEAT: have the vent switch in the close position for 5 seconds, turn to open then back to close, the heat out put will increase by 25%. Wait 5 sec. between switching. (25%, 50%, 75%, 100%)

TO CLOSE HEAT: With the vent switch in the open position for 5 seconds, turn to close then back to open, the heat output will decrease by 25% at a time. Wait 5 seconds between switching. If the vent switch is not moved for 10 min. this mode will return to auto heat control mode.

Kiln Parameter 40

The time (in seconds) for an electric vent motor to open from a closed position. Not to be changed unless a new motor is installed.

SETUP PARAMETERS

Contains parameters specific to each Kiln such as wet bulb type selection, and Kiln fan direction control.

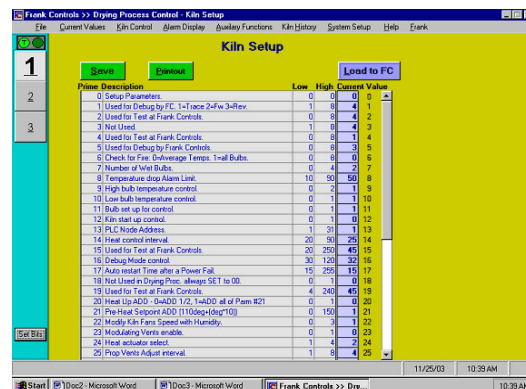


Figure 18 Setup Parameters Screen

Here is a list of Setup Parameters used to set up each kiln.

Setup Parameter 6

Checking for high temperature, possible fire

0 – average of each side

1 – each bulb

Setup Parameter 7

This is the number of wet bulbs installed. It is set to 0 if process parameter #43 is set to 3 or 4.

Setup Parameter 8

If the temperature drop across the load is greater than this value, an alarm stating a possible fan problem is activated.

Setup Parameter 9

This allows the computer to disregard the highest reading from the side 1, side 2, and center RTD's.

0 = Use the high readings.

? = A value set in here will disregard as many high readings on both sides and the center.

Setup Parameter 10

This allows the computer to disregard the lowest reading from the side 1, side 2, and center RTD's.

0 = Use the low readings.

1 = Disregard low reading from both sides and the center.

Setup Parameter 11

This parameter is used to change from disregarding the high and low temperature bulb in the kiln, to omit line (side to center to side) of bulbs if one is faulty.

0 = Disregard high and low bulbs as set in Parameters 9 and 10.

1 = Disregard all bulbs in line if one is faulty, and average the rest.

Setup Parameter 12

This controls which fans start first after pushing the start button.

0 = Circulating fans

1 = Heat fan

Setup Parameter 13

PLC node I.D. number. DO NOT change or Frank control will not be able to communicate with PLC.

Setup Parameter 14

This is the interval, in seconds, between adjustments made to the heat output.

20 = Proportional control

30 = Modulating direct fire

45 = Modulating heat exchangers & steam

Setup Parameter 17

The computer uses this value to delay the restarting of the kiln after a power failure. This is used to stagger the start up of more than one kiln to reduce the demand for electricity after a power failure. It can be set higher. If set lower you will receive an alarm after a power failure.

Kiln #1 set-to 15,
kiln #2 set-to 45,
kiln #3 set-to 75 (ie. - 30 sec. delay between kilns restarting after a power fail)
Kiln #4 set-to 105
Kiln #5 set-to 135

Setup Parameter 18

This sets the time, in minutes, between reversals so a hot oil system can dump excess heat after drying has been completed.

Setup Parameter 22

In high humidity, air becomes thinner. For this reason the fans require more RPM to speed up.

Set to 0 has no effect.

Set to 1 has a small speed increase.

Set to 2 has a larger speed increase.

Setup Parameter 23

This parameter enables electric or pneumatic modulating vents to be controlled proportionally.

0 = Disabled

1 = Enabled.

Setup Parameter 25

Modulating vents. Control loop time.

Setup Parameter 31

Set to 0 the outdoor temperature is used from the PC.

Set to 1 the internal temperature is used and also sent to the PC.

Setup Parameter 34

This allows the kiln to run in the opposite direction from normal operations

0= Side 1 is the reverse side.

1= Side 1 is the forward side.

(Side (1) is always the side where dry bulb #1 is located)

Setup Parameter 35

Balancing heat with kiln fan speed.

With multiple V.F.D. in hot oil kiln:

0 – Small connection

1- Large connection

Setup Parameter 39

Controls the starting speed of the fans in the reverse direction, by a percentage. Used with variable speed drives only (VFD).

Setup Parameter 40

Controls the starting speed of the fans in the forward direction, by a percentage. Used with variable speed drives only.

Setup Parameter 41

Controls the maximum speed of the fans in the reverse direction, by a percentage. Used with variable speed drives.

Setup Parameter 42

Controls the maximum speed of the fans in the forward direction, by a percentage. Used with variable speed drives only.

Setup Parameter 45

The reverse and shutdown have separate timers. This is the temperature where the reverse and shutdown timers start. This is used for cold weather, to stop timing in the thaw out phase. Example, if it takes 4 hours for thaw out, this timer will not start, so the elapsed time will be 4 hrs longer than the time set in parameter 10. If the timer is enabled or the wet bulb goes dry, the kiln will shut down by time before the lumber is dry.

Setup Parameter 46

Heat loss correction in winter. This value is controlling the heat limits in the program, and functions from 60F to 60 below F. If this is set to 20 then at 0 degrees F the heat limit would be 10% higher, at 60 below it would be 20% higher. Over 60F there is no correction.

Setup Parameter 47

M.C. calculation correction via the outside temperature.

Setup Parameter 49

Chart Range in Degrees F.

Setup Parameter 50

Electronic R/H or Wet bulb selection. Used to select wet bulb; RTD, FC Digital, Electronic Wet bulb, or R/H Sensor. Do not change, unless set up requires changing for different installation.

0 = 1- RTDs

1 = 2-Dig bulbs

2 = 1-R/H elect R/H

3 = 1-Electronic W/B

4 = 2-Electronic R/H

5 = 1-Electronic R/H 1-Electronic W/B

6 = 1-Electronic R/H 1-Electronic W/B

7 = 2-Electronic W/B or will display 1 wet & dry bulb at W/B

OTHER FUNCTIONS

This section describes all the extra functions of the PC program that are too small to be placed in their own section.

AUXILARY FUNCTIONS

This is a Menu item in the Main Menu the following is a definition of its sub Menu items.

Charge Number

The Operator must use a common Charge # system for all the Kilns. The Operator can select Type In for special charges, but remember to return the charge numbering system back to its original setting after the special charge has started.

The type of Charge # numbering system is set here. The available selections are:

By Date	-Charge # = yyyy/mm/dd	[yyyy=year, mm=month, dd=day]
By Month	-Charge # = mm ###	[mm=month, ###=index 1-99]
By year	-charge # = yyyy #####	[yyyy=year, #####=index(1-999)]
By type in	-charge # is any combination of characters you choose up to a maximum of 10 characters.	

The index # is incremented +1 for each charge, the index # is reset to 1 for the first charge of the month.

Update Time

This function sends the current date & time from the PC to the Frank Control Computer System to update its real time clock.

Elapsed Time

This allows you to change the current Run time value of a Charge.

Auto Set Parameter 11 & 12

This feature can be turned On & Off. It sets process parameters 11 & 12 in the following manner.

Auto Set On

The Kiln will reverse according to the time at the Reversal Time Limit in process parameter # 9. At this time it will assume the wood is 1.4 x the Target Moisture Content. Parameter 11 will be adjusted from the currently calculated Moisture Content to calculate (1.4 x Target MC). Generally the desired reversal should happen when the free water has been evaporated or 21% MC. Parameter 12 is adjusted when the Kiln shuts down at the time in Run Time Limit in Process # 10. The MC at this time will be assumed to be at the Target MC. Parameter #12 will be adjusted so that the calculated MC=Target MC.

MEMO PAD

The Memo Pad is a unique feature allowing the Operator to chat to Frank Controls personnel during a Modem hookup. The Operator can call Frank Controls Ltd. and request personnel to help troubleshoot or help with the drying process on-line.

USER SETUP

The Kiln Supervisor would have access to use this function. It would be used to provide required people with their own password and access level.

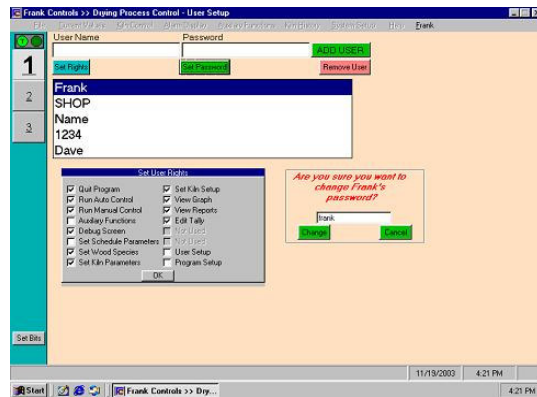


Figure 19 User Setup Screen

To set user rights simply check the rights you want to give them. Then click OK.

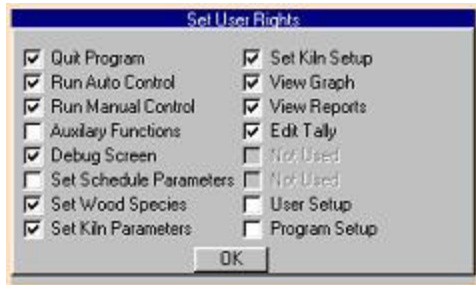


Figure 20 Set User Rights

DEBUG

The Debug window is used primarily by Frank Controls Ltd. to view the contents of the Frank Control Computer System program while it is running. The items available here are Status Registers, Timers, Bulb Status, Ktraces, Traces, I/O's, Heat up, VFD Outputs, Program Version #'s, Digital Bulb Data, View Z80 Data Locations, Get Bulbs Setup, and Get Zones & Extras.

I/O's

This window shows an On/Off indicator for each of the Digital I/O's. This data is retrieved from the PLC. IF the I/O is on the square indicator lights up green.

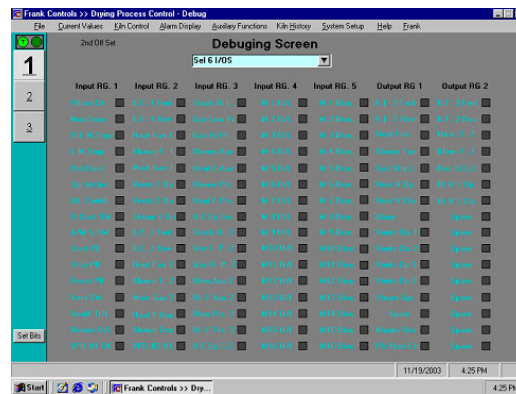


Figure 22 Debug I/O Screen (All I/O's are Off)

VFD OUTPUTS

This window shows the data being sent to the speed control, and the signal retrieved for Current draw.

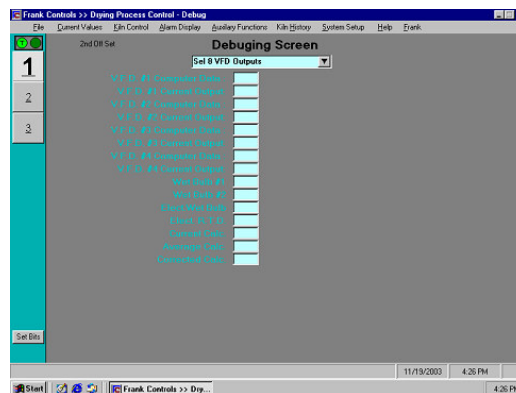


Figure 23 Debug Screen VFD Outputs

DIGITAL BULB DATA

This window shows a code for each of the digital temperature probes.

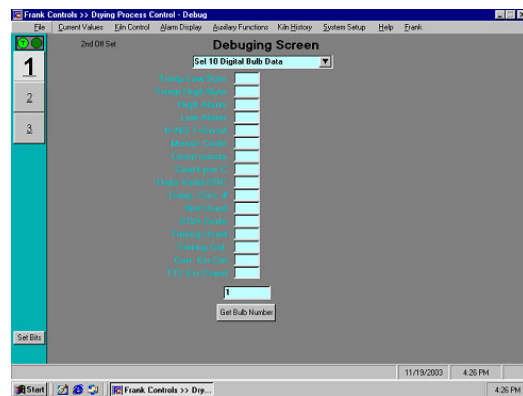


Figure 24 Debug Screen Digital Bulb Data

