BASIC OPERATION OF L&L KILNS WITH A DYNATROL 700

Press the START/STOP Button to start firing the program you have selected. You can also stop a program from firing.

*The **Vary-Fire** section is for advanced users.*

Press Review Prog to see what program you are running and to make sure you have entered the proper cone number.

Review Seg allows you see what segment of the program you are on.

The Other section is for entering options such as cone offsets. thermocouple offsets, etc.

Delay allows you to enter a countdown time to start the program automatically.

The display area provides lots of information such as temperatures, program prompts, etc.

Enter the cone number and other numeric information like delay time using the number keypad.

Choose one of the four Easy-Fire programs. The control will prompt you for cone number and hold time.

Preheat allows you to enter a set time for the kiln to fire at 150°F to dry out your work

Alarm sounds an audible signal at whatever temperature you set. The normal setting of 9999 means it will not go off. Hit ENTER to turn off buzzer.

HOW YOUR KILN WORKS

The DynaTrol automatic program control uses three separate thermocouples to measure temperature in the top, middle and bottom of the kiln (top and bottom in a two section kiln). (Some kilns are programmed to have only one or two zones). The control automatically adjusts power to evenly heat up the kiln according to the program you are firing. The four EASY-FIRE programs make firing most ceramics simple. The programs vary the ramp rates and final temperature reached based on time-proven methods. You do not have to adjust anything once you start firing.

FIRST TEST FIRING OF THE KILN

See the *dynatrol-first-firing.pdf* sheet for detailed instructions on this process.

USING YOUR KILN

TURNING ON THE KILN

1) Make sure your circuit breaker or fused disconnect switch is turned on.

2) Turn on kiln with the toggle On/Off switch on the left side of the control box.

WHEN YOU FIRST TURN ON THE KILN

1) When the kiln is turned on you will see **WAIT** in the DynaTrol display. Wait until you see **IdLE**, **TC2**, and the current temperature cycling over and over in the display.

2) This cycling **IdLE** message means that the DynaTrol is on, ready to be programmed, but the kiln is not firing yet.

3) The current temperature is measured at the tip of the three thermocouples (**TC1**, **TC2**, **TC3**). The default thermocouple reading is TC2. In other words unless you specifically ask the control to show you the temperature at **TC1** or **TC3** then it will only show you

the temperature at **TC2**. Press the **#1** button to see the temperature at **TC1**, or the **#3** button to see the temperature at **TC3**.

IF YOU HAVE A TWO SECTION HIGH KILN

If your kiln has only two thermocouples you will not be able to find **TC3** as there is no third thermocouple. The DynaTrol comes pre-programmed from the factory for your kiln's particular specifications. (Note: if you programmed the control as a single zone control you will only see one temperature and no **TC1, TC2** or **TC3** in the display.

EASY-FIRE OPERATION

1) The EASY-FIRE mode allows you to fire to a CONE NUMBER at one of four different speeds. These are the four preset EASY-FIRE programs that have been designed to do most typical ceramic firing cycles. They are "Fast Bisque", "Slow Bisque", "Fast Glaze" and "Slow Glaze". These preset programs have specific ramps and speeds built into them. (You can find out how these are written in the Appendix of the DynaTrol Reference Section). You can enter any cone number from 022 up to cone 10.

> **CAUTION:** Follow the recommendations of the clay and glaze manufacturer for proper cone to fire to - and keep in mind that if you don't fire to the proper cone you can cause a major meltdown of your work).

2) You can enter a hold time at that final cone setting. (Be careful because you will add heat-work to load when you add soak time)

3) You can enter a delay time (to prevent the program from starting for a while)

4) You can enter a preheat time to "candle" the load at 200°F to help dry it out.

5) You can enter a controlled cooling segment, or other custom segments to the end of the easy-fire program

NOTE ABOUT WHAT YOU SEE: Most DynaTrol's will read 200°F during this phase even though actual temperature in the kiln is about 180°F. This is because the thermocouple offset used to compensate for the thickness of the thermocouple protection tubes acts. When it is climbing the temperature displayed is the real temperature inside the kiln.

6) The above "Easy Options" allow for some degree of customization while still keeping the programming simple and easy.

The EASY-FIRE mode uses the Orton Foundation's patented method to achieve the correct heat work making these programs ideal for firing ceramics. The advantage of using the EASY-FIRE method is that a very complicated firing profile may be chosen with just a few keystrokes. These program's final temperature set points are based on large Orton self-supporting cone (rather than the small Orton cones or regular large Orton cones). The DynaTrol actually calculates when it should shut off based on what cone number was programmed, and how many degrees per hour the kiln was rising at the end of the firing. The DynaTrol actually adjusts the final set point using Orton's patented formula in these Easy-Fire preset programs. (NOTE: This is not always true for the Vary-Fire programs where you can set an absolute final temperature set point).

WHAT IF YOU MAKE A MISTAKE?

NOTE: If you make a mistake while programming (like entering the wrong hold time) and you have already pressed ENTER, you must continue to enter the rest of the program. Once you see IDLE (meaning programming is complete) you must then go back and re-enter the program again.

FIRING THE KILN

1) Make sure **IdLE**, **TC2**, and the **temperature** are flashing. This means that the control is not running a program.

2) Press one of the four easy firing profile buttons: **SLOW BISQUE** or **FAST BISQUE** or **SLOW GLAZE** or **FAST GLAZE**.

3) Press **ENTER**. The display will flash **CONE** and a number representing a cone number (like **06**).

4) Enter the cone number you want to fire to (for instance 5). You can enter any cone number from 022 up to cone 10. It will not let you put cone numbers in outside of this range. If you type a wrong number, press 0/ 0/ ENTER and the previous cone number will reappear in the display. Then type the correct cone

number. BE CAREFUL TO ENTER THE PROPER CONE NUMBER. DO NOT CONFUSE CONE 05 WITH CONE 5 FOR INSTANCE BECAUSE YOU COULD MELT YOUR CONE 05 CLAY.

5) Press **ENTER**. **HOLD** and **0.00** will flash.

6) Enter a hold time or leave at **0.00**. Numbers to the left of the decimal are hours, to the right are minutes.

7) Press **ENTER**. then **IdLE**, **TC2** and the current temperature will flash in the display.

8) Press **START/STOP** to begin firing or read on to enter an optional **Preheat** or **Delay** Start time.

9) When firing is complete the display will flash **CPLT**, the total firing time in hours and minutes (for instance **07.34**) and current temperature inside kiln.

IMPORTANT NOTE ABOUT HOLD TIMES:
Be careful with hold times - this will add to the heat work and will actually fire the work to a higher cone which will not be compensated by the Easy-Fire program. In general we do not recommend using a hold time unless you are carefully monitoring the kiln performance with actual cones.

ENTERING AN OPTIONAL PREHEAT TIME

With any of the EASY-FIRE modes, a preheat stage is available. During the preheat stage the temperature is automatically increased at a rate of 60°F per hour until 200°F is reached; the 200°F temperature is then held for the programmed amount of time.

NOTE: Remember when the kiln holds for a while at 200°F it is it is slowly cooling to 182°F inside the kiln because of the way that the 18°F preprogrammed thermocouple offset acts during a hold time.

Preheat is automatically set to **0.00** during EASY-FIRE programming and at the end of each firing, so if a preheat stage is wanted, it must be reprogrammed for each EASY-FIRE firing.

1) To preheat the kiln for a specific amount of time you must first program an EASY-FIRE program. Once this is done you can add the preheat option to it.

2) Press the **Preheat** button in the **Easy-Options** Section at the bottom of the control. See **HOLD** and **0.00** cycling over and over.

3) Press the number keys to input how long you want the preheat time to be. Numbers to the LEFT of the decimal in the display are hours, i.e. 3 hours of preheat time would look like **03.00**. Numbers to the RIGHT of the decimal in the display are minutes, i.e. 75 minutes of preheat time would look like **00.75**.

4) Press **ENTER** and see **IdLE** meaning that programming the preheat option is complete.

5) Press **START/STOP** to begin firing or read on to enter an optional Delay Start time.

ENTERING AN OPTIONAL DELAY START TIME

This feature makes it easy for you to be present at the end of a firing. You can delay the start of the program by up to 99 hours and 99 minutes.

To program a delay time you need not have programmed any firing profile yet. You can enter a **Delay Time** at any time the control is not firing the kiln. It will apply to the next program you run when you hit **START/STOP**.

1) When the display cycles **IdLE**, **TC2**, **current temperature** over and over. (Control is not firing)

2) Press the **Delay** button in the Easy-Options Section at the bottom of the control. See **dELA** and **0.00** cycling over and over.

3) Press the number keys to enter the amount of delay time desired. Numbers to the RIGHT of the decimal in the display are minutes, i.e. 75 minutes of delay time would look like **00.75**. Numbers to the Left of the decimal in the display are hours, i.e. 14 hours 30 minutes of delay time would look like **14.30**.

4) Press **ENTER** and see **IdLE**, meaning programming the delay option is complete.

5) This delay will appear in the display like a timer counting down when you press **START/STOP** to begin firing. The firing will begin once the timer reaches zero. It will remain set as is until you change it.

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ENTERING AN OPTIONAL ALARM TEMP

You can make the control sound an audible sound at some specific temperature. This can be useful to alert you to do something like pay attention to the end of the firing. It is not very loud.

1) You can enter an Alarm Temperature at any time the control is not firing the kiln. It will apply to the next program you run when you hit **START/STOP**.

2) Press the **Alarm** button in the **Easy-Options** Section at the bottom of the control. See **ALRM** and **9999** cycling over and over. A high value like that means the control will not sound an alarm.

3) Enter a four digit number like **2000**. (This represents 2000°F).

4) Hit **ENTER**

5) The display will go back to flashing **IdLE**, **TC2** and **current temperature.**

When you fire now, the alarm will sound at 2000°F. Once it starts to beep, press **ALARM** or **ENTER** to turn it off.

REVIEWING THE PROGRAM

1) Reviewing your program before you start (or just after) is very important. It can prevent a serious mistake. In particular check the cone number you are firing to. Also it is useful for obtaining the temperature that you reached on your last firing.

2) In the **Review** Section hit **Review Prog** button.

3) The program will scroll. You will see, in the following order, various aspects of the program.

a) The program name (like **S-bC** for Slow Bisque, **F-bC** for Fast Bisque, **S-GL** for Slow Glaze and **F-GL** for Fast Glaze)

b) **PRHT** followed by its value in time (like **3.00** for 3 hours)

c) **CONE** followed by its value (like **05**)

d) **°F** (or **°C)** followed by a value like **1888**.

e) **CNOS** followed by **9020** or some other number which could also be **0000**. The **9020** represents the Cone Offset that may be preprogrammed into the control.

f) **HLOd** followed by the value in time like **0.00** of the Hold Time programmed into the control.

g) **dELA** followed by the value in time like **02.30** if the Delay Start Time is programmed into the control.

h) **ALRM** followed by the value in temperature like **2000**

i) **ERCd** followed by **ON** or **OFF** (See in-depth *dynatrol-instruct-700.pdf* if you want an explanation of this.) Typically Error Codes should be ON.

j) **FIRE** followed by the number of firings the kiln has done.

4) If you are using the VARY-FIRE programs it will be similar except it will scroll through all the segments, ramps and holds for USER programs.

5) If you have added controlled coolings or 16-step options there will be a reference to these steps in the Review Program sequence as well. (See the Reference Manual for more information).

VARY-FIRE OPERATION

With the Vary-Fire mode you may program six different programs. Each program can have up to eight segments. Each segment has a ramp rate (set in degrees Fahrenheit or Centigrade, heating or cooling, per hour), a set point temperature (the temperature that ramp rate will heat or cool to) and an optional hold time at that temperature for up to 99 hours and 99 minutes. (As a contrast, in the Easy-Fire mode, the number of segments and the firing profile are preset. In fact you can find these profiles in the Appendix of the *dynatrol-instruct-700.pdf.* They make a good starting point for creating your own Vary-Fire programs). When the DynaTrol comes to you new it has programs already in place in these six program slots. You can program over them with your own programs or simply use the ones in there. These pre-set programs are outlined in the Reference Manual in Appendix I. In short, they are a glass slumping program, a glass tack fuse program, a glass full fuse program, a glass bead annealing program, a lost wax burnout program, and a slow cooling cycle for cone 6 that can be added to an existing program. Even if you program over these programs, you can get them back from memory any time. Unfortunately any programs you have in there that you have made will be lost if you recall the original default programs.

When programming your programs, the ramp portion of a segment need not always be increasing in temperature. You can program a *decrease* in temperature at a specific rate also. If you wish to use the more sophisticated features and options of the DynaTrol refer to the *dynatrol-instruct-700.pdf*. There are various samples and great detail about options, troubleshooting and theory.

CONTROLLED COOLING

1) If your kiln is cooling too rapidly for good glaze results, or if the cooling is so rapid that cracking occurs on certain large pieces, it is recommended to cool under power. This is accomplished using the following instructions.

2) The Easy-Fire to Vary-Fire feature allows you to fire an Easy-Fire program and then automatically start a Vary-Fire program at the end of the Easy-Fire program. The Vary-Fire to Cone feature allows you to enter a sophisticated Vary-Fire program that fires to a cone number, not to a specific temp.

3) There are complete sections on these subjects along with a step-by-step examples, in the *dynatrol-instruct-700.pdf*.

CHECKING TEMPERATURE & TIME REACHED

1) When an Easy-Fire program is complete it will tell you how long it took to finish the program, and what the temperature is as the kiln cools off.

2) At the end of the program the control will flash CPLT and a number like 7.34. The 7 stands for hours and the 34 stands for minutes. This is how long it took for the kiln to reach final set point. It will also show you the temperature inside the kiln as it cools off.

3) Hit START/STOP. You will then see STOP.

4) Press REVIEW PROGRAM. The display will scroll through the entire program and will show you the actual temperature reached.

ADJUSTING THERMOCOUPLE OFFSET

NOTE: Offsets come already programmed into the control.

For kilns (and protection tubes) made before August 15, 2004 the offsets are as follows:

The thermocouple offset was 0050 (+50°F) when it left the factory. In addition the Cone Offsets came preprogramed. From cone 022 to cone 017 the cone offsets were set at 9030. All other cones were preset at 9020.

For kilns (and protection tubes) made AFTER Oct 1, 2004 the offsets are as follows:

The thermocouple offset is 0018 (+18°F) when it leaves the factory. In addition the Cone Offsets come preprogramed. From cone 022 to cone 017 the cone offsets are set at 9020. There are no cone offsets for other cones.

Note: At room temperature (no heat in the kiln) the control will display a high temperature (it adds the thermocouple offset to the actual room temperature). (Typically it will show from 80°F to 100°F). You can always change thermocouple and cone offsets. The **RESET** option in **OTHER** will NOT reset these settings.

1) The industrial thermocouple protection tubes that are used in your Easy-Fire kiln have many advantages such as long thermocouple life, clean operation (no metallic spalling) and inexpensive replacement cost. However, they do introduce a known error into the system. The thickness of the ceramic tube creates an offset in measured temperature vs the actual kiln temperature. The composition of the tube makes a difference in the necessary offsets. This has changed as we have improved the tube and the offsets preprogrammed into the control reflect the testing that we do in the factory.

2) If you are going to be using the VARY-FIRE programs then Cone Offset won't do anything.

3) See section 4.3.3.5 in the *dynatrol-instruct-700.pdf* for information on how to change Cone Offsets and

section 4.3.3.8 to change Thermocouple Offsets (that is also described just ahead). The RESET option in OTHER will NOT reset these settings.

CALIBRATING THE CONTROL

Some people say their new kiln does not get to temperature during the test firing. There are generally two reasons for this. One reason is that the kiln is empty. Another reason is that the kiln cannot be calibrated until it has reached temperature and melted a cone so someone can see how close it really is, and then adjust it accordingly. (We do not fire the kiln before it ships). The thermocouples can be +/- 10°F when they are brand new.

EMPTY KILN VS. FULL

One difference between an empty and full kiln is that an empty kiln cools a lot quicker which will freeze the cone very quickly. In a full kiln there is a lot of mass in the kiln that is just as hot as the kiln around it. It is this mass (the load in the kiln), radiating it's heat as well, that will continue to melt the cone for a little longer after the kiln has been shut down. Once the kiln is fine-tuned, it is this variable - how you have loaded the kiln- that will account for many of the variations you will see from firing to firing. Another difference is the speed of firing - an empty kiln will fire differently than a full one. Although the control does compensate for this that compensation is not totally perfect.

FINE TUNING THE KILN

You can fine-tune how hot the kiln gets by adjusting the thermocouple offset.

If you can tell the cone bent at all during the first firing, but no more than a little bit, then you can start by reducing the thermocouple offset setting by 5°F.

If you can tell the cone did not bend at all, then you can start by reducing the thermocouple offset setting by 10°F

If it bend more than a little bit, you might wait and see how it does with a load, or start by reducing the thermocouple offset settings just 5°F and then see.

If the cone bent too much you should start by increasing the thermocouple offset by 5°F.

REMEMBER THIS: Adding thermocouple offset lowers the temperature in the kiln, subtracting thermocouple offset raises the temperature. We suggest tuning the kiln for your glaze firings which are more critical and then using cone offsets to adjust bisque temperatures (if you need to).

STEP BY STEP

1) Turn kiln on with toggle switch. Wait 5 seconds.

2) Press 1, wait 5 seconds. The kiln display will say **STOP** and then go into **IdLE** mode.

3) Press **OTHER** about eight times until you see **TCOS**

4) Press **ENTER**. See **TC 1**

5) Press **ENTER** again

6) It will flash between **°FOS** (which stands for Deg F Offset) and **0018** (The **0018** stands for a thermocouple offset of 18°F - which comes preprogrammed into the control to compensate for the ceramic protection tubes. By changing the offset to 0010 we are REDUCING the offset by 8°F- making it fire 8 deg hotter). (NOTE: On older kilns with a slightly different composition thermocouple protection tube the preprogrammed value is **0050**).

7) Press **0008** to reduce thermocouple offset by 10°F.

8) Press **0013** to reduce thermocouple offset by 5°F.

9) Press **ENTER** to accept your input.

10) Do the same for all your thermocouples. The prompts will scroll past in the order of **TC1**, **TC2** and **TC3**.

CONE OFFSETS

Tune your kiln using the thermocouple offset for your most critical firing (typically glaze firings). Then use the cone offset to adjust for other cones that you fire to to get them just right (if they are critical). Typically bisque firings are not very critical. See section 4.3.3.5 in the *dynatrol-instruct-700.pdf* for instructions.

FOR MORE INFORMATION

See our various instruction sheets about cones, specifically *troubleshoot-cones.pdf*.

MISC NOTES AND OVERVIEW

The DynaTrol controls your kiln by firing programs you choose from a bank of available programs in its memory. It has four preset programs: Slow Bisque, Fast Bisque, Slow Glaze and Fast Glaze for any cone number; cone 022 through cone 10. In addition it has six specialized programs for glass and jewelry which can be replaced by your own custom programs, or recalled at any time

To any of these four pre-set programs, you have the option of including a **PREHEAT** to the beginning (for drying). You also have the option of adding a **DELAY** time to delay the start time of the entire program as well. Both of these options are things that you add to a program.

You cannot erase something you have entered. You can only program over it. Say you enter the wrong program, a Slow Glaze instead of a Slow Bisque. You must go ahead and program the whole wrong program with any cone numbers etc, then go and enter the correct program right over top of the wrong one. A preheat must be entered with the regular program every time you want one. The DynaTrol will not remember that you always/never use a preheat with that particular program. Delayed Starts will stay in effect regardless of what else is programmed, until you actually press **DELAY** and change it.

Always press REVIEW PROGRAM to see what program is ready to be fired.

OBTAINING FIRING INFORMATION

There are a number of keys that you can push while the control is operating to get information.

Press "1", "2" or "3" while firing to change which thermocouple reading you see in the LED display.

Press 8 while firing to turn On/Off the ability to see which zones are firing by the LED display dots. Dot on the left is the top zone, dot in the center is the center zone, and the dot on the right is the bottom zone. Don't forget that the dot on the very far right is only on if you are running in Celsius temp scale.

Press 5 while firing and see the current rate of climbing in degrees per hour. This is useful to look at near the end of the program so you can look on a cone chart to accurately see what temperature your kiln will shut off.

Press 0 while firing to see how much time has elapsed since the program began.

Press Review Prog - The information displayed when Review Program is pressed varies depending on whether you are using EASY-FIRE or VARY-FIRE. When Review Program is pressed, each of the steps in the current firing profile is displayed one after another.

When a firing is complete, Review Program is used to see the final temperature reached during the firing.

Press Review Seg - to view the current firing segment or to skip from the current segment to the next segment. When **Preview Seg** is pressed during a firing the current stage of the firing is displayed. If it is pressed in between firings, STOP will flash and then the current temperature will be displayed. When you press **Preview Seg** twice you will see the program set point temperature. When you press it three times you will see the control board temperature.

ERROR CODES & DIAGNOSTICS

See Appendix G in the *dynatrol-instruct-700.pdf* for a list of error codes and their meanings.

See Section 4.4 in the *dynatrol-instruct-700.pdf* for extensive information on how to troubleshoot a firing.

UNDERSTANDING THE DISPLAY

See Appendix D in the *dynatrol-instruct-700.pdf* for a list of all the displays and their meanings.