

DTC 600C & DTC 600 INSTRUCTIONS

Safety Rules

The warranty on your DTC 600 series does not cover damage from overfiring, regardless of the circumstances. It is the operator's responsibility to make sure the kiln turns off at the end of the firing. Follow the safety rules below in addition to the safety rules for your kiln or furnace.

- ALWAYS turn controller on/off switch to off position as soon as kiln shuts off.
- Do not leave kiln unattended near end of firing.
- Wear firing safety glasses when looking into peephole of a hot kiln.
- Do not touch hot sides of kiln or furnace. Keep unsupervised children away.
- Install your kiln or furnace at least 12 inches from any wall or combustible surface. (See manufacturer's recommendation for your model.)
- Do not open lid until kiln or furnace has cooled and all switches are off.
- Fire only in a well-ventilated, covered and protected area. Keep cordset away from hot sides of kiln.
- DANGEROUS VOLTAGE! Do not touch heating elements with anything. Disconnect kiln or furnace before servicing.

Replacing a DTC 100 Series Board with the DTC 600 Series

1 UNPLUG kiln.

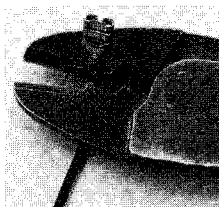
2 Remove the 4 corner screws holding the DTC 100C or DTC 100 faceplate to the switch box. Carefully lift out the faceplate.

3 Loosen screws along the terminal strip on the back of the board. Remove all connecting wires.

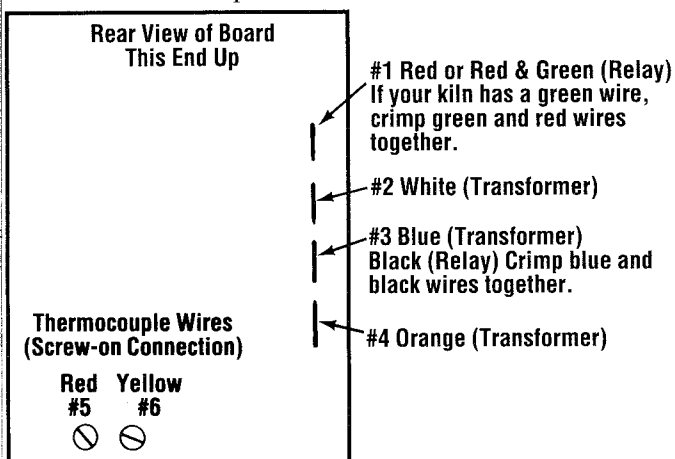
4 Cut off the wire terminals from the wire ends. (Except for thermocouple wires; they attach to DTC 600 series the same way as DTC 100.)

5 Strip 1/4" of insulation from the end of each wire. Crimp a push-on connector (furnished with replacement board) to the wires. If your kiln or furnace has a green wire, crimp it together with the red wire. Also, crimp the blue and black wires together.

Use the type of crimping tool that leaves a small indent on the push-on connector. The indent goes on the side opposite the seam of the connector.



6 Connect wires to board using the diagram below. Install DTC 600 series faceplate to the switch box.



The Basics

Which Instructions Apply to Your Controller

The DTC 600C fires by two methods: Cone-Fire or Ramp-Hold. The DTC 600 fires in Ramp-Hold only.

Cone-Fire is a simplified method of firing to a pyrometric cone. Ramp-Hold, a little more advanced, allows you to adjust firing speed and temperature up to six times during the firing.

On earlier controllers, the Enter/Start key is marked "*" and the Stop key is marked "#".

To Begin, Display IdLE

The controller will display **PF** when you first plug it into an outlet. **PF** also displays after a power failure of over two minutes.

*On the DTC 600, the alarm sounds when you first plug in the controller. To turn the alarm off, turn the toggle switch to the on position and press **ENTER** (*).*

Programming begins from the **IdLE** display. From **PF** or a flashing temperature, press any key (except **STOP**) to display **IdLE**.

*The on/off switch (located near the display window) must be in the on position before **IdLE** will display.*

If the display shows **FAIL** instead of **IdLE**, the thermocouple is either disconnected or burned out.

Time and Temperature Display

During time display, a center display dot lights. During temperature display, the dot disappears. The center display dot is a decimal separating hours from minutes (i.e. 1 hour and 30 minutes displays as 01.30).

You can enter up to 99 hours and 99 minutes, displayed as 99.99. In this example, .99 would seem to be tenths and hundredths of hours, yet .99 is 99 minutes.

°F or °C

The controller operates in °F. or °C. In °C. display, a right-side display dot lights, and in °F., it disappears. To switch from °F. to °C. or visa versa: from **IdLE**, touch **ENTER** (*) then 0. **CHG** will appear. Touch **ENTER** (*) again. This procedure will also clear the current firing program from memory.

The Safety Switch

When the firing is finished, **CPLt** will display alternating with the total firing time in hours and minutes. (Earlier models do not display firing time, only **CPLt**.) Cool-down temperature displays only after the safety on/off switch is turned off.

Turn the on/off switch to the off position right after the kiln shuts off. The switch is designed to prevent power flow to the kiln heating elements.

Before **IdLE** can display, the safety switch must be turned back to the on position.

Setting the Alarm Before Firing

The alarm beeps when a preset temperature is reached.

1 From **IdLE**, touch **ENTER** (*) then 7. **AlAr** will display alternating with the last alarm temperature entered.

2 Enter the new alarm temperature. Then touch **ENTER** (*). **IdLE** will appear. (Enter 9999 to turn alarm off.)

When the alarm sounds during a firing, shut it off by pressing **ENTER** (*). The kiln will continue firing if the alarm temperature is lower than the final firing temperature.

Resetting the Alarm While Firing

After you shut off the alarm during firing, you can set it to go off again at either a higher temperature or a cool-down temperature.

1 The alarm beeps while the kiln is firing. Touch 7.

2 Enter the new temperature.

3 Touch **ENTER** (*). The kiln will continue firing.

*Caution: if you touch 7, enter a new temperature, and forget to press **ENTER** (*), the firing will stop and the kiln will begin to cool down. You must press **ENTER** (*) after entering the new alarm temperature.*

Delay Fire

The Delay Fire programs the kiln to begin firing later. It zeroes out after each completed firing, so if you want to use it for repeat firings, you will need to reset it each time. See Cone-Fire or Ramp-Hold firing instructions.

WARNING: Never leave your kiln unattended near the end of a firing. We cannot guarantee your kiln against overfiring even though it is automatic. Operator assumes full responsibility for shutting the kiln off at the proper time.

Repeat Firings & Program Review

After you have entered a program into the controller, repeat firings are easy. Just press **ENTER** twice from **IdLE**. Use Program Review to make sure you are using the correct program. To start Program Review from **IdLE**, touch **ENTER** (*) then 6. Values for your program will display one after the other. You can also use Program Review during firing simply by pressing 6.

Cone-Fire Mode

This section is for DTC 600C boards, not DTC 600. The DTC 600 uses Ramp-Hold Mode only.

Looking Up a Cone Temperature

Use the Cone Table to look up the temperature rating of a pyrometric cone. Note, however, that pyrometric cones measure the "heat work" of ceramics inside a kiln. The firing temperature

Firing Instructions for Cone-Fire

As the program prompts you for cone, speed, etc., you will see values entered for the last firing. To use these values again, just touch **ENTER** (*).

To begin firing without using Delay Fire: Follow steps 1 through 7. Then from **IdLE** press **START** (*) twice.

- 1 Turn controller ON/OFF switch to the ON position.
- 2 If controller displays **PF** or a flashing temperature, touch **ENTER** (*). **IdLE** will appear.
- 3 Touch **ENTER** (*) then 1. **ConE** will appear. Enter new cone number.
- 4 Touch **ENTER** (*). **SPd** will appear. Enter new speed: **FAST** (1), **MEDIUM** (2), **SLOW** (3).
- 5 Touch **ENTER** (*). **Hold** will appear. Enter new hold time in hours and minutes (e.g. 12 hrs 30 mins = 12.30).
- 6 Touch **ENTER** (*). **IdLE** will appear.
- 7 To set alarm, touch **ENTER** (*) then 7. **AlAr** will appear. Enter new alarm temperature, then touch **ENTER** (*). Enter 9999 if you do not want to set alarm.
- 8 To set delay fire, touch **ENTER** (*) then 3. **dELA** will appear. Enter delay time in hours and minutes (e.g. 12 hours 30 minutes = 12.30). Then press **ENTER** (*). (Delay zeroes out after each firing.)
- 9 To start program, touch **ENTER** (*) twice. **-On-** will appear, then kiln temperature. If a delay was programmed, **-On-** will appear, then time remaining until start.

To stop the program during the firing cycle, touch **STOP** (#) or turn ON/OFF switch to the OFF position. When program fires to completion, **CPLt** will appear alternating with total firing time in hours and minutes. Turn ON/OFF switch to OFF position. To shut off the alarm when it sounds during a firing, press **ENTER** (*).

for a cone will vary depending on firing speed. Therefore, actual firing temperature may not match the temperature from the Cone Table.

1 From **IdLE** display, touch **ENTER** (*) then 9. **ConE** will appear, then the cone currently programmed in Cone-Fire Mode.

2 Enter the pyrometric cone number, then touch **ENTER** (*). The display will show the temperature for the cone you entered. If you enter a non-existent cone number, the display will show **ConE**, ready for you to enter a different cone number.

Choosing Firing Speed

Cone-Fire uses three rates: slow, medium or fast. **FAST** (1), is for small, thin-walled ceramic greenware, overglazes, decals and china paint. **MEDIUM** (2) is for larger, heavier pieces or tightly loaded kilns. **SLOW** (3) is for hand-thrown pottery or porcelain.

Hold (Soak) Time

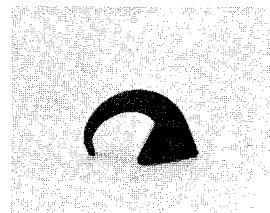
"Hold" means heat-soaking the ware at the end of the firing. You can hold the kiln at the final temperature for up to 99 hours and 99 minutes.

CAUTION: Be very careful how you use Hold. It can easily overfire your ware.

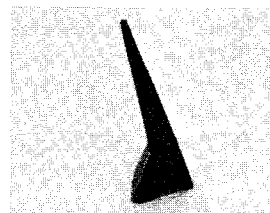
The Witness Cone on the Kiln Shelf

To check the accuracy of the DTC 600C, place a large cone on the kiln shelf, visible through a peephole. Avoid exposure to cool air by keeping the cone at least 3" away from the peephole. Program the DTC 600C for the cone on the shelf and fire. After cooling, check the cone and adjust the next firing as follows:

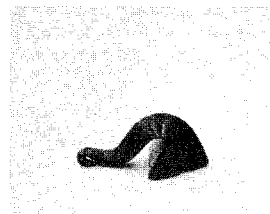
The cone bent to 6 o'clock: In this case, the controller is matched to your kiln.



The cone did not bend far enough: Add a few minutes of hold (soak) time to the next firing. Adjust hold time until the cone bends to 6 o'clock.



The cone bent too far: Program for the next cooler cone number, plus several minutes of hold time. For instance, if a large 05 cone bent too far, fire to a cone 06 with several minutes of hold time. Adjust the hold time until the shelf cone bends to 6 o'clock.



Do not be overly concerned with achieving an exact 6 o'clock bend. The difference between a 3 o'clock and a 6 o'clock bend is only a few degrees. Cones, even from the same box, also vary slightly.

Ramp-Hold Mode

Both the DTC 600C and DTC 600 use Ramp-Hold. In this mode, the kiln fires in segments, or stages. Each segment has a firing temperature, hold (or soak) time, and firing rate. Ramp-Hold includes six segments. Use only the number of segments you need per firing, from one to six.

Rate is ° of temperature change per hour, from 1° to 9999°F. (e.g., to increase temperature by 500° per hour, enter a rate of 500).

To control cooling, set the segment to a lower temperature than that of the preceding segment.

Hold (Soak) Time

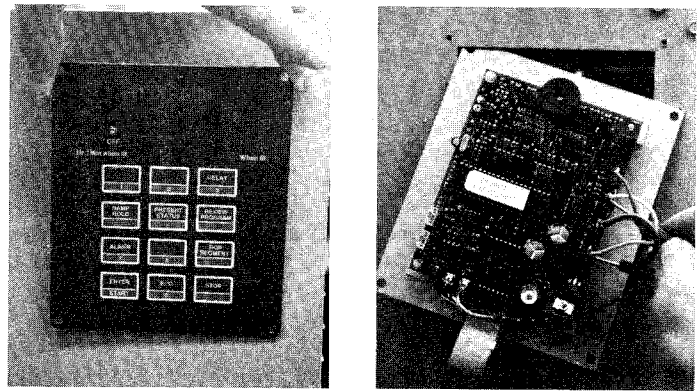
“Hold” means heat-soaking the ware at the end of the segment. You can hold the temperature in each segment for up to 99 hours and 99 minutes.

Present Status

Present Status shows which segment the kiln is in while firing. This is especially useful for firings that have heating-up and cooling-down segments. To use Present Status, press 5 during a firing. The current segment will display momentarily.

Skip Segment

Skip Segment is available only on the DTC 600, *NOT* the DTC 600C. It works only during firing. To skip a segment, press 9. **SSEG** will display. (If you change your mind and don't want to skip that segment, do nothing and the firing will continue as it was.) If you still want to skip the segment, press **ENTER** (*). **rA** will appear along with the segment number you just skipped to.



How to Remove Controller Board

SWITCH BOX WARNING: Do not remove switch box without first unplugging kiln or furnace. Touching a live connection inside switch box could be fatal. Kiln must be unplugged anytime switch box is removed from kiln.

UNPLUG the kiln. Remove the four screws holding the faceplate to the switch box.

When checking controller board with a voltmeter, remove only controller faceplate and not the switch box. Before removing controller board, unplug the kiln. Then let the controller board hang on the switch box with the back of the board facing you. Plug the kiln back in before testing the board. The reason to unplug the kiln before you remove the controller board is that some electronic components will be destroyed if they touch a grounded object with the kiln plugged in. See chart on page 1 for connection numbers on back of board.

Problem #1

Controller Display Does Not Light Up And Elements Do Not Fire.

Probable Causes:

- Tripped Circuit Breaker or Blown Fuse, Kiln Unplugged
- Blown Kiln Switch Box Fuse
- Defective Transformer
- Defective Controller Board
- Disconnected Switch Box Wire

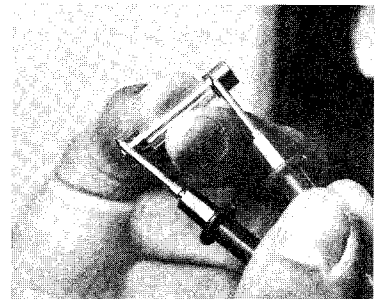
Check circuit breakers or fuses. Remove kiln's fuse and check it by placing the probes of an ohmmeter on the ends of the fuse. If the ohmmeter reading is 0 ohms, the fuse is okay. If the reading is infinity or no needle movement, the fuse is bad. Replacement fuse:

SS2-250mA 250V AC

Next check the controller board with a voltmeter. Make sure kiln is unplugged, and remove the 4 screws holding the controller board faceplate to the switch box. Lift faceplate out of box and let the board hang on the box with the back of the board facing you. Plug the kiln back in. Touch voltmeter probes (in AC mode) to connectors 2 and 4. (This should be the white and orange wires.)

Make sure the voltmeter is in the AC mode when placing the probes on connectors 2 and 4.

If you find voltage (approximately 20 volts AC), it means current is reaching the board from the transformer, so the board is probably defective. If there is no voltage, the transformer is probably defective. But before replacing the transformer, UNPLUG kiln, remove switch box, and look for a disconnected wire



Firing Instructions for Ramp-Hold

As the program prompts you for segments, rate, temperature, etc., you will see values from the last firing. To use these again, just touch **ENTER** (*).

To begin firing without using Delay Fire: Follow steps 1 through 9. Then press **START** (*) twice.

- 1** Turn controller on/off switch to the on position.
- 2** If controller displays **PF** or a flashing temperature, touch **ENTER** (*). **IdLE** will appear.
- 3** Touch **ENTER** (*) then **4**. **SEGS** will appear. Enter number of segments you will use.
- 4** Touch **ENTER** (*). **rA 1** will appear. Enter firing rate for segment 1 (any temperature from 1° to 9999° F. per hour).
- 5** Touch **ENTER** (*). **F 1** will appear. Enter the temperature you will be firing to in segment 1.
- 6** Touch **ENTER** (*). **HLd1** will appear. Enter segment 1 hold time in hours and minutes (e.g. 12 hours and 30 minutes = 12.30).
- 7** Continue entering values for all segments.
- 8** After entering values for last segment, touch **ENTER** (*). **IdLE** will appear.
- 9** To set alarm, touch **ENTER** (*) then **7**. **AlAr** will appear. Enter alarm temperature. Then touch **ENTER** (*). (Enter 9999 if you do not want to set alarm.)
- 10** To set Delay Fire, touch **ENTER** (*) then **3**. **dELA** will appear. Enter delay time in hours and minutes (e.g. 12 hours and 30 minutes = 12.30). Then touch **ENTER** (*). (Delay zeroes out after each completed firing.)
- 11** To start program, touch **ENTER** (*) twice. **-On-** will appear, then kiln temperature. If a delay was programmed, **-On-** will appear, then time remaining until start.

To stop program during the firing cycle, touch **STOP** (#) or turn ON/OFF switch to the OFF position. When program fires to completion, **CPLT** will appear alternating with total firing time in hours and minutes. Turn ON/OFF switch to the OFF position. To turn the alarm off when it sounds during a firing, press **ENTER** (*).

between the cord set and transformer and between the transformer and controller board.

Problem #2:

Controller Display Lights Up Normally, Some or All Elements Do Not Fire

Probable Causes:

- Worn or Burned Out Elements
- Defective Controller Board
- Defective Relay(s)
- Disconnected Wire in Switch Box

First check the controller board with a voltmeter. Unplug the kiln and remove the 4 screws holding the controller board faceplate to the switch box. Lift faceplate out of box and let the board hang on the outside of the box with the back of the board facing you. Then plug the kiln back in. Program the controller to fire the kiln at full power.

Put the voltmeter in DC mode. (It *must* be in DC mode.) Touch probes to connectors 1 and 3. If voltage is present, current is going to the relays from the board, so the board is okay. If there is no voltage at 1 and 3, replace the board.

If the controller board checks out okay, *UNPLUG* kiln and remove switch box. Look for loose or disconnected board-to-relay, relay-to-element, and cordset-to-relay wires.

If you still haven't found the problem, check elements with an ohmmeter. (Kiln is still *UNPLUGGED*.) Touch the ohmmeter leads to the two element connectors of each element. A no-needle movement indicates a broken (burned out) element. If you find two or more sets of element lead wires attached to the same relay or switch, you have elements wired in parallel. Elements wired in parallel can give you an ohmmeter reading even on element connectors of a burned out element. This is because the current from the ohmmeter is passing through the other parallel element(s). See your kiln's wiring diagram for further instructions on testing parallel-wired elements.

If the elements and wiring check out okay, the problem is most likely a relay.

Problem #3:

Controller Displays PF

Probable Causes:

- Temporary Power Failure
- Low Voltage at Wall Receptacle
- Corroded Cord Plug or Wall Receptacle
- Defective Transformer
- Disconnected Wire or Loose Connection

PF is the normal display message when you first plug in your DTC 600 series controller. **PF** means either Power Failure or that the kiln was just turned on. If the power shuts down for more than two minutes, the controller with display **PF**.

Low voltage can also cause this reading. If you did not have a power failure and your controller displays **PF**, have the power company or an electrician check the wall receptacle for low voltage. A 240 v. kiln needs at least 210 v. to operate the control system, and a 208 v. kiln needs at least 200 v. Sometimes there is just enough voltage to program the board. But when the relays turn on, the voltage from the transformer is drained below the minimum operating level, and the board displays **PF**.

If the voltage at the wall receptacle is okay, *UNPLUG* kiln, remove switch box, and look for a wire that has disconnected from a relay. If a wire comes loose from a relay and touches anything grounded in the switch box, it will make the board read **PF** when you start the program.

Sometimes corrosion on the kiln's cord plug or wall receptacle will cause a **PF** display. Pull the plug from the wall receptacle and slide it back in several times to remove the corrosion. A loose wall receptacle screw or loose circuit breaker screw can also cause a **PF** display.

Replace transformer if the wall receptacle voltage and switch box wiring are okay.

Problem #4:

Controller Displays FAIL

Probable Causes:

- Defective Thermocouple
- Disconnected Thermocouple Lead Wires
- Defective Board

The controller displays **FAIL** when the thermocouple (the temperature-sensing device in the firing chamber) burns out.

UNPLUG kiln. Remove the 4 screws holding the controller faceplate to the switch box. Lift faceplate out of box. Look at the back of the board. You will see a yellow and a red wire connected to connectors #5 and 6 near the bottom of the board. If one of these wires is disconnected or loose, reconnect or tighten. The controller should work now.

If the wires are attached securely to connectors #5 and 6, remove them from their connections. Touch ohmmeter probes to the red and yellow wires. If you get continuity (0 ohms), replace board.

If there is no movement of the ohmmeter needle (infinity, or no continuity), you have either a burned out thermocouple or a disconnected thermocouple wire. Make sure the kiln is unplugged. Remove the thermocouple holddown bracket and examine the thermocouple and thermocouple lead wires. (On some models, you will need to remove the switch box to remove the thermocouple.)

Problem #5:

Controller Displays Err 0

Probable Causes:

- Electrical Spike
- Arcing on Relay
- Lightning

When **Err 0** displays, press any key. The display will go back to **IdLE**. Check your program to make sure it wasn't cleared from memory. Then fire your kiln again.

Problem #6:

Controller Displays Err 1 (applies only to DTC 600C)

Cause:

- Temperature Rise Slower Than 18° F. Per Hour

When the temperature rise slows to less than 18° F. per hour, the controller will shut off and display **Err 1**. A kiln that fires this slowly may need new elements, voltage may be low, or you may be trying to fire hotter than the kiln was designed for.

Press any key. The display will show the last temperature the kiln reached before it shut off. Then it will go back to **IdLE**.

Problem #7:

Controller Displays Err 6

Cause:

- Thermocouple Leads Hooked Up Backwards

Remove board using instructions in Problem #4. Reverse thermocouple leads on back of board.

Problem #8:

Controller Displays Err 8 (applies only to TnF II)

Cause:

- The Kiln Sitter® Shut Off Kiln

The Kiln Sitter® shut off the kiln before the controller fired to completion.