



**KILNS BUILT TO LAST**

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## **Chameleon Kiln**

*Using the 3 Key Bartlett Digital Controller*

# Starter Projects for Fusing & Slumping

With Step-By-Step Instructions

By Marty Dailey

## BEGINNING GLASS PROJECTS FOR CHAMELEON HOBBY KILN

After gaining knowledge in basic fusing and slumping the Chameleon Kiln will provide the new glass artist with the perfect tool for successful fusing and slumping.

*This gallery of photos shows some projects which can be made using a Chameleon Kiln.*



# BEGINNING GLASS PROJECTS FOR CHAMELEON HOBBY KILN

## Introduction

This pamphlet will present two starter projects which provide step by step instruction in the operation of the Chameleon Kiln.

- ✚ In the first project we will create a necklace.
- ✚ The second project we will create a plate.

There is no substitute for a formal basic fusing and slumping course which provides instruction in safety in working with glass and glass tools along with the fusing and slumping instruction.

This project starter pamphlet is not intended to replace a formal basic fusing class; it is a guide for the digital controller operation. The assumption is made that you have the following basic knowledge and skills.

1. You have read and understand the operation manual for safe installation and operation of the Chameleon Kiln.
2. Studio safety practices
3. How to cut glass
4. How to shape glass with a small tabletop glass grinder
5. Glass has a characteristic referred to as C.O.E. and glass with different C.O.E.s CANNOT be mixed and fused together. There are two primary glass C.O.E.s used by warm glass artists.
  - i. C.O.E. 90 which is Bullseye Glass and Uroboros Glass
  - ii. C.O.E. 96 which is Spectrum Glass and Uroboros Glass
6. How to properly clean glass
7. Clear Glass (you can see through it, has no color)
8. Transparent Glass (you can see through it, comes in many colors)
9. Opal Glass (cannot see through, it is a solid color)
10. Dichroic Glass

## Kiln Preparation

### **Location – Safety considerations**

- ✚ Refer to Chameleon Kiln operation manual.

### **Leveling**

- ✚ You want to have a level kiln shelf when firing. If the shelf is not level the glass will distort due to gravity. You do not level the kiln but rather level the kiln shelf. Position the kiln where you want to use it then put the shelf posts inside the kiln and the kiln shelf on the shelf posts (never put a ceramic kiln shelf flat on the floor of a kiln – it may thermoshock and break). Use a “torpedo level” (this is a level which is about 10 inches long). Place the level in the center of

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the kiln shelf pointing from the left front corner to the right rear corner then shim the base of the kiln. Now rotate the level so it is pointing from the right front corner pointing to the left rear corner then shim the base of the kiln.

## Kiln Wash

- ✚ You can use powdered kiln wash which you mix with water or you can use thin fire shelf paper instead. Some artists use Lava Cloth instead of the kiln wash or thin fire shelf paper. Lava Cloth leaves a texture on the back of the glass.

## Controller

- ✚ Refer to the Chameleon Kiln operation manual.

## Flash / quick cooling

- ✚ With a digital controller there is no need to flash cool the kiln during fusing.

## Glass Preparation

### Choosing Glass

- ✚ Thin glass is approximately 1.6mm thick. (1/16 inch)
- ✚ Standard thickness glass is approximately 3mm thick. (1/8 inch)
- ✚ The projects below lists glass we have chosen for those projects. You may choose any color glass you wish. Be sure the C.O.E. (coefficient of expansion) is the same for all glass used for your project.

### Cutting & Grinding

- ✚ Cut your glass to the size you desire for your jewelry pieces. Plates and bowls should be cut to the appropriate size for the mold you are using.
- ✚ Remember when using a grinder you will have a rough edge on the glass after grinding which may show as a gray band around the glass after fusing. Using diamond sanding pads with water to smooth the edges after grinding will reduce or prevent this gray band around the glass.
- ✚ Always follow eye and respiration safety procedures when cutting and grinding glass.

### Cleaning

- ✚ Clean finger prints, oil and other blemishes from your glass before you place it in the kiln. Do not use any glass cleaner or soaps. Use tap water by itself. Using cleaners and soap will leave a film on the glass which will show up after the glass is fired. You can use isopropyl alcohol to remove oils and other blemishes then use water.

### Making holes

- ✚ There are several ways to put holes in glass for jewelry. We only discuss using the fiber paper (looks like white felt) for the project below.

### Attaching findings

- ✚ Findings are pins and bails. Pins are pin backs which have a safety clasp. Bails are loops through which a chain or cord may pass for necklaces.

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## Assembly on shelf outside kiln vs. inside kiln

- ✚ For our projects we assemble the glass on the kiln shelf while the shelf is inside the kiln. Some artists assemble the glass on the kiln shelf outside the kiln and then place the shelf into the kiln with the glass already on it. We do not do this because you usually have to glue the glass pieces in place with each other so they do not move while transferring the shelf from the work table and placing it inside the kiln.

The following information is not to replace the instructions provided in the Chameleon Kiln owner's manual. Refer to the owner's manual for complete information in the safe operation and features of the digital controller.

## Notes:

- ✚ The firing schedules below are for use with Bullseye, Uroboros, or Spectrum Glass. They are not for use with float or borosilicate glass.

## Fused Glass Pendant



This project consists of three layers of glass.

- ✚ The first layer is called the “Base”, which will be the bottom or back of the project.
  - ✚ The second layer is the artistic design portion of this project.
  - ✚ The third layer of glass is called the “Cap”; it goes on the top and is usually clear glass.
1. Cut a piece of “Base Glass” (thin black-1/16“ -1.6mm) 1” (25.4 mm x 1 ½” (38.1mm)

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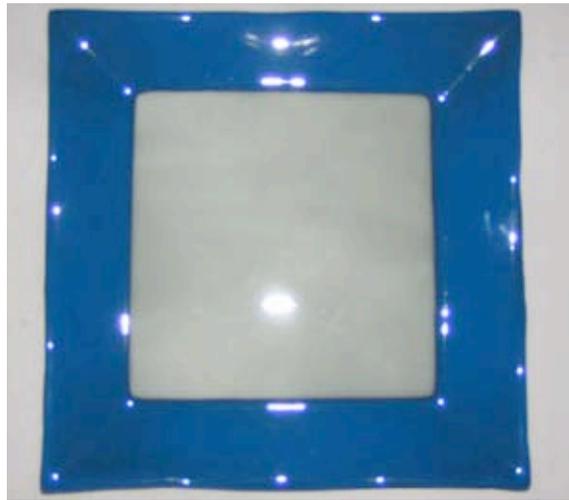
2. Cut a piece of “Cap Glass” (thin clear-1/16” – 1.6mm) slightly larger (1/8” 3.2mm length & width) than the “Base Glass”.
3. Select and cut the design portion glass. We chose 2 pieces of dichroic glass for this project, however many artists are now using bright colors of opal glass instead of the dichroic. You may use the glass of your choice for this project.

- ✚ Be sure you have applied kiln wash to the shelf and allowed the shelf to completely dry out.
- ✚ Clean glass then assemble in the kiln on the kiln shelf.
- ✚ If you want a hole through your pendant assemble the pendant with a small piece of fiber paper. (Ceramic paper looks like white felt). Cut the fiber paper so it is 1/8” (3.2mm) square by 2” (50.8mm) long and then position it horizontally across the base glass so you will have a hole through the glass when the top pieces fuse to the base glass. This is done by placing the fiber paper on top of the base glass, then the design elements, and then the cap on top of the fiber paper.
- ✚ If you do not want a hole through the glass simply place the glass in the kiln. Following fusing the glass you will glue a bail to the back of the pendant.
- ✚ Close the kiln and program the digital controller with your firing sequence. There are many firing sequences one can use from a simple single segment to very complex multiple segments.
- ✚ The following single segment will perform fine for this project. See Appendix A for step-by-step operation of the Bartlett 3 key digital controller for this project.
  4. Ramp at 300°F(165°C) per hour
  5. Soak at 1425°F (775°C)
  6. Soak for 15 minutes
  7. Let the kiln cool down to 100°F (38°C) before opening and removing your project.
- ✚ Remove the fiber paper from the pendant and clean with plain water after removing from the kiln.

Or

- ✚ Clean with plain water after removing from the kiln and glue the bail to the back of the pendant.
- ✚ Place your silver chain through the hole or bail.
- ✚ Your finished jewelry project is now ready to be worn.

## Fused & Slumped Glass Plate



Note: the white spots are light reflections

### **This project consists of two layers of glass.**

- ✚ The first layer is called the “Base”. The base glass is the bottom or back of the project.
- ✚ The second layer is the artistic design portion of this project.
- ✚ We selected a Future Form Mold for a 10 inch square Ruffle Sushi Plate. (Model: G-1015). You may choose any mold you like for your project.
- ✚ We selected standard thickness (3mm) medium blue opal glass as our base glass. We cut the base glass to 10 inches square to fit our mold.
- ✚ We selected standard thickness (3mm) off white opal glass as our design element. We cut our design element 6 inches square. This size was chosen because it is the same dimension as the flat bottom portion of our plate.
- ✚ Note: We chose not to “cap” this project. The two layers of standard thickness glass for this size plate will be strong enough. However, if you are using other design elements you may want to clear cap your project to give it added strength plus it will give the appearance of depth when looking at the design elements.
- ✚ Clean your glass then assemble in the kiln on the kiln shelf. We were careful to center the off white design element in the center of the blue base glass.
- ✚ Close kiln and program digital controller for your firing sequence. There are many firing sequences one can use from a simple single segment to a very complex sequence with 8 segments.
- ✚ The following two segment sequence will perform fine for the fusing portion of this project. See Appendix B for step-by-step operation of the Bartlett 3 key digital controller for this project.

1. Ramp at 300°F (165°C) per hour

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2. Soak at 1450°F (790°C)
  3. Soak for 15 minutes
  4. Ramp down at 200°F (110°C) per hour
  5. Soak at 100°F (38°C)
  6. Soak for 30 minutes
  7. Remove when cool enough to handle with your hands
- ✚ This 2 segment program has a cool down and annealing phase. We chose to include the cool down segment so you would have an example of entering 2 or more segments. This project would fire fine with a single segment.
- ✚ **Note:** While the kiln is fusing the glass prepare your mold by cleaning and applying kiln wash to the surface. Kiln wash provides a coating so glass will not stick to the mold when firing. After applying the kiln wash you can place the mold on top of the kiln, while the glass is fusing the heat from the kiln will dry the mold.
- ✚ Following the fusing cycle and the kiln has cooled down remove the project from the kiln and clean any residual kiln wash off the glass.
- ✚ Place the mold in the kiln then place the fused glass on the top of the mold. Be sure that the glass is centered on the mold and there is no glass hanging over the edge of the mold. Centering is extremely critical when using round molds, if not centered properly the glass may shift during the firing resulting in a strange looking bowl.
- ✚ The following two segment sequence will perform fine for the slumping portion of this project. See Appendix C for step-by-step operation of the Bartlett 3 key digital controller for this project.
8. Ramp at 200°F (110°C) per hour
  9. Soak at 1250°F (675°C)
  10. Soak for 15 minutes
  11. Ramp down at 200°F (110°C) per hour
  12. Soak at 100°F (38°C)
  13. Soak for 30 minutes
  14. Remove when cool enough to handle with your hands
- ✚ This 2 segment program has a cool down and annealing phase.
- ✚ Your finished plate project is now ready for use or display.

# BEGINNING GLASS PROJECTS FOR CHAMELEON HOBBY KILN

## Appendix A

### Step By Step Fusing Sequence For Jewelry

1. Toggle the ON /Off switch to the ON position.
2. The controller will display “ErrP”
3. Press the “Enter” key. The display will flash between “IdLE” and a number, this is the temperature inside the kiln.
4. Press ”Enter” key. The display will have “USr” with a number from 1 – 4. The controller is asking which user program you wish to use. There are 4 user programs you may choose from. You can set USr 1 for a fusing project and you can set USr 2 for a slumping project, as an example.
5. Press the “UP” or “DOWN” key until the display has a 1. You have chosen to use USER 1 program.
6. Press “Enter” key. The display will flash between “dELA” and a number with a decimal point.
7. Press the “UP” or “DOWN” key until the display has 00.00
8. Press “Enter” key. The display will flash between “SEG” and a number. The controller is asking how many segments you want to use for your firing. You can choose from 1 to 8 segments. We will use 1.
9. Press the “UP” or “DOWN” key until the display has a 1.
10. Press “Enter” key. The display will now flash “rA 1” and a number. It is asking for the ramp rate in degrees per hour.
11. Press the “UP” or “DOWN” key until the display has 300. You have instructed the controller to heat at 300°F (165°C) per hour. This means after 1 hour the kiln will be at room temperature plus 300°F (165°C), after 2 hours it will be at room temperature plus 600°F (330°C), and so forth.
12. Press “Enter” key. The display will now flash “°F 1” and a number. It is asking for the soak temperature.
13. Press the “UP” or “DOWN” key until the display has 1425. You have instructed the controller to heat to 1425°F (775°C). This means that the kiln will heat at a rate of 300°F (165°C) per hour and go to 1425°F (775°C), taking 4.75 hours.
14. Press “Enter” key. The display will now flash “HLd 1” and a number with a decimal point 2 digits to the left, You may have a number which looks like 12.30 or 1.20 or 0.20. The decimal point separates minutes from hours. Hours to the left of the decimal point and minutes to the right of the decimal point. The controller is asking for the soak time period for the first segment.
15. Press the “UP” or “DOWN” key until the display has “00.15”. You have instructed the controller to soak for 15 minutes at 1425°F (775°C).

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16. Press “Enter” key. The display will have “rED 1”. You have finished programming User 1 for this fusing project.
17. Press “Start” key. (it is the same key as the “Enter” key). The controller will now start the kiln and perform the firing sequence you have just entered.
18. Allow the kiln to cool down to at least 100°F (38°C) before removing your piece.

**Do NOT open the kiln and “peek” at the glass when the kiln is less than 1000°F (535°C); doing so may cause the glass to thermoshock and break.**

**The above glass firing sequence has instructed the kiln to do the following.**

- 🔥 Heat at 300°F(165°C) per hour, go to 1425°F (775°C), stay at that temperature for 15 minutes then stop firing.

**Note:** We did not enter an annealing segment because the kiln cools slowly that the jewelry pieces will pass through the annealing temperature range slow enough to anneal.

The digital controller has the above firing sequence in its memory as USER 1. It will remember this firing sequence even after the kiln is turned off. You can edit and change the firing sequence any time.

## Appendix B

### Step By Step Fusing Sequence For Plates & Bowls

1. Toggle the ON /Off switch to the ON position.
2. The controller will display “ErrP”
3. Press the “Enter” key. The display will flash between “IdLE” and a number, this is the temperature inside the kiln.
4. Press “Enter” key. The display will have “USr” with a number from 1 – 4. The controller is asking which user program you wish to use. There are 4 user programs you may choose from. You can set USr 1 for a fusing project and you can set USr 2 for a slumping project, as an example.
5. Press the “UP” or “DOWN” key until the display has a 1. You have chosen to use USER 1 program.
6. Press “Enter” key. The display will flash between “dELA” and a number with a decimal point.
7. Press the “UP” or “DOWN” key until the display has 00.00
8. Press “Enter” key. The display will flash between “SEG” and a number. The controller is asking how many segments you want to use for your firing. You can choose from 1 to 8 segments. We will use 2.
9. Press the “UP” or “DOWN” key until the display has a 2.

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10. Press “Enter” key. The display will now flash “rA 1” and a number. It is asking for the ramp rate in degrees per hour.
11. Press the “UP” or “DOWN” key until the display has 300. You have instructed the controller to heat at 300°F(165°C) per hour. This means after 1 hour the kiln will be at room temperature plus 300°F(165°C), after 2 hours it will be at room temperature plus 600°F (330°C), and so forth.
12. Press “Enter” key. The display will now flash “°F 1” and a number. It is asking for the soak temperature.
13. Press the “UP” or “DOWN” key until the display has 1450. You have instructed the controller to heat to 1450°F (790°C). This means that the kiln will heat at a rate of 300°F (165°C) per hour and go to 1450°F (790°C), taking 4.8 hours.
14. Press “Enter” key. The display will now flash “HLd 1” and a number with a decimal point 2 digits to the left, You may have a number which looks like 12.30 or 1.20 or 0.20. The decimal point separates minutes from hours. Hours to the left of the decimal point and minutes to the right of the decimal point. The controller is asking for the soak time period for the first segment.
15. Press the “UP” or “DOWN” key until the display has “00.15”. You have instructed the controller to soak for 15 minutes at 1450°F (790°C).

### **You have entered the first segment. You are now entering the second segment.**

1. Press “Enter” key. The display will now flash “rA 2” and a number. It is asking for the ramp rate in degrees per hour for the second segment.
2. Press the “UP” or “DOWN” key until the display has 200. You have instructed the controller to cool at 200°F (110°C) per hour.
3. Press “Enter” key. The display will now flash “°F 2” and a number. It is asking for the soak temperature.
4. Press the “UP” or “DOWN” key until the display has 100. You have instructed the controller to cool down to 100°F (38°C). This means that the kiln will cool at a rate of 200°F (110°C) per hour and go to 100°F (38°C), taking 6.75 hours.
5. Press “Enter” key. The display will now flash “HLd 2” and a number with a decimal point 2 digits to the left, You may have a number which looks like 12.30 or 1.20 or 0.20. The decimal point separates minutes from hours. Hours to the left of the decimal point and minutes to the right of the decimal point. The controller is asking for the soak time period for the first segment.
6. Press the “UP” or “DOWN” key until the display has “00.30”. You have instructed the controller to soak for 30 minutes at 100°F (38°C).
7. Press “Enter” key. The display will have “rED 2”. You have finished programming User 1 for this fusing project.

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8. Press “Start” key. (it is the same key as the “Enter” key). The controller will now start the kiln and perform the firing sequence you have just entered.
9. Allow the kiln to cool down to at least 100°F (38°C) before removing your piece.

**Do NOT open the kiln and “peek” at the glass when the kiln is less than 1000°F (535°C); doing so may cause the glass to thermoshock and break.**

You have entered the second and final segment. The digital controller has the above firing sequence in its memory as USER 1. It will remember this firing sequence even after the kiln is turned off. You can edit and change the firing sequence any time.

Note: The digital controller does not understand heating or cooling. It only understands what temperature it is at and what temperature it is to go to. Thus it will adjust the firing to go to the destination temperature.

**The above glass firing sequence has instructed the kiln to do the following:**

- ✚ Heat at 300°F(165°C) per hour, go to 1450°F (790°C), stay at that temperature for 15 minutes then cool at 200°F (110°C) per hour, go to 100°F (38°C) and stay at that temperature for 30 minutes then stop firing.

## Appendix C

### *Step By Step Slumping Sequence For Plates & Bowls*

1. Toggle the ON /Off switch to the ON position.
2. The controller will display “ErrP”
3. Press the “Enter” key. The display will flash between “IdLE” and a number, this is the temperature inside the kiln.
4. Press ”Enter” key. The display will have “USr” with a number from 1 – 4. The controller is asking which user program you wish to use. There are 4 user programs you may choose from. You can set USr 1 for a fusing project and you can set USr 2 for a slumping project, as an example.
5. Press the “UP” or “DOWN” key until the display has a 1. You have chosen to use USER 1 program.
6. Press “Enter” key. The display will flash between “dELA” and a number with a decimal point.
7. Press the “UP” or “DOWN” key until the display has 00.00
8. Press “Enter” key. The display will flash between “SEG” and a number. The controller is asking how many segments you want to use for your firing. You can choose from 1 to 8 segments. We will use 2.
9. Press the “UP” or “DOWN” key until the display has a 2.

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10. Press “Enter” key. The display will now flash “rA 1” and a number. It is asking for the ramp rate in degrees per hour.
11. Press the “UP” or “DOWN” key until the display has 300. You have instructed the controller to heat at 300°F (165°C) per hour. This means after 1 hour the kiln will be at room temperature plus 300°F (165°C) , after 2 hours it will be at room temperature plus 600°F (330°C), and so forth.
12. Press “Enter” key. The display will now flash “°F 1” and a number. It is asking for the soak temperature.
13. Press the “UP” or “DOWN” key until the display has 1250. You have instructed the controller to heat to 1250°F (675°C). This means that the kiln will heat at a rate of 300°F(165°C) per hour and go to 1250°F (675°C), taking 4.2 hours.
14. Press “Enter” key. The display will now flash “HLd 1” and a number with a decimal point 2 digits to the left, You may have a number which looks like 12.30 or 1.20 or 0.20. The decimal point separates minutes from hours. Hours to the left of the decimal point and minutes to the right of the decimal point. The controller is asking for the soak time period for the first segment.
15. Press the “UP” or “DOWN” key until the display has “00.15”. You have instructed the controller to soak for 15 minutes at 1250°F (675°C).

**You have entered the first segment. You are now entering the second segment.**

16. Press “Enter” key. The display will now flash “rA 2” and a number. It is asking for the ramp rate in degrees per hour for the second segment.
17. Press the “UP” or “DOWN” key until the display has 200. You have instructed the controller to cool at 200°F (110°C) per hour.
18. Press “Enter” key. The display will now flash “°F 2” and a number. It is asking for the soak temperature.
19. Press the “UP” or “DOWN” key until the display has 100. You have instructed the controller to cool down to 100°F (38°C). This means that the kiln will cool at a rate of 200°F (110°C) per hour and go to 100°F (38°C), taking 5.75 hours.
20. Press “Enter” key. The display will now flash “HLd 2” and a number with a decimal point 2 digits to the left, You may have a number which looks like 12.30 or 1.20 or 0.20. The decimal point separates minutes from hours. Hours to the left of the decimal point and minutes to the right of the decimal point. The controller is asking for the soak time period for the first segment.
21. Press the “UP” or “DOWN” key until the display has “00.30”. You have instructed the controller to soak for 30 minutes at 100°F (38°C).
22. Press “Enter” key. The display will have “rED 2”. You have finished programming User 1 for this slumping project.
23. Press “Start” key. (it is the same key as the “Enter” key). The controller will now start the kiln and perform the firing sequence you have just entered.

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24. Allow the kiln to cool down to at least 100°F (38°C) before removing your piece.

**Do NOT open the kiln and “peek” at the glass when the kiln is less than 1000°F (535°C); doing so may cause the glass to thermoshock and break.**

You have entered the second and final segment. The digital controller has the above firing sequence in its memory as USER 1. It will remember this firing sequence even after the kiln is turned off. You can edit and change the firing sequence any time.

Note: The digital controller does not understand heating or cooling. It only understands what temperature it is at and what temperature it is to go to. Thus it will adjust the firing to go to the destination temperature.

**The above glass firing sequence has instructed the kiln to do the following:**

- Heat at 300°F (165°C) per hour, go to 1250°F (675°C), stay at that temperature for 15 minutes then cool at 200°F (110°C) per hour, go to 100°F (38°C) and stay at that temperature for 30 minutes then stop firing.