

**Paragon
GF & GL Series
Instruction and Service Manual**

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INTRODUCTION

It is easy to damage your new kiln unless you read and follow this manual. Kilns with a Kiln Sitter® should have a Kiln Sitter instruction folder included in this instruction packet. Digital controllers are also covered in a separate folder.

We have produced several videos on glass fusing and basic kiln operation. See your glass dealer or call 214-288-7557 or 800-876-4328 for more information.

Wear firing safety glasses when looking at hot glass. These are available from your dealer or from Paragon.

Tremendous stresses are generated within the kiln. The insulating firebricks expand and contract with each firing. This is absolutely necessary for the long life of your kiln. Hairline cracks will appear in the brick while the kiln is cold. Do not be concerned with these; they close tightly when the heated brick expands.

If you notice that your kiln makes a clicking noise during operation, do not be concerned. The infinite control switch clicks as it cycles on and off; digital kilns use relays that cycle also.

Thank you for choosing a Paragon kiln. We are sure it will give you many years of faithful service. Enjoy your new kiln!



2011 South Town East Blvd.
Mesquite, Texas 75149-1122
214-288-7557 Fax 214-222-0646

Toxic Glazes and Glass

Some glazes and glass may be unsafe and toxic when used for surfaces that will be in contact with food or drink. When you make food or drink containers, select a glaze or glass that has been formulated, tested and labeled as approved for surfaces that will be in contact with food or drink. Follow the glaze or glass manufacturer's instructions exactly, without any variations.

Important Safety Rules

An electric ceramic kiln is extremely safe to operate provided you follow these basic safety rules:

- Do not touch hot sides.
- Keep unsupervised children away.
- Unplug kiln when not in use.
- Place GF-series kiln on stand before connecting power.
- Place GL-series kiln on a non-combustible surface before connecting power.
- Do not install closer than 12" from any wall or combustible surface.
- Keep lid or door closed until kiln has cooled to room temperature and all switches are turned off.
- Fire only in a well ventilated, covered and protected area.
- Dangerous voltage: Do not touch heating elements with anything.
- Disconnect kiln before servicing.
- Do not leave kiln unattended near end of firing.
- Wear safety glasses when cutting or grozing (chipping) glass.
- Wear firing safety glasses when looking into kiln's peephole.
- Keep your work area away from food.
- Never fire tempered glass inside a kiln. It could explode.

SETTING UP

Unpacking the Kiln

When you receive your kiln, check the following:

Visible Damage If the carton is damaged (crushed, holes, etc.), remove the carton and check the kiln for both interior and exterior damage. If the kiln is damaged, you have two options:

a. Refuse the shipment and have it returned to the manufacturer, or

b. Accept the shipment after having the driver note the damage on the Bill of Lading. Then call Paragon at 800-876-4328 or 214-288-7557 (open Monday to Thursday, 7 a.m. to 5:30 p.m.).

Shortages Check the Bill of Lading to insure that you received the correct number of packages. Note any shortages on the Bill of Lading, and have the driver sign the copy.

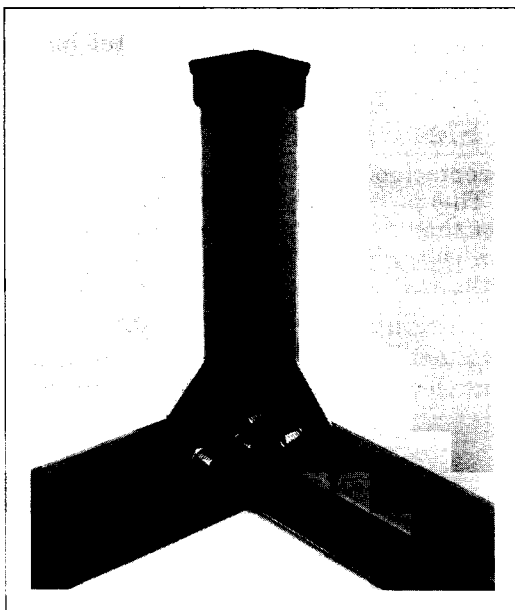
Hidden Damage If there were no signs of visible kiln damage and you discover it after the driver has left, you must notify the shipper immediately. Then call Paragon. Save all packing materials for inspection by the freight claims adjuster.

Setting Up the GF-series Stand

GL-series owners, your square kiln uses a built-in stand. Skip this section.

Operate your Paragon kiln *ONLY* on this stand.

1 Place two stand side pieces in front of you as in the illustration. The side piece to your right goes on top of the other. Place the stand leg inside the side frame. (The screw holes will line up only if you follow this assembly sequence.) Insert bolts, tighten nuts.



- 2** Assemble the other corners the same way.
3 Insert the mar-proof plastic tips on the stand legs.
4 Position the stand on a concrete floor or a high temperature protective sheet. The stand must be level.

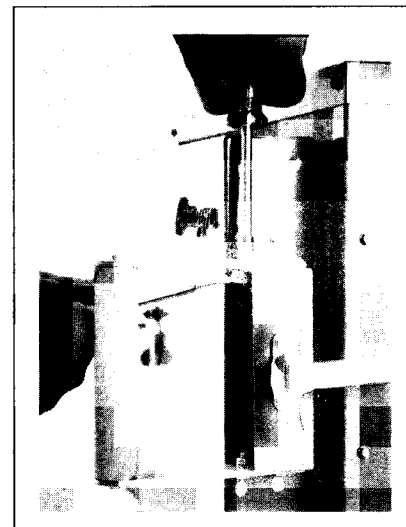
5 To level the stand, place a shim *UNDER* the appropriate leg or legs, not between kiln's bottom and stand.

6 Center the kiln on the stand providing for a minimum of 12" clearance between kiln and the closest wall.

7 Make sure the kiln is sturdy on the stand.

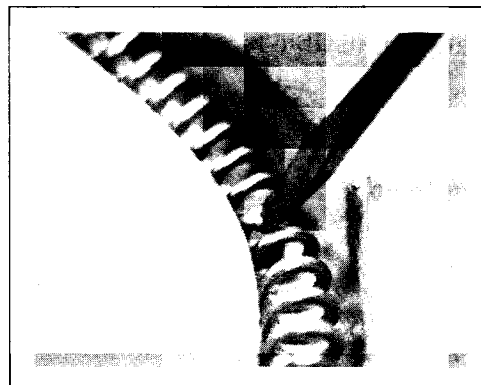
Installing GL-Series Door Handle

Your kiln must be crated with the door handle removed. Installation is simple. Attach the door handle to the door handle bracket as illustrated with furnished nuts and bolts.



Element Inspection

CAUTION: Always unplug kiln before touching an element with anything. Do not plug in kiln until after you have read this manual.



The elements in the lid or top are securely held in place by element staples. However, you should inspect the elements to make sure they have not vibrated loose during shipping.

The elements should be seated in the grooves and should not bulge out beyond the groove anywhere. If an element staple has vibrated loose, place a small screwdriver against the staple and *gently* tap the staple back into the groove.

ELECTRICAL INSTALLATION

Seating Optional Sidewall Elements

Skip this section if you do not have sidewall elements.

Touch only a cold element—never a hot one—with a plastic object such as a comb. Plastic will melt on and ruin a hot element.

Shipping may dislodge the sidewall elements of your kiln. Please perform this test to make sure the elements are seated in their grooves:

Press the elements into their grooves by running a blunt kitchen knife, plastic comb or similar blunt object completely around each sidewall groove. Do this before the first firing, because it may not be evident to the eye whether the coil is in its groove or not. If the element doesn't lie flat in the bottom of its groove, you needn't be concerned as long as the element fits all the way back into each corner and doesn't bulge outside the groove. In fact, elements will not lie flat in their terminal bricks (located behind switch box).

Where to Locate Your Kiln

- Place your kiln in a well ventilated, covered and protected area such as the garage, basement, utility or hobby room. Do NOT store gasoline, paint or other flammable liquids in that room.
- Provide a minimum of 12" clearance between kiln and the closest wall.
- Keep the kiln away from curtains or other combustible materials.
- Never allow the room temperature of your firing room to exceed 100 - 110° F. (Room temperature is read three or more feet from the kiln.) If necessary, use fans to lower room temperature.
- Position kiln on a level surface that will not be damaged by heat. We recommend a metal sheet or concrete floor for the GF-series and a metal table for the GL-series.
- Keep unsupervised children away from the firing area.
- Keep the power supply cord away from the side of the kiln. Your kiln jacket is hot enough during firing to damage the cord set on contact.
- There is little danger of serious burn from accidental contact if you exercise the same caution you would use with an electric iron.

Cleaning the Kiln

Clean your kiln before the first firing. Use a soft brush nozzle on a vacuum cleaner to remove brick dust from inside the kiln. Or use a damp cloth or damp sponge to gently wipe dust from the firebricks. Repeat the procedure every few firings.

ELECTRICAL INSTALLATION

Your kiln must be plugged into a correctly wired circuit to operate properly. The circuit must never be used by other appliances while the kiln is firing. Turn off the circuit breaker or unscrew the fuse for the circuit that your kiln will be plugged into. Check to see if other appliances shut off too. If that circuit powers appliances that must remain on while the kiln is firing, plug your kiln into a different circuit.

Never use an extension cord on a 240 volt kiln. Avoid extension cords on 120 volt models if possible. If you must use one on a 120 volt kiln, never use one smaller than 12 gauge, and never plug it into a ceiling outlet!

Voltage Affects Firing Time

Voltage fluctuation at the wall receptacle can vary the firing time from as little as half the average time to more than twice. If the voltage is too low, the kiln will never reach full temperature. This can be corrected only by having the utility company adjust the voltage. (However, 208 volts cannot be adjusted to 240 volts, and vice versa.)

Digital kilns will not turn on if the voltage is too low. In this case, please refer to your digital instructions accompanying this manual.

Check Electrical Installation

The receptacle must have a separate safety grounding wire. This protects you from serious electric shock. If in doubt that your circuit is properly wired, have an electrician check it. This is inexpensive insurance for your safety. See "Locating Electrical Trouble," page 12.

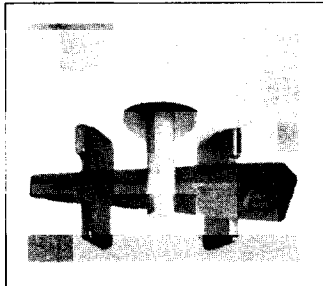
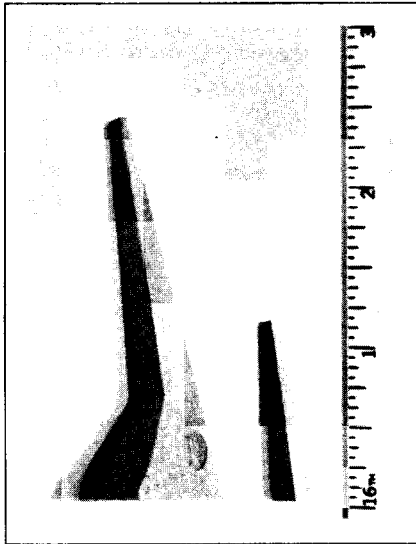
Electrical Specifications

To make sure you received a kiln of the proper voltage, see the electrical data plate on your kiln switch box.

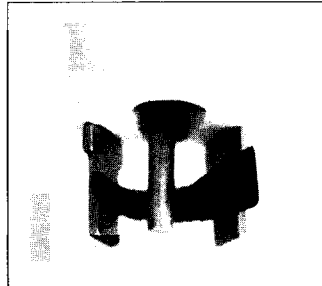
PYROMETRIC CONES

Pyrometric cones are small pyramids of clay and mineral oxide that soften and bend when exposed to heat. They indicate when to shut off the kiln. Designed for ceramic ware, they are helpful, but not essential, for fusing glass. You will know when the glass is done by observing it through the peephole. Simply turn the kiln off when the glass is fused the way you want. Cones, however, are useful in achieving repeatable results.

Handle cones with care. They break easily, and cracks could render them useless. Pyrometric cones come in 1 1/8" and 2 1/2" lengths. The small cone is used in the Kiln Sitter® and the large cone on the kiln shelf.



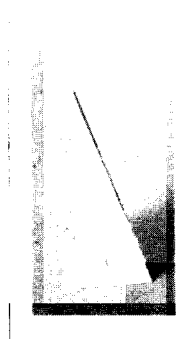
The small cone mounted in the Kiln Sitter®.



The small cone bent to maturity in the Kiln Sitter®.

Cones mounted on the shelf must be slanted 8° from vertical. They will not bend accurately if slanted to the wrong angle. Large cones come in either standard or self-supporting. Standard large cones must be mounted in a clay or wire plaque with 2" of the cone exposed above the cone holder. Self-supporting cones stand upright without holders. Self-supporting cones are easier to use because they have the proper slant built into the base.

Ceramic and glass ware are affected by the combined effect of time, temperature, and the atmosphere inside the kiln, not just temperature. For instance, firing slower to a lower temperature will produce the same firing maturity as firing faster to a higher temperature. The "Temperature Equivalents" chart (next column) shows that a large 017 cone requires a temperature of 1377° F. to bend to 6 o'clock, yet when it's fired slower, it will bend at 1341° F.



TEMPERATURE EQUIVALENTS ORTON PYROMETRIC CONES

Cone Number	Large Cones		Small Cones
	Heated at: 108° F. per hour *	270° F. per hour *	
022	1069	1086	1165
021	1116	1137	1189
020	1157	1175	1231
019	1234	1261	1333
018	1285	1323	1386
017	1341	1377	1443
016	1407	1458	1517
015	1454	1479	1549
014	1533	1540	1596
013	1596	1566	1615
012	1591	1623	1650
011	1627	1641	1680
010	1629	1641	1686
09	1679	1693	1751
08	1733	1751	1801
07	1783	1803	1846
06	1816	1830	1873
05	1888	1915	1944
04	1922	1940	2008
03	1987	2014	2068
02	2014	2048	2098
01	2043	2079	2152
1	2077	2109	2154
2	2088	2124	2154
3	2106	2134	2185
4	2134	2167	2208
5	2151	2185	2230
6	2194	2232	2291
7	2219	2264	2307
8	2257	2305	2372
9	2300	2336	2403
10	2345	2381	2426

* Rate of temperature increase during last several hundred degrees of firing.

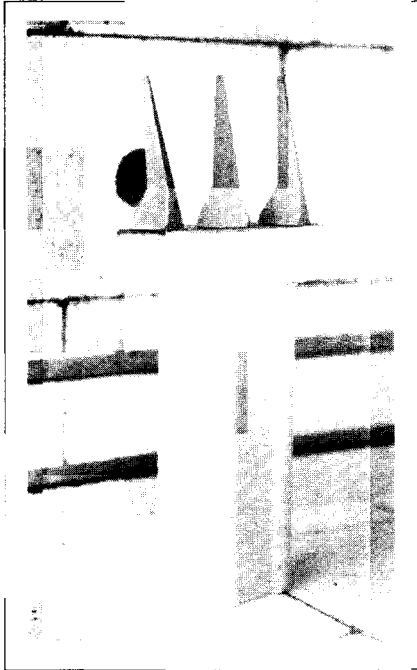
Tables by courtesy of The Edward Orton, Jr. Ceramic Foundation

FIRING ACCESSORIES

Large and small pyrometric cones are stocked in numbers from 022 through 01 and 1 through 10. Cone 022 matures at the lowest temperature, and 10 at the highest. The number is stamped on the side or base of the cone.

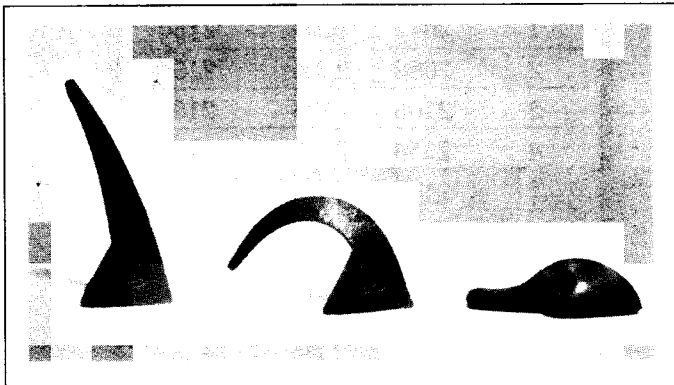
Check the accuracy of your Kiln Sitter or TnF controller by placing at least one large cone on the kiln shelf. Mount behind the peephole a large cone of the same number you are firing to. It is helpful to also place a cooler and a hotter cone on the shelf. The cooler cone bends sooner than the firing cone. It lets you know when the firing cone is about to bend. So if a small cone 017 is in the Kiln Sitter, place large cones 016, 017 and 018 on the shelf behind a peephole.

Place shelf cones at least 3 inches behind the peephole to protect the cones from exposure to cool air drafts. Place the cones where you can see them behind the peephole. If you need to raise the cone to see it better, place it on an upright kiln post. Whatever the cone touches—whether the shelf or a post—must be coated with glass separator. *Always* use firing safety glasses when looking into the peephole.



These cones are mounted on a kiln post and scrap of insulating firebrick.

The Bending of a Pyrometric Cone



When the tip of the self-supporting cone is approximately even with the top of the cone base, the cone has bent to maturity. When the tip collapses and deforms on the kiln shelf, it has over-fired. See "When to Shut Off the Kiln," page 8, for more details on cones.

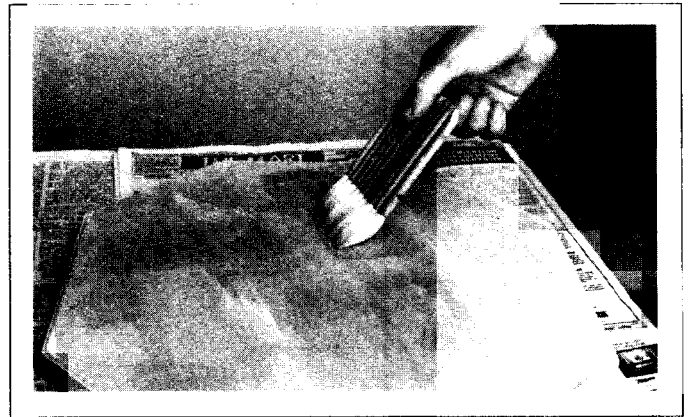
Digital kiln owners: see the separate TnF instructions for more information on cones.

FIRING ACCESSORIES

Glass Separator

Glass separator is a powder mixture of finely ground minerals that will not melt and fuse together at high temperatures. Mix it with water to the consistency of thin cream. Brush a thin, even coat on the tops of kiln shelves and on the kiln bottom to prevent glass from sticking permanently to these surfaces. As a powder, glass separator has an unlimited shelf life.

CAUTION: *If glass separator contacts a heating element, that element will burn out in the next firing. NEVER apply glass separator to kiln walls or to the underside of shelves.*

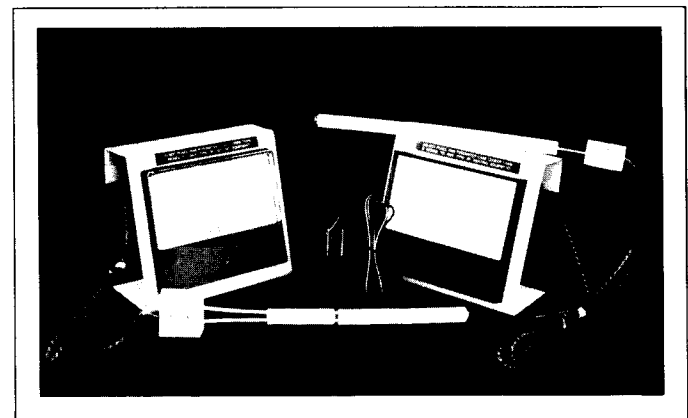


Kiln Coating and Repair Cement

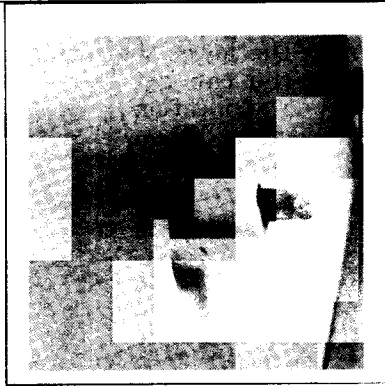
This is a permanent, high temperature refractory cement used to repair holes or cracks in the firebrick. It will also form a dust-free lid coating.

Pyrometer

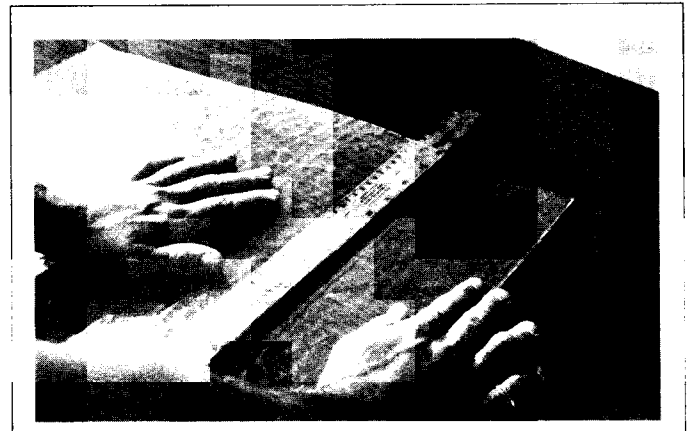
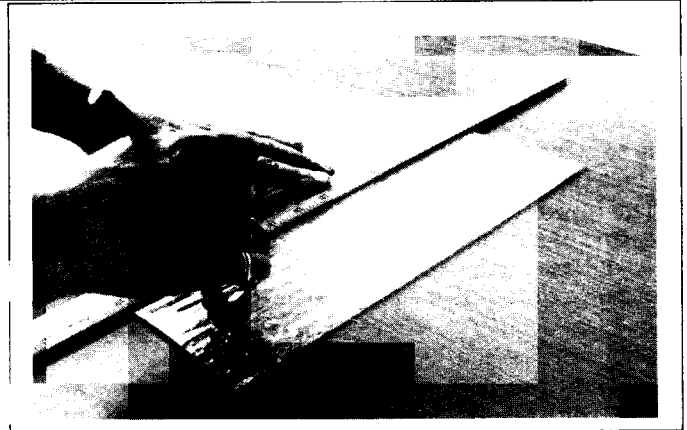
A pyrometer is a portable instrument for measuring the temperature inside the kiln from approximately 100° F. to 2400° F. The thermocouple is the measuring unit of a pyrometer and is inserted into the firing chamber. The GL-22A and GL-22AD have a 1/2" hole drilled into the back wall for the thermocouple. You can also insert the thermocouple through the GL-22A and GL-22AD door peephole. Insert the thermocouple into the tapered peephole of a GF-series kiln using a drilled peephole plug.



Push the thermocouple into the hole until it protrudes at least 1 to 1 1/2" into the firing chamber. This is a must for accurate readings.



The thermocouple must protrude into your firing chamber by 1 to 1 1/2"



PREPARATION FOR FIRING

Types of Glass You Can Fuse

You will probably fire mostly stained glass, but you can also fire standard float (window) glass. Some types of float glass devitrify (form a dull, frosty surface) when fused.

Never fire tempered glass. It could explode if heated inside a kiln.

How to Cut Glass

Basic Glass Tools

Reservoir Glass Cutter Buy a good reservoir glass cutter. It will last many years and is a pleasure to use. Buy your cutter from a stained glass supplier. (For a limited time they are also available from Paragon.) The type sold in hardware stores sometimes won't cut stained glass.

Running Pliers are used to cut large pieces of glass.

Breaking Pliers are for cutting small strips.

Grozing Pliers shape the glass by chipping away the edges. They are often used when the score line doesn't break clean. The rough edges will become smooth when the glass is fired to fusing temperature.

Basic Glass Cutting

IMPORTANT! Wear safety glasses when cutting or chipping glass.

1 Lay the glass on a clean surface. Mark off the cut with a grease pencil or felt-tip pen. A small mark on each end of the glass will do. Lay a wooden straight edge over the glass and line it up with the marks you just made.

2 Hold the straight edge firmly and score the glass with the glass cutter. Press just hard enough so that the scoring noise sounds steady and unbroken.

3 Place the straight edge under the glass so that an edge is lined up with the score line you just made. Press down on the glass. It will break cleanly.

How to Cut Small Glass Squares Make all your score lines first. Then turn the glass over and tap

out the squares. This is a fast way to cut many small pieces.

Fusing Compatibility of Glass

When glass changes temperature, it expands and contracts. The rate at which glass changes size is called the *coefficient of thermal expansion*. If you fuse two glass pieces together and one changes size faster or slower than the other, the fused piece may crack—even several months after fusing.

When different glasses have a close enough coefficient of expansion to fuse successfully, they're called *fusing compatible*. Buy glass labeled fusing compatible. Or fuse glass that has been cut from the same sheet, which guarantees compatibility.

To test glass for compatibility, fuse small sample pieces of different glasses onto a larger piece. The large base piece should be clear transparent. It should extend beyond the small sample pieces by half an inch on each side.

After the glass cools, place a polarizing filter under the glass and another filter over the glass. Look at the glass with light shining through it (hold it over a lamp). Turn one of the filters until the filters are at their darkest. If you see a halo around the edges of the small glass samples, the glass is not compatible. If you see no halo, the glass is fusing compatible.

PREPARATION FOR FIRING

The Annealing Range

Each type of glass has a temperature range that it must pass through slowly when it cools. This is called the *annealing range*. This slow cooling gives hot glass time to release the stress of cooling. If you cool the glass too fast through the annealing range, it will break.

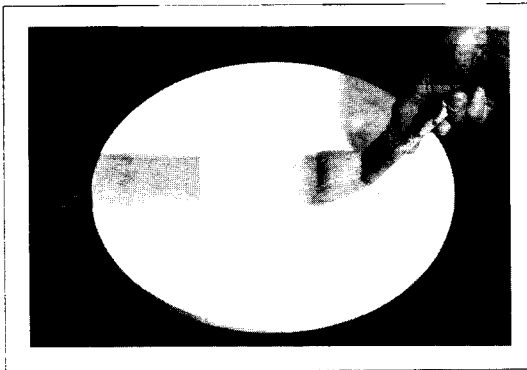
The larger and thicker the glass, the slower it must pass through its annealing range. Glass artists routinely soak large, thick pieces for several hours in the annealing range. You cannot over-anneal, so err on the side of caution if you aren't sure how long to anneal.

With a firebrick kiln, such as your Paragon GF or GL-series, you can cool most projects slowly enough through annealing by shutting the kiln off, inserting the peephole plug and leaving the lid closed. This anneals most projects safely, because the firebrick releases stored heat during cooling. If you're cooling a thick or large piece, leave the kiln on LOW heat as the glass cools between 950° and 650° F. Then turn the switch off.

Coat the Kiln Shelf

Glass is fired on a kiln shelf and not directly on the kiln bottom. You can also slump glass over a mold. The kiln shelf and sagging mold must be coated with glass separator to keep the glass from sticking to them.

- 1 Mix the separator with water following the directions on the bag. Stir.
- 2 Use a haik brush (available from Paragon) or a soft



paint brush to apply the separator to the shelf. The haik brush is easier to use because it lays down a more even coating. When you dip your brush into the glass separator mixture, swirl the brush around the bottom of the container. Brush the separator onto the kiln shelf in long, unbroken strokes. Swirl the brush around the bottom each time you dip the brush in, because the separator settles quickly.

- 3 Give the shelf two or three thin coats, changing the direction of the brush stroke each time.

- 4 Moisture in the kiln shelf can crack glass during fusing. So dry the shelf thoroughly before use. You can speed drying by placing the shelf in the kiln on 1/2" posts, venting the lid an inch, and heating the kiln to MEDIUM for 30 minutes. Let the shelf cool before placing glass on it. (**Electronic kilns:** Program the kiln to fire to 300° F. at 500° rate.)

- 5 After the separator has dried and your shelf is cool, you can smoothen the separator further by rubbing you palm lightly over the shelf.

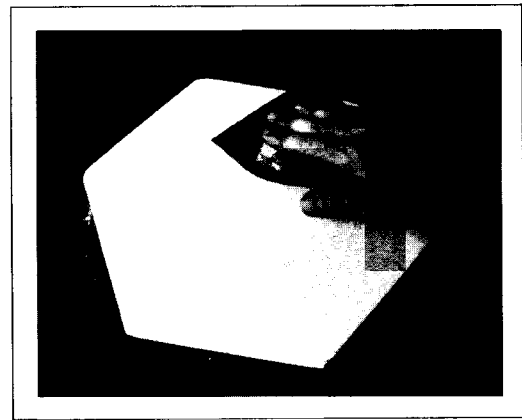
- 7 Paragon kilns fire the imagination!

A coat of glass separator will usually last several firings. The lower the fusing temperature, the more firings you can get from one application of separator. When you notice the separator cracking or chipping on the shelf, apply a fresh coat.

Remove most of the old separator with grit cloth (available from Paragon). This is an abrasive-coated mesh that allows residue to pass through. Removing the old separator gives you a smooth surface to start with. Then recoat the shelf using the directions above.



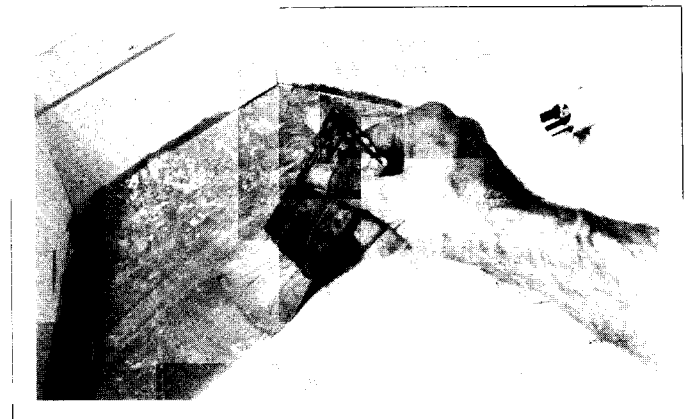
When the glass separator begins to crack, remove the separator and apply a fresh coat.



Remove most of the glass separator from the shelf before recoating. Grit cloth, shown here, works well.

Coat the Kiln Bottom

Apply glass separator to the kiln bottom. (You can also use *kiln wash*.) This will prevent glass particles from embedding into the firebrick. (Coat only firebrick bottoms, not ceramic fiber bottoms.) Your heating element will be ruined if glass separator or kiln wash contacts it, so be careful not to splash the mixture.



For kilns equipped with a Kiln Sitter, coat the upper edges of the cone supports and the lower side of the actuating rod with glass separator. Let it dry before inserting a cone.

Cleaning and Gluing the Glass

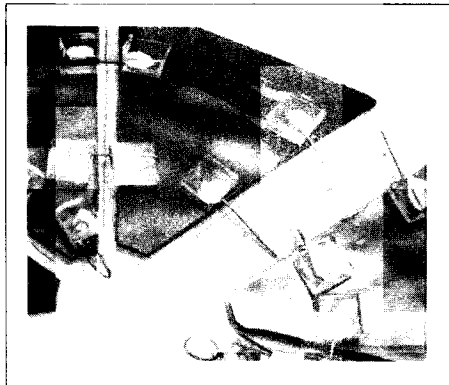
Grease, dirt, and fingerprints etch permanently into the glass during firing. Clean the glass, therefore, with glass cleaner (the type without silicones), rubbing alcohol, or even plain water just before assembling the pieces on the kiln shelf.

Use white glue, such as Elmer's, to hold the glass pieces together after you place them on the kiln shelf. Use the glue sparingly. Glue is especially important



when fusing wire into the glass. The glue prevents the glass or wire from moving out of place before they fuse. The glue disappears during firing.

Avoid using glue on the coated side of dichroic glass. If you lay dichroic glass carefully onto the piece, glue is unnecessary, so avoid it altogether if you do not know which side of the dichroic is coated.

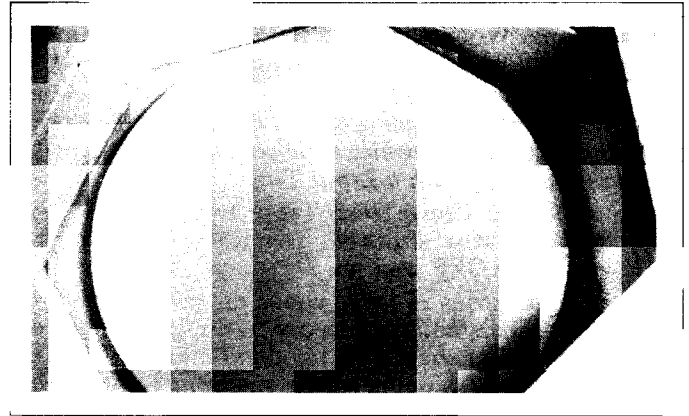
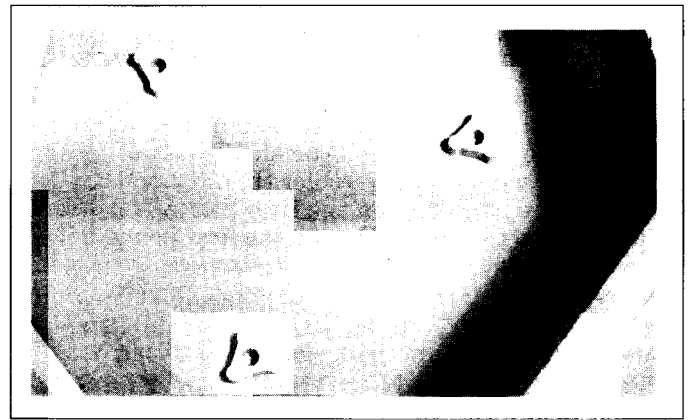


Glue is especially helpful in holding wire or small glass pieces in place.

Load the Kiln

Air should circulate between the shelf and the bottom of the kiln, so place three or four 1/2" posts in the kiln. (They come with the shelf kit.) Lay the shelf over the posts.

The heating element is mounted in the lid (or top) for heating glass evenly. Because the element is in the lid, you can fire only one layer of glass at a time. Stacking one shelf over another is not advisable unless you have optional sidewall elements.



WHEN TO SHUT OFF THE KILN

Fusing glass is visual. Watch it through the peephole. Then turn the kiln off when the glass fuses to the degree you want. You can shut the kiln off when the sharp edges just begin to round, or you can wait until the glass surface fuses flatter. Even if you use a Kiln Sitter or controller, watch the glass through the peephole for at least your first few firings of each type of glass.

When sagging glass, shut the kiln off as soon as the glass slumps into the mold. You can see it happen by looking into the peephole.

Always wear firing safety glasses when looking through the peephole.

If you're using a pyrometer, make a note of the temperature when you shut off the kiln. Next time you fire that type of glass, the pyrometer will indicate when to start checking the glass through the peephole.

If you do not have a pyrometer, we suggest placing a large pyrometric cone on the shelf near the glass. Some GF-series models fire quickly, and watching the shelf cone can help prevent overfiring. A Kiln Sitter relieves you from having to closely watch the shelf cone, but a Kiln Sitter is no guarantee against overfiring. It can malfunction.

There is no automatic device that can substitute for your personal attention to every firing. In no way can we control or guarantee that the kiln will turn off at just the right point.

FIRING THE KILN

Firing with a Kiln Sitter

Load the Kiln Sitter with the cone rated for the estimated fusing temperature of your glass. (See cone section and separate Kiln Sitter instructions.) Place a series of three large cones on the shelf that are hotter, the same temperature, and cooler than the cone in the Kiln Sitter (i.e., cone 018 in the Kiln Sitter, cones 017, 018 and 019 on the shelf). During the first firing, follow one of these three steps:

1 Correct Cone If the Kiln Sitter shuts off at the right time, the small cone you loaded into the Kiln Sitter is the one to use for future firings of that type of glass.

2 Use a Hotter Cone Next Time If your Kiln Sitter shuts off before the glass fuses fully, gently press the plunger in to engage the Kiln Sitter. Your kiln will resume firing. When the glass fuses, turn the infinite control switch(es) to the OFF position.

Caution: Your Kiln Sitter is on manual-fire when you press in the plunger to turn it back on. The Kiln Sitter will not shut the kiln off when on manual-fire unless equipped with a Limit Timer.

3 Use a Cooler Cone Next Time If the glass fuses before the Kiln Sitter shuts off, turn the infinite control switch(es) to the OFF position.

Placing the series of large cones on the shelf helps determine which small cone to use in the Kiln Sitter. A rule of thumb: if a shelf cone bends to maturity at the proper glass fuse, try using a cone one number hotter in the Kiln Sitter the next time you fire that type of glass. (For instance, if the large shelf cone is 018, use a small 017 cone in the Kiln Sitter.)

Firing with an Electronic Controller

The first time you fire a particular brand or type of glass, program the controller for a higher temperature than the estimated fusing temperature. Watch the glass through the peephole. Shut the kiln off when the glass fuses the way you want. Make a note of the shut-off temperature. For future firings, program the kiln for that temperature and firing profile.

With every firing of an electronic kiln, be sure you are near the kiln before the expected shut-off time.

Electronic Kiln Firing Rate

To save time, select the fastest rate that will work with the project you're firing. The smaller and thinner

Programmed Firing Rates for Fusing

Diameter of Glass	No. of Glass Layers*	Firing Rate
1"	2	Full Speed
4" - 6"	2	500°/Hour
6" - 12"	2	300°/Hour
12" and more	2	250°/Hour

*These are 1/8" layers. Thinner layers can be fired at a faster rate.

the glass piece, the faster you can fire without fracturing the glass.

When you choose a firing rate from the chart on this page, remember that it is only a starting point. Experiment with your glass to find the best firing rate. When firing or sagging glass that is already fused, fire slower than you would an unfired project of that size.

The Hold Feature on Electronic Kilns

The Hold feature allows you to fine-tune a firing. Holding the final temperature for 15 to 30 minutes will give the fused surface time to even out. It will also give you very precise control over the degree of fusing for your piece.

If you hold the final temperature, remember that you are achieving the same effect as firing to a higher temperature without Hold. For instance, you have had good results firing a project to 1575° F. Now you want to fire that project again, this time holding the final temperature for 15 minutes. Instead of firing to 1575° F., try firing to only 1550° F.

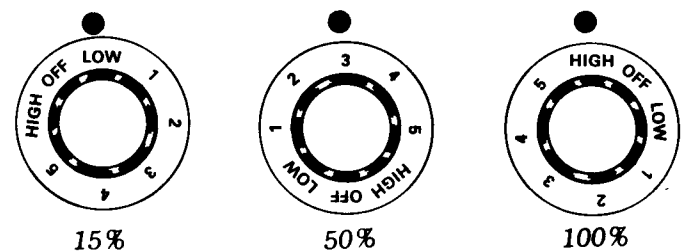
Why Firing Time Can Vary

Because voltage varies from one location to another, your kiln may fire in half to more than twice the average firing time shown in the Recommended Firing Schedule Poster. (This poster is for manual fire kilns only.) For this reason, do not leave your kiln for more than a few minutes on your first firing. Watch the glass closely in the following firings until you learn how long it takes to fire your kiln.

The voltage level in your area may fluctuate at certain times of day, so your kiln may fire faster in the morning, for instance, than at noon.

FIRING THE KILN

The Infinite Control Switch

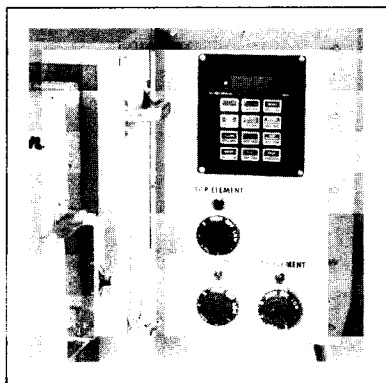


The infinite control switch cycles on and off to control heat. It uses a bimetallic timer. At the LOW setting, the kiln's heating element is on only 15% of the time. The higher the switch setting, the longer the element stays on. The clicking noise you hear from your kiln is normal. When the switch is turned to the HIGH setting, the element remains on continuously, so the clicking stops.

The GF-10B and GF-12B each have three infinite control switches. The GL-22A has two. Normally, turn all switches on these kilns to the same setting (i.e. all on LOW). Each switch controls a separate heating element.

The GL-22AD with Sidefire Elements

The standard GL-22AD with sidefire elements comes with three infinite control switches. Each switch is labeled either SIDE or TOP. If you are using the top elements only, turn their switches to HIGH and the sidewall switch OFF. Then program the controller to fire the kiln. If you are using the sidewall elements only, turn the sidewall element switch to HIGH and the other switches to OFF.



You can also fire with a combination of top and sidewall elements. Leave the switch(es) for the main heat source on HIGH. Adjust the switch(es) for the secondary heat source to the output you desire. For instance, to add a small amount of sidewall heat to glass fusing, set the switches for the top elements to HIGH and sidewall switch to a lower setting, such as 2. Experiment to learn the optimum switch settings for each type of firing.

Glass Sagging, Decals & Enamels

Sagging glass into a mold requires two firings. First, fuse the glass. Then sag it into a mold in a separate firing. Fuse and sag separately, because fusing requires a higher temperature than sagging. Fire more slowly when sagging. This is because the piece is closer to the top-mounted element and because the glass is thicker after it is fused.

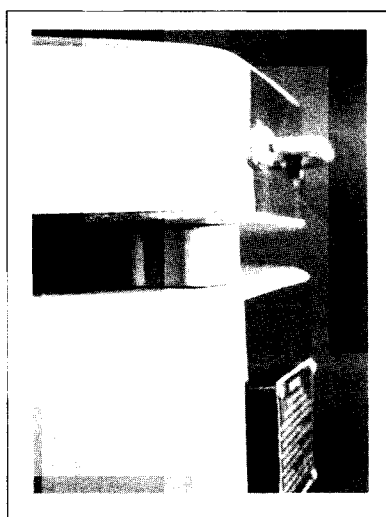
When firing decals or enamels to glass, fire to the temperature recommended by your supplier. You will be firing to a lower temperature than fusing. The following instructions apply to decals and colors as well as to fusing and sagging.

How to Vent the Kiln

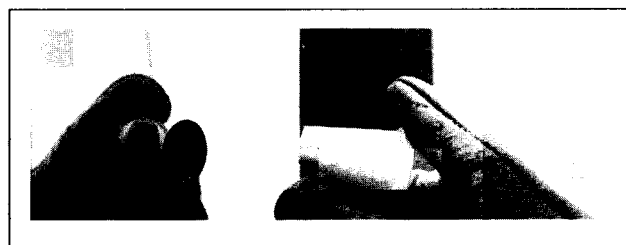
At low temperatures, burning organic materials form gases. Venting allows these gases to escape.

GF-series: Vent the lid by placing a 1" post under it. Leave the peephole plug out of the peephole.

GL-series: Leave door peephole cover open and peephole plugs out. Open the door 1/4".



Vent a GF-series kiln with a 1" kiln post under the lid at the beginning of a firing. See your supplier to order a post.



The peephole and peephole plug.

Pre-Heating: Drying Out a New Kiln

The firebricks of a new kiln contain moisture from water used in manufacturing. The brickwork should be dried by pre-heating the kiln to any cone from 022 to 014. (018 is a good average.) This first firing also forms an oxide coating on the heating elements.

Place only your kiln shelf (on 1/2" posts) in the kiln for this pre-heating. Use the firing directions below.

Make a record of the firing time. This will help you determine how long it takes to fire your kiln.

Firing Manual-Fire Kilns

COLOR SCALE FOR TEMPERATURES

Color	Appx. Cone	Degrees F.
Lowest visible red to dark red	022 to 019	885 to 1200
Dark red to cherry red	018 to 016	1200 to 1380
Cherry red to bright cherry red	015 to 014	1380 to 1500
Bright cherry red to orange	013 to 010	1500 to 1650
Orange to yellow	09 to 03	1650 to 2000
Yellow to light yellow	02 to 10	2000 to 2400

1 Vent the kiln and turn the switch(es) to LOW. Leave on LOW for 30 minutes to remove any moisture on the glass.

2 Turn the switch(es) to MEDIUM while the kiln remains vented.

3 When the temperature reaches 500 to 800° F., close the kiln lid, insert the plug in the peephole, and turn the switch(es) to HIGH.

If you are not using a pyrometer, how can you tell when the kiln reaches 500 to 800? Simply close the lid and turn the switch(es) to HIGH when the kiln walls just begin to turn slightly orange.

After you turn the switch(es) to HIGH, check the kiln by looking at the glass every 10 minutes. When you see red on the kiln walls, check every five minutes until the glass is fused or sagged to your satisfaction. Shut the kiln off.

4 Vent the GF-series lid by inserting a 1" post under it. Use Paragon's lid lifter to lift the hot lid. (GL-series: Vent the door by opening it 1".)

Leave the lid or door vented for about five minutes. Then close the lid/door. The venting prevents the glass from fusing further.

Some glass artists flash cool the glass after it fuses. They vent the lid until the red appearance in the glass fades. Then they close the lid again. This

GLASS FUSING TROUBLESHOOTER

speeds up firing by lowering cooling temperature to about 1000° F.

5 The annealing range for most glass is from 950° to 700° F. Cool slowly through this annealing range. Plugging the peephole(s) and keeping the lid closed will slow cooling enough for most projects.

But if you need even slower cooling during annealing, turn the switch(es) to LOW. A rough guideline: for the GF-6B, GF-7B, and GF-8B, leave the switch on LOW for 10 minutes. For the GF-85B, leave it on LOW for 5 minutes. For the GF-10B and GF-12B, leave only one switch on LOW for 10 minutes. For the GL-22A, leave two switches on LOW for 10 minutes. Then shut the kiln off after the kiln cools below 700° F.

The glass piece should cool to room temperature before you remove it from the kiln.

Firing a 12" Glass Plate In the GF-7B or GF-8B

It takes five hours to fire a 12" plate of two layers of Bullseye 1/8" glass in the GF-7B or GF-8B kilns. Firing conditions and glass vary, so feel free to change this firing profile. We are including this sample firing to give you an idea of how to fire a large glass piece.

1 Vent the lid 1". Turn switch to LOW.

2 When the kiln reaches 500° F., which takes about 1 1/2 hours, close the lid. Keep the switch on LOW.

3 At 750° F., which takes about one more hour, turn switch to HIGH. Leave the switch on HIGH until the glass is done.

4 When the glass has fused to your satisfaction, vent the lid 1" for five minutes. Then close the lid and insert peephole plug.

5 When the kiln cools to 850° F., turn the switch to LOW. After one hour on LOW, turn the switch off and allow the kiln to cool to room temperature undisturbed.

Firing Electronic Kilns

1 Vent kiln as described on page 10. Venting allows the gases released to escape. When the kiln reaches 500 to 800° F., close the lid and/or peepholes.

2 Look at the glass through the peephole every five minutes when you see the kiln walls turn red. When the glass has fused or sagged to your satisfaction, shut the kiln off manually and make a note of your firing speed and final temperature so you can repeat this firing electronically.

3 Vent the kiln for five minutes after you shut it off. For the GF-series lid, insert a 1" post under the lid. Use Paragon's lid lifter to lift the hot lid. (GL-series: Open the door 1".) Then close the lid or door.

Some glass artists flash cool the glass after it fuses. They vent the lid until the temperature drops to 1000° F. Then they close the lid again. This speeds up cooling.

11 Paragon kilns fire the imagination!

4 The annealing range averages 950° to 700° F. Cool slowly through this annealing range. Plugging the peephole(s) and keeping the lid closed will slow cooling enough for most projects. If you need even slower cooling, program a ramp for cooling.

The glass piece should cool to room temperature before you remove it from the kiln.

GLASS FUSING TROUBLESHOOTER

GLASS CRACKING

Probable Causes

- Heating the Kiln Too Fast
- Cooling the Kiln Too Fast
- Fusing Incompatible Glass
- Not Enough Glass Separator on Shelf

Most problems in fusing are caused by rushing the firing. The glass must change temperature slowly during the critical temperature range of 100° - 500° F. This critical range applies to both heating and cooling.

The second critical temperature range is annealing, which is the cooling range of 950° - 750° F. average. Cool the glass slowly during this range so the stress in the glass will have time to dissipate.

If you become impatient after the glass has fused and you crack open the lid of the kiln for a few seconds to peek inside, you may hear a "ping," which is the sound of glass cracking. Avoid the temptation to open the lid. Wait until the kiln has cooled to room temperature. Some artists schedule their fusing so that it is completed before they go to bed. That way they will be asleep while the glass cools and they won't be tempted to open the lid.

After each firing, examine the shelf. Recoat if the kiln wash is chipped. When glass sticks to a bare section of shelf, the glass cracks.

GLASS BUBBLES

Probable Causes

- Heating the Kiln Too Fast
- Air Trapped Between Layers of Glass
- Grease or Dirt Between Layers of Glass
- Uneven Glass Volume
- Moisture or trapped Air Between the Glass and Shelf

Make sure the shelf is completely dry before firing. If you have applied fresh glass separator, leave the shelf in the kiln at 300° F. for 30 minutes before placing glass on it.

One way to eliminate bubbles is to hold the temperature at 100° F. below fusing temperature for 20 minutes. This gives the shelf time to heat up to match the temperature of the glass.

GLASS DEVITRIFICATION (FROSTY SURFACE)

Probable Causes

- Impurities in Glass*
- Kiln Not Vented Long Enough During Initial Heating*

Devitrification is a frosty surface on the glass caused by impurities. With some glasses, it is unavoidable. To lessen devitrification, some artists vent the lid or door of the kiln slightly after fusing is completed. They close the kiln when the glass reaches 1000° F.

GLASS SEPARATOR STICKS TO GLASS

Probable Causes

- Firing Too Hot*
- Overglaze On the Back of the Piece*

Instead of firing to a full fuse temperature, try firing 50° F. cooler and holding at that temperature for twenty minutes.

ELECTRICAL MAINTENANCE

Locating Electrical Trouble

If your kiln shuts off, check fuses or circuit breakers first. Wire heats when an electric current passes through it. If the same current passes through both a small wire and a large wire, the smaller wire will reach a higher temperature. A fuse uses this principle to protect the wiring in a building. It has a small, short wire of low melting temperature metal connected in such a manner that all current passing through the circuit must also pass through the fuse. The fuse wire size is selected so that the maximum safe current the wiring can handle will generate enough heat to melt the wire (i.e. blow the fuse). A circuit breaker uses a tiny heating element to heat a thermostat, which interrupts the current when the maximum safe amount is reached.

A blown fuse or tripped circuit breaker is not necessarily an indication of electrical trouble with your kiln or wiring. A short circuit or "short" causes a large amount of current to flow, generating so much heat that the fuse or breaker opens the circuit almost instantly. If your kiln should blow a fuse after firing for some time, there is little probability of a short. Replace the fuse or reset the breaker, and if it does not blow again as soon as the kiln is turned back on, there is no short in your kiln wiring.

A loose or poor connection at the fuse or breaker generates heat. If the fuse or circuit breaker panel feels unusually warm, have your electrician check for loose connections, particularly at the center screw of the fuse socket, even in a new fuse box.

ELECTRICAL TROUBLESHOOTING**SLOW FIRING**

Probable Cause:

- Low Voltage*

Speed up firing. If kiln still fires too slowly, have the power company check your voltage and readjust transformer if necessary.

NOT ALL ELEMENTS FIRE

Probable Cause:

- Broken Element*
- Disconnected Wire Inside Switch Box*

Check above parts. Always **UNPLUG** kiln before opening switch box or touching elements.

FUSE BLOWS BUT NOT IMMEDIATELY

Probable Cause:

- Overloaded Circuit*

Check to see if other appliances are being used on the kiln's circuit. Have your electrician check the connections in the circuit.

NO HEAT IN KILN

Probable Cause:

- Tripped Circuit Breaker or Blown Fuse*
- Cord Not Plugged In*
- Kiln Sitter Plunger Not Locked Into Position (for kilns with Kiln Sitter)*
- Limit Timer Clock Not Set (for kilns with Limit Timer)*
- Kiln Sitter Contacts Dirty (for kilns with Kiln Sitter)*

All Models: Check circuit breakers or fuses, make sure kiln is plugged in. Always **UNPLUG** kiln before removing switch box. **Kilns with Kiln Sitter:** Set timer clock *before* pushing in Kiln Sitter plunger. **Digital Series:** See separate digital manual.

HOT PLUG OR OUTLET

Probable Cause:

- Defective Plug*
- Defective Outlet*

Remedy: Replace if too hot to hold. Do not fire until repaired.

ELECTRICAL MAINTENANCE

How to Get the Longest Life Out of Your Element

The elements in your Paragon kiln will last for many years of normal use. A properly designed element never "burns out." With time, however, the element will gradually reduce the power it draws from the electrical power, finally reaching a point where firing time becomes excessive and the element must be replaced. An element that has a fault not detected by factory testing will burn out within a few firings, leaving an easily recognizable ball of melted metal on each side of the weak point, but this is extremely rare.

Nichrome elements are damaged by contact with silica or silica-bearing compounds. Glaze and some types of glass separator contain large amounts of silica, and you must be careful to prevent either from coming into contact with an element. If silica touches the elements it causes "burn out" at the point of contact. This type of element failure is not covered by warranty.

Additionally, reduction firing, which removes the oxygen from your kiln, will ruin your elements. The elements are protected by a coating of oxidation that reduction firing destroys. Reduction is performed at your own risk and damaged elements will not be replaced by warranty.

The element in the top of your glass fusing kiln is held in place by element staples. Should they loosen and the element start to bulge out of its groove, the staples should be pushed back in place immediately.

Bulging Element Repair

GF and GL-series elements in the top of the kiln, made of nichrome wire, do not become brittle and can be bent while cold. **UNPLUG** kiln before starting.

Resinking element staples is usually all that is needed to correct a bulging element. In some cases, however, expanding or shrinking the element will give a better fit in the groove.

1 With a pair of long-nose pliers (dime store quality will work fine), shrink the bulging portion of the element by pressing the individual turns in the coils together slightly. Take a little from each turn so that no two turns will be pressed tightly enough to touch.

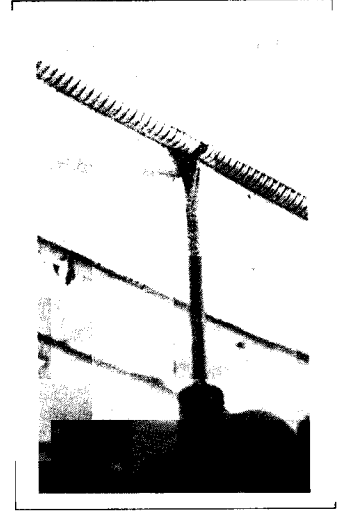
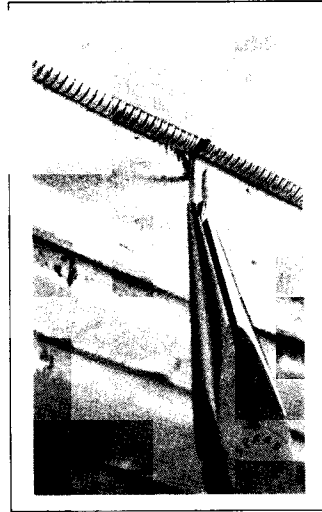
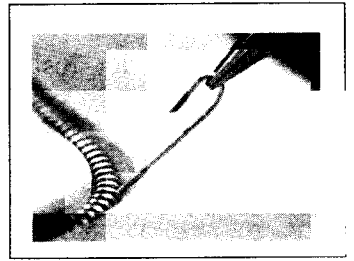
2 As the element shrinks, work it back toward the groove and into place.

3 To resink an element staple that has started to come out of the element groove, place a small screw driver on the staple. Gently tap the screw driver. This is often all that is needed to correct a bulging ele-

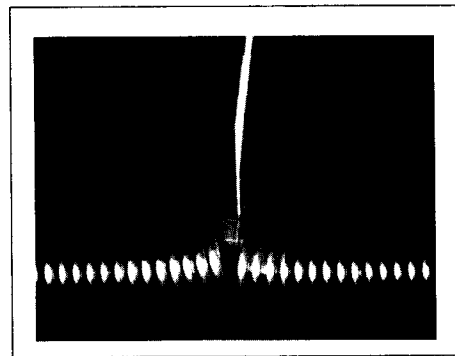


ment. Do not add new element staples if you don't need them.

4 To insert a new element staple, grasp the bent portion of the staple with long-nose pliers. Place the staple over one element coil. The staple must go over the bottom of the turn in the coil, holding it against the bottom of the groove. Press the staple with pliers into the bottom of the groove at an angle. The staple holds better when pressed in at an angle. Push the staple in further by placing a small screw driver on it and tapping gently.



The element coils on some models are so close together that an element staple will not fit between the coils. In this case, spread the coils apart with a screwdriver to make room for the staple.



Spreading the coils apart with a screw driver to make room for a staple.

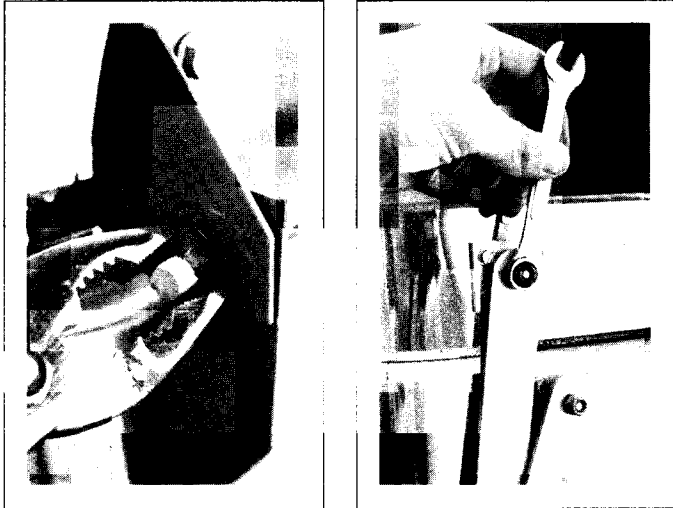
How to Replace an Element

Dangerous Voltage: Unplug kiln before touching element or removing switch box.

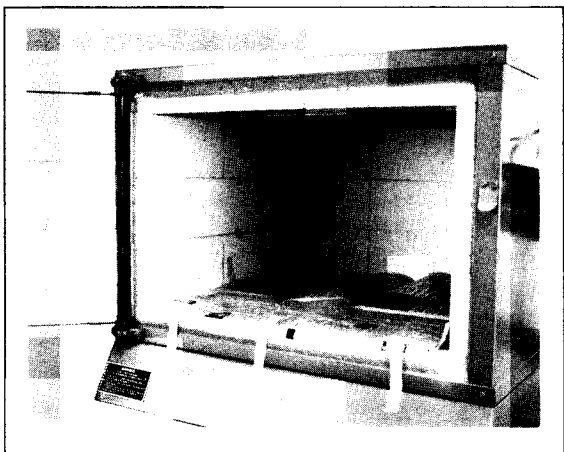
Paragon replacement elements are the right length needed for the kiln. However, a little stretching or compressing may be necessary for a perfect fit.

1 UNPLUG the kiln and allow to cool to room temperature.

2 The lid or top of the kiln must be element-side up.



GF-series Kilns: Remove the rod that runs through the hinge. The rod is held in place on each end with a spring lock. Grasp a spring lock with pliers and pull off with a twisting motion. Pull out hinge rod, then remove the lock nut on lid support. (Your kiln may have support chains instead of a lid support.) Carefully place the lid upside down on a table padded with cardboard.



GL-series Kilns: You will need to turn the kiln upside down. To do this, first remove the door. Thoroughly vacuum the kiln. Then cover the bottom of the kiln with newspaper. Hold the newspaper in place with tape. This will prevent glass separator from falling onto the element when you turn the kiln upside down. (Contact with kiln wash or glass separator will ruin a new element.)

Turn the kiln upside down onto a blanket on the floor. The easiest way to do this is to first tilt the kiln into its

back and then tilt it again onto its roof. Grab the kiln by the steel case when you lift it. **Do not grab the firebricks when lifting.** You'll probably need a couple of helpers.

3 Remove screws on front of switch box and let box hang by element lead wires.

Digital Models: Some digital models have two switch boxes: a lid switch box and a controller switch box. In this case you would remove only the lid switch box.

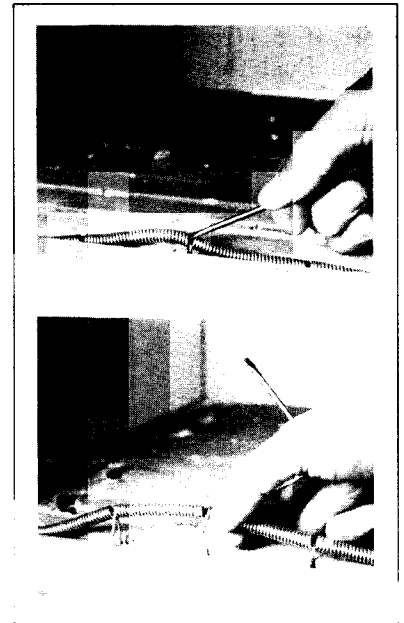
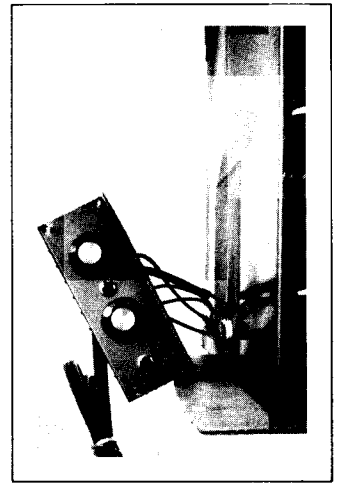
4 Remove the element connectors from the element you are replacing. Do this by holding the connector with Vice-Grips and loosening the element screw.

5 Remove the screws holding the element lead wires to the connectors and throw the old connectors away. Always use the new connectors furnished with the new elements. Remove the porcelain insulators and save them; they will be used again.

6 Begin removing the element. You'll find it easier to pull out the element ends if you begin somewhere away from the element ends and work your way towards the ends. The element is held in place by staples. To remove the staples, insert a small screwdriver tip under the upper edge of the element coil where the staple is driven. Gently lift the element up. The staple will come up with the element. Carefully pull the element from its firebrick holes.

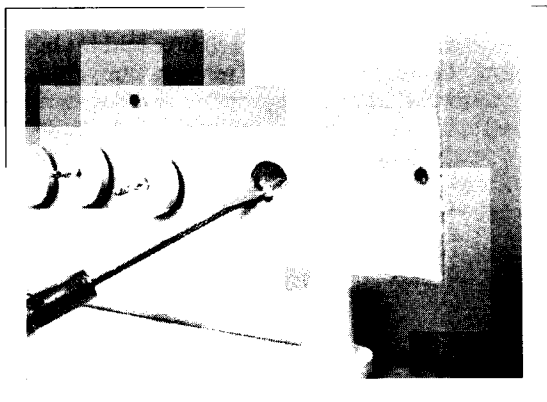
7 If the old element burned out due to contact with foreign materials (such as glass or glass separator), there may be a melted, glazed spot in the element groove. Glazed spots left in the grooves may ruin the new element, so dig out any of these spots. The small hole left in the groove will not damage the new element. Clean all dust and firebrick chips from the element grooves with a vacuum cleaner or clean, dry paint brush.

8 Although not always necessary, it's a good idea to recoat the element groove and lid or roof with Paragon Kiln Coating and Repair Cement before installing a new element. This fills in small chips and staple holes and gives the lid a hard, dust-free coating. Follow directions



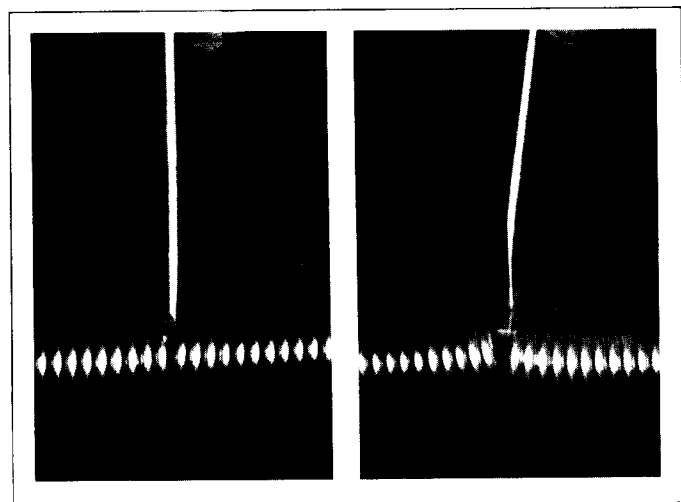
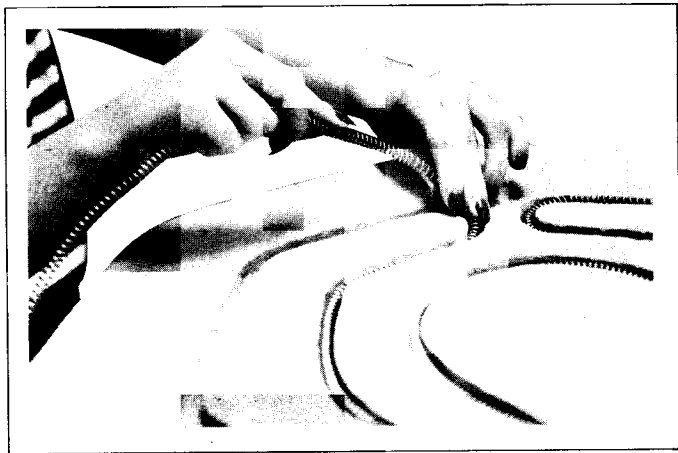
ELECTRICAL MAINTENANCE

on bag. Make sure lid or roof is thoroughly dry before installing new element.



9 Insert one end of the new element into one of the element holes and push the element through to the other side of the hole. Use a small screwdriver to guide the element out the hole should the element catch on the case.

10 Press the element into the groove. Your element was stretched to the right length for your kiln, but when you come to the end of the element after threading it through the grooves, the element may be slightly too long or too short. If so, stretch or compress the element with your hands. Push the end of the element into its second hole.



15 Paragon kilns fire the imagination!

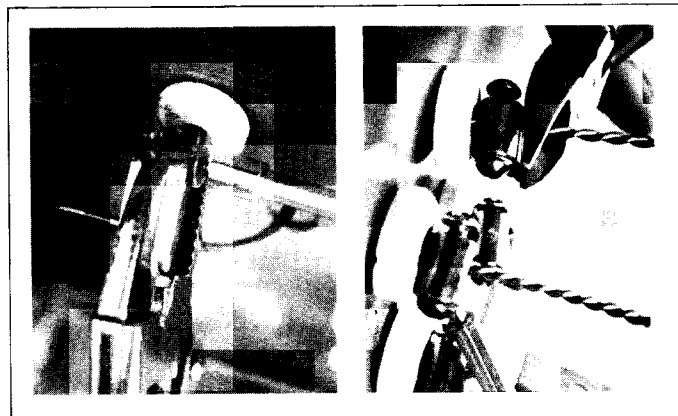
11 After element is seated in its groove and both ends are inserted all the way into their holes, secure the element with staples about every 3". See "Bulging Element Repair," page 13. On some models, the element coils will have to be spread apart with a screwdriver to make room for the staples.

12 GF-series kilns: Replace lid by connecting half hinges and lid support (reversing step 2). **GL-series Kilns:** Turn kiln right side up holding the kiln by the case and not by the firebricks or roof. Reinstall door.

13 Reinstall the porcelain insulators. Twist them into their holes as far as they will go.

14 Sandpaper the eyelets of the switch-to-element lead wires until bright and clean of all oxidation. (Install new lead wires if insulation on old ones is brittle.) Use the brass screw to connect lead wire eyelets to the new element connectors. Before tightening the screw, adjust eyelet to where it will be tilted away from kiln's case when the element connector is attached to the element. Then hold the element connector with Vice-Grips and tighten the brass screw securely with a 1/4" nut driver.

15 Pull end of element tight and install new element connectors even against porcelain insulators to prevent insulators from slipping away from the case. Use the stainless steel screw in the element connector to hold the element. (The brass screw holds the lead wire eyelet.) Hold the connector with Vice-Grips as you tighten the screw with a 1/4" nut driver. Tighten the screw until it squeaks. Then tighten some more.



16 Cut off the twisted ends of the element even with the side of the element connectors. Leaving the excess element sticking out past the element connectors could ruin your new element. (It could short out against something in the switch box.)

17 As you move the switch box back into place, check to see that no wire or wire nut touches an element connector or the kiln's case. **Wire, wire nuts, and the cord will burn if they touch the case or element connectors.** Replace screws in switch box and tighten into place.

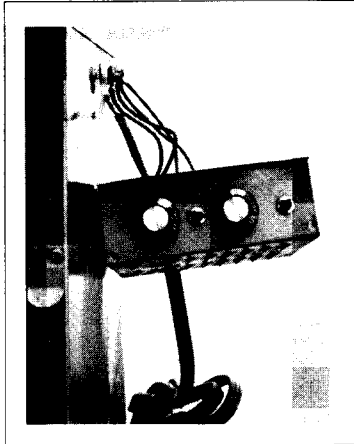
Switch Replacement (Manual Control Kilns)

UNPLUG KILN BEFORE REMOVING SWITCH BOX.

Don't be concerned if your switch makes a steady clicking noise. It's the sound of the bimetallic timer cycling on and off. When the switch is on HIGH, the noise will cease.

To replace electronic components, see your TnF instruction booklet. If you do not have the booklet, call or write Paragon for one.

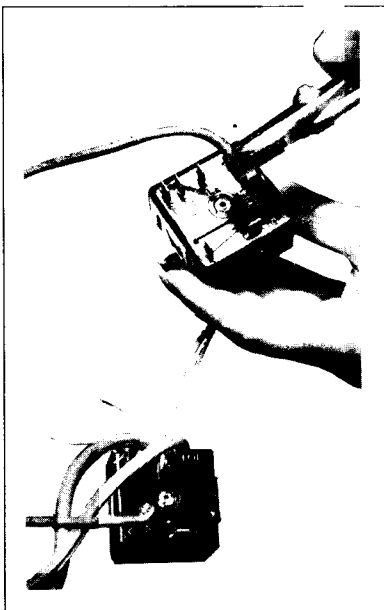
1 Pull off switch knob with fingertips. Some switch knobs are held in place by a set screw on the side of the knob. If knob won't come off when you pull it, check to see if a set screw is securing it to the shaft.



GL-22A switch box hanging by lead wires.

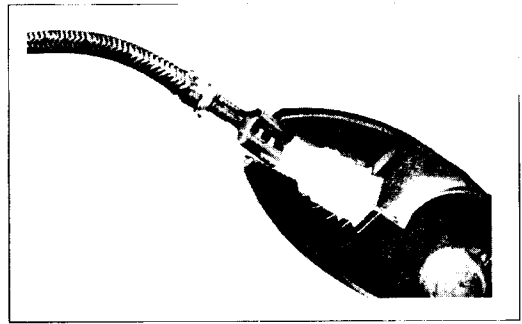
2 UNPLUG the kiln. Remove and save the screws at the side of the switch box that hold it to the kiln and let the switch box hang by the element lead wires.

3 Hold the new switch next to the switch box in the same position as the defective switch. Remove and transfer one wire at a time from the old switch to the new one making sure each connection is tight.



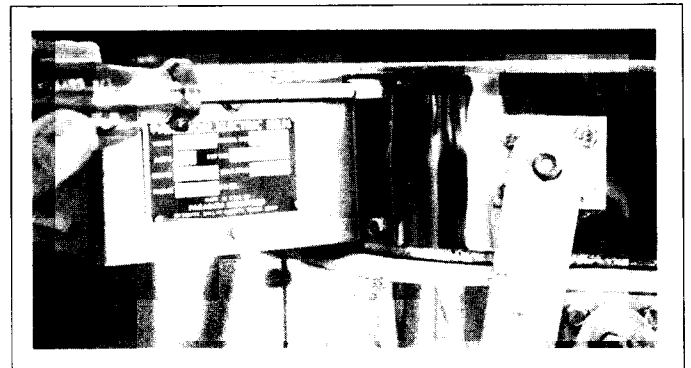
4 If push-on terminals do not have a snug fit, gently squeeze the end of the terminal with pliers.

5 Remove the single nut from the front of the defective switch. Remove switch and put new one in place making



sure it is right side up. Reinstall shaft nut checking to make sure it is not backwards. Tighten securely.

6 As the switch box is moved back into place, check to see that no wires are touching kiln case or the element connectors. Wires touching case or element connectors will burn. Tighten switch box screws. Replace knob.



Reinstalling a GF-series switch box

FIREBRICK MAINTENANCE

Small Chip Repair

If your kiln firebrick becomes chipped, leave the chipped area alone. Your kiln will continue to fire normally.

Glazed Spot Repair

Sometimes decorating materials drip onto the walls of the kiln during firing. If not repaired at once, these materials will remelt each time the kiln is fired and possibly spread. Spots should be repaired by carefully digging all of the material out of the brick with a screwdriver or knife. The small hole that remains will not harm your kiln and can be left unrepaired.

If small particles of glass fall onto the kiln bottom, remove before the next firing.

Large Chip Repair

Do not fill large chips with repair cement, because expansion of cement differs from expansion of the brick, and the cement will break out when fired. Instead, seal large chips with a thin coat of repair cement and leave unfilled.

Reversing the GF-Series Brick Bottom

This is not recommended for GL-series kilns.

Hairline cracks are a natural characteristic of insulating firebrick and are a result of expansion and contraction during firing. Do not be concerned with these, as they close tightly when the heated brick expands. This expansion and contraction during firing is absolutely necessary for the long life of your kiln.

If the bottom of your GF-series kiln becomes uneven, scrape off the old glass separator and apply a new coat. Should the brick become unusually rough, it is easy to turn the bottom over for a fresh, smooth surface.

1 Remove the lid by removing the rod that runs through the hinge. (See photos, page 14.) The rod is held in place

on each end by a push-on spring lock. Grasp a spring lock with pliers and pull off with a twisting motion. Slide out the hinge rod. Remove lock nut on lid support. (Your kiln may have support chains instead of a lid support.)

2 Carefully turn the kiln upside down on a padded surface such as cardboard. Make a mark on the steel base that lines up with the seam in the sidewall case. (This will make it easy to realign the screw holes.)

3 Remove only the screws at the bottom of the kiln jacket and pry off the steel base with a screwdriver.

4 Take the brick bottom out and turn it over. Reinstall the steel base. If the screw holes are difficult to realign, drill new ones. Turn the kiln back over. Reinstall lid.

GLOSSARY

ANNEAL

To remove the inner stresses from glass by cooling gradually.

BISQUE

Fired, unglazed clay.

BLANK

Glass cut to a specific size or shape for a project.

CARBORUNDUM STONE

Silicon carbide, used to clean irregularities from the edges of glass before firing.

CATHEDRAL GLASS

Transparent colored glass.

COEFFICIENT OF THERMAL EXPANSION

Degree of change in size of a material as it is heated. Different glasses fused together must expand and contract at the same rate to avoid breakage.

COMPATIBILITY

Refers to different glasses that have the same coefficient of thermal expansion.

CONE, PYROMETRIC

A small pyramid of ceramic materials that will react to the effect of time, temperature and atmospheric condition inside the kiln in the same way as ceramic ware. The cone bends when ceramic ware rated for that cone number reaches maturity.

DECAL

A design or picture printed in overglaze or underglaze colors on a protective coating. The decal is slipped from the paper backing onto the appropriate ware and fired for permanency.

DEVITRIFICATION

A frosty appearance on the glass surface.

ELEMENT

A coil of wire that heats when electricity passes through it.

ENAMEL

Liquid or powder containing finely ground glass. Usually applied to metal, such as copper, and fired in a kiln. Some enamels can be applied to glass.

FIRE POLISHING

Smoothing the surface of the glass by heating it to fusing temperature.

FIRING CHAMBER

The inside of the kiln that holds the load of glass being fired.

FLOAT GLASS

Window glass. It is made by floating molten glass over molten tin.

FRIT

Small particles of glass. Frit is useful in adding small bits of color to a fused glass piece.

FULL FUSE

Heating the glass until separate pieces become one flat surface.

FURNITURE, KILN

The shelves and posts used to stack ware inside a kiln.

GLASS FUSING

Heating pieces of glass until they soften and stick together.

GLASS SEPARATOR

A powder mixed with water and brushed on top of shelves or molds and bottom of kiln's firing chamber. It prevents glass from sticking to these surfaces. (Also called *shelf primer*.)

GLAZE

A liquid composed of glass particles applied to ceramic and glass ware.

GREENWARE

Unfired clay objects.

HAIK BRUSH

A natural fiber brush used to coat glass separator onto the kiln shelf.

HEAT-SOAK

Maintaining the same temperature inside the kiln. Heat soaking the glass just below fusing temperature allows finer control of the fusing. The easiest way to heat-soak is to use an electronic controller.

INFINITE CONTROL SWITCH

A switch that uses a bi-metallic timer to adjust current flow to the heating elements. It makes a clicking noise as the bi-metallic timer cycles on and off. When turned to HIGH, the power flows to the elements continuously.

INSULATING REFRACTORY FIREBRICK

The type of bricks used to line the interior of your Paragon glass fusing kiln. You can order firebrick and shape it with a knife to make your own sagging molds.

KILN SITTER

A mechanical switch activated by a pyrometric cone. It shuts off the kiln at the proper temperature.

KILN WASH

Kiln wash is similar to glass separator. It is used to coat shelves and the kiln bottom for firing ceramics. It prevents dripping ceramic glaze from embedding into the firebrick bottom or sticking to the kiln shelf permanently.

LIMIT TIMER

A Kiln Sitter with a back-up electrical power shut-off. When a clock on the Kiln Sitter runs out of time, it shuts off the kiln.

LUSTER

An iridescent overglaze, sometimes metallic.

OPALESCENT GLASS

Milky, translucent glass.

OVERGLAZES

China paints, lusters, gold, etc., used over a fired glaze and on glass. It may also be applied on polished porcelain bisque and fired for permanency.

PATE DE VERRE

Fusing crushed glass in a mold.

PEEPHOLE

The hole in the sidewall of a kiln used to see the interior of the kiln. (Remember to wear firing safety glasses when looking through the peephole.)

PLATE GLASS

Window glass 3/16" or thicker.

PYROMETER

An instrument that measures temperature.

SAGGING

Heating glass on a mold until the glass softens, sinks into the mold, and takes the shape of the mold.

SHELF

Glass is fused on the shelf, a flat slab of fireclay inside the kiln, and not directly on the kiln bottom.

SINGLE STRENGTH GLASS

3/32" window glass.

STRINGERS

Glass rods approximately 1/16" in diameter. They produce thin glass lines in fused pieces. (Also called *streamers*.)

THERMOCOUPLE

A temperature-sensing probe inserted into the firing chamber of a kiln. The thermocouple is made of two dissimilar metals welded together at the tip. When heated, they generate an electric current in millivolts, which is read by a pyrometer and converted to temperature.

PARAGON KILN LIMITED WARRANTY

Paragon kilns with a temperature rating up to and including 2300° F. are warranted to the original purchaser, subject to the listed exclusions below, to be free of defects in workmanship for a period of two years from date of original purchase from an authorized Paragon distributor or dealer. Kilns with a temperature rating of 2350° F. or higher (cone 10) are subject to the same exclusions and warranted to the original purchaser for a period of one year from original purchase date.

This warranty excludes: 1) Kilns damaged by overfiring (exceeding the melting temperature of the material being fired) regardless of cause of overfiring; 2) Ware or kiln furniture damaged by overfire; 3) Kilns allowed to exceed the maximum temperature shown on kiln's nameplate; 4) Kilns subjected to abuse, neglect, freight damage or improper storage; 5) Kilns used for either reduction or salt firing; 6) Kilns damaged by improper electrical installation; 7) Kilns used for purposes other than firing ceramics, glass, or heat treating materials; 8) Element burnout caused by contact with foreign materials; 9) The patented Dawson Kiln Sitter and/or Limit Timer manufactured by W. P. Dawson, Inc., 399 Thor Place, Brea, California 92621.

Paragon Industries, Inc. will repair or replace any parts which become defective under normal and proper use during the specified period for either type kiln, providing the kiln has not been subjected to misuse or the listed exclusions. Paragon will furnish and install replacement parts at the factory with transportation costs paid by the owner; or upon receipt of defective parts at the factory, and after factory examination of the defect, replacements complete with installation instructions will be shipped postpaid to owner.

Any claim for adjustment under this warranty must include name and address of dealer from whom kiln was originally purchased. Repair or replacement of any defective parts shall fulfill all obligations of Paragon Industries, Inc. No other obligations or liabilities are assumed in connection with Paragon kilns nor does Paragon Industries, Inc. authorize its distributors or dealers to assume any other obligations or liabilities.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.