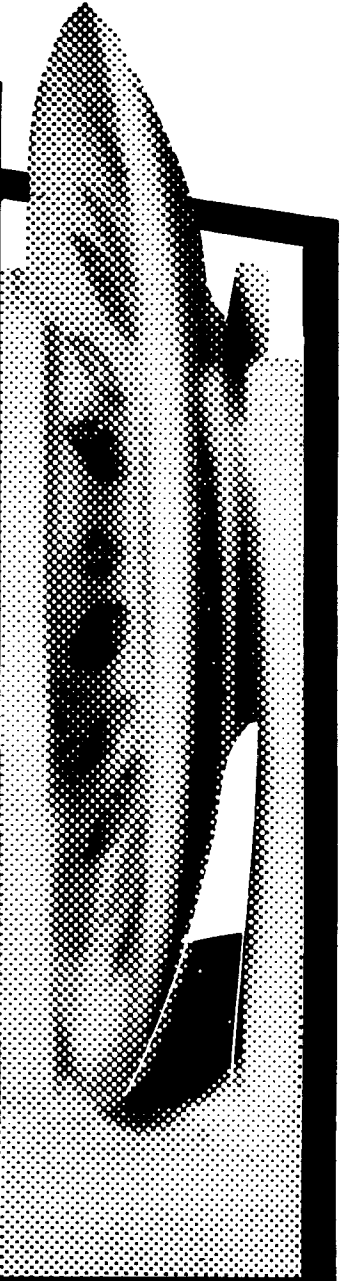
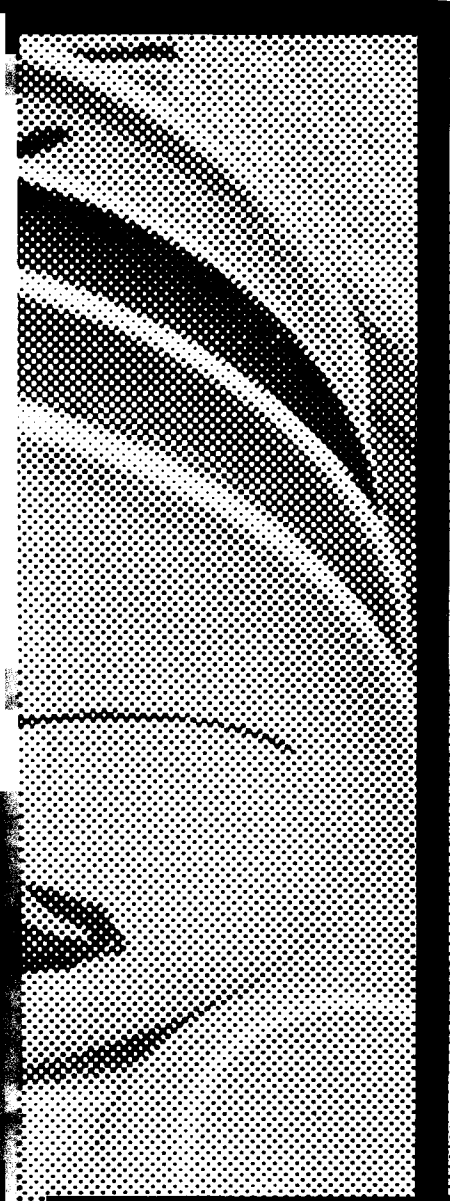




# PARAGON KILNS



**X series  
instruction  
and  
service  
manual**

# introduction

Welcome! You have joined the tens of thousands of accomplished hobbyists and professionals who proudly own a Paragon Kiln . . . the finest in America!

Especially for the china painting artist, Paragon's X-series kilns are designed to meet the exacting standards of the art. The completely portable kiln with materials used to give you many years of long, trouble-free service. A stepless control switch allows your control of particularly delicate work, and is perfect for the glass artist. In fact, new and exciting shapes that never seemed possible to fire before, are the challenge that awaits.

The time you spend in getting acquainted with your kiln and the information you will obtain from reading this manual and following the instructions will save you many dollars in ruined ware. Our manual cannot possibly cover all the many phases of china painting; that was not our purpose in preparing it. The intent is only to give you the maximum amount of information about your kiln. The warranty does not cover damage caused by failure to follow these instructions, so . . . **YOUR RESPONSIBILITY IS TO READ THIS MANUAL!**

Your Paragon Kiln should not be regarded as a household appliance which will remain looking factory new forever, but as a piece of very hard working machinery which will more than reward proper care. The temperatures required in firing create tremendous stresses within your kiln during the firing period. The insulating firebrick actually expand and contract with each firing. This is absolutely necessary for the long life of your kiln; however, hairline cracks will appear in the brick while the kiln is cold. Do not be concerned with these, as they close tightly when the heated brick expands.

Your Paragon Kiln Dealer will be glad to help you with any problems and give you suggestions for better firing. If you should have any problems with your kiln or with its operation, see or write your dealer from whom you bought your kiln. Writing the factory first will normally only delay assistance.

*Read each page of this manual in detail before you install or operate your kiln. Warranty does not cover damage caused by failure to follow instructions.*

*Your kiln will be of great help in developing your talents in all areas of china painting. Use these talents to develop plaques, figurines and similar decorative items which will not contain food or drink. When you make food or drink containers, select a decorating material which has been formulated, tested and labeled as approved for the hobbyists to use on a surface which will be in contact with food or drink. Follow the manufacturer's instructions exactly, without any variations. Some decorating materials may be unsafe and toxic when used for surfaces which will be in contact with food or drink.*

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## NOTE

*Throughout this manual numerous pictures and illustrations are shown for instruction and service of your X-series model. Do not be alarmed when you see a firing chamber deeper than your X-series model, since the procedures for loading, firing, maintenance, etc. are the same.*

# before you fire

## UNPACKING THE KILN

Paragon makes every effort to insure that your kiln arrives in excellent condition. We cut no corners in our packing materials and take every possible precaution against freight damage. Acting as your agent in engaging a freight carrier, Paragon's legal responsibility ceases when the merchandise is delivered to the carrier in good condition. In shipment, however, the crate is handled by strangers who are unaware of the fragile components of a kiln and freight damage may occur.

You should thoroughly inspect your kiln as soon as it is received. If damage is discovered, you must follow the procedure below in order for the carrier to allow any claims for damage.

1. Notify your freight agent at once and request an inspection.
2. Save all of the packing materials for inspection by the freight claims adjuster.
3. Refer to your packing list for added information or contact your Paragon Kiln Dealer.

## SETTING UP THE KILN

Your Paragon kiln stand has been specially designed for maximum support of your particular model. The kiln should be operated only on this stand.

1. Place the stand legs *INSIDE* the stand frame and tighten all metal screws firmly. Do not overtighten.
2. Insert the mar-proof plastic tips on the stand legs.
3. Position the stand on a concrete floor or a high temperature (protective) sheet making sure it is level. The stand *MUST* be level to alleviate stress on the kiln during firing and to prevent your glazed pieces from falling off their stilts.
4. To level, place a shim *UNDER* the appropriate leg or legs, not between kiln's bottom and stand.
5. Center the kiln bottom (has no handles) on the stand providing for a minimum of 12 inches clearance between kiln and the closest wall. Place the wired collar on the bottom making sure the bottom of the dropped, recessed grooves is downward. Position the lid (with handles) on top of the wired collar.
6. Make sure the kiln sets sturdy.

## CLEANING THE KILN

Your kiln should be thoroughly cleaned before it is fired. By placing a soft, brush type nozzle attachment to a vacuum cleaner, you can remove any brick dust inside the kiln, especially in the grooves. A damp cloth or damp sponge may also be used to gently wipe dust from sidewalls and kiln's brick bottom.

## LOCATING THE KILN

Convenience is the main thing to consider in locating your kiln. But equally important, is to insure the safety of the kiln's operation. The following cautions should be taken to warrant both:

- Plan your firing area near a present electrical outlet or where a new circuit can be easily and economically installed.
- Place your kiln in a well-ventilated, covered and protected area as for example, the garage, basement, utility or ceramic hobby room.
- Provide for a minimum of 12 inches clearance between kiln and the closest wall.
- Never place the kiln near curtains or other combustible materials.
- Position kiln stand on a level surface that will not be damaged by heat. A cement floor is recommended, however an asbestos sheet or other protective material may be used beneath the stand. Consult your hardware store for such information.
- Avoid placing the kiln stand on rubber tile, linoleum or any surface that might tend to mar or discolor when heated.
- Place kiln in an area where it can be easily loaded and unloaded, but out of the way when not in use.
- Keep unsupervised children away from the firing area.
- Do not allow kiln's power supply cord to come into direct contact with the side of the kiln. Your kiln jacket will become hot during firing and touching could cause damage to the cord set.
- There is little danger of serious burn from accidental contact if you use the same caution used with an electric iron.

## SEATING THE ELEMENTS

We take every precaution to buffer our product against vibration and jarring during shipment. But a kiln is fragile and the elements inside will sometimes become dislodged. By performing our simple kitchen knife test now, you may be saving yourself time, as well as trouble later on.



KITCHEN KNIFE TEST

Run a blunt kitchen knife completely around each groove before the kiln is ever fired. It may not be evident to the eye whether the coil is securely in its groove.

# electrical

## INFORMATION FOR THE KILN OWNER

Your new kiln will perform properly only when plugged into an electrical outlet that will not be used for other purposes while the kiln is firing. Otherwise, your first firing will be disappointing or even harmful to your kiln. The decision to use an existing circuit or have a new one installed should be based on the information on *How To Locate Two Circuits* and the chart on *Electrical Specifications*.

You should check your circuits by following the simple procedure below, before you contact an electrician. Should you need an electrician to install a new circuit, have him check the electrical specifications chart and read the instructions first. This will simplify his work, and assure you of having the proper electrical circuit. If a new circuit is installed, do not use less than number 12 copper wire, and if the outlet is more than 50 feet from the circuit breaker or fuse box, use at least number 10 copper wire to compensate for the voltage loss in the wire due to the traveling distance.

Your electrical installation will be as good as the electrician you use. While all electricians must be licensed, this does not insure their competence. Beware of the electrician who wants to make changes in the kiln or the recommended installation. The kiln's wiring and switches are of ample size for the current carried, and each kiln has three complete inspections plus being actually plugged into a properly wired receptacle and heated on all switch positions before it leaves the factory.

## HOW TO LOCATE TWO CIRCUITS

Model X-14J must be fired on a circuit that is not used for any other purpose while the kiln is firing. Therefore, use the circuit that is not being used by the kiln for lights, radio or other uses while your kiln is firing.

1. Plug a lamp into each of two, separate wall outlets.
2. Turn off one circuit breaker (or unscrew one fuse) at a time until one is found that causes one lamp to go out.

If both lamps go out at the same time, the outlets you are testing are both on the same circuit.

Take one of the lamps and plug it into other outlets until one is found that will light the lamp. This indicates that you have found two circuits, each connected to a separate circuit breaker or fuse.

3. Turn off the 20 Amp. circuit at the circuit breaker or fuse box.

4. Check to see if any appliances or lights are connected to this circuit which cannot be disconnected while the kiln is firing. If you cannot use this circuit only for the kiln while the kiln is firing, it will be necessary to have another 20 Amp., 120 Volt circuit installed.

### WARNING

*If you must use an extension cord, do not use one smaller than 14 gauge and never plug it into a ceiling outlet!*

## GOOD CIRCUIT AFFECTS TIME REQUIRED TO FIRE

All references to time required to fire in this manual and the enclosed Recommended Firing Schedule Poster are based on an evenly loaded kiln operating in still air at exactly 120 volts. These conditions usually are not found in actual practice, particularly exact voltage. A good circuit will deliver almost the same voltage at the kiln that is available at the meter, but the good circuit cannot correct low or high voltage supplied by your power company. This voltage may be 10% more or less than the usual 120 volts, which in turn will vary the time required to heat your kiln to a given pyrometric cone from as little as one-half the average time to more than twice the average time. When the voltage is below the minimum operating point, the kiln will never reach full temperature and can be corrected only by having the power company adjust the voltage.

Use the enclosed Recommended Firing Schedule Poster as a guide for your first firing, but do not assume, for example, that it will take exactly 2 hours to fire just because it says so on the schedule. These are AVERAGE times, and you could have high voltage and fast firing. Every kiln installation will fire differently, and you must experiment with switching schedules until you know exactly how to fire your kiln. Don't be afraid to change the suggested times between changes of the switch position - there is little danger in harming your kiln or your ware if you watch your pyrometric cones and don't overfire the kiln.

If your kiln fires too fast, slow it down by leaving the switch on LOW heat position longer. You can speed up firing by changing the switch to a higher heat position sooner.

## ELECTRICAL SPECIFICATIONS

MODEL NO.	VOLTS	AMPS	WATTS	COPPER WIRE SIZE	FUSE SIZE
<b>X-14J</b>	120	15.0	1800	12	20

## LOCATING ELECTRICAL TROUBLE

If your kiln stops heating during a firing, check your fuses or circuit breakers first! In some installations, any one of four fuses can blow and prevent half of your kiln from heating. Have your electrician show you which fuses control your kiln, and how to replace them.

Wire heats when an electrical current passes through it. If the same current passes through both a small wire and a large wire, the smaller 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 or "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 circuit 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 will generate heat. This has the same effect on the fuse or breaker as extra current flowing through it, and is the usual cause of fuses blowing during firing. If the fuse or circuit breaker panel feel unusually warm, have your electrician check for loose connections, particularly at the center screw of the fuse socket, even in a new fuse box.

## TROUBLE-SHOOTING

### SLOW FIRING

**Probable Cause:** *Low Voltage*

**Remedy:** Fire kiln with all switch(es) on HIGH during entire heating cycle. If firing time remains excessive, have power company check voltage at kiln with all switch(es) on HIGH heat position. Readjust transformer if needed.

### KILN DOES NOT REACH MAXIMUM TEMPERATURE

**Probable Cause:** *Low Voltage*

*Defective Switch*

*Broken Element*

*Tripped Circuit Breaker or Blown Fuse*

**Remedy:** Correct low voltage as above. Locate tripped circuit breaker or blown fuse by visual inspection and replace. Inspect for break. If none found, remove switch box and inspect element connections. Replace if badly oxidized. Replace switch if no other trouble is found.

### HEATS IN SOME SWITCH POSITIONS...NOT IN ALL

**Probable Cause:** *Tripped Circuit Breaker or Blown Fuse*

*Defective Element*

*Switch Connection*

*Element Connection*

**Remedy:** Reset breaker or replace fuse. Locate defective part and replace.

### FUSE BLOWS AFTER KILN HAS FIRED FOR SOME TIME

**Probable Cause:** *Short Circuit*

*Overloaded Circuit*

*Improperly Connected Line Neutral*

**Remedy:** Remove switch box. Locate and correct short. Check to see if other appliances are being used on kiln circuit. Check connections in wiring of building, if new installation. If cap on cord set has been changed, check terminal connections.

### NO HEAT IN KILN

**Probable Cause:** *Tripped Circuit Breaker or Blown Fuses*

*Cord Not Plugged Into Outlet*

**Remedy:** Check breaker or all fuses, including main fuses. Little probability of all elements or switch(es) failing at once.

### HOT PLUG OR OUTLET

**Probable Cause:** *Defective Plug*

*Defective Outlet*

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

# necessities

## PYROMETRIC CONES

Pyrometric cones are small pyramids of clay and mineral oxide that determine how long your ware should be fired. They soften and bend when exposed to heat for a period of time, and are by far the most important things you will place inside your kiln.

The maturity obtained in any firing is in direct relation to the "heat-work" produced by the kiln on the ware being fired. Time, temperature and the atmospheric conditions inside the kiln control the maturity of your ceramic bodies, as well as the bending of your pyrometric cones. If the pyrometric cones are used as instructed, they will precisely measure the amount of "heat-work" done by the kiln in a single firing.

Different materials will require different firing conditions. Large and small pyrometric cones are stocked in all numbers from 022 to 10, respectively indicating the coldest to the hottest cone. The number can be found on the side or base of the cone, and the exact cone to use with each material is usually stated on the label by the clay or glaze manufacturer or your supplier can provide this information.

Selecting the correct pyrometric cones may also be influenced by the thickness of the kiln's wall. A kiln with walls less than 3 inches thick may require one cone hotter than a kiln with 3 inch or thicker sidewalls for the ware to have the same degree of maturity. The effect of the additional heat stored in the thicker wall kilns will cause the ware to mature and additional bending of the pyrometric cone after the power is turned off.

Cones should be handled with care. If dropped, abused or exposed to moisture, they may develop cracks which could affect the performance of the cones.

**Never fire by time alone . . .  
always use a pyrometric cone!**

### 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

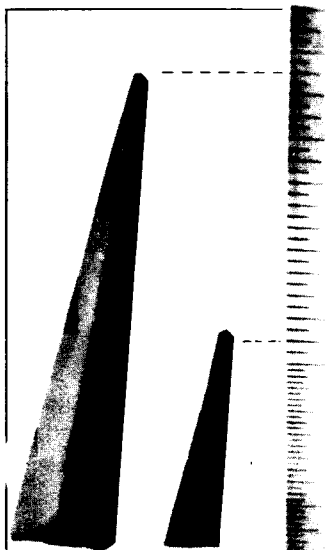
*In most cases, china painters are concerned with a firing range of 1112° F. through 1650° F., for a piece of ware to achieve its proper maturity. The pyrometric cone numbers which encompass this range are 022 through 010.*

## TEMPERATURE EQUIVALENTS ORTON PYROMETRIC CONES

Cone Number	Large Cones	Small Cones
Heated at:	270° F. *	540° F. *
022	1112	1121
021	1137	1189
020	1175	1231
019	1261	1333
018	1323	1386
017	1377	1443
016	1458	1517
015	1479	1549
014	1540	1525
013	1566	1580
012	1623	1607
011	1641	1661
010	1641	1686
09	1693	1751
08	1751	1801
07	1803	1846
06	1830	1873
05	1915	1944
04	1940	2008
03	2014	2068
02	2048	2098
01	2079	2152
1	2109	2154
2	2124	2154
3	2134	2185
4	2167	2208
5	2185	2230
6	2232	2291
7	2264	2301
8	2305	2372
9	2336	2403
10	2381	2426

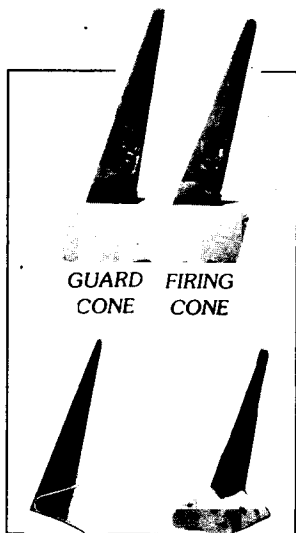
\* Rate of temperature increase per hour.  
Tables by courtesy of The Edward Orton, Jr.  
Ceramic Foundation

Pyrometric cones come in two sizes. Small cones (1 1/8" high) and large cones (2 5/8" high). It is merely a matter of personal preference which size you use behind the peepholes. Normally, the large size is placed on the shelves of the kiln's interior, because they are more easily viewed.



Even though they are made of the same material, the size and weight of the cone affects the bending. A larger, heavier cone will bend earlier or at a lower temperature than a small cone. The bending differential of the two sizes is insignificant with materials of reasonable firing ranges. However, you should be consistent in using either the small or large cone behind the peephole if you expect consistent results.

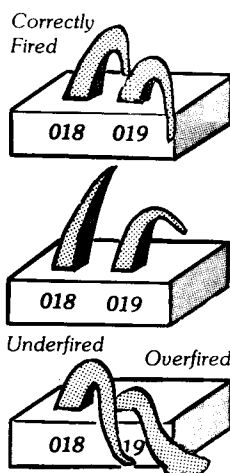
The visual cones used inside the kiln must be properly mounted in order to receive consistent results. They must have their natural 8° slant from vertical position (the incline a cone has when stood on its base). If a cone is mounted at an angle greater than 8° it will bend more or at much too low a temperature, just as a cone mounted at an angle less than 8° will bend less or at too high a temperature.



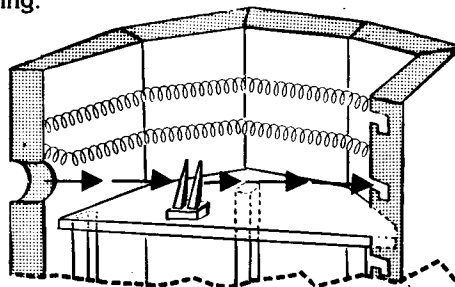
Pyrometric cones may be inserted in cone holders (clay plaques or wire holders) or you can mount your cones in a pat of clay. If a pat of clay is used, it should be completely dry before firing to prevent its possibility of exploding and ruining a full load of ware. To speed drying, make indentions in the pat of clay with the end of a small brush handle after the cone is inserted.

Mount behind the peephole a large cone of the desired firing temperature, and a large cone of lower temperature beside it. For example: large cones 018 and 019 behind the

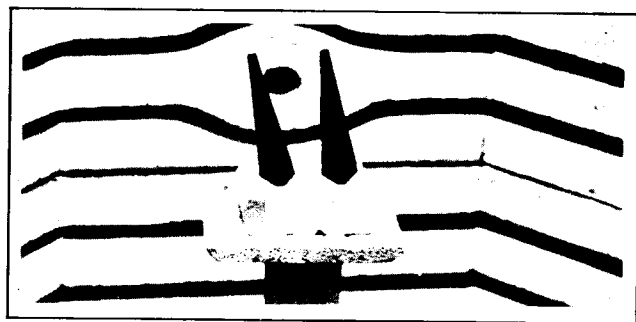
peephole. When the kiln has cooled and can be unloaded, examine the position of the cones in the cone plaques as they are removed. On each plaque note its location in the kiln and the load of ware on the shelf. After a period of time you can compare the results and adjust the firing schedule for your particular kiln.



Place your large cones at least 3 inches behind the peepholes to protect them from exposure to cool air drafts and in such a position that you have a clear path of vision to the element on the opposite side. At higher temperatures a cone is difficult to see if a piece of ware is behind it. Always use dark glasses when checking the bend of your cones during firing.



Ideally, you will be able to place your mounted cones on a shelf behind the peepholes. It may be necessary, however, to use a post to position your cones due to the size of your ware preventing a shelf behind each peephole.



When speaking with persons who tell you they fire a given product with unusually good results at a particular cone number, it is a good idea to find out where the cone was located. A cone referred to in the kiln-sitter is normally one cone hotter than the cone used on the shelf where the ware is located. Since Paragon X-series kilns are not equipped with kiln-sitters, you can achieve the same results by using a different cone number (whether higher or lower) on the shelf where the ware is located, and watching through the peephole for a correctly fired bend. Do not exceed 1700° F.





# tempering

Your kiln will give longer and better service if broken in carefully. Moisture is present in the kiln from water used in manufacturing, and the brickwork must be dried by pre-heating. You can temper the brick and increase the life of your kiln by following this pre-heating sequence.

1. Empty and clean the kiln. (see page 1 for instructions).
2. Vent the kiln lid approximately three inches. Place a post between the lid handle and switch box in such a manner that it touches only the hardware, and avoids contact with brick sections. Leave the peephole plug out of the peephole.
3. Turn the switch on LOW heat position.

While a cone is not required during pre-heating, the kiln should be checked every hour to be sure there is no electrical problem that would cause overheating. (see electrical information on page 2).

4. Leave the kiln switch on LOW for 3 hours, then turn to OFF.
5. Allow kiln to cool for 24 hours.

If your kiln is located in a garage or other unheated area subject to humid air and not used for several months, this tempering process should be repeated before firing your ware.

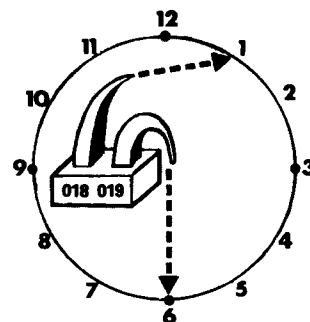
# first firings

After pre-heating, it is necessary that you fire your kiln to cone 018 (or one of the other overglaze cone numbers shown in the chart on page 11), *with only your kiln furniture and pyrometric cones in the firing chamber*. Position the cones so you can see them through the peephole, since they will serve as the examination for your kiln's reaching cone 018 firing maturity.

1. Vent the kiln lid two inches and leave the peephole plug out of the peephole.
2. Turn the switch on LOW for 30 minutes.
3. Lower the kiln lid so it is vented one inch.
4. Turn the switch on MED (3) for 30 minutes.
5. Lower the kiln lid so it is vented one-half inch, and insert peephole plug in peephole.
6. Turn the switch on HIGH for 20 minutes.
7. Check cone every 15 minutes.
8. Turn the switch on OFF when cone bends halfway over (a 6 o'clock bend).

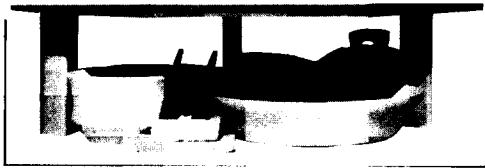
When cone 018 has properly bent, make a record of the length of time it took your kiln to fire to this temperature following this schedule. Your recorded information will assist you in predicting future firing times, but you should remember that the firing time requirement for a loaded kiln is longer than that of a kiln with only shelves, posts and pyrometric cones.

Load your kiln with ware suitable for maturing at any temperature from cone 022 through cone 010, and record information about this firing also for future reference. After this firing you may fire in any sequence desired.



# planning the load

Since all heat rises, the bottom of a kiln is the most difficult part to heat. Thus, as much of the bottom should be exposed to radiation from the sidewalls as possible.

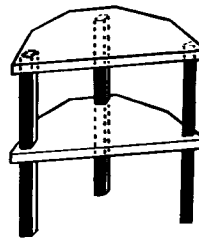


*Small, light pieces of greenware can be placed directly on the brick bottom*

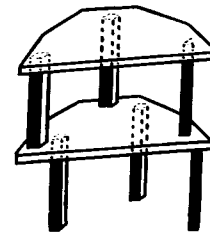
To make maximum use of your kiln's firing capacity, group similar sizes of ware as it is prepared. Directly on the floor of the kiln, place small, light pieces with ample room for air circulation around their bases. Low pieces require less heat and will allow you to use your kiln furniture more efficiently. Tall pieces may be placed on the top shelf with no posts or shelves above them. At least one element groove should be left between the floor of the kiln and the first shelf.

Heating elements must be at a greater temperature than the rest of the kiln in order for heat to transfer throughout the chamber. Because of this, the zone immediately around the heating element will be considerably hotter, and ware should be placed at least one inch away from an element coil. Larger pieces requiring all of the kiln's firing capacity should be placed so that the projecting edges are between coils.

Each shelf may be supported by either 3 or 4 posts with the minimum spacing between not less than 2". Shelves must be stacked so there is at least a row of heating elements between any two shelves. Keeping the need for air circulation in mind, place the posts on the floor of the kiln as you are loading your ware. The posts used with each layer should be at least one inch taller than the ware.

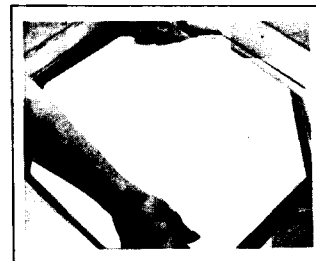


*Correctly Positioned*



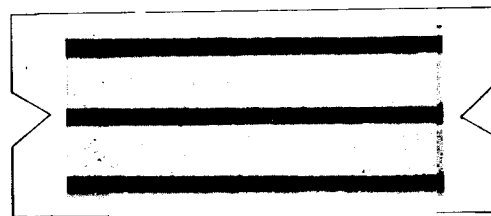
*Incorrectly Positioned*

If at all possible, posts should be placed so that there is an implied rest of one upon the other with shelves separating each layer. This will protect the shelves from breaking. As heavier, larger pieces are loaded on the top shelf, the posts sitting one on top of the other will properly make the bottom of the kiln bear the full weight of the load.



Place each shelf in the kiln by holding two edges and lowering it carefully so the sidewalls of the kiln will not be damaged. Be careful not to jar or shake the kiln after loading has started, as the ware or a shelf could be knocked over and broken. Shelves should be 1 inch to 2 inches smaller than the firing chamber of the kiln in which it is to be used.

Always have at least one element groove between each shelf. Your heaviest pieces should be layered where they will receive the most element groove coverage. Make sure at least one element groove is between the top shelf and the top of your kiln.



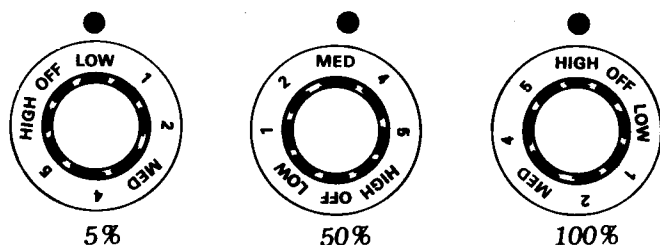
# firing

The most important item that goes in your kiln will be the pyrometric cones. We urge the use of at least one large pyrometric cone behind the peephole on the kiln's shelf. If you follow this suggestion of using large cones on the shelf to indicate the maturity of the ware, you will be rewarded by both beautiful ware and an increase in knowledge with each firing.

The pyrometric cones placed in the bottom of your kiln should be 3 inches directly behind the peephole (to prevent cool air exposure) and completely visible through the peephole. Use a short post, scrap of firebrick or modeled and fired clay pedestal to elevate the cones to correct height. Check the cone's position before placing the first shelf in your kiln.

Particular loading requirements for each type of ware are discussed in the following pages. Load accordingly, keeping these general points in mind.

## SWITCH CONTROL



Firing a piece of ware is the final step in making it a beautiful creation or a hopeless mess. It all depends on you, as there is no automatic device that can substitute for your personal attention to every firing.

Most ceramic bodies have only one exact point at which they will mature to their greatest degree of perfection. However, most of the ceramic bodies used in ceramics today have from one to two cones firing range for maturity in which satisfactory results can be obtained. In no way can we control or guarantee the kiln's turning off at just the right point. Only by using the proper cone for the ware being fired and watching it closely can you protect the ware and your kiln. The warranty on your kiln does not cover damage from overfiring, regardless of the circumstances involved. It is your responsibility to watch the cone at regular intervals and turn the kiln off as soon as the cone has bent.

Check the kiln frequently during the first few firings, and note the color inside the kiln. After a while you can learn to estimate, with considerable accuracy, the relationship the color has to pyrometric cones.

China paints fade very quickly if fired above the specified cone; so, watch the cone(s) closely and fire those colors that require the hottest cone first, second hottest next, and so on.

Paragon X-series kilns use a stepless control switch that has a bimetallic timer to allow the current to flow any percentage of the time from 5% to 100% of a minute. The switch positions include OFF, LOW, 1, 2, MED (3), 4, 5 and HIGH, with the higher percentage flow of current achieved by turning the switch toward the HIGH heat position. In the HIGH position, the cycling of on and off does not occur and remains on 100% (See bottom left).

There is a click when you turn the knob from OFF to LOW. Then the switch turns smoothly counterclockwise with a corresponding steady increase of power until it clicks into HIGH, where the switch feeds power to the kiln 100% of the time.

Because of long range and daily variations in current available, your kiln may fire in one-half to more than twice the average firing time shown in the Recommended Firing Schedule Poster. For this reason, you should not leave your kiln unattended for more than a few minutes on your first firing. Maintain a close watch on the kiln in the following firing until you have learned the range of variation in firing time.

# overglazes

Overglaze is a general term which indicates all forms of decoration which are usually applied over a fired glazed surface or a polished porcelain bisque surface. Overglazes include china paints, gold, luster, etc., usually having a firing range from 022 to 014.

Before loading the kiln, check to make sure your pieces are clean and completely dry. Smudges and fingerprints should be removed from the bottom, and a soft silk cloth can be used to gently wipe off any dust. If fired when damp or on a humid day, the pieces will result in a poor finish.

Overglazed ware must not touch each other, the floor or a shelf in your kiln during firing. Instead, stilts should be used to support the ware, and to prevent your pieces from becoming permanently bonded to the area they touch and ruined by the melted glaze. China painters usually prefer the ceramic side of stilts, allowing the metal points to rest on the shelf or kiln floor.

China paints must not be applied heavily, as cracking or peeling will occur. Apply several light coats, firing between each, until the desired shade is obtained. Since all china paint colors do not reach maximum color and brilliancy at the same temperature even when fired on the same ware, it is important to know which colors you should fire first at higher temperatures to prevent burning out the original colors in later firings. For example: Reds mature at a lower temperature than other colors and are fired after the other colors have been fired. Reds and yellows should not be fired side by side. Colors mature at a lower temperature on ceramic pieces than on porcelain or hard china. Check the overglaze manufacturer's literature for information on which cone to use with each color and type of ware.

Plates fire better when supported by a plate holder or placed on edge to permit even heating. If fired on edge, plates may be supported at the bottom with large spur stilts, which may also be used to separate adjoining plates. Tall posts can be used to prevent plates from touching the kiln wall.

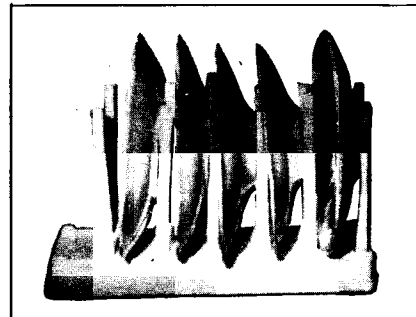
The kiln must be vented with the peephole plug out until china paint oil and other organic materials have vanished. This should be done while the kiln is at a low temperature, but the length of time required to burn out the oils will vary with the amount of decoration on the ware. The kiln may be left on LOW for as long as necessary for all odors of the oils to disappear, at which time the kiln's sidewalls will have a dark red appearance. Then put the peephole plug in place and close the lid.

Watch the cone behind the peephole closely, as even a small amount of overfiring will cause overglaze colors to

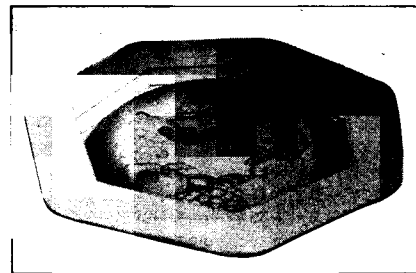
fade. Turn the kiln off *immediately* when the pyrometric cone tip is even with the cone base.



*China painted plates stacked on edge and separated by stilts.*



*Plateholders ensure even firing of china painted plates.*



*Position plates between elements for proper heat distribution.*

# glass painting

China painting antique glass lamp shades and decorating old bottles are two of the most popular forms of painting on glass. Use the same procedure for loading and firing this type ware as you would use for overglaze. Cone 022, the lowest cone, is used for firing.

Remove the lid of your kiln completely and leave the peephole plug out. Stilt your piece in the center of the kiln so that no side is closer to an element than another. Begin firing with the switch on LOW, and over a period of approximately 45 minutes, gradually increase the temperature in the kiln by 7 to 8 minutes in each heat position: LOW, 1, 2, MED (3), 4 and 5. At the end of this 45 minute period, carefully place the lid on the kiln, insert the peephole plug and turn the switch to HIGH.

Turn the kiln to OFF as soon as the cone starts to bend - a matter of only 10 to 15 minutes or more, so watch carefully. Do not wait for a full bend! Then, open the lid 3 or 4 inches and rest lid handle on post immediately to prevent further heat absorption. Do not open the lid completely until the kiln has cooled to room temperature.

The trick in firing this type of glass painting is to have it cool quickly. This keeps it from warping or melting, but even with forced cooling some shapes must be supported completely during firing. Supports may be made from castable insulating material or by shaping an insulating firebrick to fit the piece.

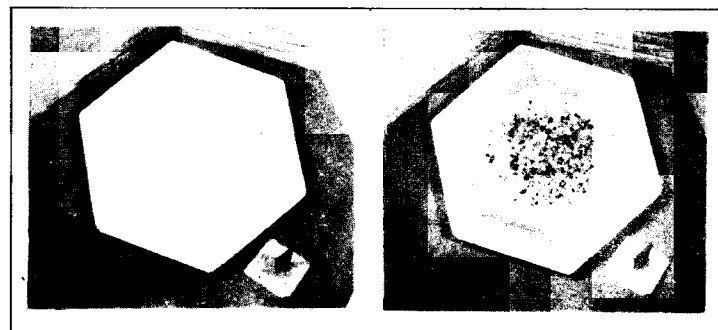
# glass sagging

Glass sagging refers to the technique of a plate of glass being placed on top of a ceramic bisque glass sagging mold, well coated with whiting, and being fired. During the firing the glass sags into the ceramic bisque sagging mold and takes the mold's shape.

This is not a mysterious or complicated operation. Molds are made of terra cotta or other low fire clay and you can make your own or buy them. There are many different types of glass that can be placed on top of the coated mold and decorated in hundreds of different ways.

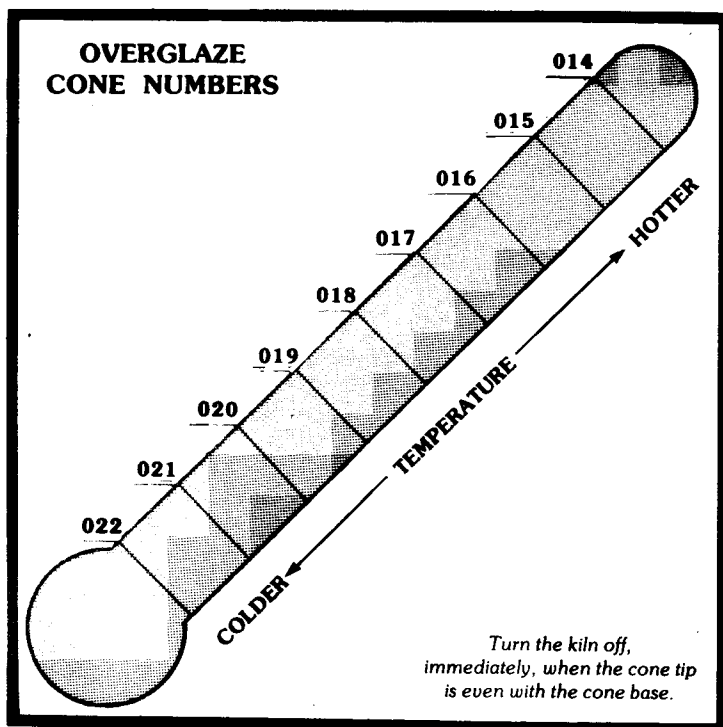
The length of firing time for glass sagging is less than ceramics. Place an 015 and 014 cone in your kiln and fire until the 014 cone has bent halfway. Then, position the kiln switch on LOW heat for 1 hour. Manually turn kiln off. With kiln lid closed, cool for at least 8 hours before opening. *The danger in glass sagging is fast cooling rather than fast firing.*

Your dealer may be able to give you additional information or you may wish to read one of the many excellent books on glass sagging.



Decorated piece of glass will be put on top of glass sagging mold.

Piece of glass that has sagged. Note that it has shrunk inside mold.



# imperfection

Imperfection is recognized any time a piece does not turn out as expected. If you unload your kiln only to find disappointing results in a particular piece of ware, you should justify your dismay with reason. Normally, defective pieces are caused by one of the reasons listed in this section.

## OVERGLAZE

**Breaking** in overglaze firing can be caused by poorly fired bisque. A slow bisque fire is always better for ware which is to be china painted. The greenware should be completely dry *before* being placed in the kiln. Standing plates on edge or using a plate holder gives good heat circulation and will help in preventing plate breakage.

**Purple spots** in gold are usually due to a thin application of gold or too much thinner. If gold is applied accidentally to an area it will show purple after being fired unless cleaned with a good gold remover.

**Broken lines** in gold can be caused by overfiring or too heavy an application. However, this is very attractive when gold is crackled over a dark color of fired glaze.

**Peeling** china paint can be caused by the paint being applied too heavily.

**Loss of color** in china painting is usually a result of overfiring or thinning your paint with too much medium when applying.

**Faded colors in overglaze decals** are a result of either underfiring or overfiring. If pinks and reds are drab, refire to a hotter cone. When used with a china paint background, apply and fire the decals first, then china

paint and fire again. *Check the recommendations of decal supplier.* If decal was underfired, refire to proper firing cone. If decal was overfired, the design may be repainted in china paints and refired.

**Weakening of luster colors** can be caused by overfiring.

**White spots** in lusters or metals can be caused by moisture on the ware before it was placed in the kiln or from having been fired at the same time as other overglazes. *Apply lusters only on a dry day.*

**Powdering of luster colors** can be caused by too heavy an application

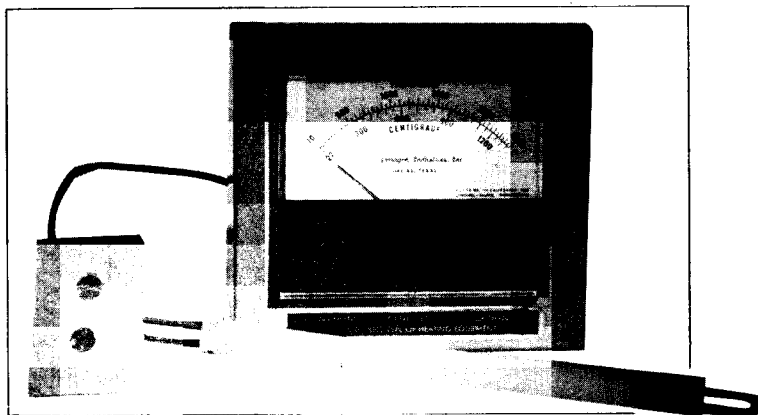
# accessories & maintenance supplies

## PYROMETER

A pyrometer is a portable instrument for measuring the temperature inside the kiln from approximately 100° F. to 2400° F. It consists of a thermocouple, lead wires and a temperature indicating meter mounted in a metal case. It is used to measure the progress of firing or cooling and as a guide for advancing switch positions.

A pyrometer indicates when it is time to start watching the pyrometric cone(s) closely and is an excellent way to fire quality ware consistently. It is not a substitute for a cone because a pyrometer measures temperature only, while a cone shows the amount of heat treatment which is applied to the ceramic body as it is being fired. Since a pyrometric cone is made from similar material and is subjected to the same heat treatment as the ware being fired, the pyrometric cone is the most accurate indicator of proper firing time.

The thermocouple is the measuring unit of a pyrometer which is inserted into the firing chamber of the kiln through a hole, 1/2 inch in diameter, which is drilled in one of the peephole plugs. The life of a thermocouple is in direct relation to the hours of heat applied to the thermocouple. Therefore, when firing the hi-fire materials, you will get far greater service by using the thermocouple inserted in the drilled peephole plug for taking readings during the firing process.



## REPLACEMENT PARTS

Thermocouple for T-2 pyrometer, 8" long, 8 gauge - All kilns.  
Chromel-Alumel pyrometer lead wire, 5' long.

## KILN COATING AND REPAIR CEMENT

A permanent, high-temperature, refractory cement for all types of kilns. Thin the cement with water to coffee cream consistency and replace broken brick section, repair holes and cracks or apply as dust-free coating on inner lid. (See page 16 for instructions). Available in 1 lb. bags.

## STAINLESS STEEL POLISH

Preserves the beauty of your stainless steel kiln. Removes finger marks and firing stains instantly and safely. Handles other household chores and polishing jobs too. Removes rust and corrosion from anything. Available in 4 oz. plastic bottles.

## ALL-PURPOSE, HIGH FIRE, KILN WASH

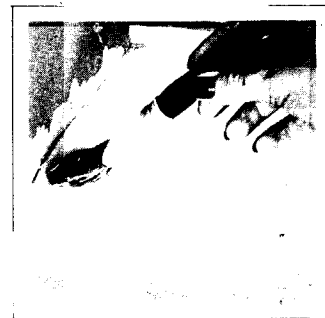
While it is not necessary to use all-purpose, high fire, kiln wash in kilns that will never be fired above china painting temperatures, it is mentioned here to familiarize you with its purpose.

Kiln wash is a mixture of finely ground minerals which will not melt and fuse together at temperatures encountered in ordinary firing. By mixing a small portion of the powder with water to the consistency of thick cream and brushing on a thin, even coat, you will prevent glaze drips from sticking permanently to the bottom of the kiln and the tops of shelves. As a powder it has unlimited shelf life.

All-purpose, high fire, kiln wash **MUST** be used in all kilns rated to 2300° F., even though the kiln is usually fired at lower temperatures. If a regular (ceramic) type wash is fired above cone 04, it will harden and be difficult, if not impossible, to remove when hotter firings are desired at a later date.

While recoating with kiln wash is not necessary after each firing, glaze drops should be scraped off the shelves or dug out of the bottom if they appear, and a new coat applied to the bare area.

Cardboard or newspaper should be used during application to bottom of kiln to prevent kiln wash drops from touching the elements, causing them to burn out.



*Kiln wash should NEVER be applied to kiln walls or the undersides of shelves.* Available in 1 lb. and 5 lb. bags.

# maintenance

## ELEMENT MAINTENANCE

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 electric 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 plant inspection 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 kiln wash 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.

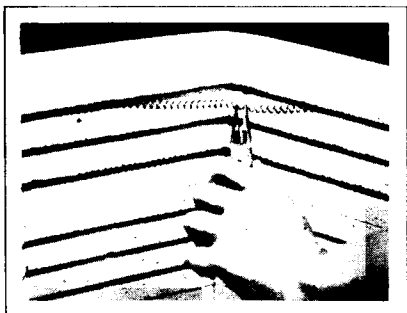
Additionally, reduction firing which removes the oxygen from your kiln will ruin your elements. The elements are protected by a coating of oxidation which reduction firing destroys. Reduction is performed at your own risk and damaged elements will not be replaced by warranty.

Paragon elements are not fastened in the grooves mechanically, as any fastening would cause a "hot spot" which would shorten the life of the element. If you seat the elements properly before firing the kiln for the first time and follow the recommended tempering procedure, you will probably have little or no trouble in the future. Should the elements start to bulge out of the grooves, they must be reseated immediately. To reseal an element, follow these simple instructions.

## RESEATING AN ELEMENT

X-series elements, made of nichrome wire, do not become brittle and can be bent when cold.

1. With a pair of long nosed 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 lengthen the element to fit into the corners, reverse the above procedure and expand the distance between coils by use of snap-ring pliers.



4. When you have the coils positioned above the dropped recess in the grooves, run a blunt kitchen knife around the elements to seat them in grooves and make sure they fit all the way back into each corner.

## ELEMENT REPLACEMENT

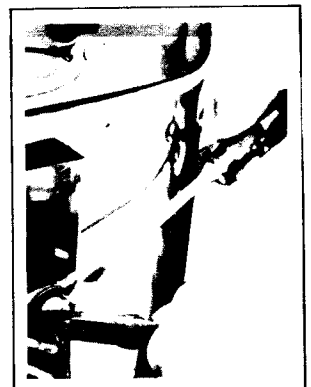
No mechanical skill is necessary to install Paragon replacement elements, only long-nose pliers and a screwdriver. However, your local Paragon dealer will make the element installation for you at a reasonable charge. If you do not have a local dealer, your appliance shop repairman is experienced in servicing heating devices and usually cheaper, as well as more experienced in this type work, than an electrician. Also, many materials used by electricians are not suitable for high temperature heating equipment.

Paragon replacement elements are formed to the shape of the kiln, however, a small amount of stretching or compressing may be necessary for a perfect fit.

1. **UNPLUG** or disconnect the kiln and allow to cool to room temperature.

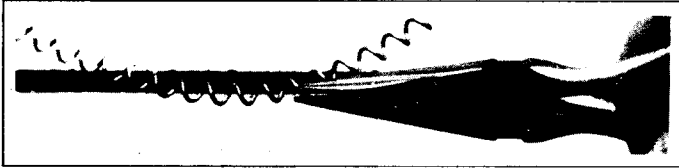
2. Remove screws on each side of switch box and let hang by switch-to-element lead wires.

3. Loosen the screws on the element connectors of the element to be replaced.



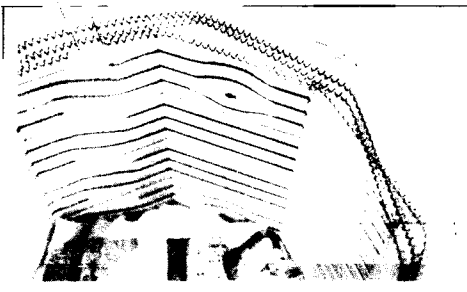


4. Remove the screws holding the switch-to-element lead wires from the connectors of the element to be replaced, and throw old connectors away. Always use the new connectors furnished with the new elements. Keep the porcelain insulators to be used behind the new element connectors; these will be used in step 11.

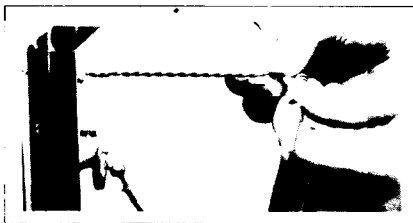


5. Remove the old element carefully, in order to prevent breaking lip of the element grooves. (If one should break, repair cement can be used to repair the brick after the new element is installed).

If the old element burned out, there will probably be a melted, glazed appearing spot in the element groove. Dig out any of these glazed spots in the element groove, since the small hole left in the groove will not damage the new element.



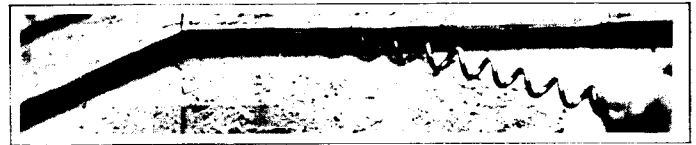
6. Protect the new element from accidentally coming in contact with kiln wash by placing paper or a shelf turned upside down on kiln bottom. Place new element on top surface of sidewall brick that touches the kiln lid.



7. Make an easy to follow guide for threading the new element's twisted ends through the sidewalls and small holes in porcelain insulators. Take the twisted ends of the old element and *reverse* its original direction by feeding them from the front of the hole in the porcelain insulator into the kiln's sidewall of the firing chamber.

When the new element's twisted ends are pushed from the firing chamber out through the hole in the porcelain insulator, the hole will be easy to locate. Starting with the

lower end of the new element, feed it into the top hole of the top groove of the terminal brick on your (*installers*) left hand side.



8. Hold element beyond first corner bend and push element well back into first corner groove. Then take part of element beyond next corner turn and push element well back into second corner groove, etc. around kiln. If element will not fit fully back into corner, pull *only* that section of the element until it is long enough to fit fully back into the corner. If a section of the element is too long between the corners, be concerned only with the corners until each corner in turn is fitted with the element pushed into the back of the corners.

*If you do not push the element fully to the backside of each corner the element will not stay in the grooves when fired!*

9. Compress or stretch the element coils being careful that no two coils are pressed together until all sections of the element between the corners are behind the lip of the brick grooves.



10. Press element down into the lower part of the groove with blunt kitchen knife.

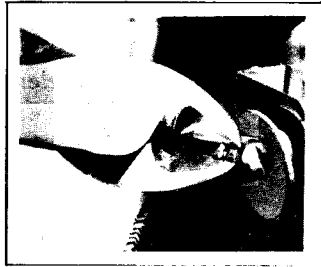
11. Replace the porcelain insulators which were removed in Step 4 making sure the insulators are pushed into the insulating firebrick surface.

12. Sandpaper the eyelet 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).

13. Install new element connectors tightly against the porcelain insulators. Make sure the stainless steel screw is used to hold the end of the element wire in the side of the connector and the brass screw to hold the eyelet in the end of the connector.

Since the twist of the element is to the right, both right-handed and left-handed repair persons must hold the screwdriver in their right hand and hold the connectors with pliers in their left hand while tightening stainless steel screw. (*holding the screwdriver in left hand will only cause a poor connection*). Tighten screws securely to assure good electrical connection.

14. Cut off twisted end of element flush with side of element connectors.



15. Place wires back inside switch box in such a manner that no element connecting wire is touching an element connector.

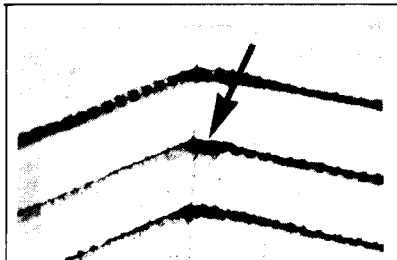
16. Replace screws in switch box and tighten into place.

## SIDEWALL MAINTENANCE

The insulating refractory brick used in the walls of your kiln is extremely fragile and if struck by your shelves or ware during loading and unloading it is likely that a chip will appear when the kiln sidewalls expand and contract during the next firing. Wall brick should be repaired immediately to prevent further damage.

### SMALL CHIP REPAIR

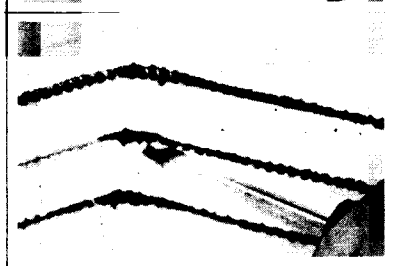
1. If a portion of the lip of a recessed element groove is chipped, it can easily be repaired with Paragon Kiln Coating and Repair Cement.



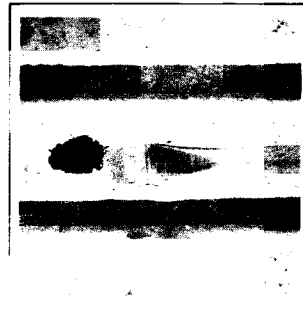
2. Build up area with repair cement and shape to groove contour using a spatula.



3. Remove the excess cement from the element groove and wall with a knife or screwdriver. Sand smooth after it has dried for eight hours or overnight.



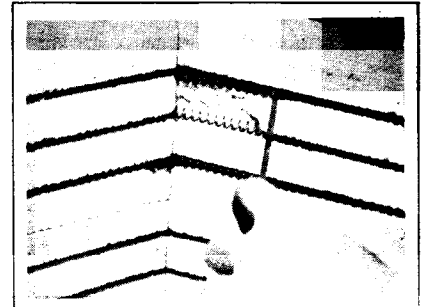
### SPOT REPAIR



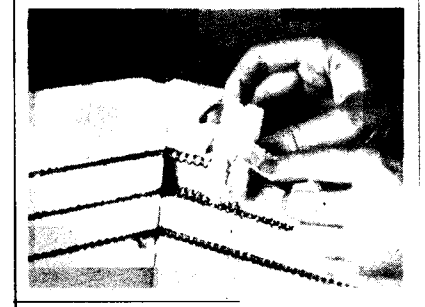
Sometimes decorating materials will get on the walls of the kiln during firing. If not repaired at once these materials will remelt each time the kiln is fired and possibly spread into an element groove causing the element to burn out. Spots should be repaired as soon as discovered by carefully digging all of the material out of the brick with a screwdriver or knife. Next, clean out all of the dust and fill the hole with repair kiln cement.

### SMALL PIECE REPAIR

1. Damaged area crumbled too badly to cement back into place should be trimmed out.



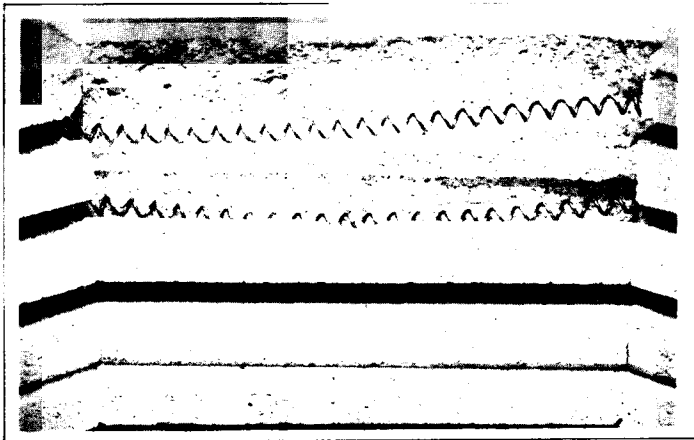
2. Cut a piece of new brick to fit the damaged area. Apply repair cement to the damaged area and the new brick.



3. Work rapidly so the cement remains wet and press the brick back into place. Remove the excess cement from the element groove and the wall of your kiln. Sand smooth after it has dried.



## FULL WALL REPAIR



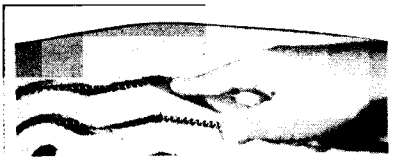
1. Brick damaged too badly to be filled with repair cement or piece of new brick.

2. Loosen the kiln jacket and slowly pull the element out of the groove in the damaged brick with long nosed pliers.

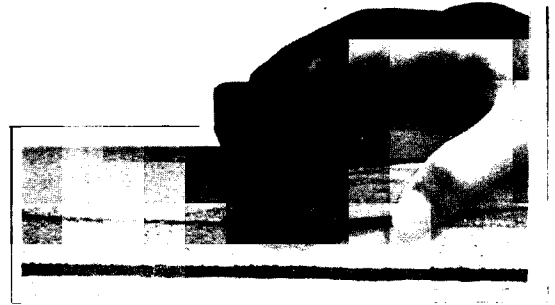
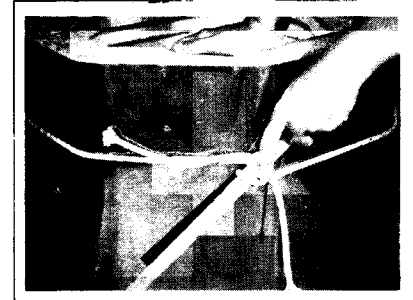


3. Slip out the damaged brick and replace with new brick, making sure the recessed groove matches the others in its down position. Sand the ends of the new brick to match length of damaged brick. The contraction of insulating brick makes used kiln brick shorter than unfired kiln brick.

4. Press element firmly into groove with blunt kitchen knife.



5. Replace the screws in the seam of the kiln jacket and tighten into place. If you have trouble getting the jacket back together at the seam, we suggest using mold straps or a rope and board tourniquet around the kiln to apply pressure. Holes need not be lined up, if extra, new holes are drilled.



6. Some sanding will be necessary on the top and edge of new brick to make it match other wall brick.

7. Vacuum the kiln and element grooves free of dirt.

## LID AND BOTTOM MAINTENANCE

Since your Paragon kiln lid is specially cut and formed with band reinforcement and refractory coating of its interior, chips in the brick are unusual if the lid is properly treated. Should chips appear in the lid, however, they should be repaired to keep them from becoming larger. Very small chips may be filled with Paragon Kiln Coating and Repair Cement.

### SMALL CHIP REPAIR

1. Clean loose particles and dust from chip.
2. Dampen area with brush dipped in water.
3. Work cement well into pores.
4. Fill the area and evenly smooth surface of lid.

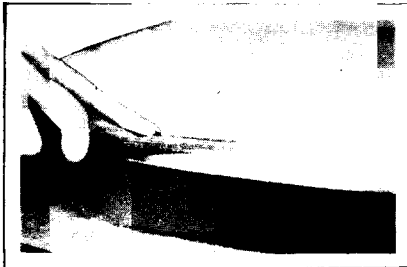
### LARGE CHIP REPAIR

Do not use repair cement on large chips, because expansion of cement differs from expansion of the brick and it will break out when fired.

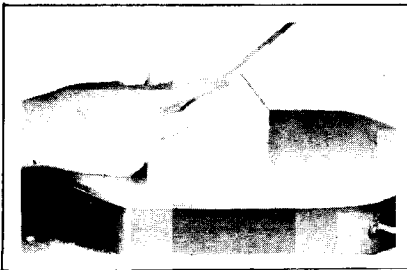
However, larger chips can be sealed with a very thin coat of repair cement and left unfilled. This type of temporary repair will prevent further damage, and does not harm the operation of the kiln in any way.

To permanently repair large chips or a broken edge of kiln's lid:

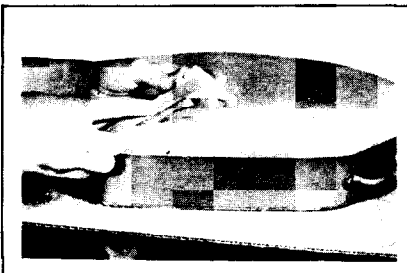
1. Trim damaged area with hacksaw blade and trace area on piece of paper as pattern.



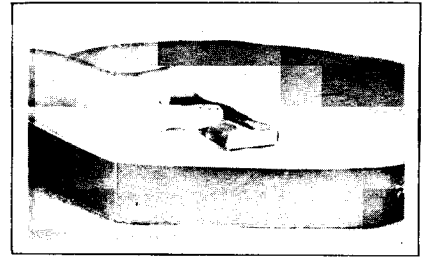
2. Trace pattern on new brick and cut new piece to replace damaged area.



3. Apply liberal coating of repair cement to new brick and damaged area.

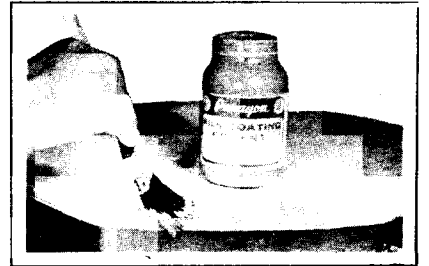


4. Press the new piece firmly into place, working rapidly before the cement dries. Scrape off excess cement.



5. Let dry overnight, then sandpaper level and smooth.

6. Clean off all dust with whisk broom and apply a very thin wash coat of cement. With a soft cloth immediately remove all of the cement coating possible.

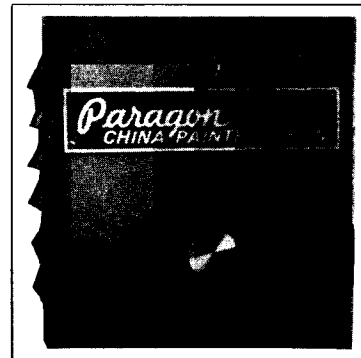


While it may seem that the thin wash coat has disappeared after the kiln is fired, you have actually left the inside surface of the lid with a hard, dust-proof coating.

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

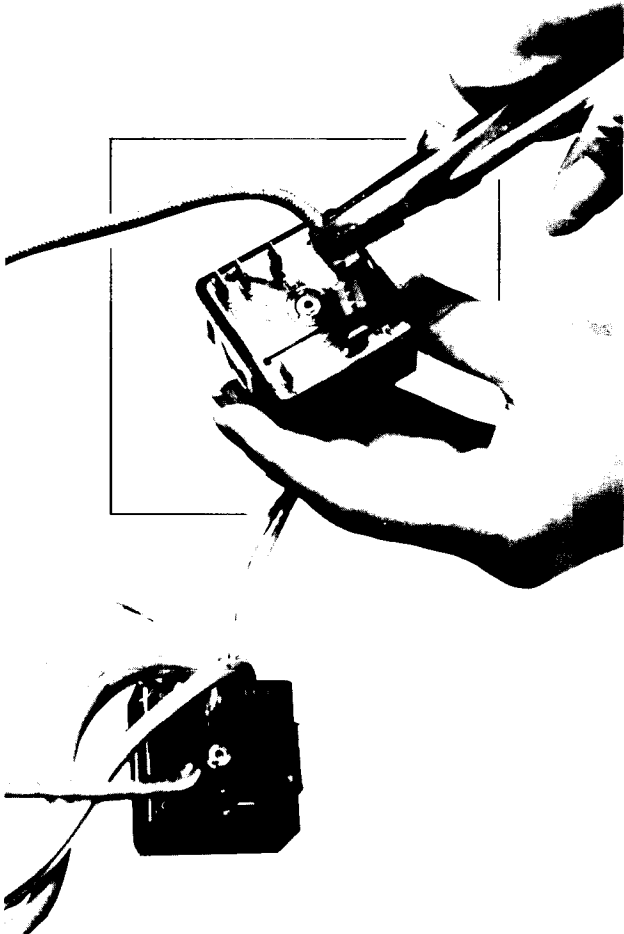
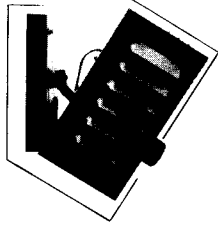
If the bottom of your kiln becomes slightly uneven, scrape off the old kiln wash and apply a new coat. Should the brick become unusually rough, it is easy to turn the bottom over for a fresh smooth surface.

## SWITCH REPLACEMENT



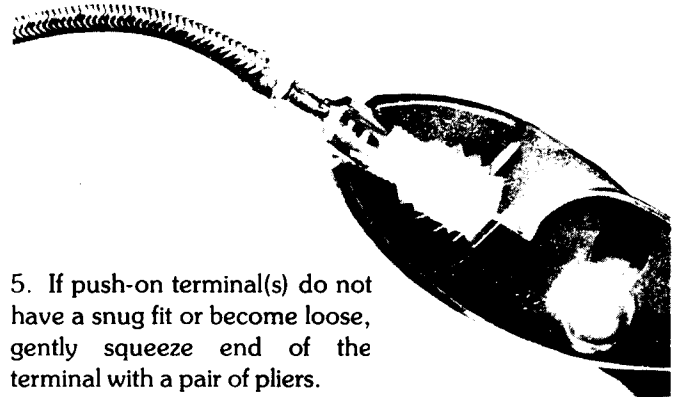
1. Remove the switch knob by using two screwdrivers to gently pry the knob straight out. Be careful not to break the knob. *Unplug kiln before removing switch box.*

2. 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 switch-to-element lead wires.



3. Hold the new switch at the side of the switch box in the same position as the defective switch with the word TOP facing upward. Remove and transfer one wire at a time from the old switch to the new one making sure the connection is tight when it is pushed on.

4. Remove the single nut from the front of the switch previously under the knob. Then remove the defective switch and put the new one in its place. Install the new switch in exactly the same position as the old one, because the indicator marks on the knob cannot be read correctly if turned from its original position. After the switch is in place, put the shaft nut on, checking to make sure it is not backwards, and securely tighten so the switch will not turn during operation.



5. If push-on terminal(s) do not have a snug fit or become loose, gently squeeze end of the terminal with a pair of pliers.

6. As the switch box is moved back into place, check to see that no wires are touching each other or the element connections. Firmly fasten the switch box to the kiln using the screws removed in Step 2.

7. Line up the flat side of the switch shaft with the flat side of the switch knob shaft hole and push knob back in place. Turn the knob to make sure it is working correctly.

# using your kiln

- DO** place the kiln on stand provided - no substitute.
  - DO** locate your kiln at least 12 inches away from any wall or combustible surface, and keep unsupervised children away.
  - DO** check to be sure all switch(es) are in OFF position before you plug in your kiln.
  - DO** coat tops of shelves and bottom of kiln with all-purpose, high fire, kiln wash.
  - DO** *always* place large pyrometric cones on a shelf behind each peephole *every* time you fire.
  - DO** make sure your cones are visible through a peephole before each firing
  - DO** use dark glasses (sun shades) if large cones are difficult to see at high temperatures
  - DO** turn kiln switch(es) to OFF position, *immediately*, if you cannot see the cones.
  - DO** check your circuit breakers or fuses anytime the kiln stops firing.
  - DO** use *new* cones if ware must be fired again for any reason.
  - DO** call your dealer if you have trouble firing your kiln.
  - DO** fire red or yellow glazes **separately**.
  - DO** use only tested, approved and properly labeled glazes for food and drink containers.
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- DO NOT** install kiln closer than 12 inches from any wall or combustible surface.
- DO NOT** fire your kiln until you have checked for bulging (sagging) elements and resealed them in their recessed grooves.
- DO NOT** exceed the maximum temperature shown on kiln's nameplate.
- DO NOT** use kiln for purposes other than firing ceramic materials.
- DO NOT** overload your electrical circuits.
- DO NOT** attach an extension cord to your kiln's power supply cord.
- DO NOT** allow kiln's power supply cord to come into contact with side of kiln.
- DO NOT** touch hot sides of kiln or lid handle.
- DO NOT** fire by time or temperature alone - *always use pyrometric cones!*
- DO NOT** put all peephole plugs in the kiln until all vapor has left the kiln.
- DO NOT** use your firing controls or Recommended Firing Schedule Poster as set rules for all types of firing.
- DO NOT** open your kiln when it is at high temperatures.
- DO NOT** open kiln lid until kiln has cooled (8 to 12 hours) and all switch(es) are turned to OFF position.
- DO NOT** let glaze or kiln wash touch the heating elements.
- DO NOT** touch heating elements with *anything*; disconnect kiln before servicing.
- DO NOT** make *any* variations in glaze manufacturer's instructions when using glaze for food or drink containers.