



# KILNS FOR THE HOME OWNER'S MANUAL



Duncan Ceramics  
Fresno, CA 93727



The Crafter  
The Artist

The Crafter — *plus* Automatic  
The Artist — *plus* Automatic

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# 1

## Assembly Instructions

1. Carefully unpack and inspect all parts. In case of damage, save all packing material and return kiln to place of purchase.
2. Carefully remove protective plastic sleeves from legs.
3. Carefully lay kiln on side.
4. Take two screws and push through hole in top of one leg section. Tips of screws should face inside of bend in leg section.
5. Place aluminum spacers over screw tips and line up over holes on side of kiln. Spacers should be placed so flanged end faces leg.
6. Start screws by hand. Do not tighten yet.
7. When top screws are started, repeat steps 4, 5 and 6 with lower screws.
8. Tighten all screws snugly.
9. Repeat steps 3 through 8 on other side of kiln.
10. Stand the kiln back up on legs.
11. Place fiber gasket on top part of kiln body. The gasket ensures a good seal when the lid is closed.

# 2

## Setting Up Your Kiln for Safe Operation

1. The kiln should be level; otherwise, glazed pieces could topple from their stilts and there is a good chance the kiln-sitter will malfunction. In leveling, place a shim under the appropriate leg or legs.
2. Allow at least 10" of space between the kiln and adjacent walls or objects. Keep kiln away from all flammable materials, such as curtains, shelves and paper.
3. Route the electrical cord so that it will not touch the kiln case.
4. **Remove the kiln-sitter firing gauge before firing.**
5. Mix a portion of the contents of the kiln wash packet with water to the consistency of cream.
6. Apply a coat of kiln wash to the top of the hearth plate and the tops of any other kiln shelves being used. This will prevent glaze from sticking if a piece falls on the shelf. (**Never apply kiln wash to the kiln walls, sides or undersides of shelves, or underside of lid.**) Also apply a thin coat of kiln wash to the top of the kiln-sitter's cone supports and the bottom of the sensing rod. (Do not apply kiln wash to the cone or to the end of the porcelain tube of the kiln-sitter. Beware of a thick wash application on the kiln-sitter parts, for this could cause the kiln-sitter to overfire.) Let kiln wash dry thoroughly before loading the kiln.
7. Set switch (manual models only) to **OFF** and connect to power source.

# 3

## Electrical Needs

Your new kiln will work on any standard 15-amp household outlet with a 20-amp fuse or circuit breaker. Normally, these are located in the kitchen, garage, laundry room or basement.

Before plugging in your kiln, check your circuit box to determine where your 20-amp circuit breakers are located.

Operating your kiln on less than a 20-amp circuit may cause the fuse or circuit breaker to trip.

**Do not use an extension cord on this kiln.**

If no 20-amp circuit is available, or you would like to add an additional one for convenience, please consult a qualified electrician.

# 4

## Cautions

Your kiln was designed with safety in mind. However, good common sense is required in the operation of a kiln. Please observe these cautions; they are for your protection.

- Kiln surface may be hot when firing. Do not touch. Keep children away unless supervised.
- Do not put hand over vent hole located in center of lid. On certain models it can be very hot.
- Disconnect electrical supply before attempting any servicing.
- **DO NOT FIRE HOTTER THAN THE RECOMMENDED CONE OR TEMPERATURE LISTED ON THE RATING PLATE.**
- Do not open lid until kiln has cooled.
- Operate kiln in a well-ventilated area.
- Do not operate kiln on or near a wet surface.
- Do not use other appliances on the same electrical outlet/circuits as this kiln.
- Never plug a kiln into an outlet unless you are certain it has the correct electrical service to handle the kiln.
- Never attach an extension cord to your kiln.
- When operating kiln, do not allow the cord to touch the kiln case.
- Never allow shredded paper or other flammable materials to accumulate in the same room with your kiln.
- Remove firing gauge and adjust kiln-sitter prior to your first firing.
- **DO NOT LEAN OR PLACE ANYTHING ON TOP OF KILN LID.**

## 1. Control Panel

### Switch (manual models) (photo 1)

The switch controls the heat of the kiln by controlling the amount of electricity to the elements embedded inside the fiber.

The switch is infinite, which means that the amount of heat the elements will produce increases as you turn the switch counterclockwise toward the higher numbers.

During firing, the switch cycles on and off, causing a slight intermittent popping noise. **This popping noise is normal.**

The amount of "on" time increases as the switch setting increases until, at the high setting, the switch is on continuously.

### Pilot Light (manual models) (photo 1)

When the light is on, the kiln is in an operating phase. When it is off, the entire kiln is off. The light is activated by the kiln-sitter.

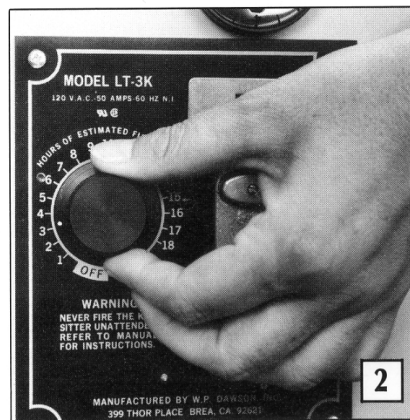
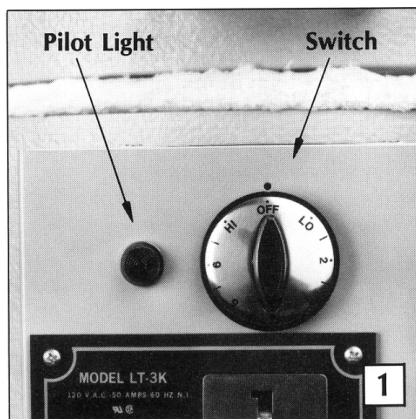
In order for electricity to go to the elements, the switch must also be on and the kiln-sitter set. If the kiln-sitter is on and the switch is off, the light will be on and no heat will be generated.

### Pilot Light (automatic models)

The pilot light on your automatic kiln indicates that the kiln is operating. *When the pilot light is off, the kiln is off.* The pilot light is activated by having the safety timer set and the kiln-sitter turned on. If either the safety timer or kiln-sitter is off, the pilot light will not operate.

### Power Failure (automatic models)

If a power failure occurs in your area, it may cause your automatic kiln to recycle and the safety timer will then shut off the kiln before the cone in the sitter has matured. Should this happen, *set a fresh cone in the kiln-sitter and a new witness cone on the hearth plate, and refire.*



### Safety Timer (photo 2)

The safety timer is a safety shut-off device (optional on manual models) designed to turn the kiln off if the kiln-sitter fails to do so, thereby protecting your kiln from severe damage by overfiring.

The numbers around the safety timer knob indicate hours of firing time. Since the safety timer will override the kiln-sitter, your timer should always be set for at least 1/2 hour longer than the estimated firing time. When that period of time has elapsed, the safety timer will turn off the kiln if the kiln-sitter has failed to do so.

### Kiln-Sitter (photo 3)

The kiln-sitter is a mechanical control which is turned on by hand and turned off by the action of a small cone bending under the sensing rod. When the kiln-sitter turns off, the kiln will no longer heat.

## 2. Pyrometric Cones and Bars

Ceramic ware matures by a combination of both time and temperature. Pyrometric cones and bars are the generally accepted way to measure this.

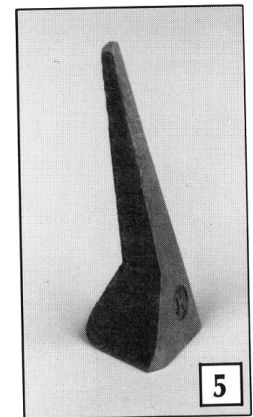
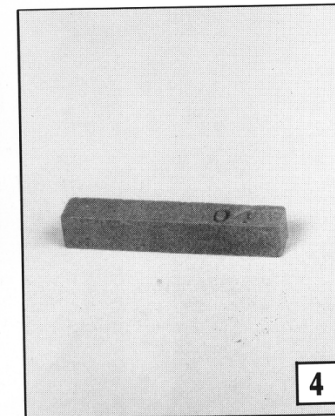
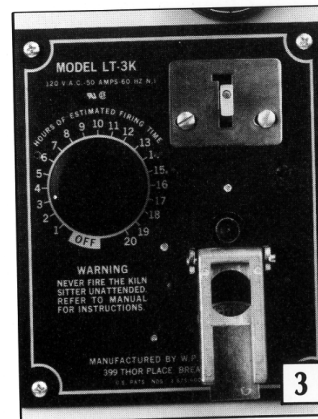
Made of a ceramic material, cones and bars will soften and bend when the proper temperature/time combination is achieved. They come in many shapes and sizes but, for your Duncan Kiln for the Home, you'll need two types.

- Orton Pyrometric Bars (photo 4)** — Placed in the **kiln-sitter**. Bars are used to shut off the kiln-sitter when the proper time and temperature have been reached.
- Orton Self-Supporting Large Cones (photo 5)** — Also known as a **witness cone**. The free-standing, pyramid-shaped cone is to be placed inside the kiln on the hearth plate (approximately in the center). Not reaching the proper cone is probably the most common reason for problems in ceramics. Using the witness cone will be your first indicator to determine the cause of a problem with your finished piece.

A witness cone can tell you the exact cone that was achieved on the shelf. Your kiln-sitter cone cannot do this.

## 3. Element Sections

The elements produce the heat in your Duncan Kiln for the Home. The elements are safely embedded just under the surface of the fiber walls inside your kiln.

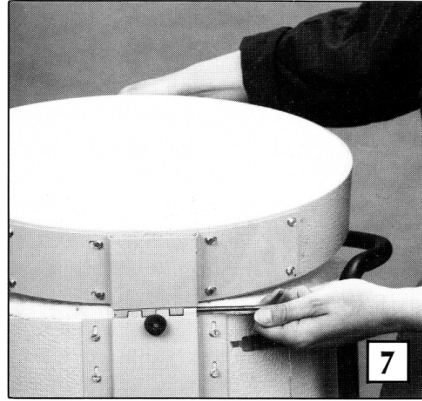
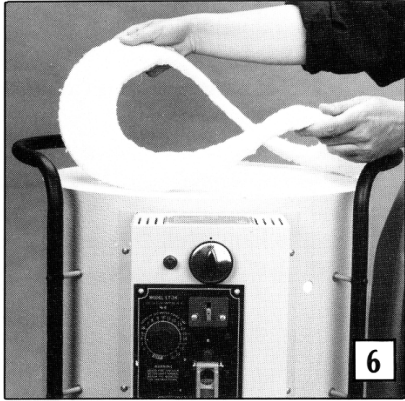


#### 4. Fiber Gasket (photo 6)

This gasket is designed to ensure a good seal when your kiln is being fired. It should always be placed between the lid and the base.

#### 5. Lid Hinge (photo 7)

Removable pin allows for easy removal of lid when repairs to kiln may be necessary.

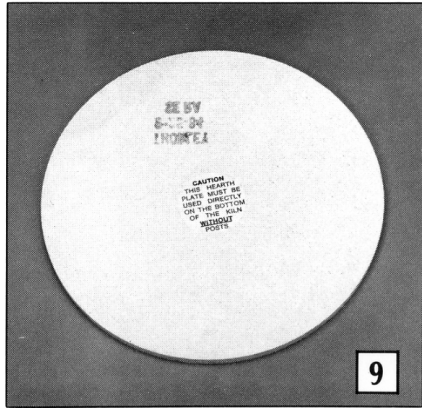
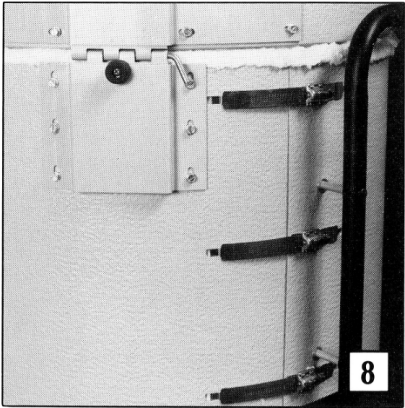


#### 6. Case Clamps (photo 8)

During the normal use of your kiln, the heat generated will, over time, loosen the fiber from the case. The clamps should be periodically tightened with a regular screwdriver.

#### 7. Hearth Plate (photo 9)

The hearth plate provides a base for kiln firing. Place hearth plate directly on the bottom of the kiln. Never use kiln posts under this plate. Place hearth plate at equal distance from sides of kiln.



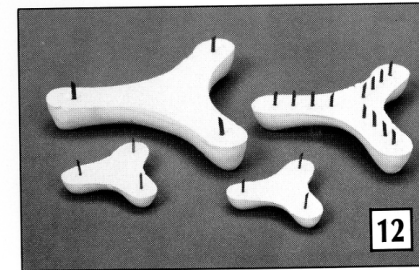
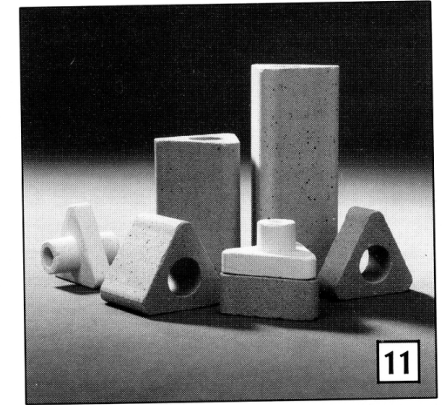
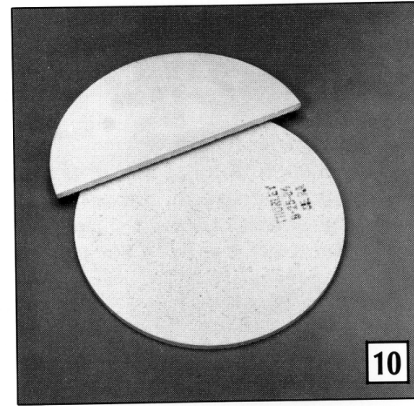
#### 8. Kiln Wash

A protective coating that, when applied to the hearth plate and kiln shelves, prevents any glaze drips from adhering permanently to these surfaces.

#### 9. Furniture (optional)

A general term for items used to divide the kiln's interior for efficient use of space. Furniture will allow you to place several layers of ware inside your kiln. Furniture is generally classified as:

- A. **Shelves (photo 10)** — Allow you to layer your pieces in your kiln. They are made of firebrick and come in half or full sizes. Tops of shelves should receive a coating of kiln wash before use.
- B. **Posts (photo 11)** — Used to support the separate layers in your kiln created by stacking shelves. Also made of firebrick, they are available in many lengths.
- C. **Stilts (photo 12)** — Made with clay and with points of heat-resistant wire, stilts are used to support glazed pieces during firing to prevent glaze from sticking to the shelf underneath. There are many styles available, and many designed for specific uses.



# 6

## Test Firing Your Kiln

**IMPORTANT: BEFORE YOU LOAD YOUR NEW KILN WITH WARE, IT IS IMPORTANT TO RUN A TEST FIRING TO ENSURE THAT YOUR KILN-SITTER IS OPERATING PROPERLY. DO NOT LEAVE THE KILN UNATTENDED BEYOND THE ESTIMATED FIRING TIME.**

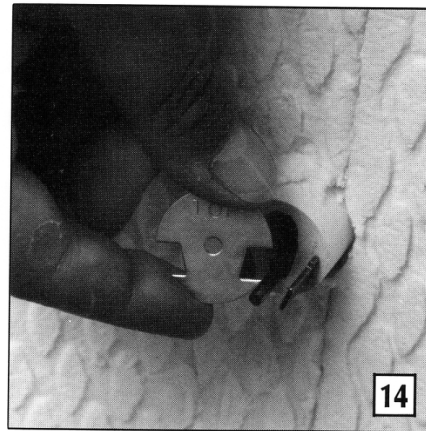
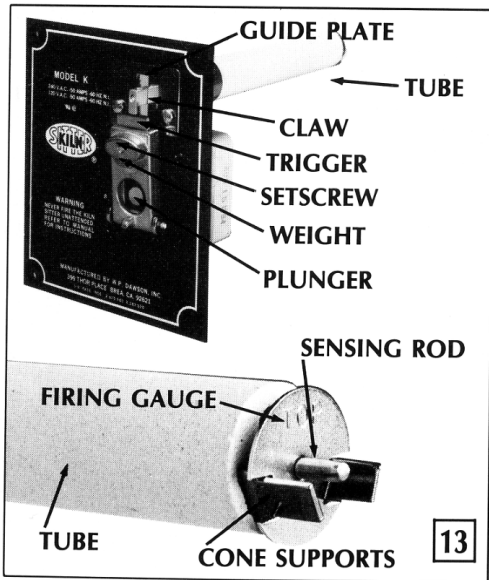
**Note: This kiln-sitter adjustment should be repeated once every 20 firings or once every month.**

1. Adjust kiln-sitter.

When shipped from the factory, your kiln-sitter (photo 13) was in adjustment but there is a possibility that it might have been jarred during shipment or delivery. Therefore, the following steps must be taken and all necessary adjustments made before the first firing.

- A. Unplug kiln.
- B. Turn off switch (manual models only).
- C. Install firing gauge.

The firing gauge was held in place by a rubber band when your kiln left our factory. If the gauge has been removed, it should be positioned over the sensing rod and cone supports inside the kiln. The word "Top" should be up (photo 14).



D. Check position of claw.

With the firing gauge in position, raise the weight up against the guide plate. Pull the claw forward (the claw moves in and out slightly). The distance between the trigger and the inside of the claw should be 1.5mm (1/16") (diagram A).

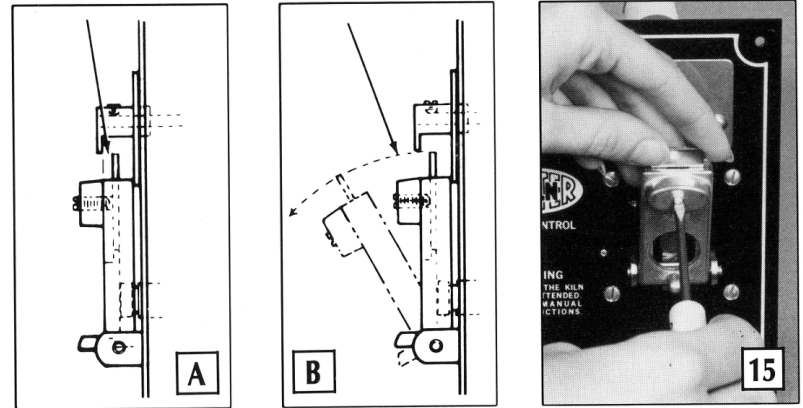
The screw on top of the claw can be loosened if adjustment is necessary. Retighten screw firmly.

E. Check position of trigger.

The trigger should just clear tip of claw (diagram B). If necessary, the setscrew in front of the weight can be loosened to raise or lower trigger (photo 15). Retighten screw firmly.

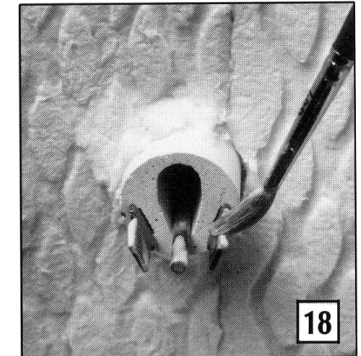
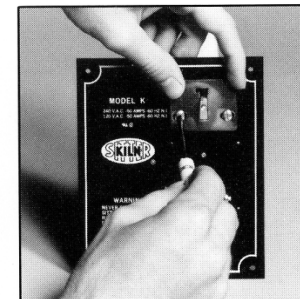
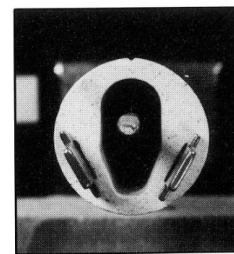
F. Remove firing gauge and save for future periodic adjustments.

G. Check position of sensing rod.



The sensing rod is now free to travel vertically within the center of the tube cavity (photo 16). By holding a small mirror inside the kiln so you can see the path of the sensing rod and by pressing down on the claws, you can easily check the movement of the rod within the tube cavity. It should not touch the sides at any point.

If necessary, the sensing rod can be centered by loosening the two guide plate screws on the front of the kiln-sitter and moving the guide plate to the right or left, as required (photo 17). Be sure guide plate screws are firmly retightened.

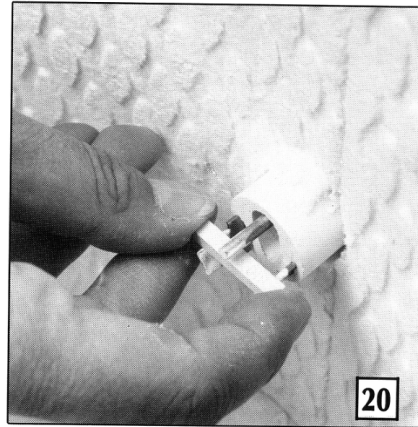
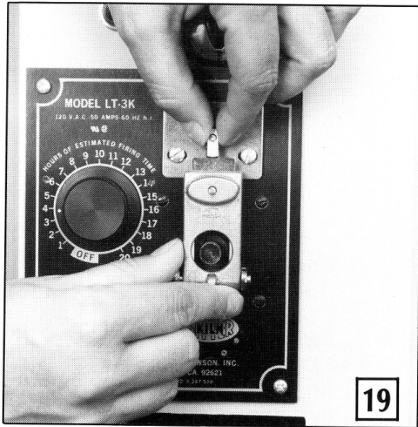


2. Apply a coating of kiln wash to the top of the cone supports and the bottom of the sensing rod, unless already done. (See Chapter 2, steps 5 and 6.) (photo 18).

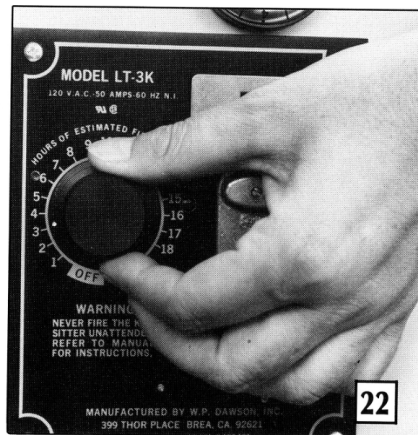
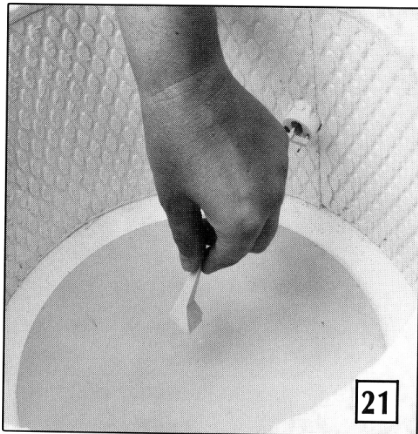
3. Raise weight up against guide plate.

4. Press claw down lightly until it prevents trigger from falling (photo 19).
5. While holding claw down, carefully place Orton Pyrometric Bar (cone 019 sample provided) under the sensing rod with a flat side on the cone supports. Be sure bar is centered on cone supports and does not touch end of tube (photo 20).

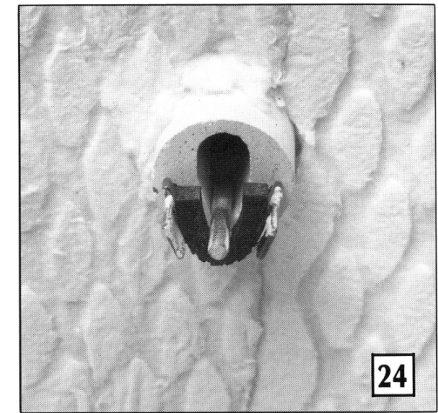
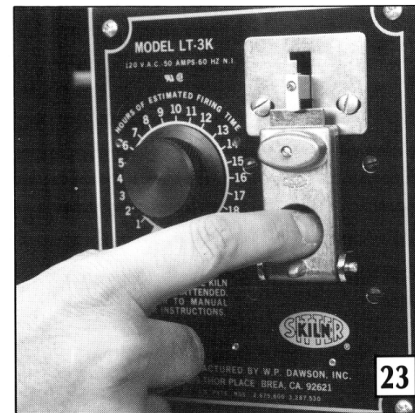
**CAUTION: Since the kiln-sitter cone is the triggering element that normally shuts off the kiln, its correct positioning is important for proper firing. IF CONE IS DISLODGED BY ACCIDENT OR ALLOWED TO COME IN CONTACT WITH THE PORCELAIN TUBE, AN OVERFIRING MAY RESULT WHICH COULD CAUSE SERIOUS DAMAGE TO YOUR KILN.**



6. Place hearth plate on fiber bottom inside kiln.
7. Place sample witness cone 019 on hearth plate as close to the center as possible (photo 21).
8. Close lid.
9. If the kiln has a safety timer, turn the safety timer knob clockwise to 3 (photo 22).

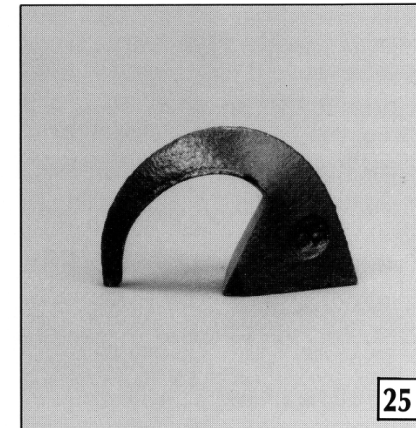


10. Push firmly on plunger until it locks (photo 23).
11. Turn switch (manual models only) to 2.
12. After one (1) hour, turn switch (manual models only) to HI.
13. Kiln will turn off when kiln-sitter weight falls and red light goes off. The safety timer should still show about 1/2 hour.

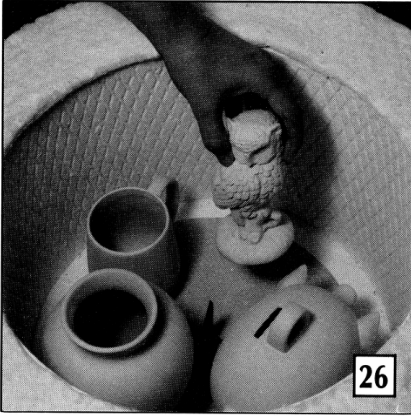


14. Turn off switch (manual models only) and safety timer.
15. Let kiln cool (about 3-4 hours) before opening.
16. Open kiln and inspect bar and witness cones.

If properly adjusted, the kiln-sitter bar will be bent to an approximate 90-degree angle (photo 24) and your witness cone will be bent as shown (photo 25). If your cones do not appear as shown, repeat steps 1 through 15 using fresh cones. (Refer to Witness Cone Interpretation on page 18.)



## Loading Your Kiln



Loading your kiln properly helps ensure a good, fully mature firing (photo 26).

Proper loading for firing is not difficult, but please follow these general guidelines so you can make maximum use of your kiln.

### Loading for a Bisque Firing

Greenware that has not been decorated can be placed directly on shelves. Generally, ware should be fired in its natural position. Pieces with flat vertical surfaces (such as wall plaques or clocks) should be fired flat to prevent warping.

For best results, pieces should not touch each other. Allow at least 1/2" between pieces. Ware should never touch the side walls.

Thin-walled cups should be fired upside down to prevent warping.

Pieces with lids should be fired with the lids in place to ensure a good fit.

### Loading for a Glaze or Overglaze Firing

**Glazed pieces must be stilted to keep them from sticking to the shelves.** Glazed pieces with fitting parts, such as lids, should not be fired together or they will fuse together.

Special care should be taken to allow at least 1" between pieces decorated with overglazes so they will not contaminate each other during firing.

Glazed pieces should normally be fired in their natural position. However, some glazes produce flowing effects (Crystaltones, for example) that can be made to go in virtually any direction you choose just by tilting the piece.

**NOTE: The following sections on porcelain and stoneware are applicable only to The Artist models.**

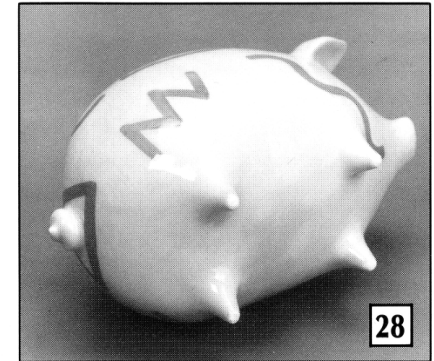
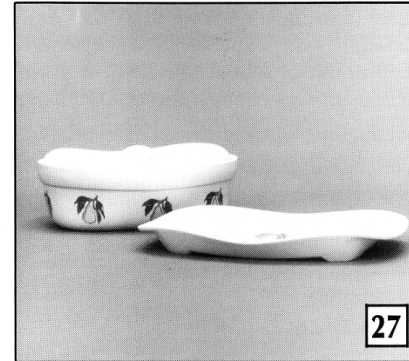
### Loading Porcelain and Stoneware for a Bisque Firing

Pieces cast from porcelain may sag if they are not supported (photo 27). This is especially true if the piece has parts that stick out (like the spout and handle of a teapot).

For best results, pieces should not touch each other. Allow at least 1/2" between pieces. Ware should never touch the side walls.

To prevent sagging, high-fire porcelain greenware support fiber is recommended. Use enough to firmly support parts of a piece that stick out.

Putting support fiber inside a piece and surrounding a piece will help reduce sagging as well.



When firing porcelain greenware pieces with lids, fire them assembled and apply a generous dusting of alumina hydrate to one surface of any areas that touch. This will prevent the pieces from fusing together.

To remove alumina hydrate, wash piece after firing and use an abrasive scrubber.

Pieces cast from stoneware can be loaded in the same way as low-fire ware.

### Loading Porcelain and Stoneware for a Glaze Firing

**Porcelain pieces cannot be stilted as they will sag. Therefore, the bottom of the piece should be left unglazed. This is called dryfooting (photo 28).** Porcelain items should always be dryfooted.

Do not let glaze touch shelf or it will fuse to it.

Stoneware is usually dryfooted, also.

### General Hints for All Firings

Before loading your kiln, make certain the switch is off (manual models only), the inside of the kiln is free of dust, and the tops of all shelves (including the hearth plate) are well coated with kiln wash.

If a shelf is used, exactly three posts placed in a triangular pattern should be used to support it. Before positioning a shelf on posts, make sure that the shelf clears the ware by at least 1/2". If more than one shelf is used, try to place posts directly above the other posts. This prevents shelf warpage.

Before ware is added, place a witness cone in the middle of the hearth plate (see Witness Cone Interpretation on page 18). If your pieces do not allow placement in the center, try to place cone as close to the center as possible.

Always keep a minimum 1" clearance around the kiln-sitter tube. This helps prevent damaging overfires.



Be careful not to jar kiln after loading, as your ware could be broken or your kiln-sitter cone could be dislodged.

Lower shelf into kiln carefully so as not to damage the kiln walls or kiln-sitter tube. Do not attempt to lower a loaded shelf into the kiln.

Do not place greenware and glazed ware in the same load. Glaze discoloration can occur.

Do not rush a firing; this could create unnecessary problems.

Duncan recommends that you record each of your firings. This practice will enable you to duplicate successful firings, avoid the unsuccessful ones, and record the results of any modifications you incorporate into your procedures.

It will not hurt your ware to stop firing prior to maturity. If the kiln is jarred or you think a piece of ware has fallen over, never chance ruining the entire load. On manual models, turn off the switch. On automatic models, turn the safety timer to zero. Wait until the kiln has cooled, and check inside. Use new cones when restarting. If your kiln shuts off before the ware is mature (underfired), set new cones and refire as usual.

Certain glazes contain materials that can affect each other during firing. They should not be fired together. Because some glazes contain small amounts of copper for color, they will not work with overglazes. Duncan glazes are all identified on the jar label as to whether they will or will not work with overglazes. Glazes that will work with overglazes state *OVERGLAZE COMPATIBLE*. Glazes that do not work with overglazes state *NOT OVERGLAZE COMPATIBLE*. There are a few other Duncan glazes that, because of their formulation, should not be used or fired with glazes that are labeled *COPPER-FORMULA GLAZE*. These colors are identified on the label by *DO NOT FIRE WITH COPPER-FORMULA GLAZES*.

After several firings, small cracks may appear in the fiber walls protecting the elements. This is *NORMAL* and is not a reason for concern. The performance of the kiln is not affected.

# 8

## Firing Your Kiln

Determining how long it will take to fire a kiln to a certain cone is, at best, an inexact science.

There are several independent influences which can affect the time it will take. As a result, it is impossible to state an exact firing time to achieve the desired cone. Some of the influences are time of day (voltage can be less at peak periods), weather (hot days mean more air conditioners and less voltage), and size of load (the larger the load, the more time required).

These and other influences mean that there could be more than a one-hour difference in firing to the same cone.

You will become familiar with your kiln and firing times through experience.

To minimize time variations, we recommend the following:

1. Try to fire at the same time of day.
2. If your kiln is full, expect it to take longer; if it's not very full, it should fire quicker.
3. Keep a record of the actual firing time at the different cones you use. By doing this, you will soon see a pattern emerge.

### Cones

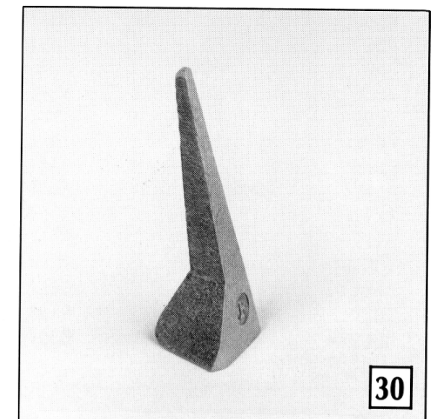
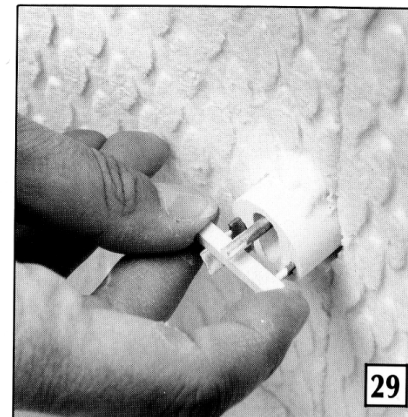
When firing ceramic ware, a ceramist does not speak in terms of temperature but refers to a specific cone number. Since different clays and glazes require different firing conditions to mature properly, cones are available in a series of numbers to allow for these differences.

There are two types of cones needed for your kiln:

1. **Kiln-Sitter Cones:** One is placed in the kiln-sitter for each firing. It is a small cone or bar designed for this purpose. Duncan recommends the **Orton Pyrometric Bar** for your kiln-sitter.

If the **Orton Pyrometric Bar (photo 29)** is used, choose the bar equal to the firing cone desired.

If another type of kiln-sitter cone is used, refer to the cone chart on page 19 to select the proper cone.



2. **Witness Cones:** One is placed inside the kiln on the hearth plate (as close to the center as possible) for each firing. Duncan recommends the **Orton Self-Supporting Large Cone** for your kiln.

The most common cause of problems with a ceramic piece is the result of either underfiring (kiln shut off before reaching the desired cone) or overfiring (kiln shut off after exceeding desired cone).

A kiln-sitter cone by itself will not guarantee that your firing achieves the desired cone. This is especially true when the kiln-sitter is out of adjustment. Placing a witness cone on the shelf with the pieces indicates the actual cone achieved during the firing. In most cases, if the poor result was caused by underfiring, it can be corrected by adjusting your kiln-sitter and firing the piece over again, using new cones.

Pieces that were exposed to an overfire cannot be corrected by refiring, but the next load can be correctly fired by adjusting your kiln-sitter.

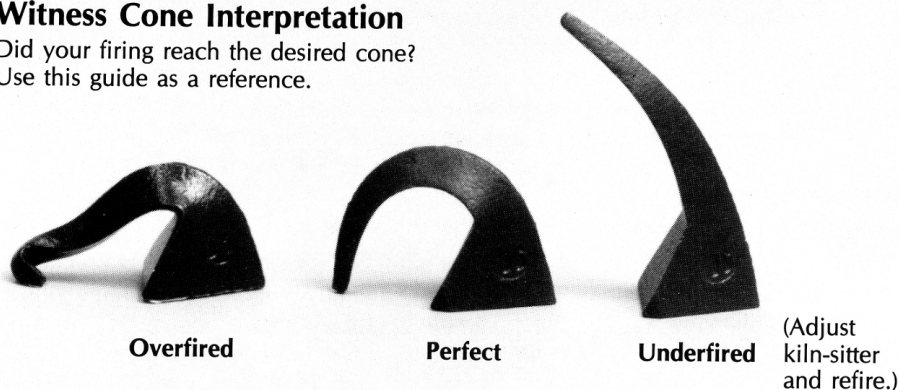
A witness cone is sometimes known as a **Large Self-Supporting Cone (photo 30)**.

Select the cone that corresponds to the desired firing cone and place it as close to the middle of the shelf as possible.

As the cone matures, it will bend toward the direction it points, so be sure to leave enough space for it to fall without touching a piece.

### Witness Cone Interpretation

Did your firing reach the desired cone?  
Use this guide as a reference.



## Choosing Your Cone

Choosing the right cone is very important. Use the following chart as a general guide in selecting the right cone. Always check label on jar. There are exceptions.

| Type of Firing                    | Shelf Cone Desired | Orton Pyro-Bar Type Cone for Kiln-sitter | Orton Pyramid Type Cone for Kiln-sitter | Large Witness Cones |
|-----------------------------------|--------------------|--|---|---------------------|
| <b>Bisque</b>                     |                    |  |   |                     |
| For stains, acrylics              | 06-04              | 06-04                                    | 05½-03                                  | 06-04               |
| For Crackletone Glazes            | 06                 | 06                                       | 05½                                     | 06                  |
| For stains that have glazed areas | 04                 | 04                                       | 03                                      | 04                  |
| For general-purpose ware          | 04                 | 04                                       | 03                                      | 04                  |
| For Duncan Red-Strokes            | 03                 | 03                                       | 02                                      | 03                  |
| For porcelain                     | 6                  | 7  | 7                                       | 6                   |
| For stoneware                     | 6-8                | 7-9                                      | 7-9                                     | 6-8                 |
| <b>Glaze</b>                      |                    |  |   |                     |
| Luster (Mother-of-Pearl)          | 020                | 020                                      | 020                                     | 020                 |
| Metallic overglazes               | 019                | 019                                      | 019                                     | 019                 |
| China paints*                     | 019                | 019                                      | 019                                     | 019                 |
| Decals*                           | 018                | 018                                      | 018                                     | 018                 |
| Hobby ceramics glazes**           | 06                 | 06                                       | 05½                                     | 06                  |
| Porcelain or stoneware glazes     | 6                  | 7  | 7                                       | 6                   |

\*Check manufacturer's label for recommended witness cone.

\*\*When properly fired to witness cone 06, Duncan glazes labeled as dinnerware safe comply with the Food and Drug Administration's safety requirements concerning lead and cadmium release.

Be aware that the lower the cone number, the cooler the firing, and vice versa. Thus, numbers prefaced by zero (cone 05, for example) are cooler than numbers which stand alone (such as cone 5). Heat increases as the cone numbers increase - cone 06 is cooler than cone 05, and cone 6 is hotter than cone 5. (See following chart.)

Note: These are general guidelines. Always check the specific product label for recommended witness cone.

### Conversion Table for Pyrometric Cones

| C<br>° Centigrade | Orton Cones | F<br>° Fahrenheit | C<br>° Centigrade | Orton Cones | F<br>° Fahrenheit |
|-------------------|-------------|-------------------|-------------------|-------------|-------------------|
| 605               | 022         | 1121              | 1015              | 06          | 1859              |
| 615               | 021         | 1139              | 1020              | 05½         | 1868              |
| 650               | 020         | 1202              | 1040              | 05          | 1904              |
| 660               | 019         | 1220              | 1060              | 04          | 1940              |
| 720               | 018         | 1328              | 1115              | 03          | 2039              |
| 770               | 017         | 1418              | 1125              | 02          | 2057              |
| 795               | 016         | 1463              | 1145              | 01          | 2093              |
| 805               | 015         | 1481              | 1160              | 1           | 2120              |
| 830               | 014         | 1526              | 1165              | 2           | 2129              |
| 860               | 013         | 1580              | 1170              | 3           | 2138              |
| 875               | 012         | 1607              | 1190              | 4           | 2174              |
| 895               | 011         | 1643              | 1205              | 5           | 2201              |
| 905               | 010         | 1661              | 1230              | 6           | 2246              |
| 930               | 09          | 1706              | 1250              | 7           | 2282              |
| 950               | 08          | 1742              | 1260              | 8           | 2300              |
| 990               | 07          | 1814              |                   |             |                   |

## Using the Safety Timer

The safety timer is a safety shut-off device (optional on manual models) designed to turn the kiln off in the event the expected time for the firing is exceeded.

Using a safety timer is your best insurance against damaging overfires.

Normally, the safety timer is set 1/2 hour past the expected firing time.

Setting the timer for too short a time will result in the kiln shutting off before maturity. Setting the timer for too long a time may result in an overfire.

The exact firing time will depend on how full your kiln is, the desired cone and exact voltage. As a result, exact firing times may vary. It is suggested that the safety timer be set for 6 hours during the first regular firing following all test firings. If your load is small, you may try it for about 1/2 hour less. If your load is large, try it for 1/2 hour more. If the timer shuts the kiln off before the proper cone is reached, set the timer for 1/2 hour longer and refire, using new cones. If more than 1/2 hour is left, reduce the time on the next load so about 1/2 hour will be left on the timer when the kiln-sitter shuts off.

## OPERATING INSTRUCTIONS

### MANUAL KILNS

#### BEFORE FIRING STEPS

1. Turn switch to the OFF position.
2. Place desired cone in kiln-sitter and set kiln-sitter.
3. Place witness cone on hearth plate, as close to the center as possible.
4. Load kiln.
5. Set safety timer.

#### FIRING STEPS

1. Push in plunger of kiln-sitter.
2. Turn switch to NUMBER 2 for 1 hour.
3. After 1 hour, turn switch to HI.

#### AFTER FIRING STEPS

1. After kiln has turned off, allow to cool for at least 3 to 4 hours before touching kiln or opening it.
2. Do not remove ware until pieces are cool to the touch.

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## Cooling and Unloading the Kiln

The cooling period is very important. If the lid is opened before the kiln has cooled sufficiently, there is a good chance both the ware and the kiln will be damaged.

The lid may be opened 3 to 4 hours after the kiln has shut off but the ware will still be quite warm. Do not attempt to remove ware until it is cool to the touch.

When unloading a glaze firing, remove the stilts from the ware. Handle the ware carefully and check for stilt marks. Stilt marks can be sharp and should be ground off with an abrasive stone.

If your witness cone indicates an underfire, it is advisable to refire the ware.

| PROBLEM   | POSSIBLE CAUSES  | POSSIBLE REMEDIES   |
|---|--|---|
| <b>Cratered or Bubbled Glaze</b><br>(See photo on page 27.) | <ol style="list-style-type: none"> <li>1. Glaze application too thick.</li> <li>2. Underfired glaze.</li> <li>3. Underfired bisque.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Grind down the bubbles, add a thin coat of glaze and refire to proper cone.</li> <li>2. Same as #1.</li> <li>3. Same as #1.</li> </ol>  |
| <b>Crazing</b><br>(See photo on page 27.)                   | <ol style="list-style-type: none"> <li>1. Underfired or immature bisque.</li> <li>2. Kiln cooled too rapidly.</li> <li>3. Thermal shock (removing piece from kiln too soon or subjecting it to extreme temperature changes).</li> <li>4. Incompatibility of glaze and clay body.</li> </ol>                | <ol style="list-style-type: none"> <li>1. Sometimes can be corrected by refiring the piece one cone hotter than the original glaze firing.</li> <li>2. Same as #1.</li> <li>3. Same as #1.</li> <li>4. Impossible to correct.</li> </ol>  |
| <b>Cloudy Transparent Glazes</b>                            | <ol style="list-style-type: none"> <li>1. Glaze applied too heavily.</li> <li>2. Not fired hot enough.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Sometimes can be corrected by refiring the piece one cone hotter than the original glaze firing.</li> <li>2. Same as #1.</li> </ol>   |
| <b>Greyed or Discolored Glazes</b>                          | <ol style="list-style-type: none"> <li>1. Ware placed too close to walls.</li> <li>2. Overfiring.</li> <li>3. Insufficient application of glaze.</li> <li>4. Fired with incompatible colors or greenware.</li> <li>5. Applied to greenware.</li> <li>6. Insufficient ventilation during firing.</li> </ol> | <ol style="list-style-type: none"> <li>1. Although difficult to correct, sometimes refiring to the proper cone will work. If not, try applying a heavy coat of glaze and refiring to proper cone.</li> <li>2. Same as #1.</li> <li>3. Same as #1.</li> <li>4. Same as #1.</li> <li>5. Same as #1.</li> <li>6. Sometimes refiring to proper cone will work.</li> </ol> |
| <b>Shiny Matte Glazes</b>                                   | <ol style="list-style-type: none"> <li>1. Misfiring, either overfiring or underfiring, depending upon glaze composition.</li> </ol>  | <ol style="list-style-type: none"> <li>1. If underfired, refire to proper cone.</li> </ol>  |
| <b>Pinholes</b><br>(See photo on page 27.)                  | <ol style="list-style-type: none"> <li>1. Underfired bisque.</li> <li>2. Glaze was applied to greenware.</li> <li>3. Improperly adjusted slip.</li> <li>4. Pin-sized holes left on greenware.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Sometimes refiring to proper cone or applying another coat of glaze before refiring will correct the problem.</li> <li>2. Problem best remedied before glazing.</li> <li>3. Properly adjust slip with silicate of soda.</li> <li>4. Properly clean and fire greenware.</li> </ol>   |

|                                       |   |  |
|---------------------------------------|---|--|
| <b>Smooth Textured Glazes</b>         | <ol style="list-style-type: none"> <li>1. Insufficient application.</li> <li>2. Extreme overfiring.</li> </ol>          | <ol style="list-style-type: none"> <li>1. Reapplying glaze and refiring to the proper cone will usually correct this problem.</li> <li>2. Same as #1.</li> </ol>   |
| <b>Distorted Bisque</b>               | <ol style="list-style-type: none"> <li>1. Overfiring.</li> <li>2. Ware incorrectly removed from the mold.</li> </ol>    | <ol style="list-style-type: none"> <li>1. It is not usually possible to save these pieces.</li> <li>2. Same as #1.</li> </ol>  |
| <b>Cracked Metallic Overglazes</b>    | <ol style="list-style-type: none"> <li>1. Overfiring.</li> <li>2. Too heavy an application.</li> </ol>                  | <ol style="list-style-type: none"> <li>1. Refire the object to cone 06 to burn off the overglaze, then apply another coat and refire to proper cone.</li> <li>2. Same as #1.</li> </ol>  |
| <b>Faded Decals</b>                   | <ol style="list-style-type: none"> <li>1. Overfiring.</li> <li>2. Underfiring.</li> </ol>                               | <ol style="list-style-type: none"> <li>1. If decal was overfired, the problem cannot be corrected.</li> <li>2. If decal was underfired, refire to the proper cone.<br/><b>Note:</b> In both cases, check the manufacturer's firing recommendation to determine if it was over- or underfired.</li> </ol> |
| <b>Blistering during Decal Firing</b> | <ol style="list-style-type: none"> <li>1. The decal firing was too hot, causing the glaze to start to react.</li> </ol> | <ol style="list-style-type: none"> <li>1. It is not usually possible to save these pieces.</li> </ol>  |

Careful attention to the following preventive maintenance instructions will greatly increase your kiln's life span.

### Every Loading

CHECK THE KILN-SITTER'S SENSING ROD AND CONE SUPPORTS.

Check sensing rod for free and centered travel. This can be done as you place the cone in the kiln-sitter.

Continued operation for porcelain and stoneware firings will eventually cause the cone supports and end of the sensing rod to deteriorate or bend. This will, in turn, affect the adjustment between the trigger and claw. If this occurs, both the rod and cone supports must be replaced.

CHECK THE KILN SHELVES.

Shelves do not have to be recoated with kiln wash for every firing, but an adequate coating should be maintained. Brush any loose particles of kiln wash from the shelves and check every shelf for cracks before placing in the kiln.

### Every 20 Firings or Every Month

CHECK KILN-SITTER ADJUSTMENT.

Due to heat, corrosion and mechanical wear, the kiln-sitter may slip out of adjustment over a period of normal use or the repeated fall of the weight could force the trigger out of adjustment.

### Whenever Necessary

REMOVE GLAZE SPOTS FROM SHELVES AND WALLS.

Whenever spots of glaze appear on the shelves or walls, they should be carefully removed prior to the next firing. Use a heavy spatula or flat-bladed screwdriver to remove spot. Recoat shelf only with kiln wash.

CLEAN INSIDE OF KILN WITH VACUUM CLEANER. USE SOFT ATTACHMENT.

**CAUTION: Remember that your kiln, like a range or dryer, is an electrical appliance. It has been built for many years of reliable operation; however, if you do have trouble, consult this chart for possible causes before you call a serviceworker. These solutions are not the total answer but may save you unnecessary costs. Have all electrical wiring done by an authorized serviceworker or electrician. ALWAYS UNPLUG KILN BEFORE ATTEMPTING ANY REPAIRS.**

| TROUBLE                                       | POSSIBLE CAUSES   | REMEDIES  |
|---|---|---|
| Kiln will not heat and pilot light(s) not on. | <ol style="list-style-type: none"> <li>1. Kiln-sitter plunger not pushed in.</li> <li>2. Blown fuse or tripped circuit breaker.</li> <li>3. If just repaired, kiln may be wired wrong.</li> </ol> | <ol style="list-style-type: none"> <li>1. Push in plunger.</li> <li>2. Replace fuse or reset circuit breaker.</li> <li>3. Have wiring checked.</li> </ol> |

| TROUBLE  | POSSIBLE CAUSES  | REMEDIES   |
|--|--|--|
| Fuse or circuit breaker trips immediately after turning on kiln.     | <ol style="list-style-type: none"> <li>1. Short circuit in kiln.</li> <li>2. Electrical service wired wrong.</li> <li>3. Overloaded circuit.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Have wiring checked.</li> <li>2. Have electrician check wall receptacle.</li> <li>3. Disconnect any other appliances from the circuit.</li> <li>4. Have wiring checked.</li> <li>5. Consult an electrician.</li> </ol>   |
| Fuse or circuit breaker trips after being on for some time.          | <ol style="list-style-type: none"> <li>1. Short circuit in kiln.</li> <li>2. Defective circuit breaker or fuse(s).</li> <li>3. Circuit breaker or fuse size may be too small.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Have wiring checked.</li> <li>2. Replace circuit breaker or fuse(s).</li> <li>3. Consult an electrician.</li> </ol>  |
| Cracks in kiln bottom. Small cracks are normal (see page 16).        | <ol style="list-style-type: none"> <li>1. Case loose.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Place kiln on floor; loosen, then tighten 2 bottom case clamps. Retighten periodically. Reposition kiln on stand.</li> </ol>   |
| Excessive time to complete firing, maximum temperature not attained. | <ol style="list-style-type: none"> <li>1. Inadequate wiring to kiln.</li> <li>2. Insufficient voltage to kiln.</li> <li>3. Loose connection in kiln wiring, wall receptacle or service wiring.</li> <li>4. Elements are wearing out.</li> <li>5. Part of kiln is not heating.</li> </ol> | <ol style="list-style-type: none"> <li>1. Consult an electrician.</li> <li>2. Consult your electric company.</li> <li>3. Have all connections checked and tightened.</li> <li>4. Replace elements.</li> <li>5. See next item.</li> </ol>   |
| A section of the kiln does not heat up.                              | <ol style="list-style-type: none"> <li>1. Defective or broken element.*</li> <li>2. Defective switch.</li> <li>3. Loose connection.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Replace element.</li> <li>2. Replace switch.</li> <li>3. Check and tighten.</li> </ol>   |
| Kiln shut off before firing cone is matured.                         | <ol style="list-style-type: none"> <li>1. Safety timer might have shut kiln off early.</li> <li>2. Wrong cone in kiln-sitter.</li> <li>3. Kiln-sitter out of adjustment.</li> <li>4. Power failure caused automatic kiln to recycle and timer shut off kiln.</li> </ol>                  | <ol style="list-style-type: none"> <li>1. If kiln just turned off, reset timer and push plunger; otherwise, cool kiln and refire with new cones.</li> <li>2. When kiln has cooled, check and correct.</li> <li>3. Make adjustment.</li> <li>4. Set fresh cone in kiln-sitter and new witness cone on hearth plate, then refire.</li> </ol> |
| Lid handle slides up on lid.   | <ol style="list-style-type: none"> <li>1. Lid strap loose.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Loosen lid band, reposition band and handle, tighten lid band.</li> </ol>  |
| Top or bottom of kiln overfires consistently.                        | <ol style="list-style-type: none"> <li>1. Some elements older than others.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Change switch setting to compensate for the unevenness or replace the old elements.</li> </ol>   |
| One pilot light not working (on kiln with more than one).            | <ol style="list-style-type: none"> <li>1. Defective pilot light.</li> <li>2. Defective switch.</li> <li>3. Loose or defective wiring to switch.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Replace pilot light.</li> <li>2. Replace switch.</li> <li>3. Tighten or replace.</li> </ol>  |
| Hot plug/wall receptacle.  | <ol style="list-style-type: none"> <li>1. Receptacle has loose connection or worn-out receptacle.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Have electrician check receptacle.</li> </ol>  |
| Kiln-sitter plunger will not stay in.                                | <ol style="list-style-type: none"> <li>1. Safety timer not set.</li> <li>2. Problem in kiln-sitter mechanism.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Set safety timer, then push in plunger.</li> <li>2. Have authorized Duncan kiln repair outlet check kiln-sitter.</li> </ol>  |

\*If one element is broken or burned out, a whole section or bank of elements will not work. Unless you have an ohmmeter or a continuity checker, the only way to determine which element in the section is damaged is by a visual inspection.

- Alumina Hydrate** A mineral which, in a powder form, prevents porcelain greenware articles that touch from fusing together during firing or adhering to kiln shelf.
- Bisque** Fired, unglazed objects of clay. Hard bisque, witness cone 04 or higher; soft bisque, witness cone 06.
- Cone or Bar, Pyrometric** Heat-measuring device used when firing a kiln. A bar or a three-sided pyramidal form made of ceramic materials which react to time and temperature in the same way ceramic ware does in a kiln.
- Cratering** Moon-like craters on a glazed surface.
- Crazing** Hair-like cracks which appear on a fired glaze surface. Often referred to as either immediate or delayed crazing.
- Decal** A picture or design, printed with ceramic colors (underglaze or overglaze) on special paper, which can be transferred to the surface of the ware and fired for permanency.
- Dryfooting** Leaving the bottom area of an article unglazed so stiling is unnecessary. Not recommended for utility items.
- Earthenware** Nonvitreous ware made from low-fire clays.
- Element** A high-temperature resistance wire wound in a coil that carries electrical current for heating kiln.
- Firing** The process of maturing ceramic products by various degrees of heat.
- Firing Chamber** Inside area of kiln.
- Furniture** Articles necessary to use full capacity of kiln space. Shelves, posts and stilts.
- Glaze** A fired finish consisting of a prepared mixture of frit which produces a glass-like surface when fired.
- Greenware** Unfired clay articles.
- High-fire** Refers to ceramic articles or glazes which are fired to witness cone 4 or higher (stoneware and porcelain).
- Kiln-sitter** A mechanical device triggered by a small cone that shuts off the kiln.
- Kiln Wash** A coating used on the tops of kiln shelves and kiln floor to protect them from glaze drippings.
- Luster** An overglaze that imparts an iridescent surface to the ware.
- Maturing Point** Temperature needed to mature glaze or clay.
- Overglaze** A decorative finish applied over a fired glaze surface and made permanent by firing.
- Pinholes** Tiny holes penetrating a glazed surface. A glaze defect caused by underfired bisque, applying glaze to greenware, firing too rapidly or poorly deflocculated casting slip.
- Porcelain** A vitrified clay body that matures at a high temperature and is translucent.
- Posts** Columns of refractory material used to support shelves inside the kiln. (See Furniture)

**Safety Timer** A shut-off device designed to turn the kiln off if the kiln-sitter fails to do so.

**Shelves** Flat slabs of special high-temperature materials on which ware is placed inside kilns. (See Furniture)

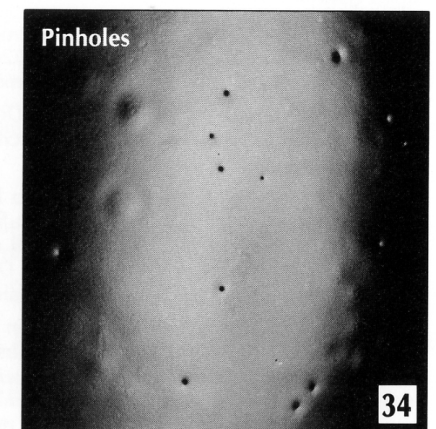
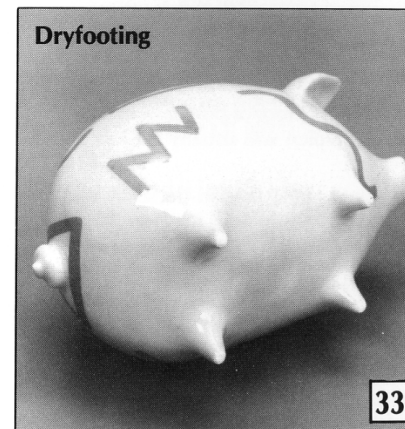
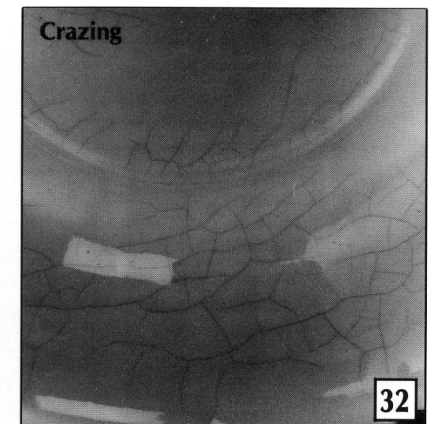
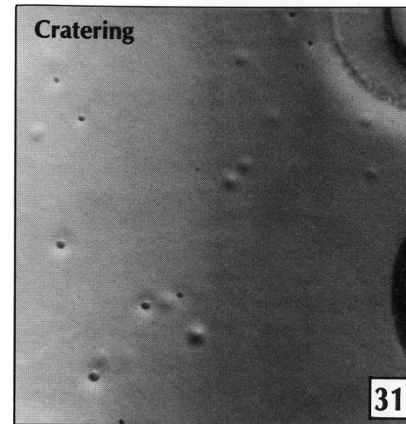
**Stilts** Supports used to separate a glazed article from a shelf during firing. (See Furniture)

**Stoneware** A heavily grogged clay body requiring a high firing to vitrify.

**Thermal Shock** Subjecting the ware to abrupt changes from hot to cold or vice versa.

**Underglaze** A ceramic color used under a glaze.

**Vitrify** To become a stone-hard, impervious surface.



Duncan Enterprises ("Duncan") hereby warrants all ceramic kilns manufactured by Duncan, together with all component parts except the Dawson kiln-sitter and safety timer, against defects resulting from faulty workmanship or materials for a period of one (1) year from the date of purchase, subject to the terms and conditions set out below.

## 1. Parties Entitled to Benefits Under This Warranty.

Only the original purchaser of a Duncan kiln can claim benefits under this Warranty. For purposes of convenience, this Warranty refers to the original purchaser of a kiln as "you," and all references to "you" or "your" in this Warranty are to the original purchaser only.

## 2. Your Responsibilities.

In order to take advantage of benefits under this Warranty, you must do the following:

- A. For fastest service on repair of your kiln, contact your local Duncan Kilns and Equipment Distributor (for the name of the Duncan Kilns and Equipment Distributor in your area, call Duncan's Customer Service Department at (209) 291-4444 or write to the Customer Service Department at P.O. Box 7609, Fresno, CA 93747) and provide the following information:
  1. By letter or telephone, notify your distributor within a reasonable amount of time after you discover the defect, but in no event more than fourteen (14) days after discovery.
  2. Provide your distributor with a proof-of-purchase for the kiln, including the date on which you made the purchase (your invoice will suffice) and the serial number.
  3. Deliver or ship the kiln to the distributor's place of business for repair or replacement of defective parts or replacement of the entire kiln, if necessary. You must pay the cost of delivering or shipping the kiln to the distributor's place of business and the cost of transporting or shipping the repaired kiln or new kiln from the distributor's place of business to your residence or place of business.
- B. If Duncan does not have a Duncan Kilns & Equipment Distributor in your area, you must take these steps:
  1. Contact the Customer Service Department at Duncan either by letter (P.O. Box 7609, Fresno, CA 93747) or by telephone ((209) 291-4444) within a reasonable time after you discover the defect, but in no event more than fourteen (14) days after discovery.
  2. Provide Duncan's Customer Service Department with proof-of-purchase for the kiln, including the date you made the purchase (your invoice will usually suffice) and the serial number.
  3. Do not return the kiln or kiln parts to Duncan until authorized to do so by the Customer Service Department. (Note: Since repairs can often be made without shipment of the entire kiln, we suggest you call or write Duncan's Customer Service Department before seeking warranty repairs from Duncan so that our experienced personnel can help you choose the best way to obtain repairs.)
  4. Upon receipt of a return authorization by the Customer Service Department, return the defective part or, if in the event repairs cannot be made without access to the kiln, send the entire kiln, shipping charges prepaid, to Duncan, Customer Service Department, 5674 E. Fountain Way, Fresno, CA 93727. A copy of the return authorization must be included with the part or kiln that is returned to Duncan.
  5. Prior to shipment of the kiln, contact Duncan's Customer Service Department by letter (P.O. Box 7609, Fresno, CA 93747) or telephone ((209) 291-4444) and inform them of your intent to return the kiln not later than the date of actual shipment. Duncan will return part prepaid. Repaired kiln or new kiln will be returned to you C.O.D. (You will be required to pay the return shipping charges.) In the event a kiln is out of warranty and you have been authorized to return the parts or kiln for repair, replaced parts, repaired kiln or new kiln will be returned to you C.O.D. (You will be required to pay the return shipping charges.)

## 3. Your Duncan Distributor's Responsibilities.

If the kiln or any component part (except the Dawson kiln-sitter and safety timer) becomes defective within one (1) year after purchase of the kiln and your warranty work is performed by a Duncan Kilns & Equipment Distributor, the distributor will:

- A. Repair or replace, at the distributor's option, any defective part or parts (except the Dawson kiln-sitter and safety timer) if the kiln can be restored to proper operating condition by such repair or replacement.
- B. Replace the entire kiln if the kiln cannot be restored to proper operation by the repair or replacement of component parts.

## 4. Duncan's Responsibilities.

If the kiln or any component part (except the Dawson kiln-sitter and safety timer) becomes defective within one (1) year after purchase of the kiln and your warranty work is performed by Duncan's Customer Service Department, Duncan will:

- A. Repair or replace, at Duncan's option, any defective part or parts (except the Dawson kiln-sitter and safety timer) authorized to be returned to Duncan's Customer Service Department and will return new or repaired parts to you, shipping charges prepaid, while equipment is under warranty.
- B. Repair or replace, at Duncan's option, any kiln authorized to be returned to Duncan's Customer Service Department and will return new or repaired kiln to you C.O.D. (You will be required to pay the return shipping charges.)

## 5. Dawson Kiln-sitter and Safety Timer.

The Dawson kiln-sitter and safety timer are warranted by the original manufacturer against defects in materials and workmanship for a period of one (1) year from the date of purchase of the kiln. Duncan Kilns & Equipment Distributors and Duncan's Customer Service Department will honor the manufacturer's warranty for the one (1)-year period only. For warranty service on the Dawson kiln-sitter and safety timer, use the procedures outlined in Paragraph 2 of this Warranty. Neither Duncan nor any Duncan Kilns & Equipment Distributor undertakes any obligation with respect to the Dawson kiln-sitter and safety timer except to honor the manufacturer's warranty upon your compliance with the procedures outlined in Paragraph 2 of this Warranty. For repair of the Dawson kiln-sitter and safety timer beyond the warranty period, contact W. P. Dawson, 1147 E. Elm Ave., Fullerton, CA 92631.

## 6. Length of This Warranty.

This Warranty shall expire one (1) year from the date of purchase, and any repair or replacement of kilns or component parts after the initial one (1)-year warranty period shall be made at your sole expense and upon such terms as you may arrange with the person or business performing the repair work.

## 7. Exclusions and Limitations.

This Warranty does not apply to the Dawson kiln-sitter and safety timer. The kiln-sitter and safety timer are covered by a separate manufacturer's warranty, as explained above.

This Warranty also does not apply to the kiln or its components if any one or more of the following circumstances shall be present:

- A. The kiln has suffered freight or transit damage. (Such damage may be the responsibility of the shipper.)
- B. The kiln has suffered deterioration because of abuse, improper storage or exposure to the elements.
- C. The kiln has been altered so that it no longer conforms to Duncan factory specifications.
- D. The serial number on the face of the kiln has been altered, obliterated or otherwise rendered illegible.
- E. The kiln has suffered damage from overfiring (i.e., exceeding the melting temperature of the object or material being fired), regardless of the cause of such overfiring.
- F. The temperature of the kiln has been allowed to exceed the cone or temperature shown on the rating plate.
- G. The kiln has been operated on a voltage other than the voltage specified on the rating plate.

- H. The kiln has been connected to a source of electric power in a way not specified or permitted in the instructions accompanying the kiln.
- I. The kiln has been used for any purpose other than the firing of ceramic materials.
- J. The kiln has been used for reduction or salt firing.
- K. The object or material inside the kiln or the kiln furniture has been damaged by overfiring.

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Some states do not allow the exclusion of implied warranties or limitations on how long implied warranties may last, so the above limitation or exclusion may not apply to you insofar as it concerns implied warranties. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you insofar as it concerns incidental or consequential damages. This Warranty gives you specific legal rights, and you may also have other rights, which may vary from state to state.

No employee or agent of Duncan is authorized to alter the terms of this Warranty, nor is any Duncan Kilns & Equipment Distributor authorized to alter the terms of this Warranty. This Warranty is made exclusively by Duncan, and you are not authorized to claim benefits hereunder from any person or entity except a Duncan Kilns & Equipment Distributor.

