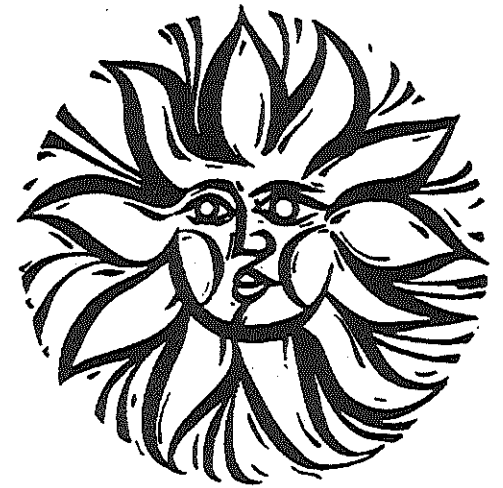


Skutt kiln owners manual



CERAMIC KILN—FIRING RECORD

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WARNING: Kiln should not be used by unsupervised children. Read and follow all safety labels on the kiln.

SETTING UP YOUR NEW KILN

LOCATION

For safety and convenience follow these rules:

- Locate kiln near your present electrical outlet or where a new circuit can be run with least cost. Position kiln to the left of your electrical outlet so the cord will have an easy run and will put no strain on the plug or outlet.
- Place in a well ventilated covered area where loading will be easy, yet where the kiln will not be in the way of other activities.
- Allow at least 8" of space between your kiln and adjacent walls.
- Have no curtains, aprons, plastic or other flammable materials hanging near by.
- Never fire kiln within a four-sided cabinet or closet—the fourth side must always be "wide open" to room air lest kiln and surrounding surfaces seriously overheat. Better yet, leave at least two sides open for easy access to controls and peep holes.

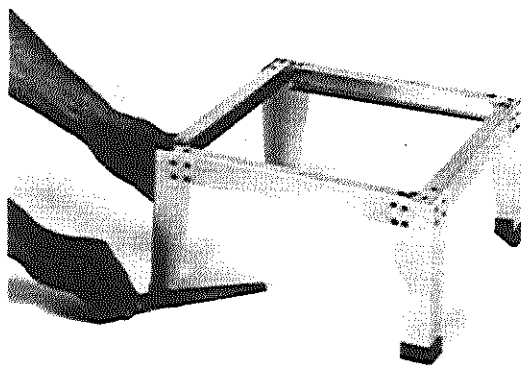


Fig. 1—Leveling the stand by placing a shim UNDER one of the legs.

- If possible locate the kiln in a room with a cement floor. Use a sheet of asbestos beneath the kiln stand if you must set your kiln over a tile floor.

SET-UP

Having decided on the location, place the kiln on the stand, and make sure it sits level. If not, it puts unnecessary stress on the kiln during firing and also makes it more difficult for you to stilt delicate pieces for glaze firing. To level the stand, place firm shims (see Fig 1) UNDER the legs, not above. Center the kiln's Bottom Slab on the stand and double-check against teetering.

Proceed to reassemble the kiln as it was in the carton, remembering to handle rings by their outside surfaces *only*. Pick up each section (see Fig. 2) so the switch boxes can be aligned by eye before engaging the interbox power blades. Re-hinge lid to top ring, and replace cotter pins and lid brace anchor screw. See Unpacking Sheet.



Fig. 2—Center finger, left hand in top peep hole. Grip jacket tightener with right hand. This assures good balance and ease in aligning switch box connectors.

ELECTRICAL REQUIREMENTS FOR YOUR NEW KILN

The most important part of installing your new kiln is to make sure you have **ENOUGH** of the **PROPER** power to operate it. If this is done, your kiln will give you years of satisfying service; if not, your first firing could be disappointing or even disastrous for your kiln.

3-PHASE OPERATION

Only special-order Models 231 and 235 with wall-mounted 3-pole connector, will operate *balanced* on a 3-phase supply. But any Skutt kiln can be properly powered via unbalanced connection to two of the three hot wires of a 3-phase supply—plus the Solid Neutral wire for Models 181 and 145—all plus of course the green safety ground connection provided in Skutt power cords.

208 VS. 200-240V SUPPLIES

The "120/208V." supply is increasingly encountered in schools and newly-built communities, since it's more efficient for heavy 115V. loads.

This development affects Models 235, 231, 231-18, 183, 185, 183-27 and 185-27 since their elements receive the full 208 (or 230) applied volts. The 230V. versions of these kilns will usually *low-fire* satisfactorily when moved to a 208V. area. But the 208V. versions should *never* be fired on a 220-240V. supply without first installing a full set of 230V. elements—all components would otherwise be seriously overtaxed.

Models 181 and 145 however are universal: their 115V. elements neither know nor care about the Upper Voltages involved.

MODELS 181 & 145

Wiring Diagrams on Page 22 & 24

The wall outlets for these models must be powered by 3-wire 115/240-208V. solid neutral supply—as for an electric range, but only No. 10 wire required (or No. 8 for runs over 50 ft.), with 30 amp. fuses or circuit breakers—no larger or smaller. The U-shaped fourth blade of the 4W30 amp. grounding plug is for pure green-wire grounding of the kiln case. The blade *opposite* this U-shaped one takes the white Solid Neutral wire.

ELECTRICAL REQUIREMENTS:

MODEL NO.	VOLTS	AMPS	WATTS	COPPER WIRE SIZE	FUSE OR BREAKER SIZE	RECEPTACLE NEMA CONFIGURATION
145	120/240-208	20	3600	10 #8 wire for	30	14-30
181	120/240-208	20	4600	10 runs over 50'	30	14-30
183	240	21.7	5200	10*	30	6-50
183	208	24	4990	10*	30	6-50
185	240	26.7	6400	8* #6 wire for	40	6-50
185	208	26.7	5550	8* runs over 50'	40	6-50
183-27	240	32.5	7800	6	45	6-50
183-27	208	36	7490	6	50	6-50
185-27	240	40	9600	6	50	6-50
185-27	208	40	8320	6	50	6-50
231-18	240	38.5	9250	6 #4 wire for	50	6-50
231-18	208	40	8320	6 runs over 50'	50	6-50
231	240	47	11250	6	60	6-50
231	208	47	9775	6	60	6-50
235	240	48	11520	6	60	6-50
235	208	48	9984	6	60	6-50
2353ph	2403ph	29.3	11520	8 #6 wire for	40	Wired directly
2353ph	208ph	31.3	10580	8 runs over 50'	45	

TESTING MODELS 181 & 145

DO NOT OMIT.

Should your wall outlet accidentally be mis-wired, 230V. will be applied to some of the 115V. elements in these kilns. To check for this condition, turn the 3-heat switches to *Off* and plug the cord into the wall outlet. Insert a cone in the automatic shut-off, latch the plunger in (see Kiln Sitter instructions, page 4) and now turn both switches to *Medium*. The first and third elements from the bottom should heat at the *same* slow rate with nothing visible for at least 30 seconds, but dull to medium red within 15 minutes. If either element heats up suddenly, turning bright red or orange, turn off

the kiln at once—your wall outlet is improperly wired.

If OK, leave the top switch on *Medium*, turn the other to *High*. If the element left on *Medium* becomes brighter than its earlier partner now switched to *High*, your wall outlet is not properly supplied by a white neutral conductor. This must be remedied.

CANADIAN KILNS

Canadian kilns have the same power requirements as their U. S. counter parts. However, they are wired directly into an electrical junction box and connection must be done by a qualified electrician.

*Use #6 wire if you are anticipating adding another section or installing a larger kiln in the future. The only change then required will be fuse or breaker size.



AUTOMATIC SHUTOFF

WARNING Shipment or setup could have disturbed your automatic shutoff. To avoid an unnecessary overfire, check the adjustments **THOROUGHLY**, then place and watch a senior visible cone (Fig. 11) placed at the same level as the junior cone in the automatic shutoff for the first TEN firings. The warranty does not cover these initial firings, nor those afterward unless instructions below are **FULLY** observed.

VITAL ADJUSTMENTS

Check these every time you set a cone.

1. Guide Plate: Grip Claw, push it down about 1/8" and, at that level, move it left and right while you look directly down into firing

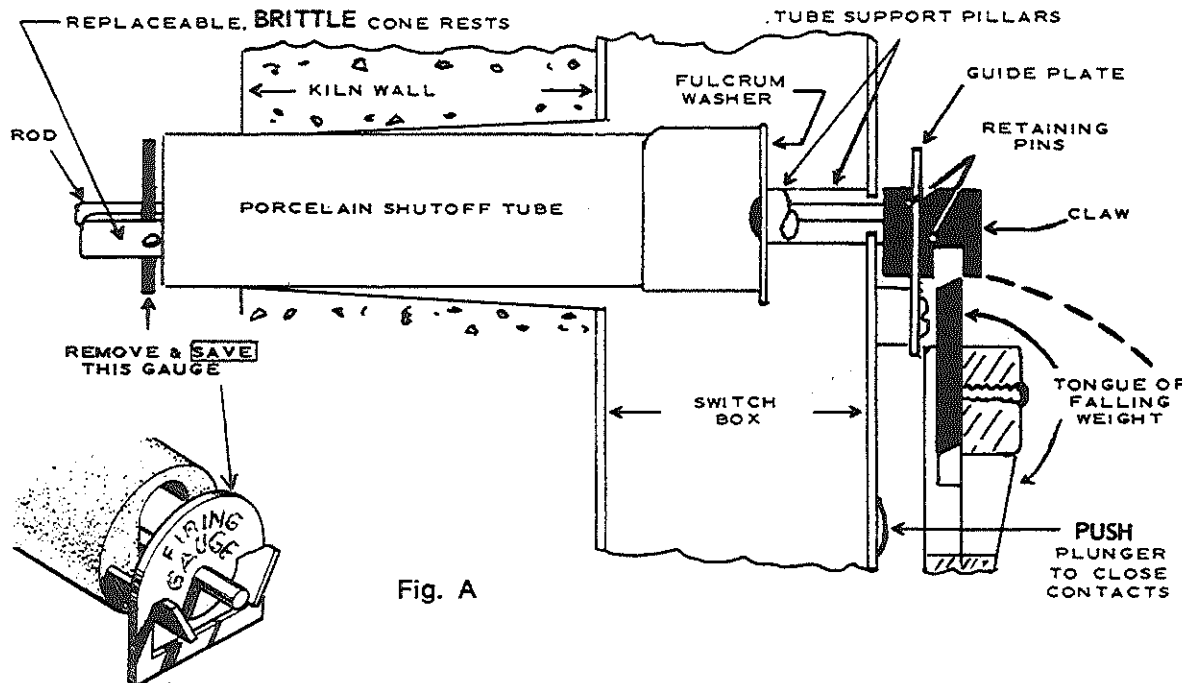


Fig. A

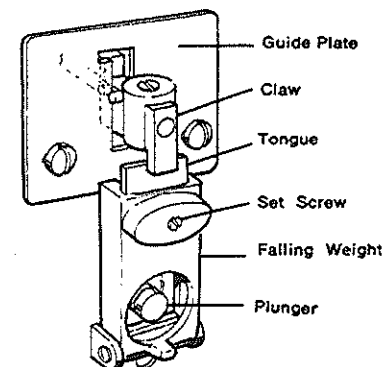
chamber where Rod's excursion must be accurately centered between Cone Rests. When your eye detects otherwise, don't procrastinate:

- a—Loosen the two Guide Plate Screws with your Skutt screwdriver, then snug up lightly.
 - b—Resume the left-and-right business while with the other hand you employ the handle of our screwdriver (or a heavier one) to tap Guide Plate left or right until Rod's excursion is centered between Cone Rests.
 - c—Retighten screws firmly, *then confirm* that adjustment has held. If not, repeat the above but with screws snugged tighter in Step "a".
2. Keep Tongue adjusted so Falling Weight will be released at the proper time (when cone has sagged and lowered Rod to the position shown in Fig. A): Loosen set screw in Falling Weight and slide Tongue up or down until it barely escapes from Claw with Gauge in position. Retighten set-screw firmly.

—Or, with a sharp eye, make a quick and quite accurate check of the Tongue setting by letting the Weight come away from the switch box far enough that it will support the tip of the Claw. Then look inside the firing chamber: Sensing Rod should be exactly where shown in Fig C below.

OPERATION

1. Keep a light coating of **HIGH FIRE** kiln wash on those metal surfaces touching the Cone both before and after it sags. But accumulation of kiln wash here — or inside Porcelain Tube — will cause **OVERFIRING**. Let wash dry before placing cone.
2. Be sure all the kiln's switches are turned to **OFF**.
3. *With Gauge removed*, raise Falling Weight to its upright position (Fig. A), and capture it there by light downward pressure on Claw. Maintain this light pressure while, with other hand, you place Jr. cone as shown in Fig. B, with flat numbered side up.
4. Observe the additional instructions under Firing Instructions, p. 7.



DON'T OVERLOOK THESE POINTS

1. In the automatic shutoff, use only Junior cones (pressure-molded 1½" long), not tips taken from the weaker hand-molded Seniors. But use only Full Seniors (2-9/16" long) as visible check cones, and at the SAME level as the automatic cone. See Fig. 11.
2. To fire slightly hotter, slide Junior cone endwise to utilize its thicker end. Fig. D. The opposite for cooler. Fig. E. **MAKE NO OTHER ADJUSTMENTS.**
3. Fired automatic cones should be crescent-shaped like Fig. C, and **IDENTICAL** from all firings. If not, you're in trouble—watch Senior visual cones until cured.
4. Any cracks across lower face of fired Junior Cone? Deep ones weaken the cone so it bends prematurely. See *Cracking Cones*, P. 12.
5. **BEWARE!** Let nothing impede the free fall of the Weight. Let no foreign object get inside the Tube (remove such with wire hook and double check to be certain Rod's travel is without impediment).
6. Falling Weight has extra mass to insure reliable tripping. To test, set Plunger, then raise Weight to only the 2 o'clock position and release it cleanly. This should trip Plunger.
7. When Replaceable Kanthal cone supports begin to spread apart noticeably, remove and switch from one side to the other, or heat to redness and straighten.
8. When Sensing Rod becomes noticeably bent, loosen set screw on top of claw and pull rod out into kiln chamber. Replace with new rod.

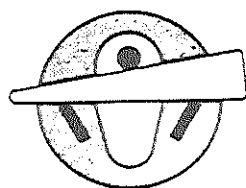


Fig. B
STANDARD POSITION FOR
KILN-SITTER CONE

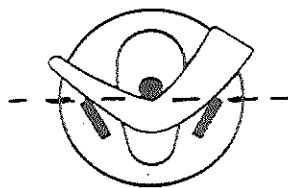


Fig. C
PROPERLY BENT FIRED CONE.
ROD'S IMPRINT WILL SHOW
MIDWAY BETWEEN CONE
REST IMPRINTS

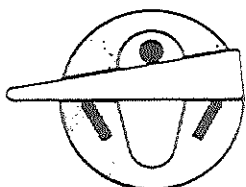


Fig. D
USING THICK END OF CONE
TO FIRE HOTTER

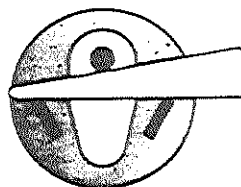


Fig. E

BEFORE FIRING

Remove any brick chips or other foreign matter from around the elements—both now and forever after! Bits of bisque and glaze will eat right through an element and no guarantee can cover such.

We recommend that you lightly vacuum the inside of the kiln to remove any dust that might have accumulated during shipment.

Wipe all your new shelves clean and kiln wash one side of each to 1/16" thickness with *high-fire* kiln wash from your dealer. Except for porcelain glaze fires, full new coats are seldom needed—just spot-patch and sand off even with coarse sandpaper wrapped around a wooden block.

Kiln wash the floor of the kiln, being careful to leave a one-inch margin unpainted all the way around. See Fig. 4.

Never kiln wash the walls or lid of your kiln!

Now your kiln is ready to fire. *Read most carefully* the preceding Kiln-Sitter and the following firing instructions—or repent at leisure!

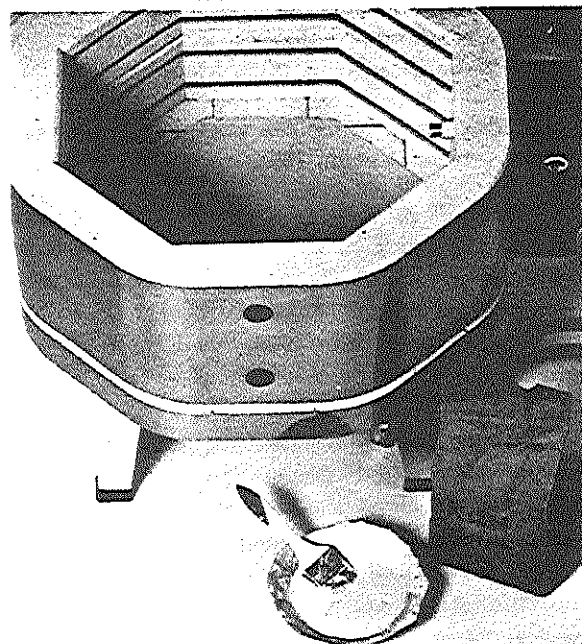


Fig. 4—Kiln wash bottom slab leaving a 1" margin of unwashed brick.

FIRST FIRING

It is very important that your first firing be successful and done properly.

Before attempting the first firing, read and carefully study:

1. Kiln-Sitter Instructions.
2. Loading Instructions.
3. Firing Instructions.

New elements and foreign matter such as dust give off vapors that often tend to discolor glazes. Therefore your first firing should be a **BISQUE** fire or a Cone 05 empty test fire with only your shelves in the kiln, posted as though ware on them, following the suggested standard switching schedule on page 7.

Set a Senior visual cone in line with the peep-hole on the same level as the Kiln-Sitter to make sure the automatic shut off is working properly. See Fig. 8. When using Senior visual cones as a check on the Kiln-Sitter Junior cone, always start with equal cones—that is, if you are placing an 05 Junior cone in the Kiln-Sitter, use an 05 Senior visual cone.

Don't try to rush through the first firing. Prepare yourself by studying this manual. Make notes of things that you want to remember and make visual observations of the kiln while it is firing.

LOADING THE KILN

IN GENERAL

Never load damp ware into your kiln. Make sure it's all bone dry first. Keep a piece of old greenware on your drying shelves. New ware should feel no cooler on your check than the old piece; if it does, water is still evaporating from it.

Plan your load carefully. Set out all your pieces before you start loading. For example, have all pieces pre-arranged as you wish to load them into the kiln. Always load slowly—dropped ware or shelves may damage the inside of your kiln.

Balance out your load by density—that is if half your load consists of small, heavy pieces and half of large thin-walled pieces, don't group the

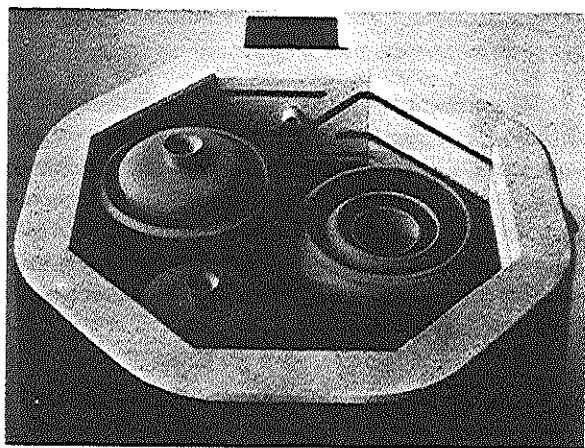


Fig. 5—Mixing of heavy and light pieces. Bisque firing with lids in place.

small heavy pieces in one section but mix them so that there is a balance of each type throughout the kiln. See Fig. 5. It is not advisable to set pieces of ware directly on the floor of the kiln; rather stilt them to allow better circulation of heat under them except as noted under Porcelain.

Ware should not be placed closer than within 1" of the elements. In case of large flat pieces such as plates, etc. which demand the full width of the kiln, place them so that their rims are positioned *between* two elements. To nurse through ill-designed or roughly-handled plates, etc., may also require that they be stilted up from the slow-heating shelves during *all* firings. Plate or washbowl pins serve well, placed every 2" to 3" around the foot.

Always have at least one element groove between shelves and two grooves between the bottom of the kiln and the first shelf. See Figs. 9 and 10. Involve at least 2 element grooves in the heating of your 4½" Blank Ring—or 4 grooves if possible with the Model 145 Blank Ring. Remember though that the Blank Ring must be entirely removed whenever firing hotter than Cone 01—or Cone 1 in 230V. Model 231.

Don't crowd the Kiln-Sitter—keep shelves at least ¼" from Sensing Rod, ware ½".

During Test Firings (p. 4) remember to leave room for a senior cone to be visible through the peephole on same level as Kiln-Sitter. Place the cone back at least 3" from the peep hole so that draft won't affect its actions. See Fig. 8

And why not make it a firm habit to *always* place a senior visual cone at Kiln-Sitter level? At 3c a load, it's about the cheapest Peace of Mind around. Though you normally won't watch it go down, its condition when you unload the kiln will definitely establish whether the firing was exactly correct and thereby tell you where suspicion should be directed if the ware displays any faults.

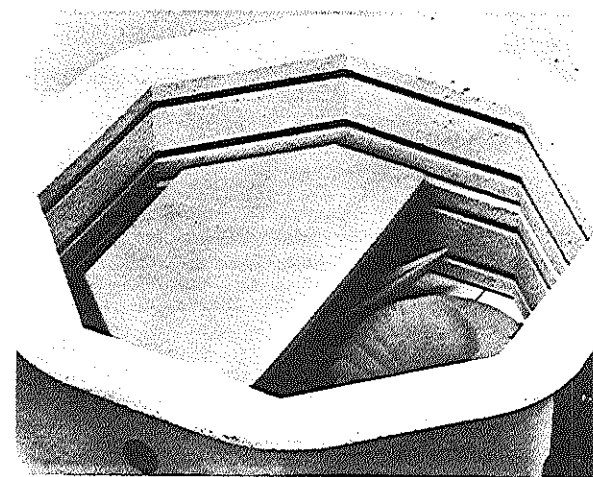


Fig. 6—Leave at least two element grooves between the bottom of the kiln and the first shelf, full or half.

A senior cone, set at the proper angle, is the Ultimate Standard, and the Kiln-Sitter must *always* be operated to conform to it—but always within the limitations of the Kiln-Sitter instructions, pp. 3 & 4.

LOADING THE KILN

LOADING CERAMIC BISQUE

Observe all preceding General Loading Instructions.

Greenware should be placed in the kiln in its natural position if possible, but any large flat piece—such as a wall plaque—on its flat side to prevent warpage. Cannisters, etc. should be bisque fired with lids in place for best assurance of good fit. See fig. 5. If production so dictates, you may wish to experiment with nesting bisque: the First Law is to Never Strain the Rims.

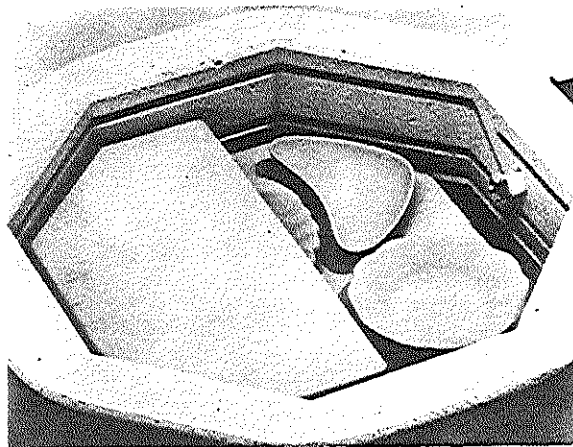


Fig. 7—Leave at least one element groove between shelves, full or half.

LOADING CERAMIC GLAZE

Observe all the General Loading Instructions.

Have you kiln-washed the bottom of the kiln and one side of each shelf? If not, do it now.

Glaze sticks stronger than any glue. Don't let any of your pieces touch one another or the sides of your kiln.

Stilts are devices used in glaze firing to elevate the fired pieces from the shelves. There are

several kinds and shapes. For each piece, use the one providing the widest bearing within the foot. See Fig. 11.

If a piece wobbles on its stilts, there is likelihood it will tumble during firing. Make sure you have a good solid load.

Dry-footing: in many cases you can remove the unfired glaze from the foot of your ware with a damp sponge. This eliminates the need for stilts if you've not applied your glaze too thickly.

Leave all possible "breathing room" between pieces for best firing uniformity—never less than $\frac{3}{4}$ " or bubbles and fumes may contaminate adjoining ware. See Fig. 8.

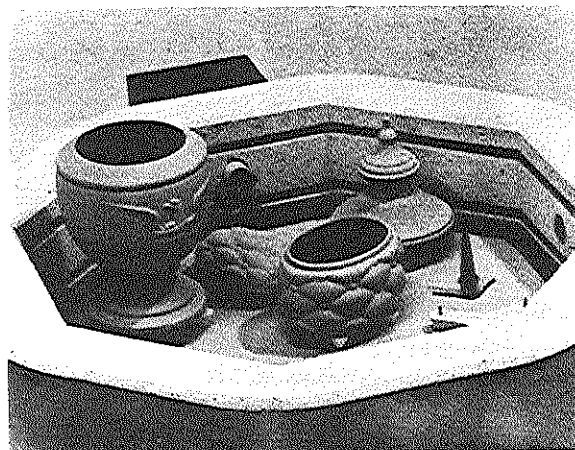


Fig. 8—Ware in place for glaze fire, stilted and with safe distance between pieces. Junior Cone in Kiln-Sitter. Ware not obstructing Kiln-Sitter. Senior visible cone on same level as Kiln-Sitter and back three inches from peep hole.

LOADING PORCELAIN AND STONEWARE

Basically these materials differ only in purity, hence in color. By definition, both are fired hot enough to render the bodies waterproof ("vitrified"), at which temperatures they tend to wilt.

Therefore they are always bisque and glaze fired resting flat on a freshly kiln washed surface—or one sprinkled with silica flour, "Flint", which *must* be kept out of the element grooves. To avoid distortion, pieces must either be carefully designed or the overhangs specially supported. Figurine arms and such are generally supported by hollow greenware pillars, made of the same material which therefore shrink right along with the piece (as much as 12%). Simpler shapes such as wide plate rims are generally supported by reusable rings ("setters") made of higher-firing material specifically shaped for that one article.

Both porcelain and stoneware are almost invariably "dry-footed" (foot wiped free of glaze with a damp sponge) to prevent fusion to the shelves.

GLASS SAGGING

Because of the very close temperature control necessary with glass, it is rare to fire on more than two shelves, the lower one posted well off the kiln floor and the upper one held at least 3" above the first mold. The center of the load should preferably fall a bit above the center of the kiln.

OVERGLAZE

STILTING, while not essential in overglaze fires, is often helpful in nursing unsound ware since tall stilts allow heat to penetrate between ware and the slower-heating shelves. Large double-pointed stilts can be used to hold plates apart when fired on edge, leaning the first one against one side of the kiln—surprisingly enough, probably the safest of overglaze loading schemes.

FIRING INSTRUCTIONS

Present-day prepared clays and glazes, if used as directed, are exceedingly tolerant to various firing schemes—as evidenced by the fact that a number of studios begin all firings of slip-cast ware by immediately turning all switches to HIGH and closing the lid after 45 minutes! So realize that if it ever seems necessary to slow down the Basic Schedule given below, its most likely time you checked into the Health of your ware instead.

When firing a new kiln or one that has undergone repairs or a disturbance of any kind, PLACE and WATCH a Senior (29/16") visual cone at Kiln-Sitter level for at least the first ten firings to double-check the automatic shut-off. Make it a firm habit to always place a senior visual cone at Kiln-Sitter level. At 3c a load it's about the cheapest Peace of Mind around. Though you normally won't watch it go down, its condition when you unload the kiln will definitely establish whether the firing was exactly correct and thereby tell you where suspicion should be directed if the ware displays any faults.

If EVER IN DOUBT about a firing, SHUT THE KILN OFF! Never chance ruining an entire load of ware if something has toppled off its stilts, or if you hear any odd noises, or if the kiln has been jarred. You *won't* harm your ware by shutting the kiln off before maturity. Simply set fresh cones and start over. See 5th entry under "Electrical", p. 12.

Because you have the top peep-hole unplugged during the entire firing NEVER unplug any of the lower peep-holes for more than a few seconds. To do so causes a serious jet-draft which can easily fracture ware and chill the cones in the kiln, particularly a visible cone placed behind that particular peep-hole.

Most workers prefer to take 5-7 hours for ceramic bisque and glaze fires. (Cones 06-04), 7-10 hours for porcelain and stoneware Cones 3-6). The simple switching schedule below is suitable for *all* full load firings of ceramics, porcelain and stoneware.

BEFORE EACH FIRING:

1. Turn all switches to OFF position.
2. Raise lid and lock in UP position.
3. Check kiln-sitter adjustments (p. 4).
4. Raise and latch Falling Weight and set proper Junior cone in Kiln-Sitter.
5. Load Kiln. Set Senior visual cones while loading.
6. Lower lid and insert lid prop. 2½" for overglaze and lace fires, 1" for all others. See Figs. 9 and 10.
7. Plug all peep holes *except the top one*; leave it unplugged *throughout the entire firing* to insure that fumes will never be forced out the shut-off tube to gum up the back of the Guide Plate and interfere with the motion of the Claw.
8. If your kiln is equipped with a Limit Timer set it for ½ hour beyond the anticipated firing time. If at any point before shut-off you wish to change the Limit Timer setting, you may do so by simply turning its knob to correct the remaining time.
9. Insert a finger through the hole in the Falling Weight and push the Kiln-Sitter plunger *firmly* so that it stays latched in.

BASIC FIRING SCHEDULE:

- A. Kilns equipped with 3-heat switches.
1. Turn all switches to LOW for 1 hour for slip-cast ware, much longer (even overnight) to avoid explosion of thicker wheel-thrown and hand-formed pieces.
 2. Turn all switches to MEDIUM for 1 hour. When unable to load Model 145's Blank Ring as recommended on page 6, compensate by staying 3-5 hours on Medium, thus keeping center element off as long as possible. Close lid as soon as you can.
 3. Turn all switches to HIGH. If the kiln atmosphere is already free of haze and very little odor is coming from the kiln, close the lid. But if not, check every 10-15 min-

utes until the atmosphere has cleared and then close the lid. If you've fired overnight on Low, per #1 above, close the lid and turn to High immediately.

B. Kilns equipped with infinite switches.

1. Turn all switches to LOW for 1 hour for slip-cast ware, much longer (even overnight) to avoid explosion of thicker wheel-thrown and hand formed pieces.
2. Turn all switches to 3-4 for 1 hour. (This is the Medium setting for infinite switches.) On kilns with three wired sections you may retard the heat setting of the center section by ½ to 1 number for more even heating.
- 3a. For kilns with two wired sections turn both switches to 5½-6 setting for up to cone 04 firings. Use High setting for cones 03 and hotter.
- 3b. For Kilns with three wired sections turn the top and bottom switches to 5½-6, center switch to 4½-5 for up to cone 04 firings. For cones 03 and above turn top and bottom switches to High and center to 5½-6.
4. Close lid when vapor free.

C. Firing will continue until the Junior cone sags, causing automatic shut-off via the Kiln-Sitter. But also unfailingly WATCH your Senior visual cone for the first ten firings of a new kiln or if the kiln has been disturbed or any recent Junior cones have come out bent even slightly different than Standard. See Fig. C on page 4.

AFTER EACH FIRING:

1. Allow the kiln to cool *naturally*, never unplugging any other peep holes nor posting the lid up until the ware is cool enough for *barehanded* unloading.
2. In unloading, be sure to examine the Senior check cone and the Junior Kiln-Setter cone carefully. If they disagree, *now* is the time to figure out why.
3. If your kiln has a Limit Timer, there should still be 15 to 45 minutes left on its

FIRING INSTRUCTIONS

dial (it stops when the Kiln-Sitter trips). *If otherwise, correct your setting appropriately next time.* If Falling Weight is found upright, you know the timer shut the kiln off—find out why and remedy!

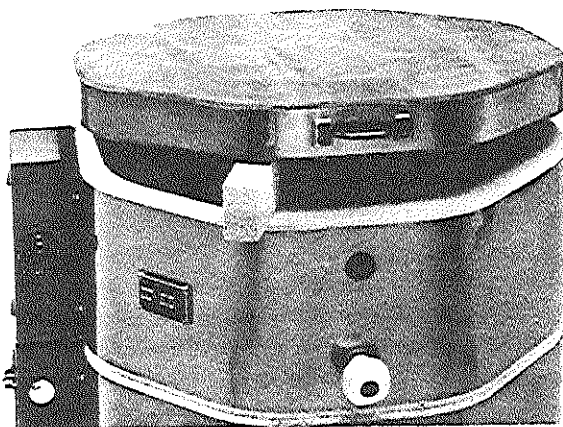


Fig. 9—Kiln lid posted for lace, china, gold or luster fire.



Fig. 10—Kiln lid posted for bisque or glaze fire.

THE UNDERGLAZE FIRE

Greater detail can be preserved in conventional and One-Stroke underglaze decoration if it is first "set" in a cone 019-04 firing before

glazing and glaze-firing. If the decoration was applied directly to greenware, the underglaze fire acts as the bisque fire, and therefore should be a full cone 05-04 fire.

CERAMIC GLAZE FIRE

If your ware has been bisque-fired to Cone 05 or 04, and properly glazed, dried and loaded (p. 6), an 06 or 05 glaze fire will normally produce a flawless surface. If not, consult the Ware Troubleshooting section, pp 12-13.

Crystalline glazes often require Cone 04 firing to develop fully—or Soak as instructed below.

ONE-FIRE CERAMICS

With the talc clay bodies and prepared glazes available to the ceramist today, many prefer to "one-fire" their ceramics. In many instances you *can* satisfactorily glaze a piece of greenware and complete it in a single firing, maturing the clay body and the glaze at the same time. But there are definite hazards associated with this practice such as persistent cratering and pinholing, off-color spots caused by impurities in the clay burning out and passing into the glaze, etc., etc. Fire to at least Cone 05, preferably Cone 04.

Except with reds, the best one-fire results are usually obtained by SOAKING for 20 to 30 minutes.

Soaking is accomplished immediately after automatic shutoff by an 05 cone:

1. Turn ALL Switches to MEDIUM.
2. Lift the Kiln-Sitter falling weight half way.
3. Push Kiln-Sitter plunger in firmly, making sure it is well latched.
4. Gently lower falling weight so as not to unlatch plunger.

Warning: Use only lead-free or lead-safe glazes on any surface which may come in contact with food or drink.

5. Leave in this position for 20 to 30 minutes.
6. Push falling weight down to unlatch plunger in Kiln-Sitter, turn all Switches to OFF.

On MEDIUM this is a safe procedure since neither your ware nor the kiln can be harmed if you exceed the suggested 30 minutes. *But not so on HIGH.*

OVERGLAZE FIRES

CHINA PAINTS—If fired too hot, fine detail will be blurred; if too cool, the pigments will not be absorbed into the glaze and will quickly wear off. So fire until the paints acquire a sheen close to that of the surrounding glaze (which, with practice, can be judged through a peephole; if you read several nearby senior visual cones at the same time, you can then duplicate the firing by Kiln-Sitter). This temperature will vary over several cones if widely varying colors are used, so that high quality is to be had only by applying and firing the higher temperature colors first, followed by others in one or several groups. The required temperature also varies with the softening temperature of the parent surface.

However, for ceramic and porcelain articles other than tableware, a single Cone 019 firing can suffice.

METALLICS (gold, platinum, copper, etc.) will fire dull if applied too sparingly — Likewise if underfired. Overfiring, particularly of larger areas, results in Reticulation or "Crocking" — shrinkage of the metal, leaving a network of glaze lines exposed. Greater overfiring results first in spotty, then total, disappearance of metal through vaporization. On ceramics and porcelain start with Cone 019. Metallics and greens are usually incompatible.

FIRING INSTRUCTIONS

LUSTERS will flake off if applied thickly, will "frost" if overfired: fire to 06-05 and start over. Keep ware well away from elements. Fire to 019 for durability, drop to 020 if Frost encountered. Lustres are extremely sensitive to contamination by kiln vapors—particularly those from greens—and lid ventilating must sometimes be continued at $\frac{1}{2}$ " or 1" throughout the firing.

BREAKAGE of ware during overglaze firings can almost invariably be traced back to roughly-handled, unevenly-dried or unevenly-sponged greenware. In general, there is less trouble with art porcelain than with ceramic pieces, and least of all with high quality, pre-glazed, dry-footed imported china blanks.

FIRING SCHEDULES for overglaze can usually be considerably accelerated since the ware is entirely free of moisture. Sound ware can be started on MED. for 1 hr., switched to HIGH and the lid closed whenever the oils have been completely driven off, as determined by odor. Underventilation can cause a host of problems.

FIRING PORCELAIN

Art porcelain should be bisque fired to Cone 5 or 6 (not 05-06) in your Skutt kiln, with $4\frac{1}{2}$ " Blank Ring removed of course, the ware being loaded and supported as on p. 7. Begin lace fires with lid posted open $2\frac{1}{2}$ ". OPTIMUM TRANSLUCENCE can be achieved by:

- 1—Loading the kiln very heavily (extra shelves, etc. qualify);
- 2—Bisque firing twice to the same temperature, (often wet-sanding with a fine grit silicon carbide paper between firings for maximum smoothness) or

3—"Soaking" for 30-45 mins. *immediately* following automatic shutoff, as discussed under One-Fire Ceramics.

Porcelain glaze is usually fired at Cone 3 at which temperature auxiliary supports for arms, etc. are no longer required. But dry-footing is essential — p. 6.

Overglaze decoration is fired exactly as with ceramics, but usually 2 to 4 cones hotter (017-015) to produce penetration, gloss and durability on the higher-softening glaze. Overglazes are also frequently applied directly to porcelain bisque which is to remain unglazed; fire to the above cones.

FIRING STONEWARE

Under all normal voltage variations (name-plate plus or minus 10%), Skutt Kilns are capable of attaining Cone 8 with their $4\frac{1}{2}$ " Blank Rings removed. Attempting to utilize any model's Blank Ring at these temperatures seriously overworks the elements.

Since Stoneware Shapes are designed for self-support during firing, the glaze can be matured at the same time as the body, particularly since the pinholes, subursts, scumming, etc. which tend to accompany One-Firing are often highly prized in stoneware. Pieces are dry-footed, of course, and loaded per p. 6.

The procedure for stoneware differs from that for one-fire ceramics in that the plain or decorated greenware is usually first given a low bisque firing at Cone 016-04 before glazing. Due to the wares' thickness, the LOW period is extended in all firings.

While the typical overglaze decorations are rarely considered suitable on stoneware, Cone 06-04 reds, oranges and crackles are sometimes added by afterfiring to provide effects unobtainable at the higher temperatures; warm the vitrified ware to facilitate application of such glazes.

FIRING GLASS

SAGGING of sheet glass, bottles, etc. is carried out in terra cotta molds dusted with whiting (calcium carbonate) or one of several similar tradename separators.

FIRE on LOW for 1 hr. with lid posted up 1", then close lid and switch directly to HIGH until kiln is shut off by an 016-014 cone (varies with brand of glass). For best results, then *immediately* "flush" the kiln by posting the lid open 1" for one to ten minutes; then close lid and allow kiln to cool naturally.

Glass softens very quickly once it starts and for this reason many workers prefer to use a Pyrometer (see p. 27) rather than a pyrometric cone. With it, you need remain on LOW only until about 700° F., then Switch directly to HIGH, closing the lid as soon as odors cease, and firing rapidly to preserve the colors. Shut the kiln off and post up the lid immediately when the pyrometer reaches the desired temperature, within the 1450-1525° F range for most glass.

GLASS DECORATION can often be carried out with conventional china paints, metallics and lustres when the glass is being fired to sagging temperatures. But freestanding tumblers, etc. can rarely be taken above Cone 022 without wilting and at such low temperatures the special Glass Stains, Golds and Lustres produce more dependable results.

GENERAL INFORMATION

BRICK

Skutt kilns are constructed of the finest insulating fire brick available today, offering strength, cleanliness and long life in admirable combination. All brick are precision cut and grooved to assure air-tightness, perfect element suport and ease of replacement. Because of their porous composition, insulating fire brick are necessarily fragile; so always handle your kiln and its brick with care. The brick in your kiln may begin to show some fine cracks after the first few firings, most noticeably in kilns which have been high-fired. This is normal for this type of brick and does not harm the structural integrity of the kiln or impair its proper functioning.

ELEMENTS

The highest quality iron-aluminum-chromium (Kanthal-type) element wires are used in all Skutt kilns. Thus all Skutt kilns are of the high-fire type—Cone 8 to 10 depending upon the particular model. Elements are meticulously tested both before and after installation for assured performance, more even firing.

Element life will vary depending on whether the kiln is used primarily for low-fire and bisque or high-fire and stoneware, but elements will last for many firings if treated considerably. 1—*Never* attempt to fire above Cone 1—without first removing the 4½" Blank Ring, if purchased with your kiln. 2—Let *nothing* get into the element grooves. Bits of bisque, or glaze, or cones, or metal will immediately fuse to an element and proceed to eat through it. Removal is hazardous, since this type of element becomes quite brittle in just the first few firings.

SWITCHES

Dependable three-heat type. All are UL-rated considerably higher than the electrical loads they carry.

PILOT LIGHTS

All Skutt automatic kilns are equipped with pilot lights to indicate when the *Kiln-Sitter* is on, regardless of 3-heat switch settings.

STAINLESS STEEL

Only the finest grade stainless steel is used in Skutt kiln jackets, selected for its expansion qualities so that the brick are never unduly stressed, yet are fully supported during *all* stages of heating and cooling. Stainless steel has a tendency to eventually discolor with repeated heatings and therefore a bottle of special Skutt Stainless Steel Cleaner is available.

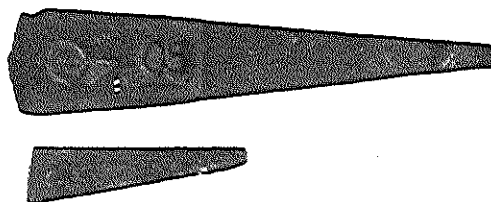
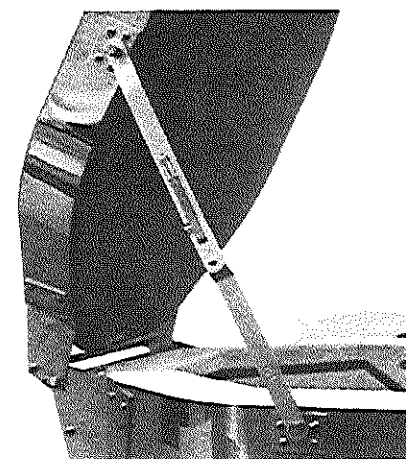


Fig. 11 — Senior and Junior Orton Cones, both 05.



Fig. 12 — Three positions of Visual cone. Left to right: Unfired, reaching temperature, at proper temperature.



LID BRACE

The lid brace holds the lid securely open for loading and unloading the kiln. As you open the lid, pull forward on the brace until it locks with a click. To close, push back on the lid handle, push the button on the side of the brace, and lower the lid gently.

CONES

The Pyrometric Cone is a remarkable, simple device which measures more than just the maximum kiln temperature: it shows the amount of useful *fusion* accomplished during a firing. There are two sizes and you will work with both: the small Junior cone, 1-1/8" long, and the large Senior, 2-9/16". See Fig. 11. Both are composed of precisely controlled raw clays, frits, etc., and identified by standard Orton numbers. Study the Cone Charts on the next page.

The Junior is the size to be placed in the Kiln-Sitter automatic shutoff. While composed of the same materials as Senior cones of the same numbers, their shorter length and greater compaction make them stand longer than the Sen-

GENERAL INFORMATION

iors if placed on end. But when used horizontally in the Kiln-Sitter, Juniors bend at almost exactly the same time as the large Seniors placed on end.

Senior cones are placed at various levels throughout the load to tell you if you are getting any temperature variations due to loading, etc., and are also placed at the *same level* as the Kiln-Sitter Junior cone to check the accuracy of automatic shutoff. See Fig. 8. It is advisable to set the Seniors in commercially available cone plaques or in wire cone holders also made for that purpose. If you prefer to make your own cone pats from wet clay, be sure they are *thoroughly dry* before firing or they will explode in the kiln. The best insurance is to pre-dry them on the top of your kiln lid during one of your firings. It is important that the cone is standing at the proper angle (the base of the cone is pre-cut to provide this angle) in order for it to bend at its standard temperature. See Fig. 12.

CRACKING CONES: Exposure to moisture at any time during their lives can cause cones to crack when fired, bending prematurely. So keep them in a dry place at *all times* — drying will never restore Junior cones, particularly, to their original dry-pressed strength. The cracks will often be invisible before firing but will stand revealed when you unload the kiln. If you have trouble with cracking cones, try some from another source. In a pinch you may be able to use the thin end of the next-hotter Junior cone.

DRAFTS: Place cones in the kiln at least three inches back from the peep holes. See Fig. 8. Open the lower peep holes only momentarily, otherwise the draft will affect cone fusion.

VISIBILITY: Try to keep ware as far away from behind the cone as possible. At higher temperatures the color of the cone and the ware will blend, making the cone almost invisible—so when loading the kiln check cone placement by viewing same through the peep holes.

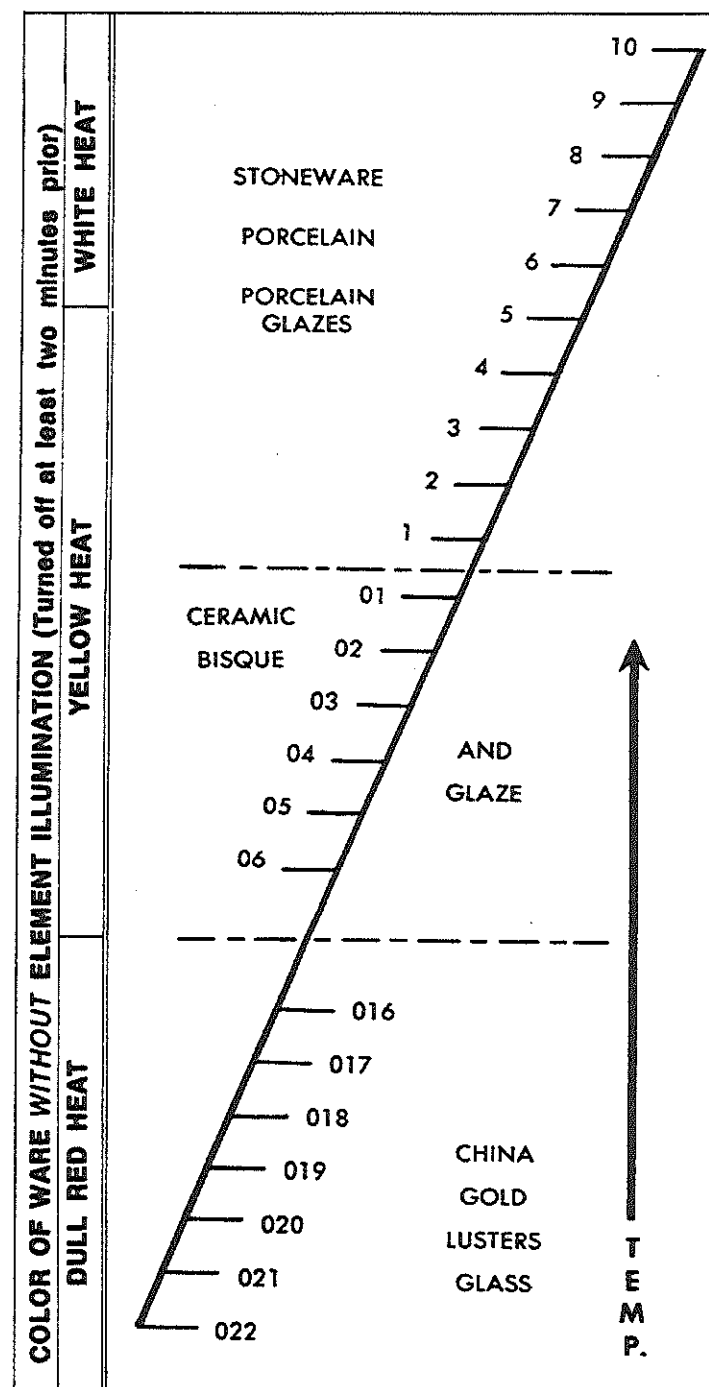
ORTON PYROMETRIC CONES

SENIOR CONE NUMBER	FINAL TEMPERATURE REQUIRED	
	@ 108° F/hr.*	@ 270° F/hr.*
022	1085° F	1112° F
021	1116	1137
020	1157	1175
019	1234	1261
018	1285	1323
017	1341	1377
016	1407	1458
015	1454	1479
014	1533	1540
013	1596	1566
012	1591	1623
011	1627	1641
010	1629	1641
09	1679	1693
08	1733	1751
07	1783	1803
06	1816	1830
05	1888	1915
04	1922	1940
03	1987	2014
02	2014	2048
01	2043	2079
1	2077	2109
2	2088	2124
3	2106	2134
4	2134	2167
5	2151	2185
6	2194	2232
7	2219	2264
8	2257	2305
9	2300	2336
10	2345	2381

*Final temperature for cone maturity depends on rate of temperature increase within kiln during final 300-400° of firing.

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

QUICK REFERENCE CHART



TROUBLE SHOOTING

AUTOMATIC SHUTOFF

Difficulty	Check these points in the order given:
Kiln-Sitter consistently over—or under—firing the Senior Check Cone at Kiln-Sitter level.	<ol style="list-style-type: none"> 1. Check Kiln-Sitter adjustments thoroughly: p. 3 2. Move Jr. cone endwise to correct: p. 4. 3. Bent Jr. cones from Kiln-Sitter deeply cracked across lower faces? See pp. 4 & 11.
Kiln equipped with infinite switches consistently firing too hot or too cool in one section.	Adjust infinite switch higher or lower on Medium and High settings to compensate.
Occasional over-firing.	<ol style="list-style-type: none"> 1. Sensing rod accurately centered between cone rests? p. 3 2. Falling Weight mounting bracket bent so Weight rubs against it when set upright at that end of its pivot rod? Straighten. 3. Overglaze oils or organic matter from native clays accumulated on inner face of Guide Plate? Remove plate, clean with lacquer thinner. Never plug top peephole. Vent longer via lid if necessary.
Sr. check cone over-fired, but Jr. K-S cone only normally bent.	<ol style="list-style-type: none"> 1. Use magnifying glass to double-check numbers on both fired cones. 2. Cones may erratically "freeze" if, near end of firing, the temperature rises less than 50° F per hour or, in Skutt kilns, when more than 10-11 hrs. is required on HIGH after lid is closed. Always remove 4½" Blank Ring when firing hotter than Cone 01 (Cone 1 in 230 V Model 231). See Slow Firing curves on p. 17.
Kiln found with weight fallen but pilot light and all elements still on. Cones overfired.	<ol style="list-style-type: none"> 1. Turn 3-heat switches off. While kiln still hot, perform 2 o'clock drop test (p. 4) 50 times. Repeat when cooled. If Plunger is unfailingly released every time, be assured that you either forgot to latch the Weight up when setting the cone, or that its fall was impeded by power cord or other obstruction. 2. If any cleanly-made 2 o'clock drop fails to release the plunger, contact Skutt Factory at once for an exchange switch box, giving Model and Serial Nos. and arranging a deposit (can be C.O.D.), much of which is normally refundable upon factory's receiving your unit—or totally so if presence of an Original Defect confirmed in a kiln less than two years old. But keep your switch box and fire with aid of alarm clock and visual cones until replacement arrives with exchange instructions.

ELECTRICAL

Difficulty	Check these points in the order given:
Only half of elements light up on Medium.	Normal. The Medium element always occupies the lower half of the section controlled by that 3-heat switch.
Irregular clicking noise from models equipped with infinite switches.	Normal. These switches constantly cycle on and off at all settings other than HIGH.
Elements hum at first, later do not.	Normal. Kanthal-type elements are magnetic only up to red heat. Humming then ceases.
Fuse blows, breaker trips more than 1 min. after switching to HIGH.	<ol style="list-style-type: none"> 1. Fuse/breaker and wire sizes proper for the kiln? See pp. 1 & 2. 2. Other loads on same circuit? 3. Non-supermarket fuses screwed firmly into fuse holders? 4. Tarnished or loose connections at a breaker, or especially, a fuse socket can further increase the temperature of either device, causing unwarranted interruptions. Likewise for poor factory riveting of their internal parts. Brighten hookup surfaces and fuseholders with steel wool only after entire panel is proved disconnected. Tighten all screws firmly. Replace panel parts if necessary. 5. Let no one tell you that "Your kiln must be taking more power than when new." Aging elements can only draw less power. Look elsewhere.
As above, but almost immediately after switching to HIGH.	<ol style="list-style-type: none"> 1. Model 181, 145, 129, 127: New or disturbed studio wiring or wall receptacle, or new kiln plug? Plugging kiln into someone else's wall outlet, even though for a Skutt kiln? See Testing, p. 2. 2. Does circuit pop fuses/breakers even with nothing plugged in? Call electrician back. 3. Examine cord and plug and, if necessary, interiors of switch boxes per p. 16.
Power interrupted during firing. Kiln still hot.	<ol style="list-style-type: none"> 1. If still in Venting stages, refire as though a fresh load, using original cones. 2. If venting completed and you positively know the load was never within 1 hour of shutoff, resume firing with the same cones. If chamber glows visibly red with power OFF, switch directly to HIGH; otherwise first fire 1 hr. on MED. 3. But if there's the slightest reason to suspect that load was within 1 hour of shutoff, cool kiln, set fresh cones, and refire as usual except that the lid can be left closed throughout.

Abrupt increase in firing time.

Gradually increasing firing times (Often accompanied by increasingly uneven temperatures within kiln).

1. Observe visual Sr. check cone at once and shut kiln off manually if cone is down. Check Kiln-Sitter thoroughly, pp. 3 & 4.
2. If visual cone still standing and you have absolute confidence that it bears the correct number, check fuses or trip and reset breakers. If temperature then begins to rise, complete firing as usual. See "Fuse blows, etc." at left on this page.
3. In any other circumstance, shut off immediately, cool and unload:
 - A. If either cone is overfired, check thoroughly, pp. 3 & 4.
 - B. If cones are underfired, turn all switches of empty kiln to HIGH, leaving lid open. Check elements for redness after 5-10 minutes. If, in Model 181 or 145, entire top or bottom half of kiln is unlighted, check fuses thoroughly, trip and reset breakers—since one side of many 2-pole breakers can trip without affecting the handle position. (A Model 181 or 145 is in essence two completely independent 115 V. kilns incorporated into one: if half of 181 or 145 is not working, one popped fuse or breaker will still leave the other half of the elements burning normally on HIGH. But one popped fuse or breaker will entirely shut down Model 235, 231, 231-18, 183, 185, 183-27, 185-27.
4. If on Models 183, 183-27, 185 or 185-27 entire section won't heat, or if on models with 3-heat switches the elements are dead in other than the patterns given in 3, above, first unplug kiln from wall and check dead elements for breaks by very gently attempting to lift each straight run with a pick. P. 11 lists causes of element breakage. If no break found, refer to Switch Box Repairs, p.16.
5. If nothing found under 4, above, contact power company for a voltage check at wall outlet with all switches on high—or better yet, directly on the elements per Voltmeter Test described on pp. 17 & 18.
1. Power Plug hot? Disconnect circuit feeding wall receptacle (check to be certain), pull receptacle out of its box and tighten terminal screws; also within kiln plug. If no improvement, wall receptacle must be replaced, plug blades brightened.
2. Deaden circuit feeding wall receptacle. Inspect and, if necessary, thoroughly brighten and tighten—or replace—screws, fuse sockets, etc., throughout length of circuit.
3. Swing kiln's switch boxes aside (p. 16) and inspect for discolored components—see "Visual Inspection" on p. 17.
4. Have power company connect recording voltmeter to studio wiring and also make spot check of voltage drop from main panel to kiln's wall outlet with kiln drawing full power. Start a firing at your usual time and voltmeter will record voltage variations during the critical hours when kiln should be approaching shutoff.
5. See Element Replacement, p. 17.

TROUBLE SHOOTING - WARE

COMMON GLAZE FAULTS

Crawled Glaze—The condition known as “crawling” is one whereby blank or “bald” spots appear in the glaze surface after firing. See Fig. 16.

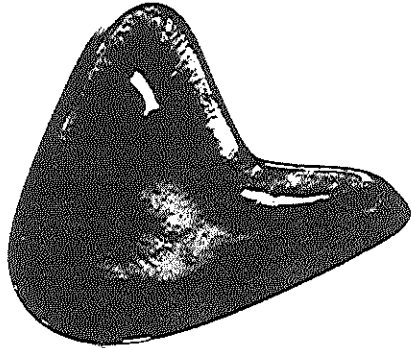


Fig. 13 Crawling glaze

Crawling may be caused by having a dusty or dirty bisque surface; applying the glaze heavily; excessive handling of greenware which results in oil from the skin filling the clay pores, thereby causing the glaze to be repelled; and/or hard spots in the clay surface created by excessive sponging or polishing of the greenware.

To attempt to salvage such a piece, apply additional glaze to the bare spot and refire, or cover the entire piece with a textured glaze and refire.

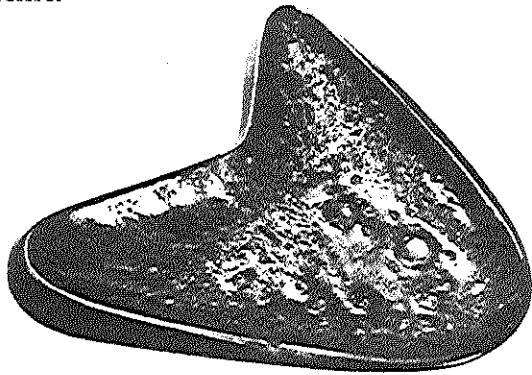


Fig. 14 Excess of glaze

Excessive Application of Glaze—The piece shown in Fig. 14 is an outstanding example of the type of surface which can result from too heavy an application of glaze. This type of error is extremely difficult to salvage, and it should indicate the need for lighter application of glaze on future pieces.

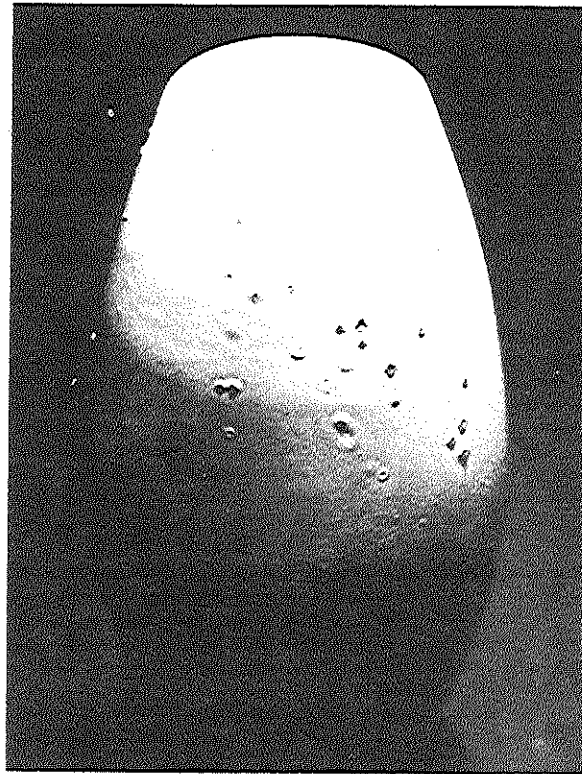


Fig. 15 Craters

Cratered or Bubbled Glaze—In this type of glaze error, the craters develop as a result of body gases erupting through the glaze and “freezing” as the kiln cools; this condition is caused by underfiring. See Fig. 15. To salvage such a piece, grind down the high spots, apply a thin coating of glaze, and refire to a higher temperature.

Pinholes—Pinholes are tiny indentations in the glaze surface which are generally no larger than the point of a pin. This fault may occur in almost any type of glaze, and is caused by underfiring. See Fig. 16. To salvage such a piece, refire at a higher temperature.

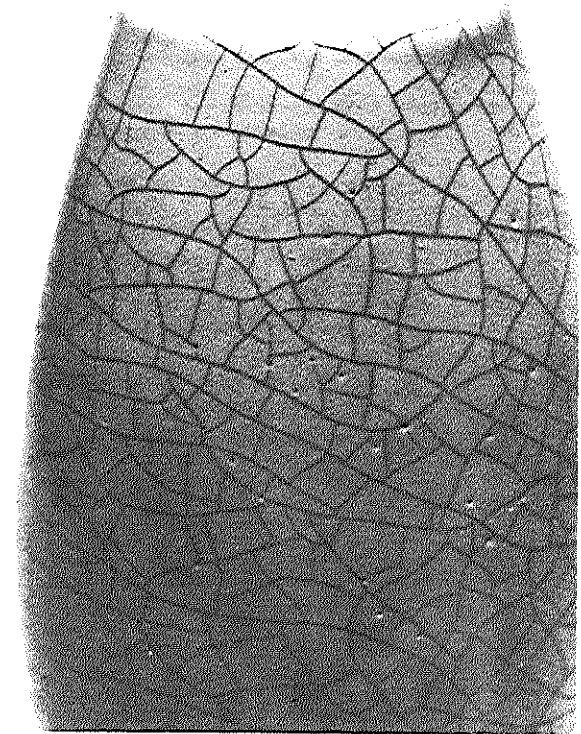


Fig. 16 Pinholes, crazing

Sagging glaze on a vertical surface—Sagging or running glaze is generally caused by too heavy an application of glaze. See Fig. 17. When this condition occurs, consider it a warning sign that glaze has been applied in excess, and that extra care should be exercised when glazing future pieces with a similar shape.

TROUBLE SHOOTING-WARE



Fig. 17 Excess of glaze

Discolored Over Glazes—Underfiring occasionally leaves small pin holes or pores in the glaze that can't be seen without a magnifying glass. In some cases when overglazing, especially if there is poor ventilation in the kiln, the china paint oils will seep into these pores and burn to charcoal, seriously affecting the color of the finished piece. If this happens you can sometimes repair the damage by soaking the piece for several hours at a low red heat, cooling and inspecting to be certain that all the carbon has been oxidized, then giving the piece a true glaze firing.

Additional Glaze Errors

Cracks in the Body—When a crack occurs in the body, examine the glaze at the edge of the crack. (A) If the glaze is inside the crack or rounded over the corners, the break occurred early in the glaze firing, and therefore was almost surely

present in the clay body before the piece was glaze fired. In some instances a sound appearing piece of ware will crack during a glaze or overglaze firing. This can be caused by an excess of water being used in the original clean-up of the greenware. Too much moisture applied to an area of greenware causes that area to expand while the dry or slightly damp areas have already gone through or are going through the normal shrinkage. Even if a piece of dry cleaned greenware shows no visible cracks it is possible the crack is there in an internal stress and this crack can open up during one or more firings. (B) If the glaze at the edges of the crack is sharp, this indicates that the break developed after the glaze was fired. This type of crack is usually due to opening the kiln door or peepholes while the ware is still hot.

Crazing—Crazing is characterized by a network of fine cracks in the glaze surface. See Fig. 16. This condition may be caused by underfired clay or glaze, incompatible clay and glaze, and/or by opening the kiln door either fully or partially before the ware is completely cooled. Crazing may be eliminated by refiring the piece to a temperature one cone higher than the original firing.

Delayed or After Crazing—Crazing may also occur days or months after the piece has been fired. Although the finish may look perfect when it is first removed from the kiln, crazing as described above may occur. While underfiring may or may not be the direct cause of immediate crazing, it is almost surely the major cause of delayed crazing. To correct this condition, refire the piece.

Shiny Matt Surface—A matt glaze which becomes glossy in the glaze firing, is generally caused by over-firing. It is extremely difficult to correct this condition.

Textured Glazes—Smoothed—A textured glaze is formulated to develop an irregular surface when fired. If it fails to do so, it is generally due to too light an application of glaze. It is extremely difficult to correct this condition. Reglazing and refiring rarely will help.

Cloudy or Discolored Glazes—This condition is characterized by a muddy or discolored appearance in the fired glaze. It may be caused by using dirty or contaminated brushes, by not leaving enough space between the glazed pieces during firing, so that chemical fumes jump from one glaze to the other, and/or by placing the piece too close to the kiln elements. It is extremely difficult to correct this condition.

Grainy Glaze—This condition is characterized by uneven or irregular color in the glaze surface. It is generally caused by too thin an application of glaze. To correct this error apply a coat of glaze, then refire.

Greyed or Discolored Red Glazes—This condition is characterized by grey wash out, or black areas in the red glaze. It may be caused by too thin an application of glaze, the red glaze being fired in the company of other glazes with which it is incompatible (generally yellows and greens) and/or firing too hot. (Cone 07-06 is usually the best range for red glazes). To salvage, apply a heavy coat of glaze and refire.

Underglaze peeling—This condition is characterized by the underglaze pulling away from the clay body. This may be caused by too heavy an application, and/or not firing the underglaze before applying glaze, it is extremely difficult to correct this type of error.

This Section on glaze faults prepared in collaboration with Martin L. La Vor who assisted with information and illustrations.

Happily your Skutt kiln will give you few occasions to refer to this section. But when you must, you'll appreciate why so many owners call these *The Practical Kilns*, for repairs are inexpensive and easy for any careful handyman — or mechanically-inclined school-boy.

But if you happen to have a phobia about matters electrical, and an authorized Skutt service person is not close at hand, carefully **TAKE** the kiln to a competent small-appliance repairman (toasters, percolators, etc.) *rather than calling in* a major-appliance repairman or other electrician. Take this Owner's Manual along with you.

Transportation: Handle sections by their *outside* surfaces: Fig. 2. In your car, support them on a perfectly flat surface—evenly supported by folded blankets.

WALL REPAIRS

The premium brick used in Skutt walls will withstand thousands of firings without crumbling. Broken element grooves and the like are strictly the result of carelessness in handling the kiln sections or in loading ware.

It's almost impossible to cement a broken groove lip back into place without contaminating the heating element. But often the several unpointed 1½" element pins, inserted by pliers which must hold them unswervingly on course during the process.

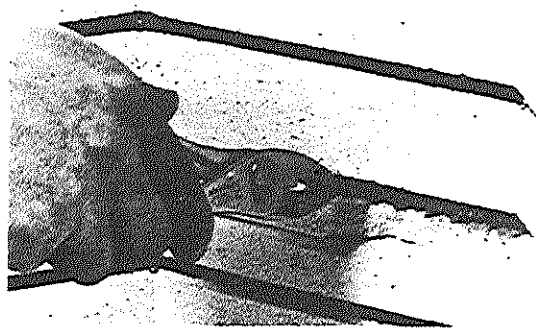


Fig. 18 — Hanging element on sloping 1½" element pins through every third turn, when element trough damaged.

ALL ABOUT REPAIRS

If this cannot be done and the element starts to sag out of position, **HANG** it on 1½" element pins, none other, inclined toward the back of the groove as in Fig. 18.

CAUTION: Elements become very brittle after a few firings, so if straightening is necessary, heat that element electrically to visible redness, unplug kiln from wall and promptly push element back into position with a metal implement, reheating whenever stiffening is detected. Place your hanging pins in a straight row and element will sag to fit and happily serve out the rest of its normal life.

In general, don't be concerned about the loss of a little wall or floor thickness: the element grooves reduce nearly 9 sq. inches of each wall brick to 1-7/8" thickness, so a few more square inches make little difference.

REPLACEMENT OF WALL BRICKS is simple and satisfactory in these kilns:

1. Order needed bricks by number (see parts lists, pages 20 to 25.) Note that replacement of Terminal Bricks involves cutting and renewing element connectors and should normally be postponed until it's necessary to replace that element.
2. If repairing a top ring, disconnect lid and remove all fittings from jacket except the switch box.
3. Place ring, damaged side up, on a perfectly flat surface—like the kiln lid.
4. Pull out the four straight element pins at the ends of the damaged brick.
5. Loosen the worm-type jacket tighteners equally, ½ - ¾".
6. Gently lift elements from troughs with pick or long-nose pliers and gently bow them out into firing chamber (Fig. 19) *only far enough* to allow damaged brick to be slipped out and replacement inserted with element troughs proper side up. This is easiest if an accomplice holds

the adjoining bricks away. Remember that the elements are brittle.

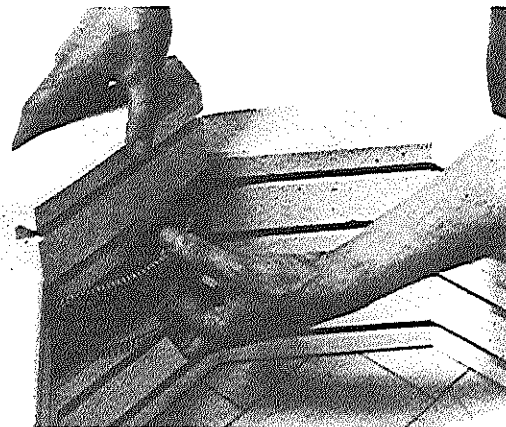


Fig. 19 — Damaged brick being slipped out. Note that element corner pins have been pulled, elements gently lifted from troughs with pick or long-nosed pliers, and then pulled inward barely enough to permit brick exchange.

7. Hold the Tightener housings with pliers and tighten them evenly until the worms seize. Set elements into new grooves and pin down.
8. Use sandpaper over a woodblock to sand edge of new brick down *nearly* flush with its neighbors.
9. Replace hinges, etc. and position the kiln so you can finish tightening the jacket just before the kiln shuts off on your next Cone 06 or hotter firing.
10. Now finish sanding the new brick down flush with its neighbors.

FLOOR REPAIRS

Unless a glaze is overfired, drips of it can normally be knocked off a well-maintained 1/16" layer of kiln wash without damage to the surface below. Remember to remove all ceramic glaze drips before taking the kiln to porcelain/stone-ware temperatures, where they would be overfired and likely soak down through the kiln wash.

The floor can be patched level again even though several square inches have been lifted to a depth up to 5/8". Simply undercut—"dovetail"—the edges of the area to retain a patch made by mixing dry high-fire kiln wash with only enough water to form an exceedingly stiff, almost crumbly, putty which you tamp into place, scrape flush with rest of floor, and allow to dry well before firing.

Don't forget that your kiln floor has *two* lives—just turn it over.

LID REPAIRS

Because your Skutt lid is so strongly cemented and well reinforced by its stainless steel band, you'll have to work hard to get it to develop a crack which will sift particles down on your ware. Use only the contoured Venting Prop to "post" your lid up and you'll not damage the dustproof coating.

If a tall glazed piece expands enough to fuse to the lid, *do not* attempt to fill the resulting hole, but simply smooth its interior with sandpaper and blow clean. Your lid too, has a Flip Side if ever needed: just remove the screws holding the hinges leaves, turn the lid over, and reattach the leaves to new 3/32" holes drilled appropriately in the lid's band.

TO REMOVE A SWITCH BOX

The careful handyman need feel no hesitation in opening up, examining or repairing any Skutt switch box. The Master switch box—containing the Kiln-Sitter—is opened in this way:

1. *Unplug the kiln from the wall outlet.*
2. Remove or rotate the other kiln rings to disengage interbox power blades.
3. Provide a carton, stack of books or the like within 1/2" as high as bottom of switch box.

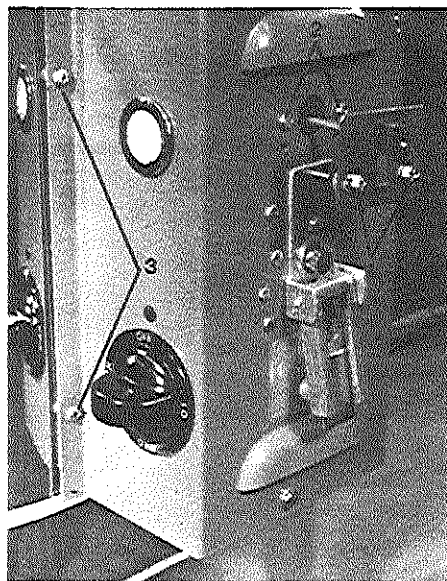


Fig. 20—Remove the two guide plate screws and pull out guide plate sensing rod assembly. (2) Remove the two screws behind the guide plate which secure the shut off tube. (3) Remove the four box mounting screws and swing box aside, rest it on a box or other platform of convenient height.

REMEMBER that fired Kanthal elements are brittle, so keep strain off the element feeder wires.

5. Perform the necessary examination, tests or repairs, then reattach box to kiln jacket in reverse order to that of Fig. 20, first



Fig. 21—Starting top screws into their holes. Lower screws were started one at a time but only inserted about one turn.

checking that no wires lie in the path of the porcelain Kiln-Sitter tube. Fig. 21 shows the Easy Way to reattach box to jacket.

6. *Carefully adjust Kiln-Sitter* according to its instructions on p. 4, and monitor Sr. visual cones for at least ten firings.

REPLACING AN ELEMENT CONNECTOR

While the new power-crimped high-temperature connectors on your elements will probably outlast the elements themselves, you will need to know part of the connector replacement procedure in order to install replacement elements in your kiln, and all of it in case your initial field crimps should be substandard:

1. *Unplug kiln from wall outlet* and swing switch box aside as described in the preceding section.
- 2a. If replacing a discolored connector on a good element, *proceed carefully* according to Figs. 22 through 26.

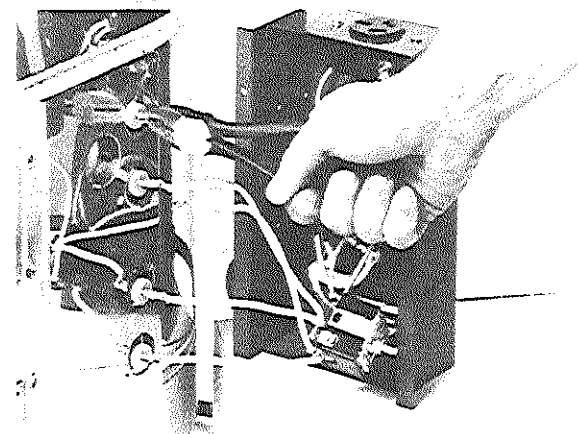


Fig. 22—Tips of diagonal nippers have snipped element connector in two crosswise in two or three steps. The near side of that half remaining on the element pigtail has also been snipped away and nipper tips are now progressing along the far side in three or four steps.

ALL ABOUT REPAIRS

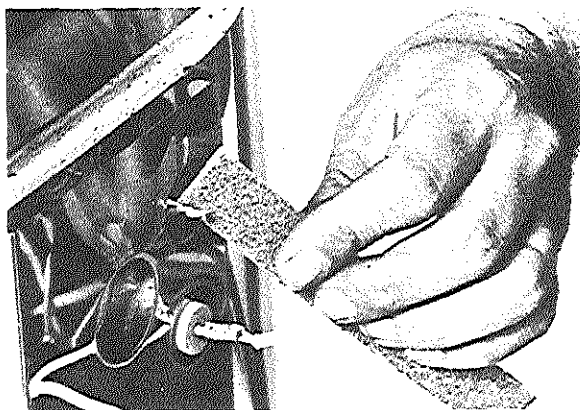


Fig. 23 — With old connector removed, hills and valleys of twisted element pigtail are being thoroughly brightened with a piece of folded sandpaper.

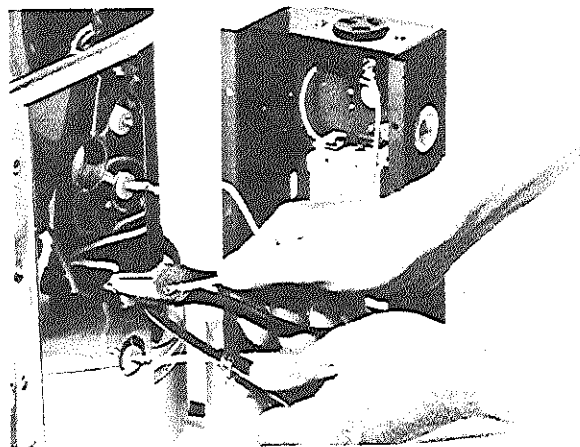


Fig. 24 — Other half of connector has been cut away from feeder wire, exposing nickel strands. Strands are being scraped truly bright on all sides while rotating wire over a firm support. (Side of nippers in this case.) For best connection, clean $\frac{1}{2}$ - $\frac{3}{8}$ " of wire and bend back double.

REMEMBER the brittleness of fired elements and roll your diagonal nippers as necessary to avoid twisting or bending the element pigtail.

2b. If installing a new element, follow above procedure except that the pigtail of the old element may be simply nipped off flush with Porcelain Spacer. See the following Element Replacement section for other details.

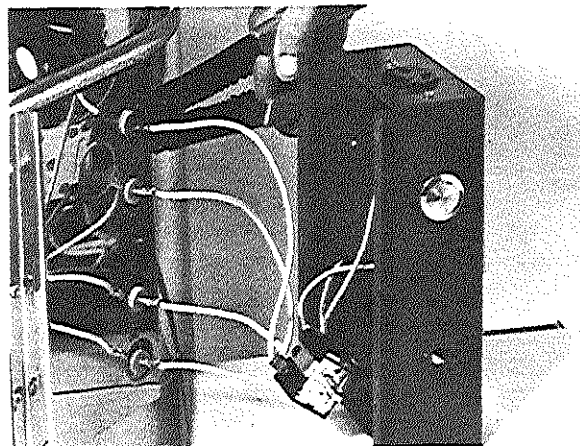


Fig. 25 — New connector is crimped extremely hard first over element pigtail, then over DOUBLED feeder wire —Man's work.

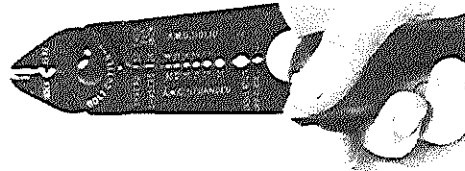


Fig. 26 — Closeup of superior indenter-type crimping tool used in Fig. 28. (Burndy #Y10M, \$6.95 at most electric supply houses). Grind away upper jaw to indenter, as shown, to admit Flag Lugs too.

REPLACING ELEMENTS

1. ARE YOU CERTAIN IT'S NECESSARY? Surely it is if the element has been eaten through by a contaminant (p. 11), since satisfactory splicing of elements is a near impossibility.

Even though your elements may have already served you well, still check the kiln out according to p. 13, for the slow firing could be caused by quite something else for which new elements could still not compensate.

2. VISUAL INSPECTION of all switch box components is certainly in order before ordering elements, for the reason just mentioned. Swing aside the switch boxes as described under "To Remove a Switch Box," p. 16, and check carefully that there are no element connectors, terminal screws or flag lugs significantly darker than their companions. The flag lugs used under switch screws, etc. are power-crimped and most reliable; whenever one of them is discolored, you may be almost certain that the overheating is the fault of the component to which it's attached.

Note however that replacement of the defective switch or such is not enough. You must replace the discolored lug as well, for its grip on its wire has been weakened by the heat attending failure of the old switch and now the lug will generate extra heat and burn out new switches, one right after another! Avoid such needless frustration by doing a *thorough* job of replacing any overheated lug, cutting it apart and brightening the exposed wire strands exactly as described under "Replacing an Element Connector" on p. 16.

SWITCHES, INTERBOX PLUGS AND RECEPTACLES

A few of even the best commercially produced switches and interbox receptacles are imperfect. These usually fail slowly, taking from 5 to 25 firings before total disability — but these firings are not necessarily the initial ones. During this period, the tophoff is Gradually Increasing Firing Time — which symptom can also be produced by power supply problems.

When the Page 12 rundown draws suspicion to a switch box component, access to the boxes is gained according to p. 16, while the Visual Inspection of page 17 will locate the particular offending component.

Replacement is then a very straightforward matter, the part being obtained by number (from the Parts List for your particular model on pages 19 to 26), ordering either from your Skutt dealer or directly from the factory in Portland.

Installation is then simply a matter of transferring one wire at a time from the old part to the new (see Fig. 27), being *sure* to replace any

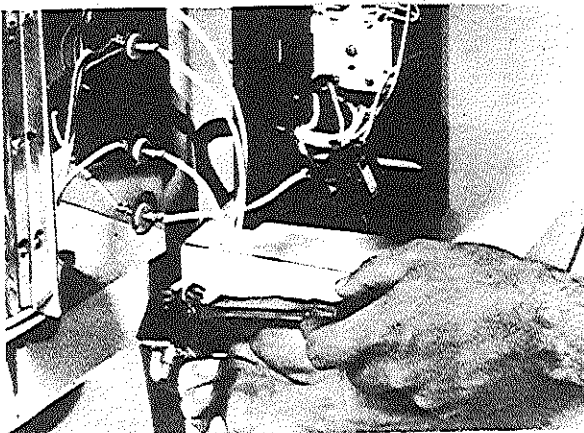
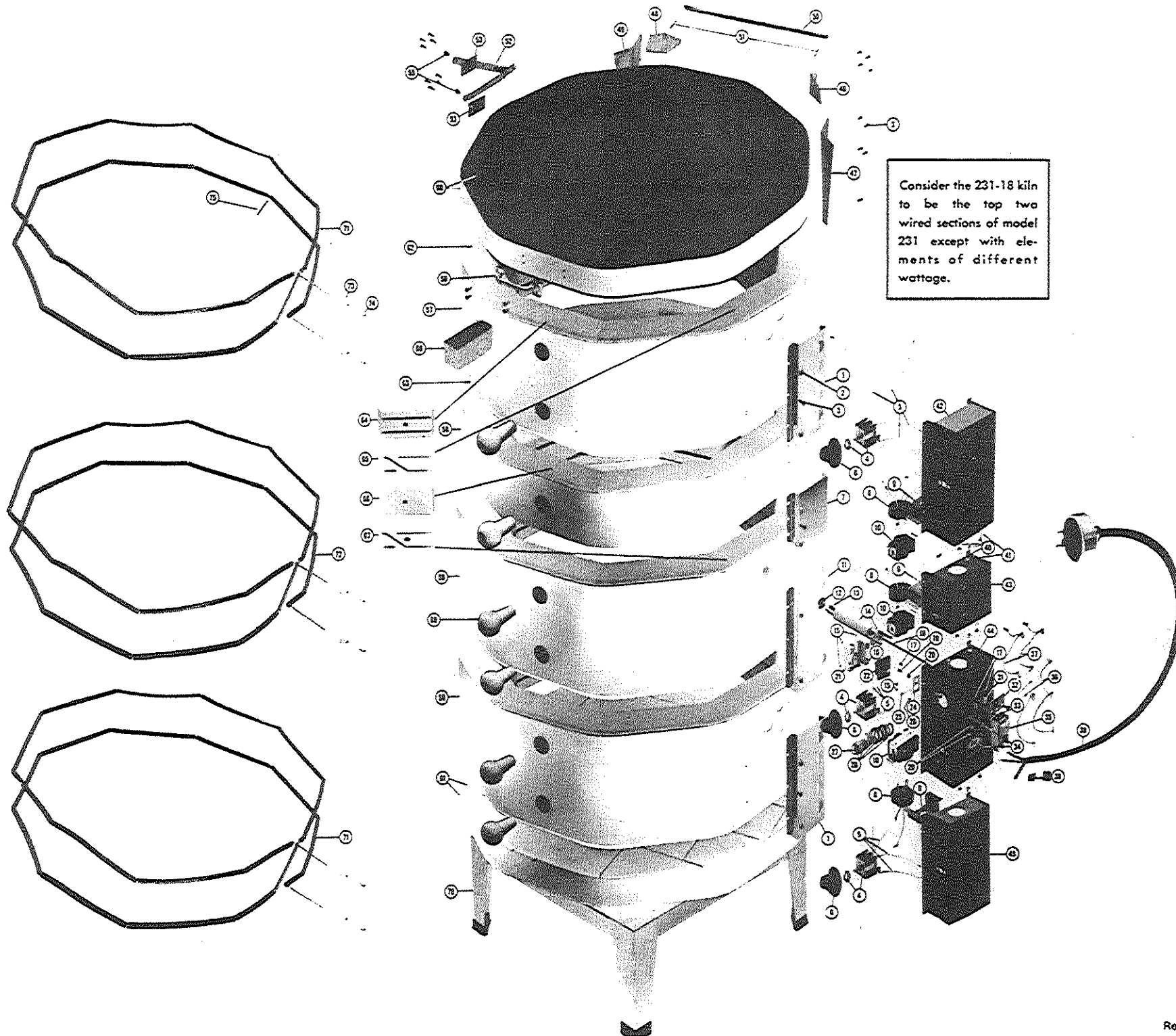
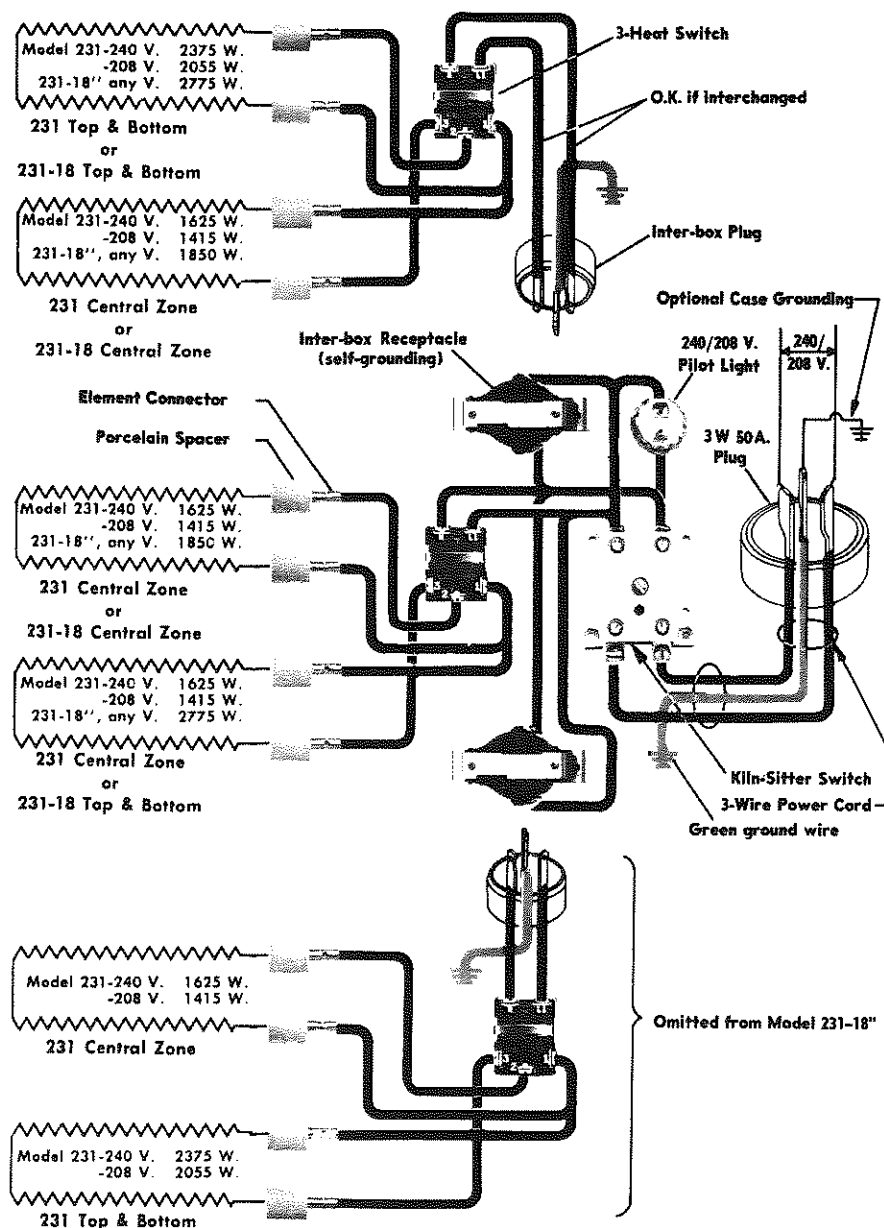


Fig. 27 — Transferring wires one at a time from old switch to new, replacing any darkened lugs per text. Tighten screws firmly.

lugs which are darker than their companions—as covered under “item 2 — Visual Inspection” on p. 17.

Should any confusion arise in transferring the wires from the old to the new part, you can set things straight by consulting the Wiring Diagram for your particular kiln on pages 19 to 26.





MODELS 235, 231 & 231-18"

WIRING DIAGRAM

Model 231, 240 V. Cone 8 — 11,250W

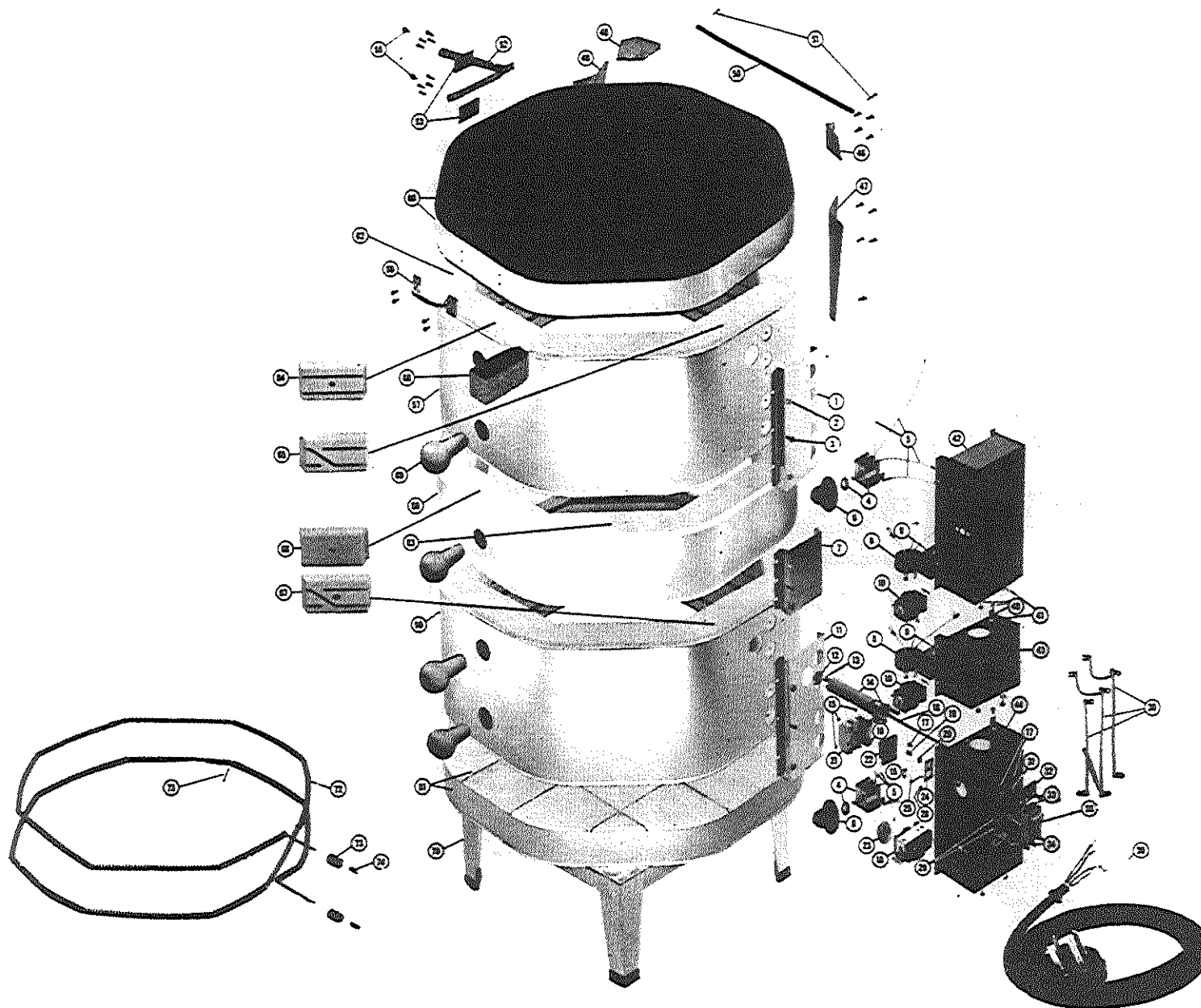
Model 231, 208 V. Cone 6 — 9,770W

Model 231-18", any V., Cone 6—9,250W

Model 235, 240V. Cone 10— 11, 250W

Model 235, 240V. Cone 10— 9, 984W

Ref. No.	Part No.	Description	Number Required 231 231-18 88			Ref. No.	Part No.	Description	Number Required 231 231-18 88		
1	101	Radiation shield, slave ring	2	1	—	41	141	Grounding lock washer	5	4	2
2	102	Spacing washers	48	36	12	42	142	Upper switch box	1	1	—
3	103	1/2" #6 sheet metal screws	48	42	12	43	143	Blank ring jumper box	—	—	1
4	104	Three heat switch w/nut	3	2	—	44	S144	Master switch box	1	1	—
5	S105	Element feeder wires, set	3	2	—	45	S145	Lower switch box	1	—	—
6	106	Knob for 3-heat switch	3	2	—	46	146A	Lid hinge leaf, right hand	1	1	—
7	107	Radiation shield, blank ring	—	—	1	47	147A	Body hinge leaf, right hand	1	1	—
8	S108	Interbox plug with wires	2	1	1	48	148A	Lid hinge leaf, left hand	1	1	—
9	S109	Retaining strap for interbox plug	2	1	1	49	149A	Body hinge leaf, left hand	1	1	—
10	110	Interbox receptacle	2	2	1	50	150	Lid hinge rod	1	1	—
11	111	Radiation shield, master ring	1	1	—	51	151	Cotter pin	2	2	—
12	112	Kiln-Sitter gauge washer	1	1	—	52	152	Latching lid brace	1	1	—
13	113	Kiln-Sitter Kanthal tips	2	2	—	53	S153	Lid brace anchor pad	2	2	—
14	S114	Kiln-Sitter Porc. tube in holder	1	1	—	55	155	6-32 x 1/4" Thumb screws	2	2	—
15	115	4-40 hex nuts	6	6	—	56	156	Lid handle	1	1	—
16	116	Kiln-Sitter contact-opening spring	1	1	—	57	S157	Stainless jacket for top ring	1	1	—
17	117	6-32 x 3/16" Rd. Hd. Screw	2	2	—	58	S158	Stainless jacket for blank ring	—	—	1
18	118	Kiln-Sitter sensing rod	1	1	—	59	S159	Stainless jacket for master or bottom ring	2	1	—
19	119	6-32 x 5/16" Rd. Hd. Screw	1	1	—	60	S160	Lid with stainless band	1	1	—
20	120	Latch plate retaining washer	1	1	—	61	S161	Bottom slab w/stainless band	1	1	—
21	S121	Kiln-Sitter switch body w/contacts	1	1	—	62	162	Straight grooved brick	48	32	—
22	122	Kiln-Sitter shunt block w/plunger	1	1	—	63	163	Blank ring brick	—	—	9
24	124	Kiln-Sitter latch plate	1	1	—	64	164	Grooved peep-hole brick	6	4	—
25	125	Latch plate return spring	1	1	—	65	165	Terminal brick	5	3	—
26	126	Return spring hub	1	1	—	66	166	Blank ring peep-hole brick	—	—	1
27	127	Replacement neon bulb only	1	1	—	67	167	Kiln-Sitter Terminal brick	1	1	—
28	S128	Pilot light assembly, comp. w/bulb	1	1	—	68	168	Venting prop	1	1	—
29	129	4-40 x 1/4" Rd. Hd. Screws	2	2	—	69	169	Peep-hole plugs	5	3	1
31	131	Guide plate spacers	2	2	—	70	S170	Kiln stand	1	1	—
32	S132	Kiln-Sitter guide plate & claw	1	1	—	71A	171AV	Top & bot. elements for Model 231 (state voltage)	2	—	—
33	133	6-32 x 1/2" Rd. Hd. Screws	2	2	—	71B	171BV	Top & bot. elem. for Model 231-18 (state voltage)	—	2	—
34	134	4-40 x 1/4" Rd. Hd. Screws	4	4	—	72A	172AV	Center elements for 231 (state voltage)	4	—	—
35	S135	Kiln-Sitter falling wgt. in bracket	1	1	—	72B	172BV	Center elements for 231-18 (state voltage)	—	2	—
36	S136	Receptacle-feeding harness	2	2	—						
37	S137	Master 3-Ht. switch fdr. harness	2	2	—						
38	138	Power cord strain relief	1	1	—	73	173	Porcelain spacer tubes	12	8	—
39	S139	Power cord w/plug	1	1	—	74	174	Element connectors	12	8	—
40	140	6-32 x 1/4" Pan head screws	8	6	4	75	175	Kanthal corner pins	120	80	—

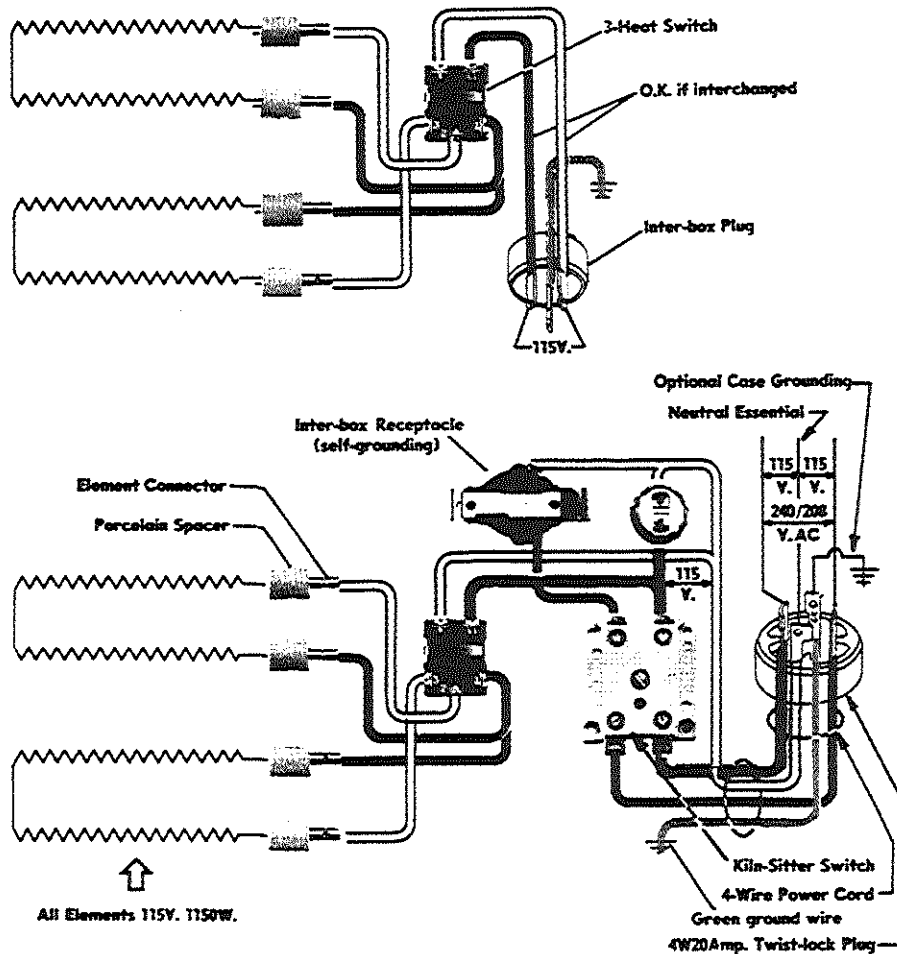


MODEL 181

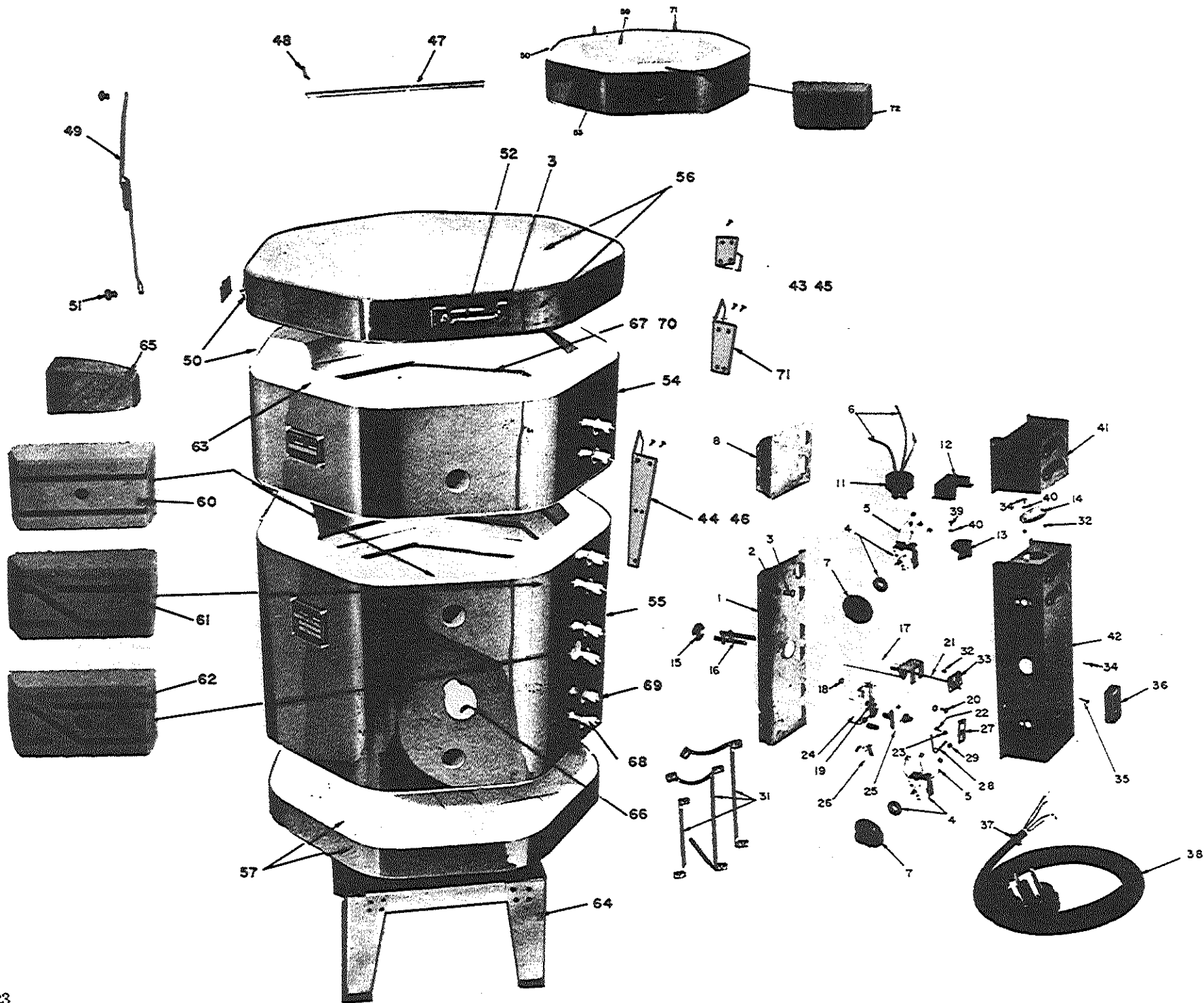
MODEL 181 WIRING DIAGRAM

115/240-208V.AC 1 Ph. 4600 W.

Cone 6 2250°F

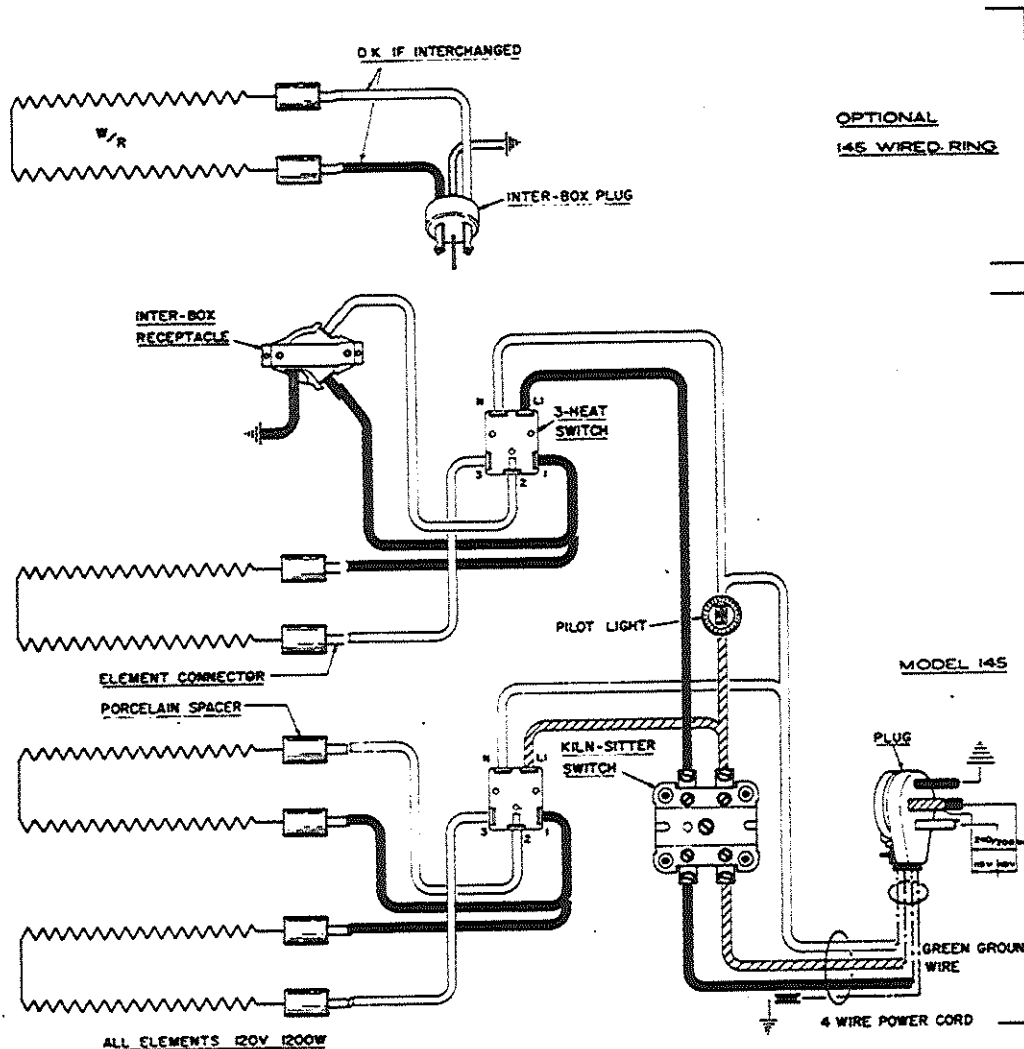


Ref. No.	Part No.	Description	Number Required		Ref. No.	Part No.	Description	Number Required	
			181	SR				181	SR
1	101	Radiation shield for upper ring	1	—	39	S239	Power cord with 4-blade plug	1	—
2	102	Spacing washers	36	24	40	140	6-32 x 1/4" Pan head screws	4	4
3	103	1/2" #6 sheet metal screws	42	6	41	141	Grounding lock washers	2	2
4	104	3-heat switch & nut	2	—	42	S142	Upper switch box	1	—
5	S105	Element feeder wires, set	2	—	43	S143	Blank ring jumper box	—	1
6	106	Knob for 3-heat switch	2	—	44	S144	Master switch box	1	—
7	107	Radiation shield for blank ring	—	1	46	146B	Lid hinge leaf, right hand	1	—
8	S108	Interbox plug w/wires	1	1	47	147B	Body hinge leaf, right hand	1	—
9	S109	Retaining straps for interbox plugs	1	1	48	148B	Lid hinge leaf, left hand	1	—
10	110	Interbox receptacle	1	1	49	149B	Body hinge, leaf, left hand	1	—
11	111	Radiation shield, master ring	1	—	50	250	Lid hinge rod	1	—
12	112	Kiln-Sitter gauge washer	1	—	51	151	Cotter pin	2	—
13	113	Kiln-Sitter Kanthal tips	2	—	52	252	Latching lid brace	1	—
14	S114	Kiln-Sitter porcelain tube in holder	1	—	53	S153	Lid brace anchor pad	2	—
15	115	4-40 hex nuts	6	—	55	155	6-32 v 1/4" thumb screw	2	—
16	116	Kiln-Sitter contact-opening spring	1	—	56	156	Lid handle	1	—
17	117	6-32 x 3/16" Rd. Hd. Screw	2	—	57	S257	Upper ring stainless jacket	1	—
18	118	Kiln-Sitter sensing rod	1	—	58	S258	Blank ring stainless jacket	1	—
19	119	6-32 x 5/16" Rd. Hd. Screw	1	—	59	S259	Master ring stainless jacket	1	—
20	120	Latch plate retaining washer	1	—	60	S260	Lid with stainless band	1	—
21	S121	Kiln-Sitter switchbody w/contacts	1	—	61	S261	Bottom slab with stainless band	1	—
22	122	Kiln-Sitter shunt block w/plunger	1	—	62	262	Straight grooved brick	24	—
23	223	Pilot light	1	—	63	263	Blank ring brick	—	7
24	124	Kiln-Sitter latch plate	1	—	64	264	Grooved peep-hole bricks	4	—
25	125	Latch plate return spring	1	—	65	265	Terminal brick	3	—
26	126	Return spring hub	1	—	66	266	Blank ring peep-hole brick	—	1
29	129	4-40 x 1/4" Rd. Hd. Screw	1	—	67	267	Kiln-Sitter terminal brick	1	—
30	S130	Full set yel. wire harn's. for mstr. bx.	1	—	68	168	Venting prop	1	—
31	131	Guide plate spacer	2	—	69	169	Peep-hole plugs	3	1
32	S132	Kiln-Sitter guide plate & claw	1	—	70	S270	Kiln stand	1	—
33	133	6-32 x 1/2" Rd. Hd. Screw	2	—	72	272	Heating elements	4	—
34	134	4-40 x 1/4" Rd. Hd. Screw	4	—	73	173	Porcelain spacer tubes	8	—
35	S135	Kiln-Sitter falling weight in bracket	1	—	74	174	Element connectors	8	—
38	238	Power cord strain relief	1	—	75	175	Kanthal corner pins	64	—



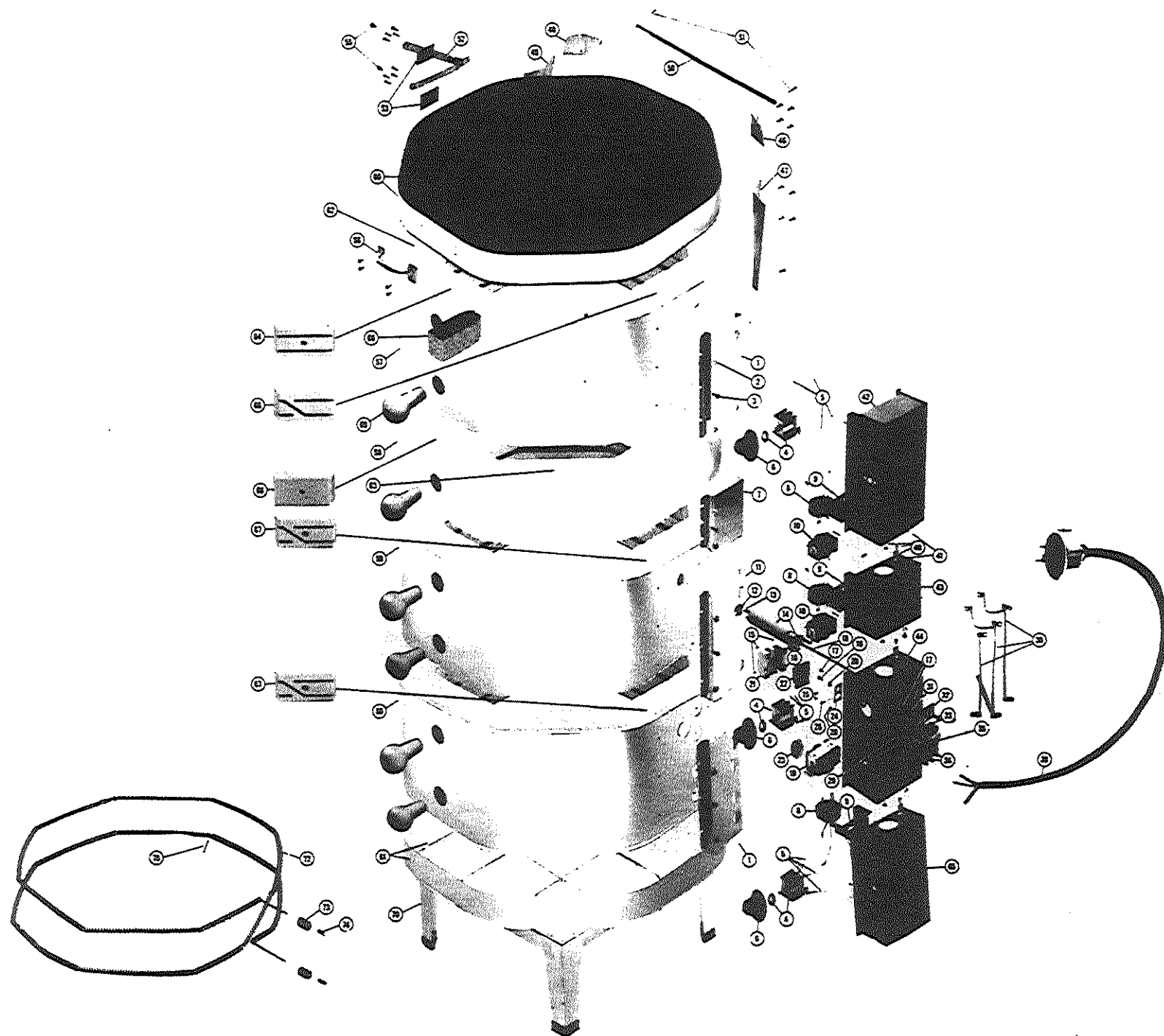
MODEL 145

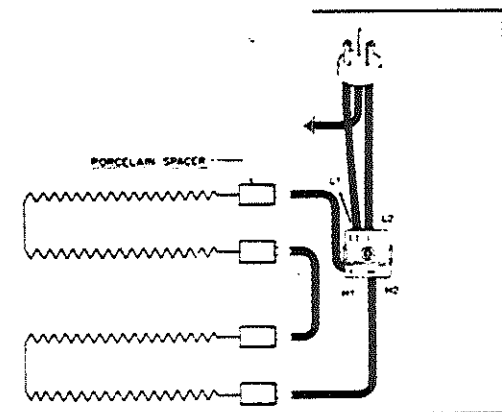
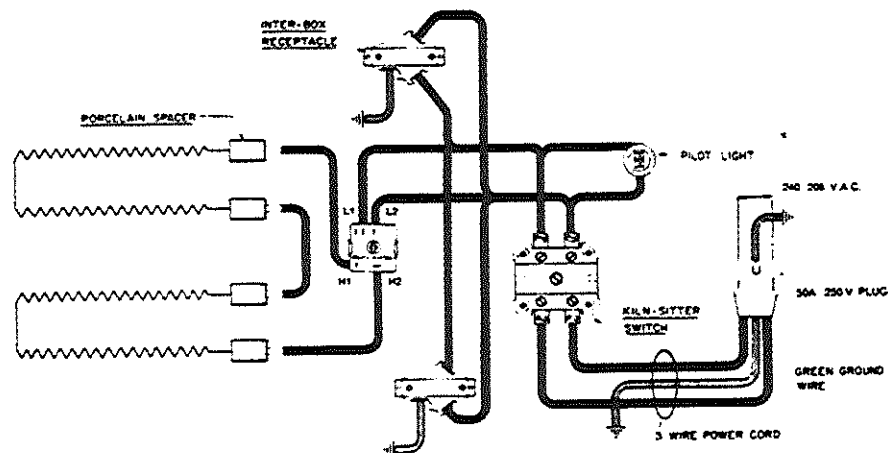
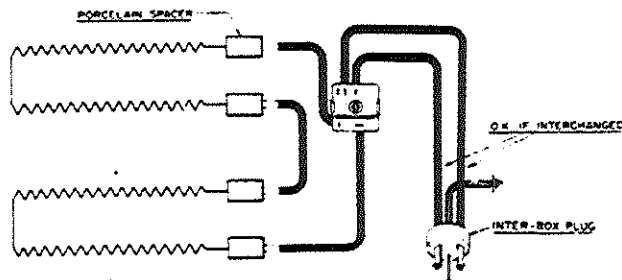
MODEL 145 WIRING DIAGRAM 115/240-208V.AC 1 Ph. 3450 W. With Wired Ring 4600 W. Cone 8 2300° F



NOTE:
Top element is not energized on low heat
unless optional WIRED RING is installed.

Ref. No.	Part No.	Description	Number Required	145	BR	WR	Ref. No.	Part No.	Description	Number Required	145	BR	WR
1	400	Radiation shield 145 master	1	—	—	—	37	138	Power cord strain relief	1	—	—	—
2	102	Spacing washers	24	—	24	—	38	S239	Power cord with 4-blade plug	1	—	—	—
3	103	1/2 in x No. 6 sheet metal screws	36	12	16	—	39	140	6-32 x 1/4 SS screws	2	—	2	—
4	104	3-heat switch & nut	2	—	—	—	40	141	Grounding lock washer	1	—	1	—
5	S451	Element feeder wires	1	—	—	—	41	S143	Wired ring box	—	—	1	—
6	S471	Element feeder wires — WR	—	—	1	—	42	208	Master switch box	1	—	—	—
7	106	Knob for 3-heat switch	2	—	—	—	43	148C	Lid hinge leaf, right hand	1	—	—	—
8	456	Radiation shield for WR	—	—	1	—	44	147C	Body hinge leaf, right hand	1	—	—	—
11	S408	Interbox plug w/nickel wires—WR	—	—	1	—	45	148C	Lid hinge leaf, left hand	1	—	—	—
12	S109	Retaining strap for interbox plug	—	—	1	—	46	149C	Body hinge leaf, left hand	1	—	—	—
13	110	Interbox receptacle	1	—	—	—	47	450	Hinge rod	1	—	—	—
14	477	Interbox receptacle cover	1	—	—	—	48	151	Cotter pin	2	—	—	—
15	112	Kiln-Sitter gauge washer	1	—	—	—	49	462	Latching lid brace	1	—	—	—
16	113	Kiln-Sitter cone supports	2	—	—	—	50	S153	Lid brace anchor pad	2	1	1	—
17	114	Kiln-Sitter porcelain tube in holder	1	—	—	—	51	155	6-32 x 1/4 thumb screw	2	—	—	—
18	115	4-40 hex nuts	6	—	—	—	52	156	Lid handle	1	—	—	—
19	116	Kiln-Sitter contact opening spring	1	—	—	—	53	458	Blank ring stainless jacket	—	1	—	—
20	117	6-32 x 3/16 Phillips screw	2	—	—	—	54	457	Wired ring stainless jacket	—	—	1	—
21	118	Kiln-Sitter sensing rod	1	—	—	—	55	459	Master ring stainless jacket	1	—	—	—
22	119	6-32 x 5/16 Phillips screw	1	—	—	—	56	460	Lid with stainless band	1	—	—	—
23	120	Latch plate retaining washer	1	—	—	—	57	461	Bottom slab with stainless band	1	—	—	—
24	S121	Kiln-Sitter switch body w/contacts	1	—	—	—	58	462	Straight grooved brick	15	—	—	—
25	122	Kiln-Sitter shunt block w/plunger	1	—	—	—	59	463	Blank ring brick	—	6	—	—
26	223	Pilot light	1	—	—	—	60	464	Peep hole brick — 145 & wired ring	3	—	1	—
27	124	Kiln-Sitter latch plate	1	—	—	—	61	465	Terminal brick	2	—	1	—
28	125	Kiln-Sitter latch plate return spring	1	—	—	—	62	467	Kiln-Sitter brick	1	—	—	—
29	126	Kiln-Sitter return spring hub	1	—	—	—	63	468	145 WR Ungrooved half brick	—	—	7	—
30	129	4-40 x 1/4 slotted screw	2	—	—	—	64	S470	145 Kiln stand	1	—	—	—
31	453	Yellow harness for master box	1	—	—	—	65	168	Venting prop	1	—	—	—
32	131	Guide plate spacer	4	—	—	—	66	169	Peep hole plugs	3	1	1	—
33	S132	Kiln-Sitter guide plate with claw	1	—	—	—	67	S472	Heating elements	3	—	1	—
34	133	6-32 x 7/16 Phillips screw	4	—	—	—	68	173	Porcelain spacer tubes	6	—	2	—
35	134	4-40 x 1-3/8 slotted screw	4	—	—	—	69	154	Element connection	6	—	2	—
36	S135	Kiln-Sitter falling weight in bracket	1	—	—	—	70	176	Element corner pins	48	—	16	—
							71	378	Blank ring & wired ring hinge	—	2	2	—
							72	468	145 Blank ring peep hole brick	—	1	—	—





Lower ring omitted on models 183 & 185

183, 183-27 240 volt 1300 watts all elements
 183 183-27 208 volt 1250 watts all elements
 185, 185-27 240 volt 1600 watts all elements
 185, 185-27 208 volt 1390 watts all elements

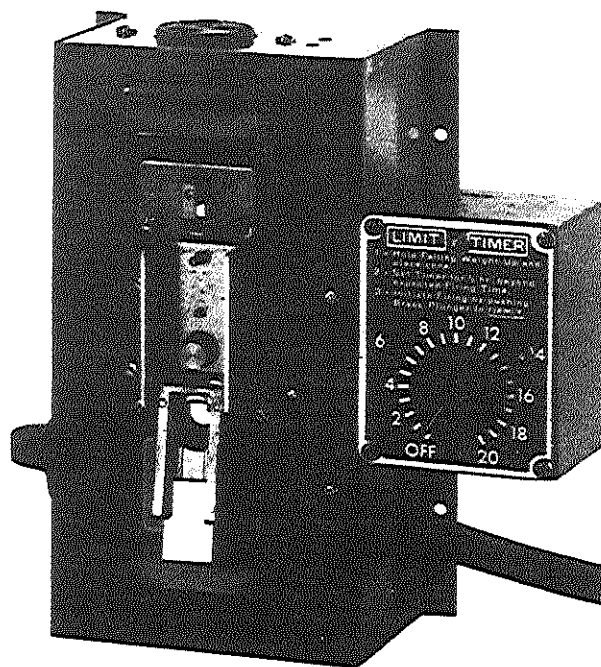
MODELS 183, 183-27, 185, 185-27

WIRING DIAGRAM

Model 183, 240V. Cone 8—5200W.
 Model 183, 208V. Cone 8—4990W.
 Model 183-27, 240 V. Cone 8—7800W.
 Model 183-27, 208V. Cone 8—7490W.
 Model 185, 240V. Cone 10—6400W.
 Model 185, 208V. Cone 10—5550W.
 Model 185-27, 240V. Cone 10—9600W.
 Model 185-27, 208V. Cone 10—8320W.

Ref. No.	Part No.	DESCRIPTION	Number Required						Number Required			
			183-27	183	185	BR			183-27	183	185	BR
1	101	Radiation shield, slave ring	2	1			39	S239	Power cord assembly	1	1	
2	102	Spacer Washers	48	36	12		40	140	6-32 x 1/2" pan head screws	4	4	
3	103	1/2" #6 sheet metal screws	48	36	4		41	141	Grounding lock washer	2	2	
4	870	Robert Shaw infinite switch	3	2			42	S142	Upper switch box	1	1	
5	S105	Element feeder wires, set	3	2			43	S143	Blank ring jumper box			1
6	214	Knob, infinite switch	3	2			44	S144	Master switch box	1	1	
7	107	Radiation shield for blank ring			1		45	S145	Lower switch box	1	1	
8	S108	Interbox plug w/wires	3	2			46	146B	Lid hinge leaf, right hand	1	1	
9	109	Retaining straps for interbox plug	2	1			47	174B	Body hinge leaf, right hand	1	1	
10	110	Interbox receptacle	2	2			48	148B	Lid hinge leaf, left hand	1	1	
11	111	Radiation shield, master ring	1	1			49	149B	Body hinge leaf, left hand	1	1	
12	873	Kiln-Sitter gauge washer	1	1			50	050	Lid hinge rod	1	1	
13	113	Kiln-Sitter Kantal tips	2	2			51	151	Cotter pin	2	2	
14	S114	Kiln-Sitter porcelain tube in holder	1	1			52	252	Latching lid brace	1	1	
15	115	4-40 x 1/4" hex nuts	6	6			53	053	Lid brace anchor pad	2	2	
16	116	Kiln-Sitter contact opening spring	1	1			55	155	6-32 x 1/4" thumb screw	2	2	
17	117	6-32 x 3/16" Rd. Hd. Screw	2	2			56	156	Lid handle	1	1	
18	118	Kiln-Sitter sensing rod	1	1			57	S257	Upper ring stainless jacket	1	1	
19	119	6-32 x 5/16" Rd. Hd. Screw	1	1			58	S257	Lower ring stainless jacket	1	1	
20	120	Latch plate retaining washer	1	1			59	S259	Master ring stainless jacket	1	1	
21	S121	Kiln-Sitter switch body w/contacts	1	1			60	S260	Lid with stainless band	1	1	
22	122	Kiln-Sitter shunt block w/plunger	1	1			61	S261	Bottom slab with stainless band	1	1	
23	128	Pilot light	1	1			62	262	Straight grooved brick	36	24	
24	124	Kiln-Sitter latch plate	1	1			63	263	Blank ring brick			7
25	125	Latch plate return spring	1	1			64	264	Grooved peep-hole brick	6	4	
26	126	Return spring hub	1	1			55	265	Terminal brick	5	3	
29	129	4-40 x 1/2" Rd. Hd. screw	1	1			66	266	Blank ring peep brick			1
30	S130	Full set wire harness for master box	1	1			67	267	Kiln-Sitter terminal brick	1	1	
31	131	Guide plate spacer	2	2			68	168	Venting prop	1	1	
32	S132	Kiln-Sitter guide plate & claw	1	1			69	169	Peep-hole plugs	6	4	1
33	133	6-32 x 7/16" Rd. Hd. screw	2	2			70	S270	Kiln stand	1	1	
34	134	4-40 x 3/8" Rd. Hd. screw	4	4			72	272	Heating elements (state voltage)	6	4	
35	S135	Kiln-Sitter falling weight in bracket	1	1			73	173	Porcelain spacer tubes	12	8	
38	238	Power cord strain relief	1	1			74	174	Element connectors	12	8	
							75	175	Element corner pins	108	72	

ACCESSORIES



SKUTT LIMIT TIMER

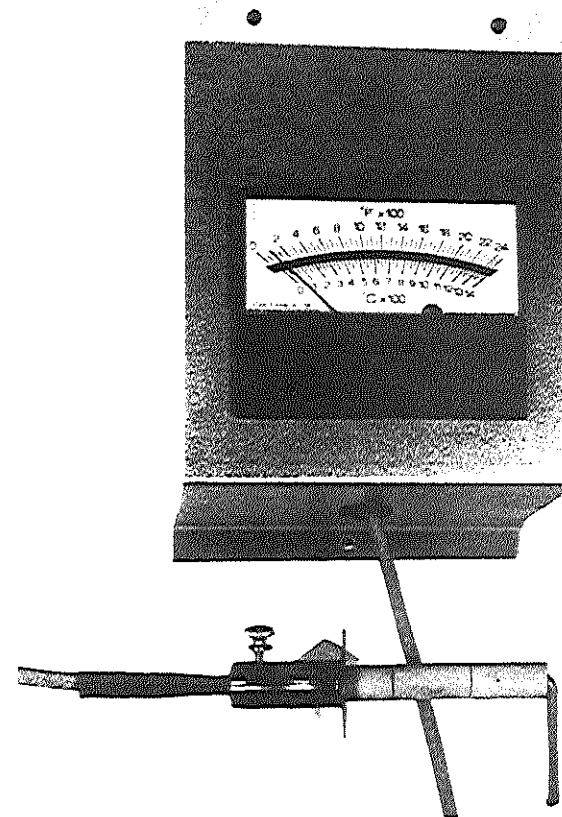
- The Skutt Limit Timer is an electrically driven clock mechanism. It almost totally safeguards against human error when setting the Kiln-Sitter (Note the Limit Timer is attached directly to the automatic kiln control box).

- The Kiln-Sitter (standard equipment on Skutt kilns) remains the most accurate method of shut-off. However, the Kiln-Sitter can be mechanically defeated under the following circumstances: (a) When a shelf is placed too close to the sensing rod; (b) when a piece of ware topples and thereby obstructs the sensing rod; (c) if you accidentally select the wrong cone or neglect Kiln-Sitter adjustments; (d) if you set cone without lifting falling weight.

- If any of the above should happen while your kiln is in operation — the Skutt Limit Timer will take over and shut off the kiln at a predetermined time.

- Limit Timer is optional at extra cost on all new automatic Skutt Kilns.

- Post-installation of the Limit Timer is possible on most Skutt Kilns already in use.



PYROMETER

- This new, exceptionally rugged Pyrometer can be a valuable aid to you — especially when firing glass!

- It will help you determine progress during all firings — and give you an idea of proper shut-off time. (Note: don't consider this a substitute for the pyrometric cones operating your Dawson Kiln-Sitter)

- Operates from 0° to 2500° F. range.

- Each instrument is furnished with a very heavy 8 gauge thermocouple and 6 feet of flexible lead wire.

- Wall mounted for greater accuracy and easy installation. **DO NOT** mount on jacket or switch box of kiln.

ACCESSORIES

TRIANGULAR 1½" SHELF SUPPORTS AVAILABLE LENGTH 1" THROUGH 10"



SHELVES

KILN FURNITURE is not supplied with kilns and should be ordered to suit the work at hand.

Shelves	Actual Wts.
Model 145 Full Shelf.....	6 lbs.
Model 145 Half Shelf.....	3 lbs.
Model 181 Full Shelf.....	9 lbs.
Model 181 Half Shelf.....	4½ lbs.
Model 231 Full Shelf.....	Not Available
Model 231 Half Shelf.....	8 lbs.

Crate weight approximately 8 lbs.

Up to 5 full shelves, or equivalent, can be packed free with a kiln of the *same size*.

For average work we recommend that each new kiln be equipped with shelves as follows:

TRIANGULAR POST ASSORTMENT

	Length	Suggested Assortments for	
		181-145	231-231-18
1½" triangular post	1"	3	6
1½" triangular post	2"	3	6
1½" triangular post	3"	3	6
1½" triangular post	4"	3	6
1½" triangular post	5"	3	6
1½" triangular post	6"	3	6
11" per pound			

Model	Full Shelves	Half Shelves
231	Not Available	8
231-18	Not Available	6
181	2	2
145	1	2

GLOSSARY

- After-Crazing**—Glaze crazing after firing—days, weeks or months later.
- Bisque**—Ware which has passed through its first firing without the benefit of glaze.
- Ceramic**—In general, any man-made solid product resulting from the fusion of mineral substances. Term also used to identify a type of high-talc body which fuses at moderate temperatures—cones 05-03.
- Clean-up**—The process of cleaning, scraping, sanding and sponging greenware to make it ready for firing and decoration.
- Cone Plaque**—A stand or rest for holding cones during firing.
- Crackle Glaze**—Type of glaze which when fired is intentionally "crazed". Stains or other colorants are often rubbed into the cracks to heighten the effect.
- Crazing**—Small hairline cracks in glazed surfaces appearing after firing. Usually caused by underfiring the body.
- Dipping**—Application of glaze to bisque or green ware by simply immersing it in a container of same.
- Dry Footing**—Removing applied glaze from the underside of the foot by wiping. Avoids the need for stilts.
- Element**—A coil of resistance wire through which current passes, creating the necessary heat for firing.
- Element Groove**—The recess in the kiln brick into which the element is placed.
- Firing**—The act of maturing clays and glazes by the application of heat.
- Firebrick**—The insulating blocks which form the chamber of your kiln.
- Foot**—The supporting rim at the base of a piece of ware.
- Glaze**—A special finely ground glass suspended in water with the aid of gums, etc. May be clear or colored; glossy, eggshell or matte; applied to bisque or greenware by brushing, spraying, pouring or dipping.
- Greenware**—Unfired, fragile clay forms, wet or dried.
- Impurities**—Minute quantities of foreign matter in clays—often causes spots in glaze.
- Incising**—Cutting through moist greenware in a desired pattern.
- Kiln-Sitter**—A patented device which utilizes Pyrometric cones for the purpose of automatically and accurately shutting off the kiln.
- Kiln Wash**—A high-fusing powder to which you add water and brush onto kiln shelves and kiln floor. Allows removal of accidental glaze drips. Also used on high-temperature parts of the Kiln-Sitter.
- Limit Timer**—Device which operates by time alone, back-stopping the Kiln-Sitter in case it is defeated.
- Lusters**—Iridescent overglaze. Apply thinly.
- Mature**—A completely fired piece of ware or glaze.
- Nesting**—Placing one piece of greenware within another for bisque firing.
- Ohm Meter**—An instrument for measuring resistance in elements.
- One Fire**—The practice of applying glaze to greenware and firing one time.
- Overglaze**—Decorative liquids applied over the glazed surface, such as china paints, lusters, gold and other metallics and fired at lower temperatures.
- Peephole**—An opening in the kiln wall which allows visual inspection of the chamber during firing.
- Peephole Plug**—A piece of refractory used to plug the peephole.
- Pinholes**—Small holes in glazed surface of ware.
- Pigtail**—The end of an element that has been doubled and twisted.
- Porcelain**—A body which, when fired to approximately cone 6, becomes vitreous and translucent.
- Posts**—Come in various sizes and support kiln shelves during firing—best only three per shelf.
- Pouring**—Act of filling a mold with slip.
- Pyrometer**—Temperature measuring device, i.e., high temperature thermometer. Most useful in glass firing. Cannot accurately be substituted for cones in firing other materials.
- Pyrometric Cone**—A slender, unfired clay pyramid which softens and bends when kiln load has fused to the desired degree. Two sizes are available: Junior cones are for use in the Kiln-Sitter, Senior cones are for visual use.
- Refractory**—Any high temperature clay material.
- Sgraffito**—The decorative technique of removing some areas of underglaze from ware with a sgraffito tool, thus allowing the color of the body to show through.
- Shelf**—Slab on which ware is placed in kiln. Allows utilization of full height of kiln.
- Slip**—Liquid clay slurry which is poured into molds.
- Soaking**—Holding a kiln at or near a given temperature.
- Stilts**—Various single and multi-pointed supports used to hold ware up off the shelves during the glaze fire, thus preventing adhesion.
- Stoneware**—A high-fired ceramic body which is vitreous, not translucent, and usually made of native clays.
- Talc**—A white powder used in ceramic clay bodies.
- Terminal Brick**—The kiln brick through which the element pigtails pass into the switch box.
- Terra Cotta**—A natural, low-firing red clay.
- Thermocouple**—A pair of wires which are inserted into the firing chamber to serve as the temperature-sensing element of pyrometer.
- Underglaze**—Liquid coloring which is applied directly to bisque or greenware.
- Venting**—The practice of propping up the kiln lid ("posting" it) to allow the escape of vapors during initial stages of firing.
- Vitreous**—Fully fused, waterproof ware—glazing not necessary.
- Volt Meter**—An instrument for measuring voltage at the kiln.
- Warpage**—Ware losing its shape during firing—usually over-fired or improperly placed in the kiln.
- Ware**—Any shaped piece of pottery, stoneware, porcelain, etc., in any state of completion.