

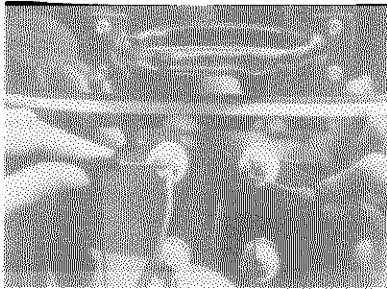
Paragon Industries, Inc.

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How To Replace A Duncan Element

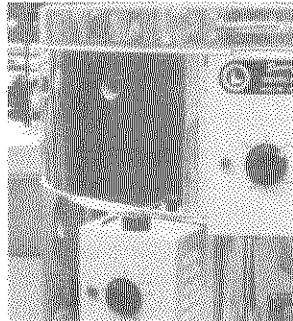
Use a continuity checker or ohmmeter to find the defective element.

Duncan replacement elements are formed to the shape of the kiln. However, a little stretching or compressing may be necessary for a perfect fit. It is safe to bend and stretch new elements before they have been fired, but once fired and allowed to cool, elements become brittle and will break if bent.



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

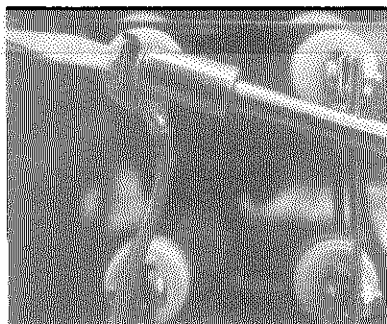
2 If kiln has a collar: Remove screws on each hinge that connects collar to kiln. Lift collar to disengage interconnect. Turn the collar so the interconnect remains separated.



3 Remove the lid-venting prop. Remove screws on each side of control panel. **Kilns equipped with Kiln Sitter:** Pull box straight out to avoid damaging kiln sitter tube. Let control panel hang by element lead wires.

You can free the control panel for easier access to the element. To do this, disconnect switch-to-element wires from the switches.

4 Using a screwdriver and a crescent wrench or a 3/8" hex nutdriver, loosen (but do not disassemble) the element connectors. Slip them off. Be sure to loosen both ends of a bus bar assembly.

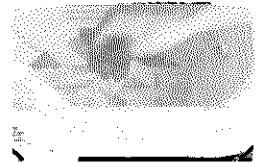


5 Compress the "V" at each element end with pliers. Remove the two insulators.

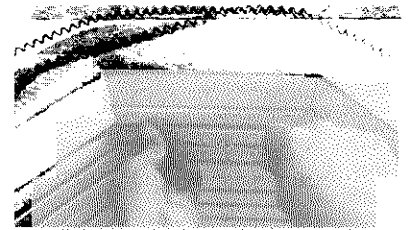
6 Remove the old element carefully to prevent breaking the lip of the element grooves.

If the old element burned out due to contact with foreign materials, there will probably be a melted, glazed spot in the element groove. Glazed spots left in the grooves may ruin the new element, so dig out any of these spots. The small hole left in the groove will not affect the new element. Small pieces of firebrick in the grooves should be removed with a small brush or vacuum cleaner.

7 Protect the new element from accidentally coming in contact with kiln wash by placing newspaper on the kiln bottom. To keep from tangling up the element as you thread it into the brick grooves, lay it on the top rim of the kiln's sidewall. (If you place element in bottom of kiln, element will tangle up.) Also, arrange the loops of element on the top of the kiln so you're feeding the bottom loop first instead of the top one.

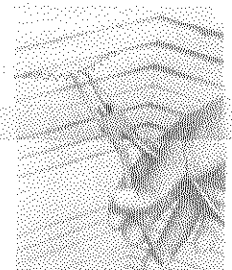


8 Thread the new element into either element hole. The element will probably go through the sidewall easily to the other side. However, if the element catches on something in the sidewall, look into the hole where the porcelain insulator goes to guide the element through.



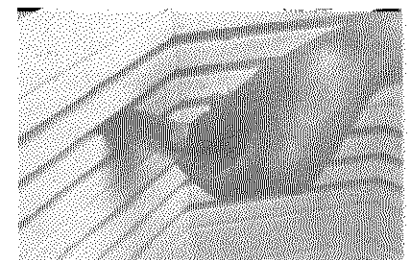
9 Begin threading the element into its grooves. The element is bent slightly where it fits into each firebrick corner. The bend must fit all the way into the back of each corner. As you feed the element, hold it with both hands in such a way that you are applying a constant pressure that pushes the element into the corners. If you let go before the element is completely threaded, it will spring back out of the corners. After the first element bend is in its corner, do the next corner. If the next element bend will not reach the next corner, gently stretch that section of element with your hands to make the next bend reach its corner.

If the element is too long between bends, let that section of element curve out of the groove. Then continue threading the element into the other corners. When element is completely installed, go back to the section that was too long. Compress coils with long-nose pliers until the element fits into its groove. No two coils should be compressed tightly enough to touch.



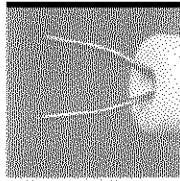
All Models: Remember, if you do not push the element fully to the back side of each corner, the element will not stay in the grooves when fired!

10 Press element down into the lower part of the groove with a plastic comb or wooden tongue depressor.



11 Reinstall the porcelain insulators. Push them flush against the heat shield where they had previously fitted. They protect element from contact with the case and heat shield, so they *must not* work their way out after the element connector is tightened into place.

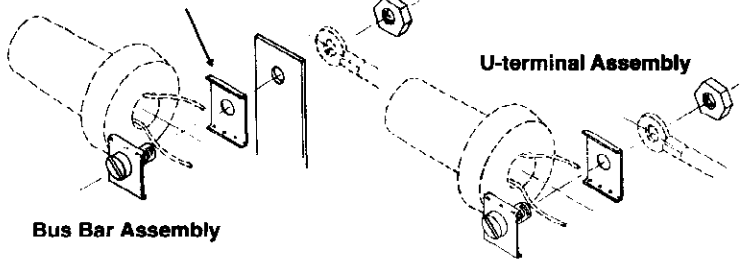
12 Cut off the tip of the new element ends. Spread the wires with pliers as shown.



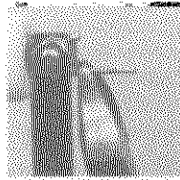
13 Sandpaper the eyelets of the element lead wires until bright and clean of all oxidation. (Install new lead wires if insulation on old ones is brittle.) Reinstall the connectors (U-terminal or bus bar), slipping the "V" of the element between the terminal clamp and the U-terminal or bus bar. Note the holes in the bus bar and U-terminal are not centered; place the widest part toward the insulators for easiest installation.

14 Be sure the insulators are snug against the heat shield and that each element is pulled toward you firmly. Tighten the connectors. (The tighter the better.)

This U-terminal was added to the bus bar of newer kilns for easier element installation.



15 Cut off excess element close to the connectors. Leaving the excess element sticking out past element connector could ruin your new element! (The element could short against something in the control panel.)



16 Reconnect switch-to-element wires to the switch(es) if they were removed.

Kilns with kiln sitter: Route the wire from the lowest U-terminal connector to the left side of the kiln sitter tube as you face the kiln.

Press all wires to the front of the control panel. As you move the control panel back into place, check to see that no wire touches an element connector. Wires and wire nuts must also not touch kiln's case inside the control panel. **Wires and wire nuts will burn if they touch the case or element connectors.** Reinstall screws in control panel and tighten.

17 Vacuum kiln. Be careful to vacuum all brick pieces that may have lodged in the element grooves.

How to Get the Longest Life Out of Your Elements

Dangerous Voltage: Unplug kiln before touching element or removing control panel.

The elements in your kiln will last for many years of normal use. With time, however, the elements will gradually draw less and less power, finally reaching a point where they will not develop enough heat to bend the pyrometric cone. Replace elements when firing time becomes excessive.

High temperature elements are damaged by contact with silica or silica bearing compounds, such as glaze and kiln wash. If silica touches an element, the element will burn out during the next firing.

Also, reduction firing, which removes the oxygen from your kiln, will ruin your elements. The elements are protected by a coating of oxidation, which reduction firing destroys.

All heating element wires change in length with use. This is an inherent characteristic that metallurgical science has never found a way to control. This change can cause elements to shrink away from

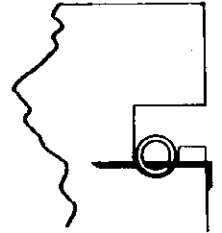
the corners and bulge outside the grooves into the kiln. At porcelain temperatures, however, elements become quite soft and will not support their own weight. During high temperature firing, the elements soften to conform to the shape of their grooves.

If you never fire hotter than cone 05, the element never becomes soft enough to conform to the grooves, so bulging may occur. If you do not fire hotter than 05 and you are having a problem with bulging elements, you may want to pin the elements in place as follows:

1 Cut an element staple in half at an angle to leave a sharp point.

2 Bend about $\frac{3}{16}$ " at a right angle.

3 Grasp the bent portion with pliers and push it through the lip of the groove at a slight angle. The pin must go over the bottom of the turn in the element coil, holding it against the bottom of the groove.



If you check to make sure the elements are seated when you set up your new kiln, and if you fire your kiln to cone 05 or hotter occasionally, your elements will probably stay in their grooves throughout their life. Should the elements start to bulge out of the grooves, they must be reseated immediately (see below).

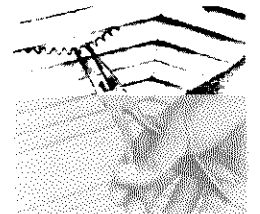
Reseating a Bulging Element

1 Once an element has been fired, it becomes brittle and will break if bent while cold. Follow this procedure to heat element. **Always unplug kiln before touching element with anything!**

Switch-Controlled Kilns: Manually engage kiln sitter and turn switch(es) to HIGH position. Heat element until it glows dull red. Turn off switch(es), disengage kiln sitter and **UNPLUG** kiln.

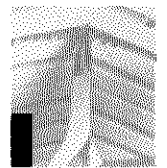
Electronic kilns: Program your controller to heat the kiln at high speed. When the elements glow dull red, turn the controller off and **UNPLUG** the kiln.

2 Be sure kiln is unplugged. With a pair of long-nosed pliers, shrink the bulging portion of the element by pressing the individual turns in the coils together slightly. Take a little from each turn so that no two turns will be pressed tightly enough to touch.



3 As the element shrinks, work it back toward the groove and into place. Work rapidly, and at the first sign of stiffness in the coils, stop bending and reheat the kiln. The elements do not have to be red to be bent safely, as the stiffening can be felt through the pliers.

4 To lengthen the element to fit into the corners, reverse the above procedure and expand the distance between coils by using snap-ring pliers. Use caution, as your warranty covers only elements that fail in service under normal use and not from being broken while cold.



5 When you have the coils positioned above the dropped recess in the grooves, reheat the kiln, turn off the switch(es), **UNPLUG** the kiln, and run a blunt kitchen knife around the elements to seat them into grooves and to make sure they fit all the way back into each corner.

6 Fire the kiln hot enough to soften the elements completely.