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**Oven, Stove, Range
and Cooktop Repair**

Foreword

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Oven, Stove, Range and Cooktop Repair

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Chapter 4

ELECTRIC COOKTOPS AND OVENS

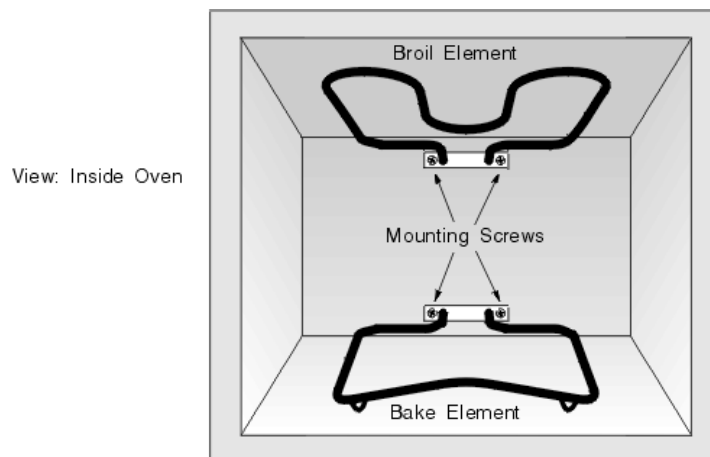
4-1 NORMAL OPERATION

NOTE: The diagnosis sections of this chapter assume that all other electrical controls, i.e. timer and thermostatic-limit controls, as described in chapter 2, are operating properly, and the malfunction has been isolated to the heating system!!!

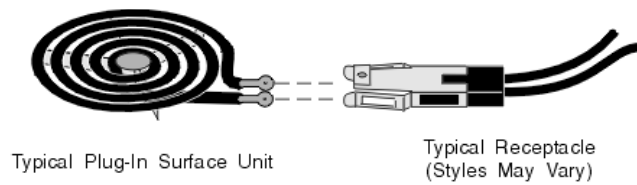
The heating element is simply a big resistor wire, with enough resistance to generate a high heat. Usually these are nichrome wire, surrounded in ceramic insulation, with a steel sheath around the ceramic.

Inside the oven, the heating element is called a "bake" or "broil" element. A "bake" element is located below the oven it affects. A "broil" element is located above the oven it affects. See figure 4-A.

Figure 4-A: Oven Elements



In a electric cooktop, the heater elements are coiled into a round thing called a "surface unit." A single surface unit might contain two or even three different elements all mounted together, with different resistance ratings. Sometimes the wiring is screwed directly to terminals on the ends of the surface unit. Some surface units plug into a receptacle mounted under the cooktop, which makes them more easily removable for cleaning, but also more susceptible to burned connections. (Figure 4-B)



Typical Two-Element
Wire-In Surface Unit



Note that each separate element is separately grounded to the cabinet!

TEMPERATURE CONTROL

To maintain a set temperature in an electric **cooktop**, the element is cycled on and off, usually by a switch called an infinite switch, so named because it theoretically provides an infinite number of heat settings. This switch has its own little heater inside, which heats a bimetal switch. (see figure 4-C) A cam attached to the control knob changes spring tension on the bimetal, which changes the amount of heat needed to open the switch.

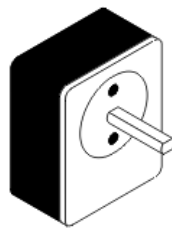
When the heating element is on, the heater inside the switch is on. The bimetal heats (along with the element) until the contacts open. Then the bimetal cools (along with the elements) until the contacts close again.

There are also fixed-temperature switches that vary the voltage going to the heating elements to maintain fixed, pre-set temperatures. These are usually push-button or rotary switches with fixed settings such as warm, low, medium and high.

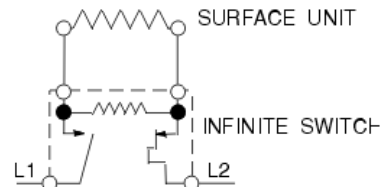
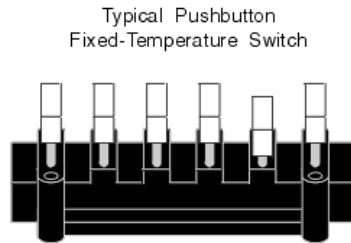
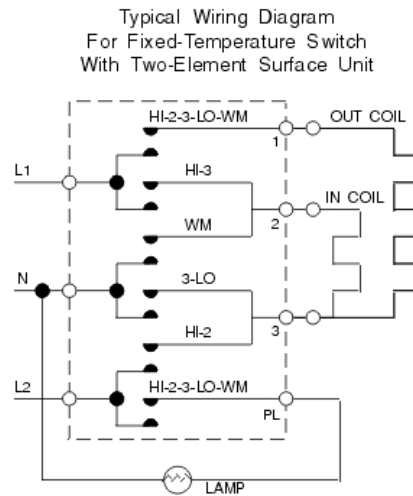
In fixed-temperature switch controls, heat levels are varied by applying different voltages (110V or 220V) to different coils of different resistances, as shown in figure 4-C.

In an oven, the temperature is controlled by a thermostat. Using a liquid-filled bulb and capillary, the thermostat senses temperature inside the oven and cycles the heating system on and off to maintain oven temperature within a certain range.

Figure 4-C: Temperature Control Switches



Typical Infinite Switch

Typical Infinite Switch
Wiring DiagramTypical Pushbutton
Fixed-Temperature SwitchTypical Wiring Diagram
For Fixed-Temperature Switch
With Two-Element Surface Unit

4-2 CLEANING HEATING ELEMENTS

Do not put any cleaning agents or solvents directly on heater elements or surface units. The steel sheath is semi-porous; cleaning solvents can penetrate the steel and damage the ceramic insulation or electrically short the element. Think about it... when these elements are in operation, they glow red-hot. They will eventually incinerate anything that contacts them. If there is any carbon or other crusty residue left after that, just scrape it off as best you can.

The exception to this is the solid, or "euro-style" surface units. These units can be cleaned; your appliance parts dealer has a special cleaner for this purpose.

When troubleshooting electrical cooking equipment, the very first thing to do is stand back and observe the big picture. What's really going on? If *nothing* is operating, you probably have a breaker, fuse or other power source problem. Do the surface units heat, but not the oven elements? Does the bake element heat, but not the broil element? Does the oven cleaning only work on Tuesdays in July during a snowstorm? Knowing what's operating and what isn't, in conjunction with a wiring diagram, can point you towards the failed component.

In a moment, we'll talk about the general steps to follow. But first, I want to impress upon you something really important. I know I said this in chapter 2, but it bears repeating. In electric cooking equipment, you're usually dealing with 220 volt circuits. **DO NOT TAKE THIS LIGHTLY. 220 VOLTS CAN KNOCK YOU OFF YOUR FEET, AND DO YOUR BODY SERIOUS DAMAGE, VERY QUICKLY. DO NOT TEST LIVE 220 VOLT CIRCUITS.**

Unless you are dealing with an obvious, simple repair like a burned element, isolating the problem in a 220 volt cooking circuit basically boils down to shutting off the power, testing each component for continuity, and looking for burned or chafed wires. Electric oven or cooktop repairs can be broken down into 3 categories:

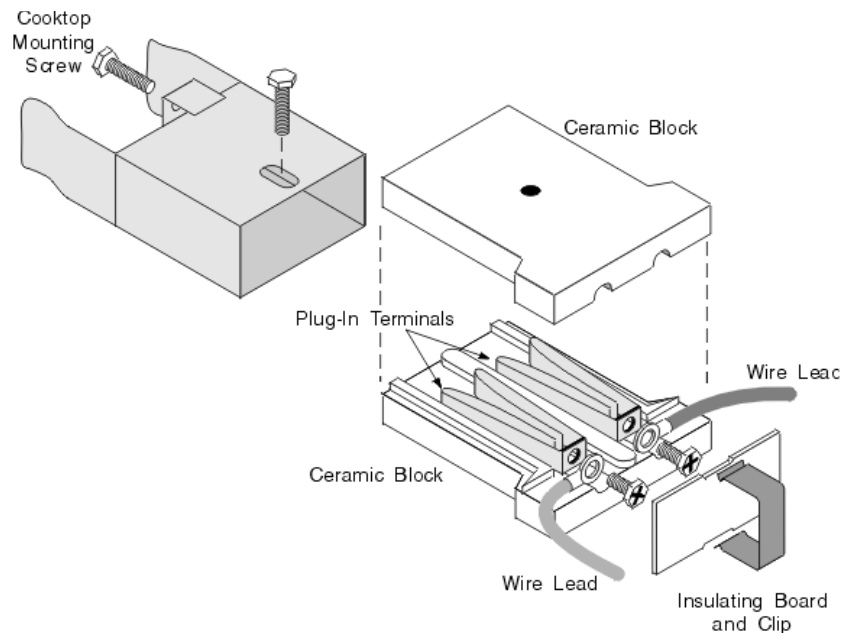
4-3 (a) ONE ELEMENT NOT HEATING

In surface units, this is usually caused by a burned out element, terminal, or receptacle. (see figures 4-B and 4-D) It may also be an infinite switch or fixed-temperature selector switch. Turn the breaker off or pull the fuse, and inspect the element, terminals and receptacle.

Most receptacles are mounted to the cooktop by one or two screws. Some receptacles can be disassembled as shown in figure 4-D to inspect and replace the internal terminals.

Usually the burned or melted area of terminals or elements will be visible, but test for continuity, even if it appears to be OK. A bad element will show no continuity. A good element will show some continuity, even though there is a lot of resistance.

Figure 4-D: Receptacle Repair



A switch will show no continuity when off and good continuity when turned on. You should also see continuity through the bimetal heater inside an infinite switch.

Replace a burned or bad receptacle, terminal, element or switch; repair a broken wire end terminal. When replacing elements, make sure you get a replacement element of the right wattage; the element is matched to the control switch.

If an oven element isn't working, do not forget rule number one from section 2-6 (d): check the automatic baking cycle (timer) controls first! If those are OK, the break is usually where the wire attaches to the element, inside the back wall of the oven. Turn the breaker off or pull the fuse, remove the screws holding the element into the oven, and pull the element away from the back wall a little. There is a little bit of extra wire in there to allow you to access it from the front, but do not pull out any more wire

than you need to work on it. You may need to tilt the element upwards to get the terminals through the holes. If the wire is broken or burnt completely off the terminal, you may be able to fish the wire out of the hole with needlenose pliers, as long as the power is off.

If there is a burn in the element, usually it will be visible, but test the element for continuity, even if it appears to be OK. A bad element will show no continuity. A good element will show some continuity as described in section 2-6(e).

Replace a burned or bad element; repair a broken wire end terminal using special high-temp terminals, available at your appliance parts dealer.

4-3(b) NO POWER TO OVEN

First, make absolutely sure you have no power. Check all heating elements, on all settings. Check the

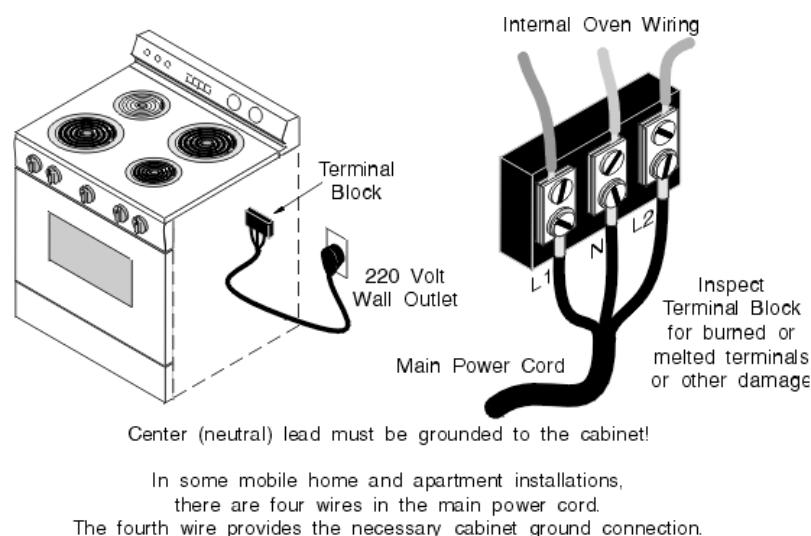
volts but not 220. (see section 2-5, page 16) This might mean the oven light and clock and even some of the heating elements operate on low power, but the high-heat circuits do not work. It also means you still have power, and you can still get zapped.

If you're sure you have no power, we need to figure out if the problem is in the house wiring or inside the oven or cooktop. First, of course, check the house breaker or fuse. Next we need to test for power where it enters the oven.

This can sometimes present a problem. In most installations, there is a 220 volt wall plug. If this is the case, turn the breaker off or pull the fuse, pull the oven or range away from the wall, pull the plug out of the wall, turn the breaker back on, and test the wall outlet as described in chapter 2. Also check the terminal block for problems as described below. The terminal block is where the main power cord attaches to the oven circuitry. It will be just inside the back somewhere. (see figure 4-E)

In some installations, the electric oven or electric stove is wired directly into the house wiring. If so, the wiring will be connected directly to a terminal block within the unit. You need to follow the steps as described above, but while the power is off, locate the 3-wire terminal block as shown in figure 4-E.

Figure 4-E: Main Power Terminal Block



Inspect the terminal block for any signs of damage; overheating, melted terminals, etc.

Make sure all wiring is clear and make sure you don't touch any bare wires or terminals, turn the breaker or fuse back on briefly, and check the terminal block for power across all three legs as shown in chapter 2. Then remove power again at the breaker or fuse.

If power is not getting to the terminal block, the problem is in your house wiring. During the 70's some houses were built with aluminum wiring, which is notorious for not being able to handle oven currents. House wiring repairs are beyond the scope of this manual. There are plenty of good books on house wiring; get one of those, or call an electrician.

If power is getting to the terminal block, the problem is obviously somewhere within the oven. There may be a main fuse, or a main switch that everything is routed through. Find your wiring diagram, isolate the problem and repair as described in section 4-3(c).

4-3 (c) COMPONENT PROBLEMS

One fairly common failure with confusing symptoms occurs when an infinite switch or a fixed-temperature switch shorts internally to ground. The symptom will be that with the switch off, the indicator light remains on dimly. If this occurs, replace the defective switch.

Let's say that you have power to the surface units but none to either the bake or broil element. Or let's say the electric oven comes on, but the self-clean function doesn't work. It's time for a wiring diagram. Find the wiring diagram for your machine as described in chapter 3. Trace the circuits as best you can and test components as described in chapter 2. The wiring diagram can be very complex and difficult to follow, but the general objective is to trace the malfunctioning circuit as described in section 2-5, find the components in it and check them for continuity. Also check for burned wires, especially in the back of the oven. It might help to make several copies of the wiring diagram and trace the circuit that you're interested in with a colored highlighter pen.

Replace the bad component, or repair damaged wires with special high-temp wire and connections, available at your appliance parts dealer.

This covers the basic for **Electric Oven Repair** | **Electric Stove Repair**.

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