

Electric Range basic training

Well hello there!
My name is Electra
and I'm going to tell you
all about electric ranges
today. Now listen up,
because what I'm about to
tell you is **red hot!**



First, a little history...

“As long as people have known how to harness electricity, they’ve been using it for heating and cooking. The Carpenter Electric Heating Manufacturing Co. invented the first electric stove in 1891, and in 1893 it was showcased at the Chicago World’s Fair where an electrified model kitchen was put on display. But it wasn’t until June 30, 1896, that a man by the name of William Hadaway was issued the first patent for the electric stove.”

“Gas stoves, like my older brother, have been around for some time, but the electric stove took a while to become popular. For starters, when electric stoves were first invented, only one in ten households were wired for electricity. Moreover, electricity was very expensive back then and the first electric stoves required a lot of it. Another problem with the early electric stoves was the short life span of their heating elements, that is, before the nickel-chrome alloy was invented that could better withstand the heat. By the 1930s, our technology had matured and we slowly began to replace the gas stove, especially in household kitchens (which was a major source of sibling rivalry as we were growing up). The first technology used resistive heating coils which heated iron hotplates, on top of which the pots were placed. As technology of electric ranges progressed, there was a major emphasis on convenience. For instance, in the 1950s one of the features of the Westinghouse Emperor range was a built-in cigarette lighter, and it came with a set of pans as standard equipment, now that’s convenient!”

“The big development in range cooking technology was the advent of the CalRod heating element, which was introduced at the end of World War I. This element consisted of a wire surrounded with a coating of fine sand and magnesium powder, incased in an aluminum tube. The big advantage of this design was that the electricity running through the wire was not conducted to the outer casing so it was insulated and waterproof. Now that’s hot!”

“The first electric range to use CalRod elements was built in 1928. The first self-cleaning oven was built in 1963, and in the 1970s glass-ceramic cooktops began to appear. The cooktops have a very low heat conduction coefficient, but they let infrared radiation pass very well. Cooktops use either electric heating coils or infrared halogen lamps as heating elements, and because of their physical characteristics, they heat quicker, give off less afterheat, and only the plate heats up while the adjacent surface remains cool. Also, glass-ceramic cooktops have a smooth surface and are easy to clean, but they only work with flat-bottomed cookware and are significantly more expensive. Today’s major appliance brands offer both gas and electric stoves, and many also offer dual-fuel stoves combining gas cooktops and electric ovens. So, you see, my brother and I have found a way to work together and get along after all.”

The most common parts...

“Generally speaking, electric cooking is pretty simple. Here’s how it works...

Electric stoves have a heater that you put a pot on top of called the **burner**. In almost all newer electric stoves this burner is plugged into a **receptacle**, located just beneath the stove top. The burner is controlled by a **switch**, which controls the amount of heat by turning the electricity on and off for certain amounts of time while you are cooking. Pretty simple right? Now, let’s talk about oven cooking.”

“We can cook in the oven two ways, either by baking or broiling. For baking, we use the heating coil at the bottom of the oven called the **bake element**. While baking, we control the temperature with the **thermostat** by turning the element on and off continually to get the right average temperature for cooking.”

“The other way we cook in the oven is by broiling, where food is placed directly under a heater at the top of the oven called the **broil element**. There is no temperature control here, so you have to watch your food to see that we don’t burn it up! If you do let it burn, don’t complain to your stove about it either, we’re just doing our job. Some ranges out there have a thermostat that is designed to control both functions, bake and broil, but most ranges just have the additional switch for the oven called the **selector switch** that allows you to select either bake or broil.”

“Now, I don’t know if you know, but some ranges are actually built with two ovens. That’s right, they are called double ovens. Ranges that have two ovens, will have two sets of controls, one set for each oven. When replacing parts in a double oven, it is important to know which oven you need the parts for since each one might be slightly different.”

“Did you know that some ovens can clean themselves?! That’s right, self cleaning is done by combining all of the oven components above to get the oven to heat up to a temperature of about 800 degrees for a certain length of time to burn the oven clean. There is also the addition of a locking system to keep the oven closed while it is at the high temperature. Another variation in electric ranges is the ‘Convection Oven’, which is basically a standard oven that has a combination of an additional heater and a fan to circulate the hot air, substantially shortening the time it takes to cook your food. My uncle is a convection oven; he is always bragging about how fast he can cook, as if he’s a microwave or something.”

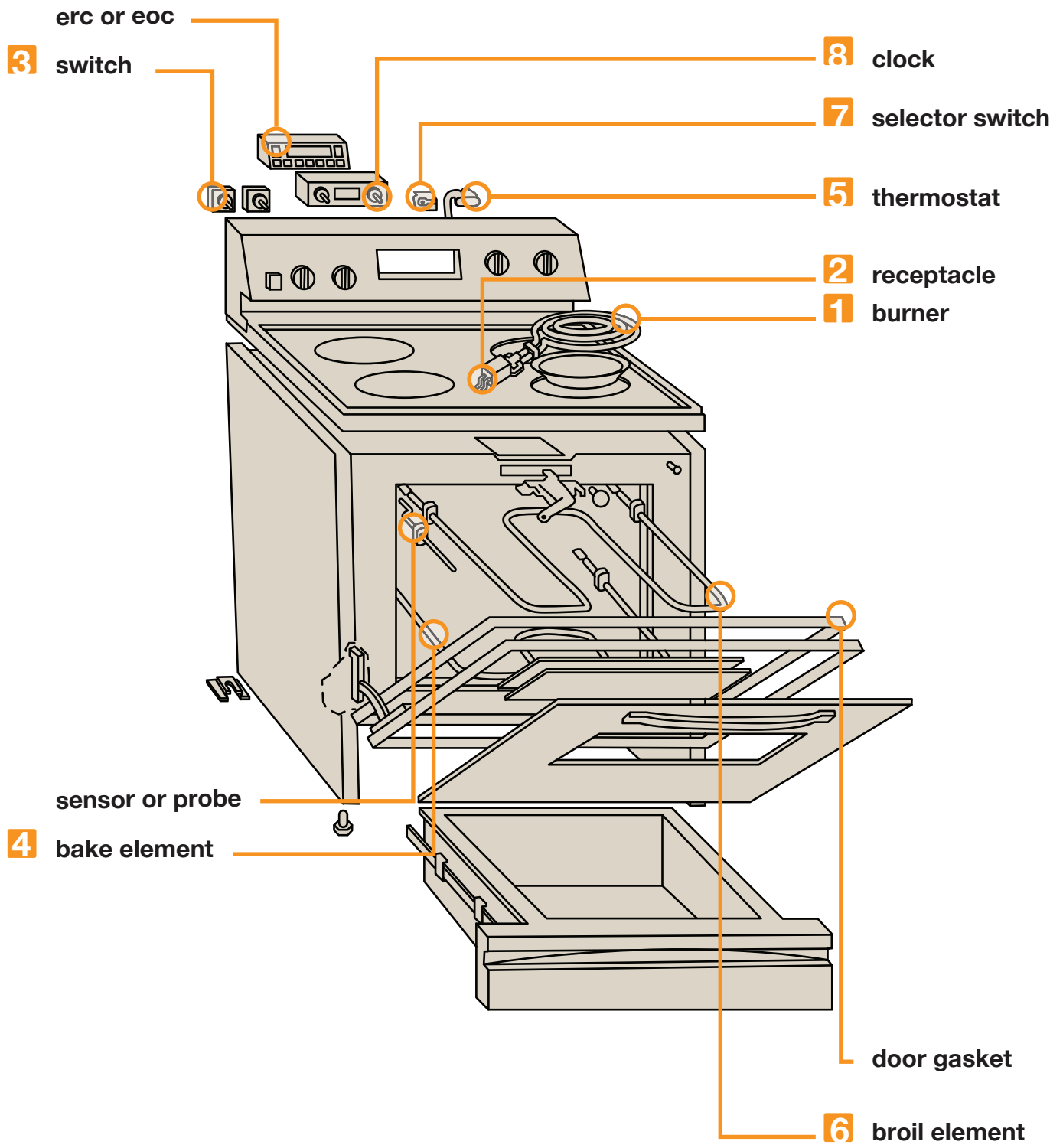
“Today’s modern ranges are designed with convenience in mind, which is why we are equipped with a feature that allows you to set us to start automatically and cook your food for a pre-determined amount of time, and then shut off again. We do this by using a **clock-timer**. These days, our manufacturers are combining the functions of the thermostat, selector switch, and clock-timer into one electronic unit. This unit is called either the electronic range control (ERC) or the electronic oven control (EOC).”

Take a look at the parts
that make me so
electrifying
on the next page!

major parts

- 1 burner**
element that heats food
- 2 receptacle**
part that the burner plugs in to
- 3 switch**
turns power to burner on or off
- 4 bake element**
heats food from bottom of oven
- 5 thermostat**
controls temperature inside oven by turning bake element on and off
- 6 broil element**
heats food from top of oven
- 7 selector switch**
switch between bake, broil, or clean
- 8 clock-timer**
set bake start or stop times





1 burner

Also called:
Top Coil
Eye
Surface Unit
Element

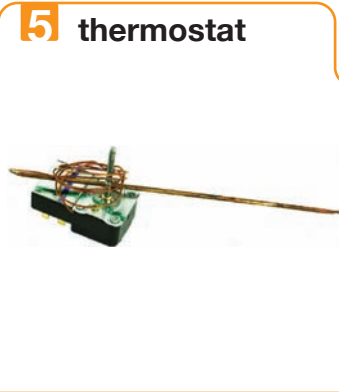
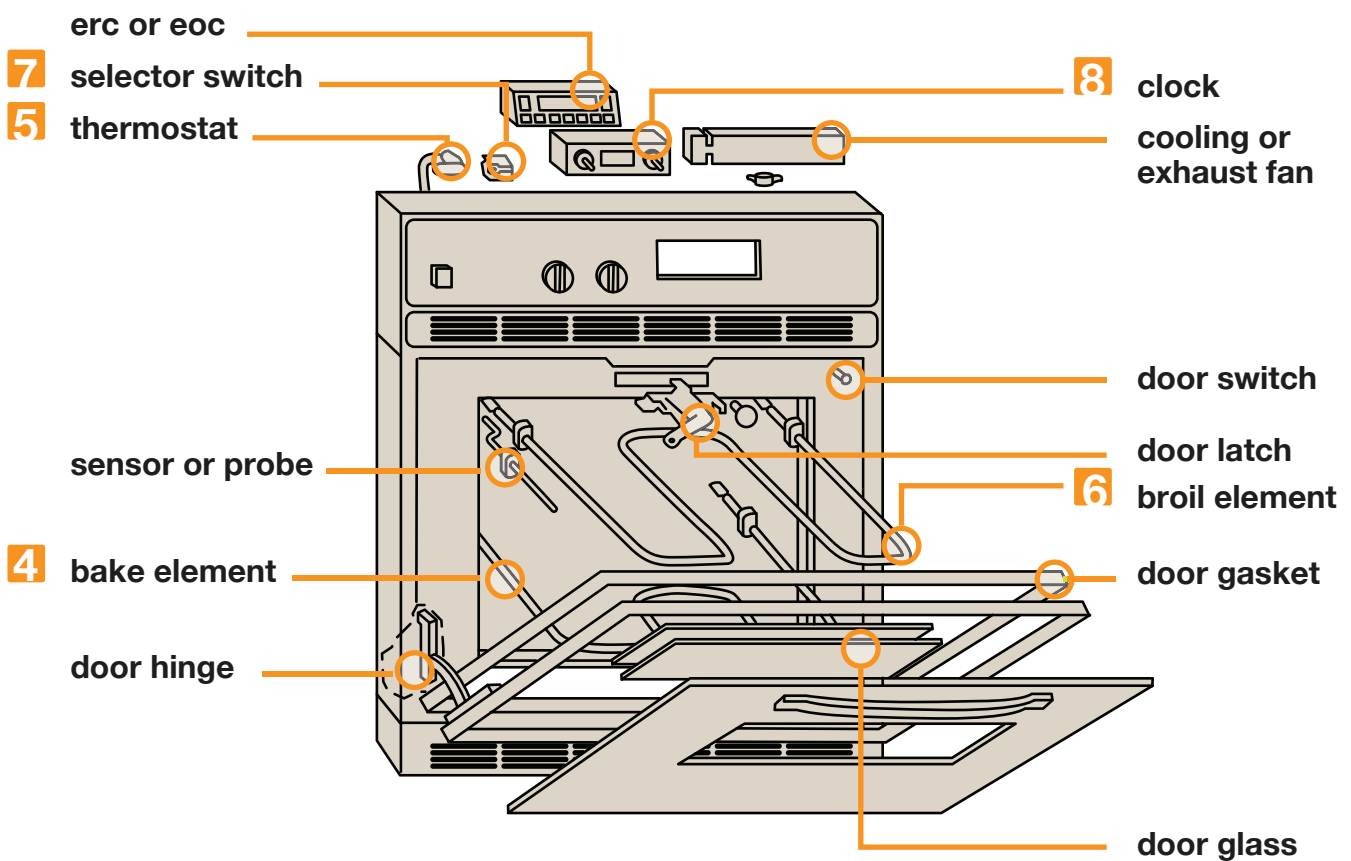
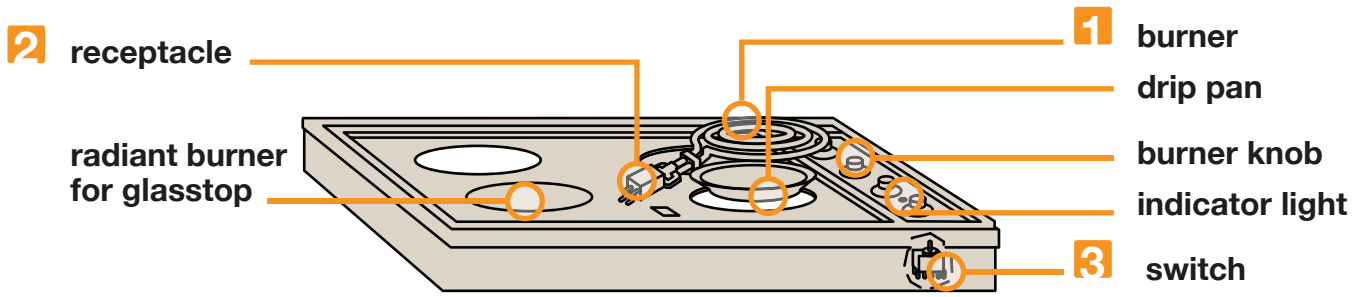
2 receptacle

Also called:
Burner block
Burner plug
Terminal Block

3 switch

Also called:
Surface Unit Switch
Infinite Switch
Burner Control

4 bake element



on the wings of time



1900s

1910
The first electric range is manufactured.



1930s

Evolution of the parts...

“I have seen a lot of changes in my day. A big one is the design of the **burner** going from the spiral coil (much like a dryer element), to the Euro burner (which was encased in cast iron), to the newer designs using radiant and halogen technology. In the very early days of electric ranges’ burners consisted of a spiral coil under an iron cover, and later the CalRod element, a nickel-chrome alloy surrounded by a porcelain magnesium coating; both were wired right into the range itself. Some of the older electric ranges had burners called mono-tubes that were so thick you might as well have been talking to a brick wall they were so stubborn! I mentioned the glass-top ranges before; well some of them have a different type of burner called a radiant burner, which is basically a coil encased in a high-heat resistant housing allowing the heat to only radiate upwards. In the past there were generally only two sizes of burners, 6” and 8”. With today’s demands we are now being manufactured with burners in a variety of sizes from 4” to 10” and everywhere in between. Older stoves only had three to four burners, while some newer models can have up to ten, and that’s without even going to the commercial cooking category! I wouldn’t even know what to do with ten burners! Although burners last a lot longer now than they did in the early days, consumers can actually wear them out by sliding pans across them. Don’t do this, we don’t like it! What happens is it actually wears the coating off the burner to the point that the alloy wire is exposed, and boy, does this make us hot! With that wire exposed, it can cause a small explosion and sometimes even a fire. Do yourself a favor; be kind to your burners.”

“**Receptacles** really didn’t exist as a separate part until burners could be plugged in rather than hard wired into the range, sometimes surrounded by a glass or porcelain block. Usually the receptacle goes bad due to debris from cooking that causes arching between the burner and receptacle. Today, manufacturers recommend replacing the receptacle when a new burner is installed. Making sure the contact is complete between burner and receptacle will extend the life of the burner. You should always follow the doctor-I mean manufacturer-recommendations for keeping your appliances healthy and long-lasting.”

“Burner, or surface unit **switches**, work by turning the switch to high or low, increasing or decreasing the amount of electrical current flowing through the burner, thereby adjusting the temperature of the element. These switches are located on the control panel and can also be called ‘infinite switches’, since there are an infinite number of settings between low and high. On some ranges all the burner switches are the same, and on some models they are different according to the amperage the burner needs to operate. (Amperage refers to the amount of electricity.) The larger the burner, generally the higher the amperage. Some ranges get real fancy with an additional switch that allows the consumer to choose different sizes all in one burner. They could make a single burner be a 4”, 6”, or 8” just by making their selection to only heat up those turns on the burner, which adds an additional switch for selecting size.”

“**Bake elements** for the electric range are said to be the most even cooking in an oven as they cover more area in the bottom of the oven cavity. This is where my brother, the gas range, and I usually disagree, but he’s got his advantages too. Typically, the bake element goes bad due to spill-over of the food we are baking. The food lands on the bake element causing a small grease fire that burns through the coating and shorts out the element. On newer models coming out, manufacturers are now “hiding” the bake element under the bottom of the cavity to prevent these problems. Proves to be great for the consumer but, makes it tough on the technician to get in there and replace a bad one. Some bake elements are hinged to make it easier to clean up spills underneath. I have this friend who is always bragging about how clean her oven floor is and she insists her bake element is not hinged, but we all know the truth.”



1952
Vintage
electric range

1950s



2009
Modern
stainless steel
electric range

Present

on the wings of time

“Before the invention of the Calrod element, coiled bake elements were placed under the floor of the oven cavity to prevent spillages on the coil elements that were then unprotected. Today, they are placing them there again and calling them ‘hidden bake elements’. Some people have asked me if there are such things as universal bake elements that all brands of ranges can use. Unfortunately, due to varying wattages, sizes, and shapes, each model has a specific element that will fit in it. Self cleaning ovens use a very high wattage element that allows them to get to the higher temperature required to burn off the residue inside the oven.”

“Oven **thermostats** haven’t been around forever, they weren’t invented until 1915, and first on gas ranges only. Electric ranges got thermostats approximately a decade later. The oven thermostat is located on the control panel with a long capillary tube extending from it, which runs down the back of the range and into the oven toward the top of the oven cavity. The capillary tube is what senses the temperature of the oven sending a signal back to the thermostat asking for more or less heat from the bake element to maintain the temperature selected. So basically, the thermostat turns the bake element off and on to maintain the temperature selected. Once the capillary tube has been bent or broken off, the thermostat will no longer function. On newer model ranges, the thermostat has been replaced with an electronic control board and a sensor, or probe, to cycle the bake element. The probe works on resistance caused by temperature change, rather than by temperature itself, sending an electrical signal back to the electronic oven control (EOC) or electronic range control (ERC). I’ll tell you what, you do not want to be around an aging electric range when her thermostat starts to go out, talk about inconsistent temperatures!”

“The **broil element**, as I mentioned earlier, is the element that is suspended from the ceiling of the oven cavity by a bracket or clip. Most ranges do not have any temperature control for broil although newer ranges may have a high, medium and low broil setting. Again this is done by cycling the broil element off and on much like the top burners and bake element, just by increasing or decreasing the electrical current according to the setting.”

“The oven **selector switch** allows the consumer to choose whether the oven will bake, broil, self clean or time bake. When these features first came out, our manufacturers had to come up with a way for us to tell the oven what to do without adding a separate part for each function, so they are all on one switch. Nowadays, for the most part the oven selector switch is being replaced by the electronic oven control (EOC) which is able to serve many functions.”

“In the beginning, the **clock/timer** was merely a clock and a minute timer combined; they had absolutely nothing to do with the actual working of the range. The early clock/timers were analog and the maximum time you could set was only about one hour. In today’s ranges, the clock timers, along with many other parts have been replaced by the ERC, bringing electric ranges into the digital age. Older clocks were rebuildable, you could actually get replacement parts for them, but that is not the case with the new electronic range control, where the whole thing must be replaced. Before ERCs, some of the newer clock/timers gave the consumer the option of ‘time bake’, where they could set the oven to come on and go off at certain times and to cook at a particular temperature. This was a great feature for the working woman, allowing her to come home to a cooked dinner; however, it raised food safety concerns because of meats being kept at unsafe temperatures until the oven came on. So, now they have an oven that keeps the food refrigerated until the oven begins to bake!”

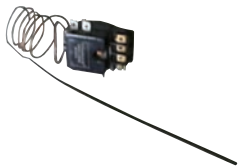
“Electric ranges are all about convenience. We’ve come a long way from the old coil burners and simple switches, to halogen cooktop burners and electronic controls that allow you to pre-program your cooking. By the way, I have brought some diagrams so you can see how all the parts we discussed fit together.”

parts on the wings of time

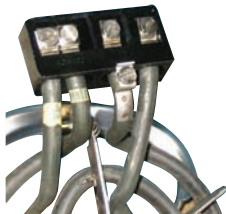
then:

now:

 thermostat



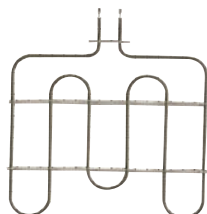
 burner



 clock



 bake element



Most popular electric range part numbers to remember:

WPL surface burner
Y04100166



WCI (1st #) or WPL receptacle
5303935058 or
330031



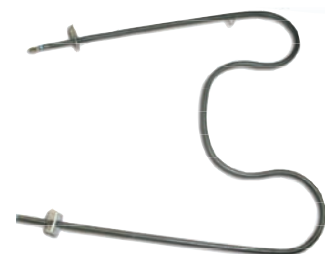
GEH bake element
WB44X5082



WCI bake element
5303051519



WPL bake element
74003019



reading parts diagrams

On the next several pages you will see a typical electric range breakdown containing the parts that you have learned. Knowing the appearance of the part and location on the range will help you identify it on a diagram. Most manufacturers present their “parts list and exploded view” in this type of diagram.

The diagrams are presented in a “facing the appliance” view, so when you are talking with a customer make sure that when they tell you where the item is located that they are facing the appliance, otherwise their left will actually be the right on your diagram. Many mistakes are made because of this.

Because the diagram is an “exploded view” parts are not exactly where they belong. Once you find the particular section the part should be located in use the lines or arrows to follow the part back to where it is actually mounted. This will help you determine if it is the part you are looking for.

Remember most parts do not include screws or trim, and most customers believe everything is included, so it is very important that you communicate with your customer exactly what you are seeing on the diagram. Also be aware of color; an example would be on page 9 in the diagram for the Cooktop parts, item #3 is the “Cooktop” itself and it lists three #3’s, one for white, black, and biscuit. Most customers are not aware that they need to tell you which color they need. Even the drip pans on this model come in colors. Asking the customer what color, when choices are given, will eliminate the guess work and ensure you send the right part the first time. On page 11 the diagram item #4 for the burner switch gives you four choices according to the location of the burner you need the switch for. On some descriptions you will notice a quantity in parentheses, usually that is an indication of how many are required on that model, not how many come with that part number. Asking secondary questions will allow you to get the customer all the parts needed to complete the repair the first time.

There are many differences between what the customer is seeing and what you see on the diagram. On the diagram you can not see color, size, or any small details that the customer may be using to describe the part. This is why using the location and what the part does may be your only way of locating the part needed. Although there are several websites that may give you a true to life picture of the part, you can not rely on that.

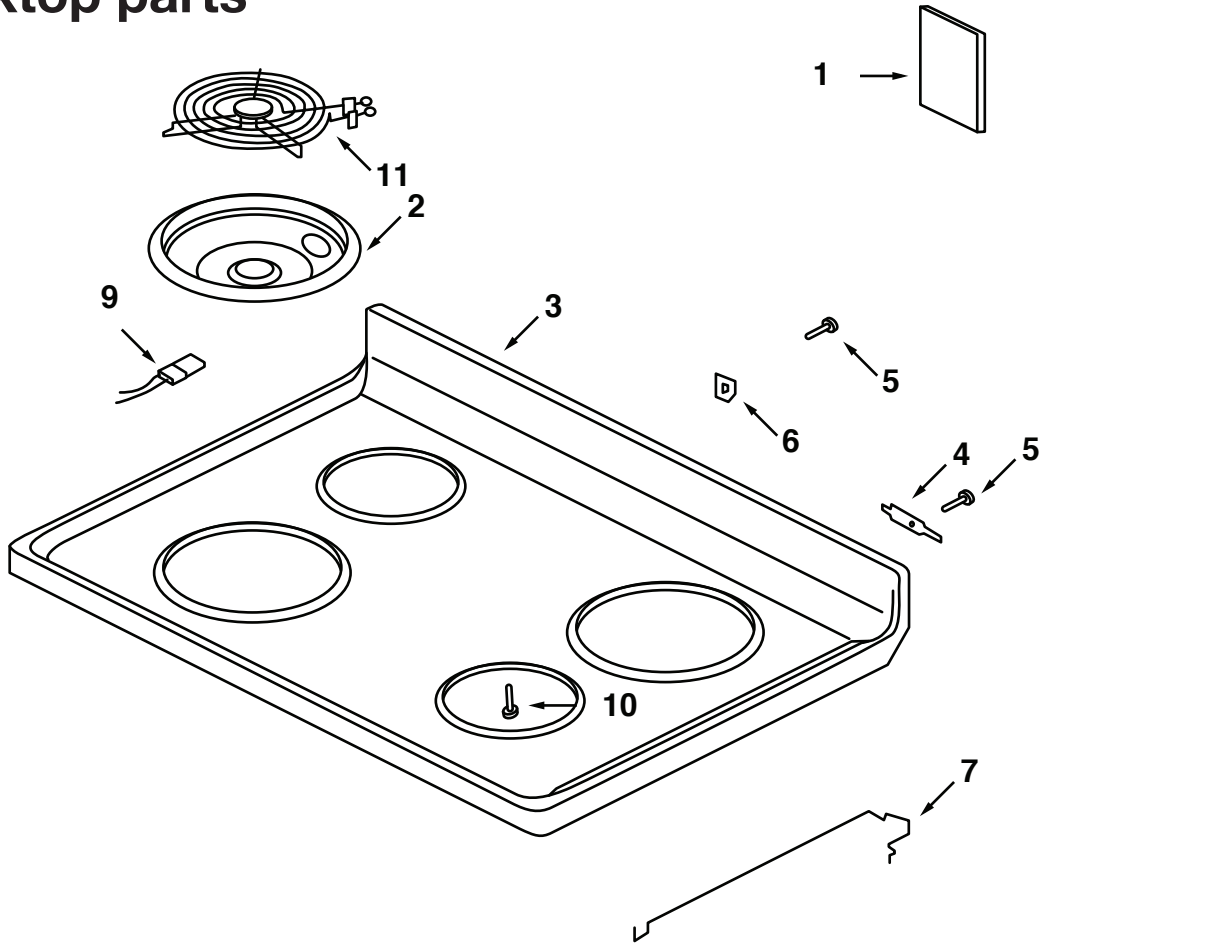
On many diagrams the manufacturer will offer parts as an assembly. They will indicate this by placing a dotted line box around several parts. If the parts have an item number they are available separately, if there is no item number they are only available as an assembly. Always give the customer the option of replacing the assembly rather than just the one part. This usually makes the repair easier and more complete.

Take a few minutes to identify some of the parts and their locations in the diagrams on the following pages. See if you can spot the eight major parts of the electric range.

parts diagrams

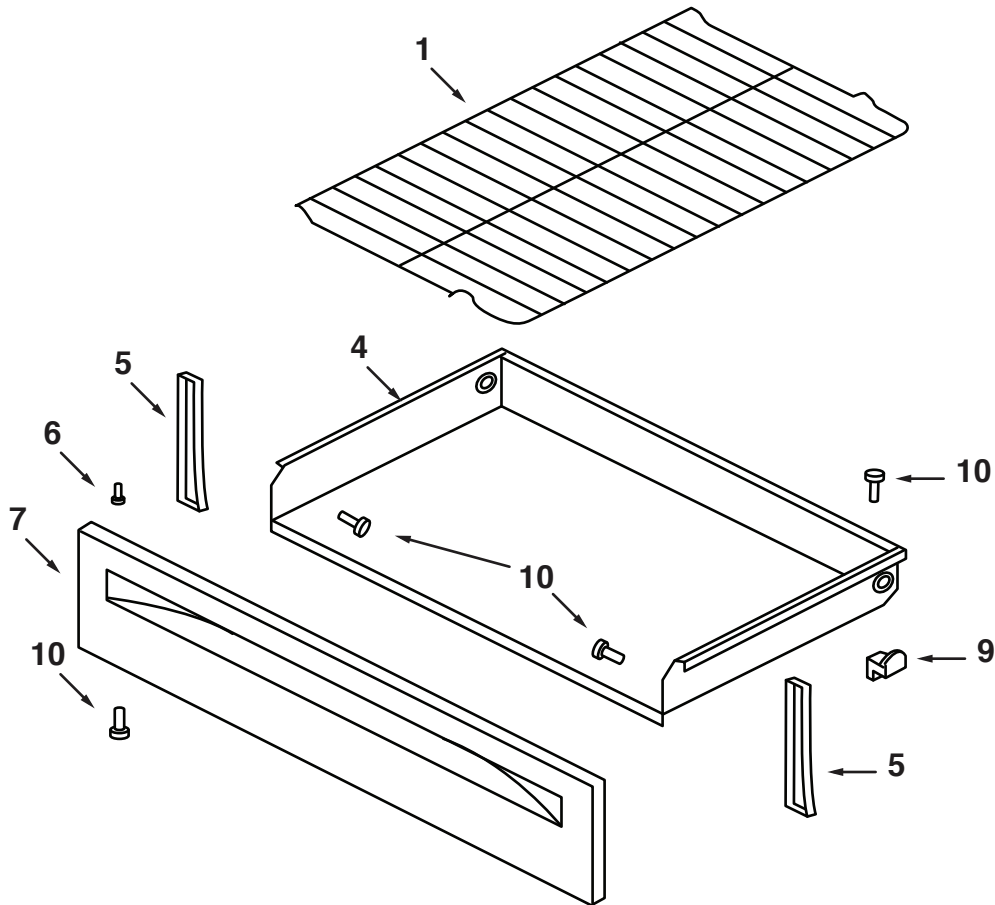
Typical Electrical Range Breakdown:

cooktop parts



1	9757142	English/Spanish	3	3186231	Cooktop (White)
	9757143	English/French		3186233	Cooktop (Black)
	9762761	Safer Cooking Tips		8272527	Cooktop (Biscuit)
	9762976	Tech Sheet	4	3195060	Hinge, Cooktop (2)
	9762996	Instructions, Installation Tem	5	3196178	Screw
		plate, Anti-Tip	6	308605	Strain Relief
2	9763001	Owners Manual	7	3195812	Rod, Support (2)
	3196203	Bowl, Drip (8" Black)	9	814399	Receptacle, Elmnt
	3196206	Bowl, Drip (6" Gray)	10	3196154	Screw
	8522881	Bowl, Drip (6" Espresso)	11	9761345	Element, Surface (8" (2))
	8522882	Bowl, Drip (8" Espresso)		9761347	Element, Surface (6" (2))
	3196202	Bowl, Drip (6" Black)			
	3196207	Bowl, Drip (8" Gray)			

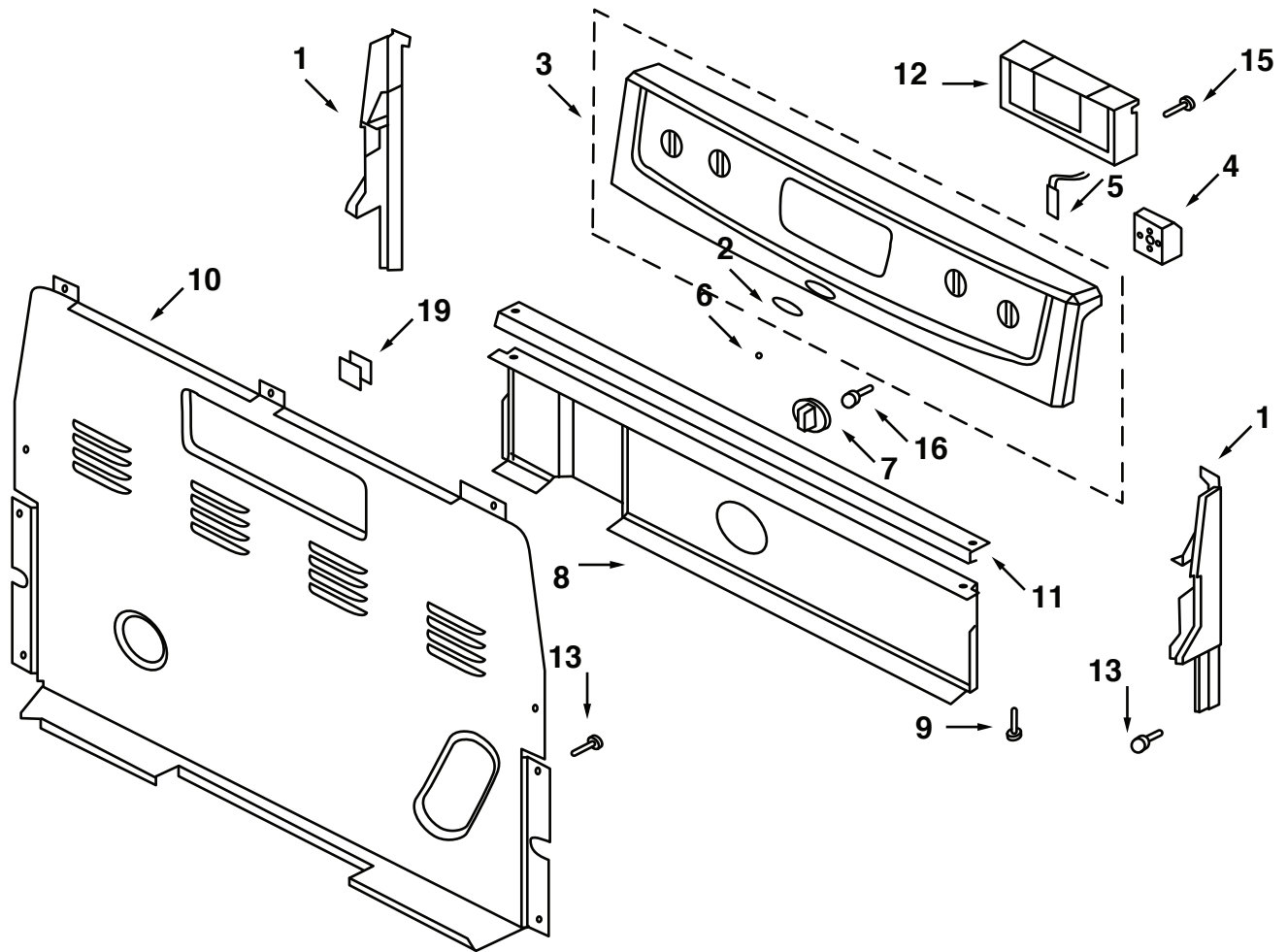
Typical Electrical Range Breakdown:
drawer and broiler parts



1	3195710	Rack, Oven (2)
4	9761030	Drawer, Storage
5	9758200	Bracket, Drawer(2)
6	3196814	Rivet, Push (2) (White)
7	8053341	Panel, Drawer Frnt (Black)
	8272501	Panel, Drawer Frnt (Biscuit)
	8053339	Panel, Drawer Frnt (White)
9	8053334	Glide, Drawer (2)
10	3196168	Screw36

parts diagrams

Typical Electrical Range Breakdown: control panel parts

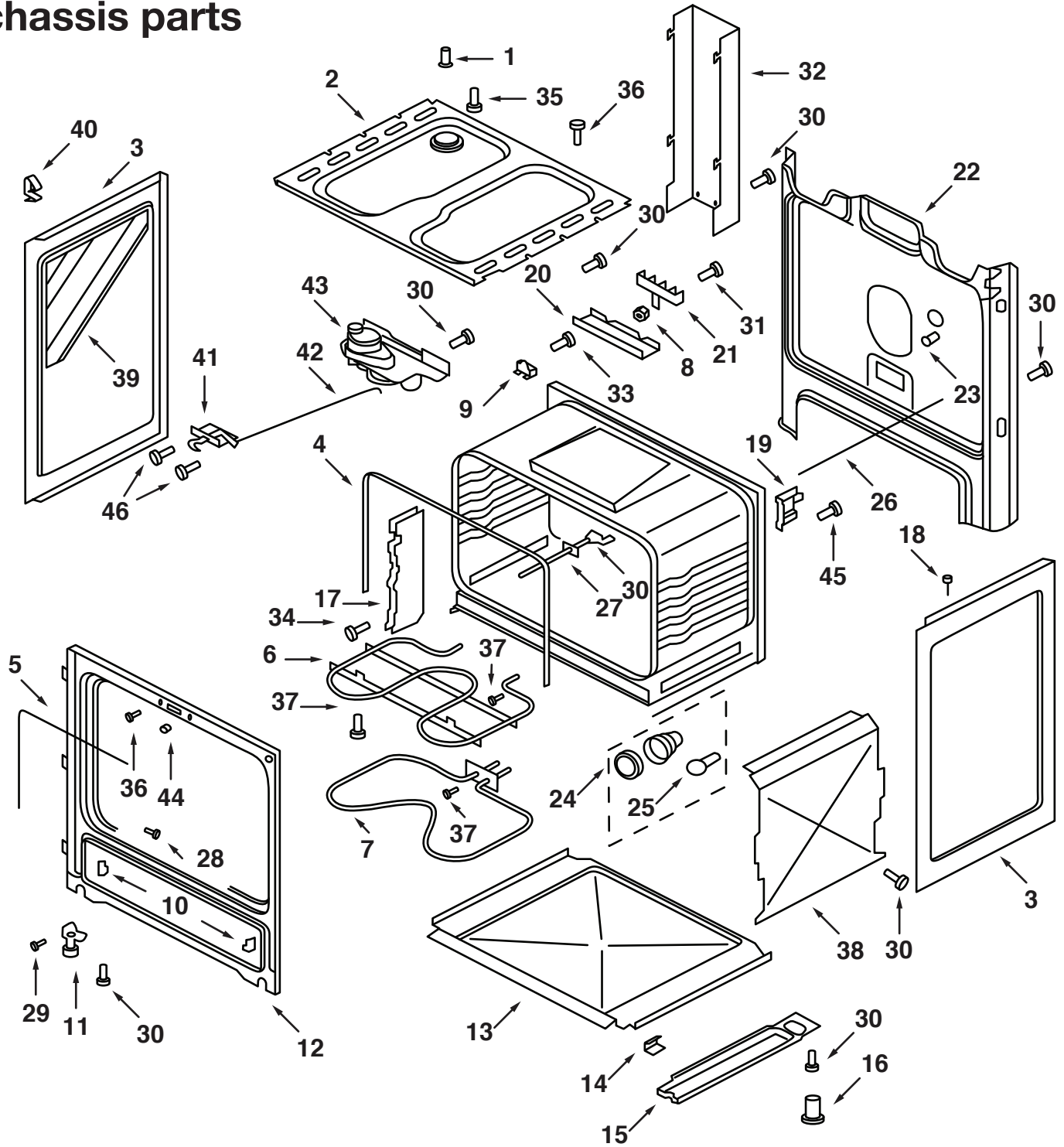


1	W10009040	Endcap (White Left Hand)
	W10009050	Endcap (White Right Hand)
	W10009060	Endcap (Biscuit Left Hand)
	W10009070	Endcap (Biscuit Right Hand)
	W10009080	Endcap (Black Left Hand)
	W10009090	Endcap (Black Right Hand)
2	9757609	Nameplate
3	9762081	Panel, Control (White)
	9762082	Panel, Control (Biscuit)
	9762083	Panel, Control (Black)
4	3148952	Switch, Infinite (Left Rear)
	3148952	Switch, Infinite (Right Front)
	3148954	Switch, Infinite (Left Front)
	3148954	Switch, Infinite (Right Rear)
5	8523265	Light, Indicator
6	3196068	Lens, Light
7	9761962	Knob, Infinite (4) (White)
	9761963	Knob, Infinite (4) (Biscuit)
	9761964	Knob, Infinite (4) (Black)
8	8053912	Shield, Heat
9	3196166	Screw
10	8272473	Cover, Upper
11	9762095	Brkt-Mntg, Console
12	9762184	Control, Range (White)
	9762185	Control, Range (Black)
	9762186	Control, Range (Biscuit)
13	3196178	Screw
15	3196169	Screw
16	3400882	Screw
19	3196200	Clip

parts diagrams

Typical Electrical Range Breakdown:

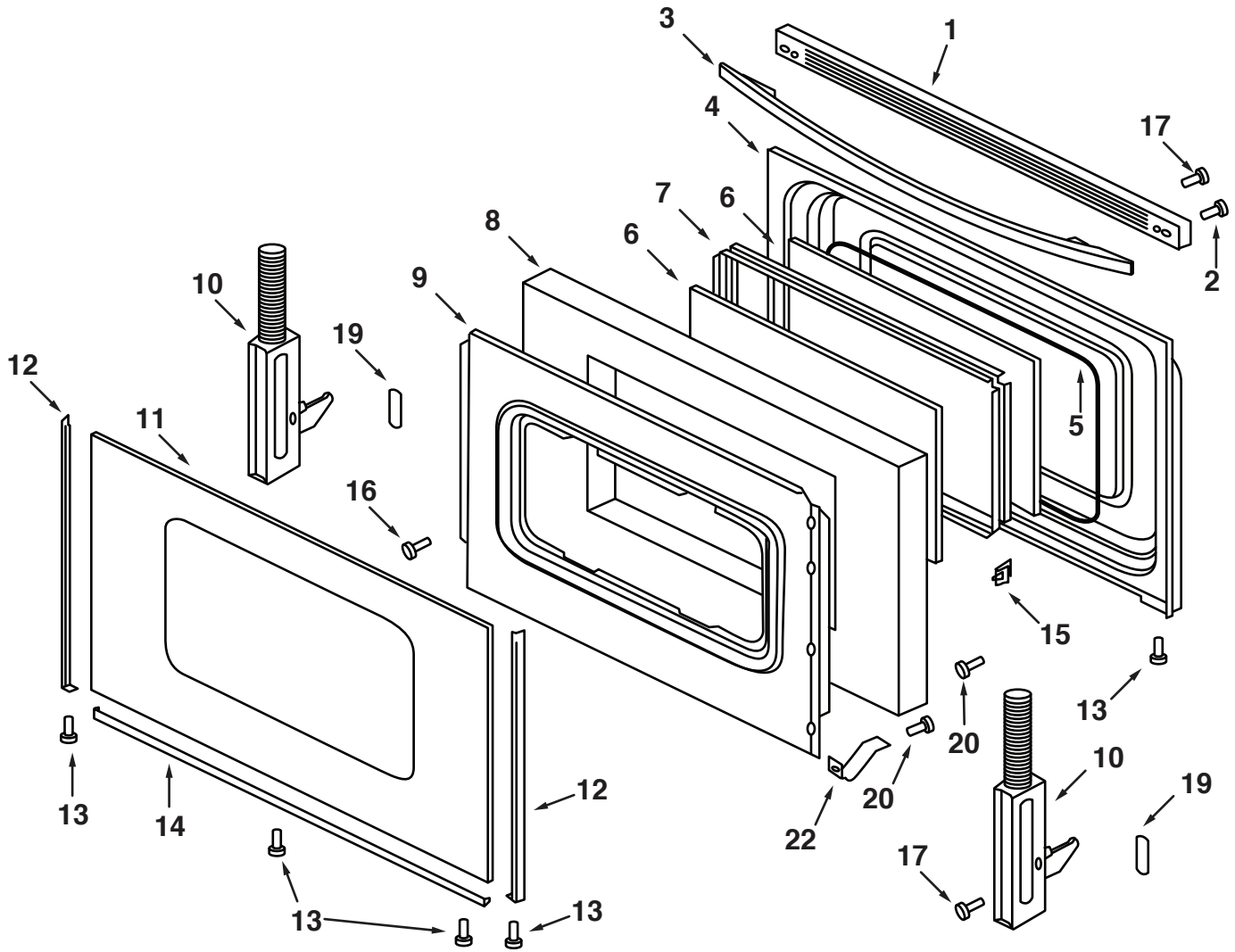
chassis parts



1	9755804	Vent Tube
2	3186144	Box, Burner
3	8053830	Panel, Side (2) (White-Textured)
	8053832	Panel, Side (2) (Black)
	8272519	Panel, Side (2) (Biscuit-Textured)
4	W10010350	Seal, Oven Flange
5	8522416	Seal, Oven Door
6	9757340	Element, Broil
7	9758541	Element, Bake
8	112432	Nut (3)
9	3196548	Fuse, Thermal
10	9759785	Glide, Drawer Frnt
11	3196037	Foot, Front (2)
12		Frame, Front (Not Serviced)
13	8054068	Tray, Insulation
14	3196576	Clip, Panel (6)
15	9760314	Rail, Base (2)
16	9761935	Foot, Rear (2)
17	9760407	Brkt-Mntg,Dr Hinge
18	3195809	Bumper, Side (2)
19	3186116	Support, Oven (2)
20	3186034	Bracket, Service
21	9761958	Block, Terminal
22	8274034	Back, Main
23	9757262	Switch, Door
24	3196701	Light Socket Assy
25	311255	Bulb, Oven Light
26	9757239	Rod, Door Switch Rear Mount
27	8273902	Sensor, Oven
28	3196165	Screw
29	3196179	Screw
30	3196178	Screw
31	3400016	Screw
32	9758283	Cover, Box
33	3196172	Screw
34	W10031780	Screw
35	3196567	Screw
36	3196168	Screw
37	3196174	Screw
38	9758238	Retainer, Side (2)
39	9761490	Insulation
40	3195813	Clip, Mounting
41	9761013	Latch, Door
42	3196961	Rod, Latch
43	9757241	Latch Assy, Rear
44	9758701	Spacer, Door
45	3196169	Screw
46		Insulation
46	3196560	Screw (2)
	8272616	Insulation, Wrap
	8272612	Insulation, Back

parts diagrams

Typical Electrical Range Breakdown: door parts



1	9761975	Trim, Top (White)
	9761976	Trim, Top (Biscuit)
	9762391	Trim, Top (Black)
2	3196164	Screw
3	9761982	Handle, Door (White)
	9761983	Handle, Door (Black)
	9761984	Handle, Door (Biscuit)
4	9761344	Liner, Door
5	8522414	Seal, Window
6	9758162	Glass, Inner (2)
7	3186289	Frame, Glass
8	8272618	Insulation, Door
9	9761357	Retainer, Insul.
10	9761493	Hinge, Door (2)
11	9762479	Glass, Outer (White)
	9762480	Glass, Outer (Black)
	9762481	Glass, Outer (Biscuit)
12	8523165	Trim, Side (Black Right Hand)
	8523167	Trim, Side (Biscuit Left Hand)
	8523171	Trim, Side (Black Left Hand)
	8523172	Trim, Side (White Right Hand)
	8523166	Trim, Side (White Left Hand)
	8523173	Trim, Side (Biscuit Right Hand)
13	3196160	Screw
14	8523175	Trim, Lower (White)
	8523178	Trim, Lower (Biscuit)
	8523177	Trim, Lower (Black)
15	3196025	Clip, Glass (4)
16	W10031790	Screw
17	W10031780	Screw
19	9761517	Clip, Dr Mntg (2)
20	3196165	Screw
21	3195809	Bumper, Door (2)
22	3196794	Bracket, Window(2)
	3196897	Pin Kit-Dr Removal
	350930	Paint, Pressurized Spray (12 Oz.) (White)
	4392899	Paint, Touch-Up (1/2oz.) (Biscuit)
	4392900	Paint, Bulk (1 Qt.) (Biscuit (Uncut))
	4392901	Paint, Pressurized Spray (12 Oz.) (Biscuit)
	72017	Paint, Touch-Up (1/2oz.) (White)
	799344	Paint, Bulk (1 Qt.) (White (Uncut))
	3196154	Screw
	3196173	Screw
	313660	Clip, Wire Ground
	3184478	Cleaner, Glass
	206922	Parts Not Illustrated and Optional Parts (Not Included)
	241430	Paint, Pressurized Spray (12 Oz.) (Primer (White))
	261514	Foil, Aluminum Oven (18" X 25")
	261582	Insulation, Fiberglass (1-1/2" X 24" X 120")
	240132	Grease
	242756	Insulation, Fiberglass (2-1/2" X 22" X 120")
	285006	Touch-Up Self-Clean(1/2 Pt)
	9762952	Paint, Pressurized Spray (12 Oz.) (Superior Black)
	W10017440	Harness, Wire (Main)
	511873	Anti-Tip Kit
	799832	Paint, Touch-Up (1/2oz.) (White Porcelain (2 Oz.))
	9762428	Kit, Porcelain Repair (White)
		Harness,Wire Door Switch/SenSor31



Wow, it's **shocking** how much you've learned! You're ready to go on to the Basic Training Electric Range Quiz. Good luck!