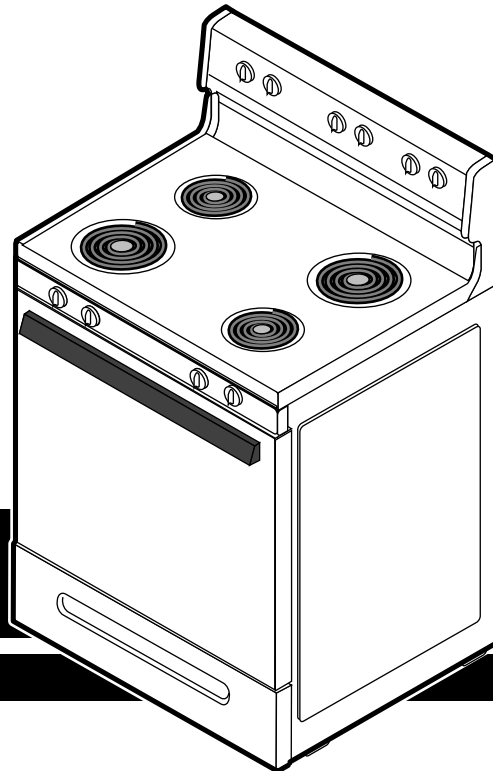


AM2

APARTMENT MAINTENANCE SERIES

SERVICING ELECTRIC RANGES



WORKBOOK
Part No. 4322213

WARNING

Electrical Shock Hazard

Disconnect the range's line cord plug from the wall receptacle before you service any of the components inside the unit. Failure to do this could result in violent electrical shock.

VOLTAGE CHECKS

When making voltage checks, be sure to observe the following precautions:

1. The floor must be dry. Water and dampness increase the chances of electrical shock.
2. Set the voltmeter correctly for the voltage being measured.
3. Touch only the insulated parts of the meter probes.
4. Touch the component terminals, or wires, with the meter probe tips only.
5. Touch the meter probe tips only on the terminals being checked. Touching other components could damage good parts.

PARTS QUALITY

An important step in the appliance repair procedure is the selection of FSP® (FACTORY SPECIFICATION PARTS) as replacements. Use of “fits-all,” or “look alike” parts could result in early parts failure, safety hazard, or substandard performance of a WHIRLPOOL appliance. It could also result in an unnecessary repeat of your repair efforts.

To be sure that the part(s) you purchase meet the exacting quality standards used to build every new WHIRLPOOL appliance, be sure to ask for genuine FSP replacement parts, as specified for your model. “FSP” is a registered trademark of WHIRLPOOL CORPORATION.

You can buy your genuine FSP replacement parts from any authorized WHIRLPOOL Parts Distributor.

WHIRLPOOL CORPORATION assumes no responsibility for any repair made on our products by anyone other than qualified TECH-CARE® Service Technicians.

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INTRODUCTION

This program is designed to teach the servicer basic skills in handling common service procedures for electric ranges. This program does not cover the diagnosis and repair of all range problems and components, (oven liner, wiring harness, etc.).

PROGRAM OBJECTIVE

Upon completion of this program, the participants will be able to identify the location of major range components, as well as diagnose problems, and remove and repair the components causing the problem.

INSTRUCTIONS

This program has the following sections:

- Major Component Locations
- Component Access & Testing
- Theory Of Operation
- Wiring Diagram & Diagnosis Charts

Complete the “Major Component Locations” section, and have the instructor review the “Performance Check” before continuing. If you have any questions, ask your instructor.

TOOLS YOU WILL NEED

Needle-Nose- Pliers

Screwdriver:

- Phillips.

Special Tools:

- Volt-Ohmmeter.

– Section 1 –

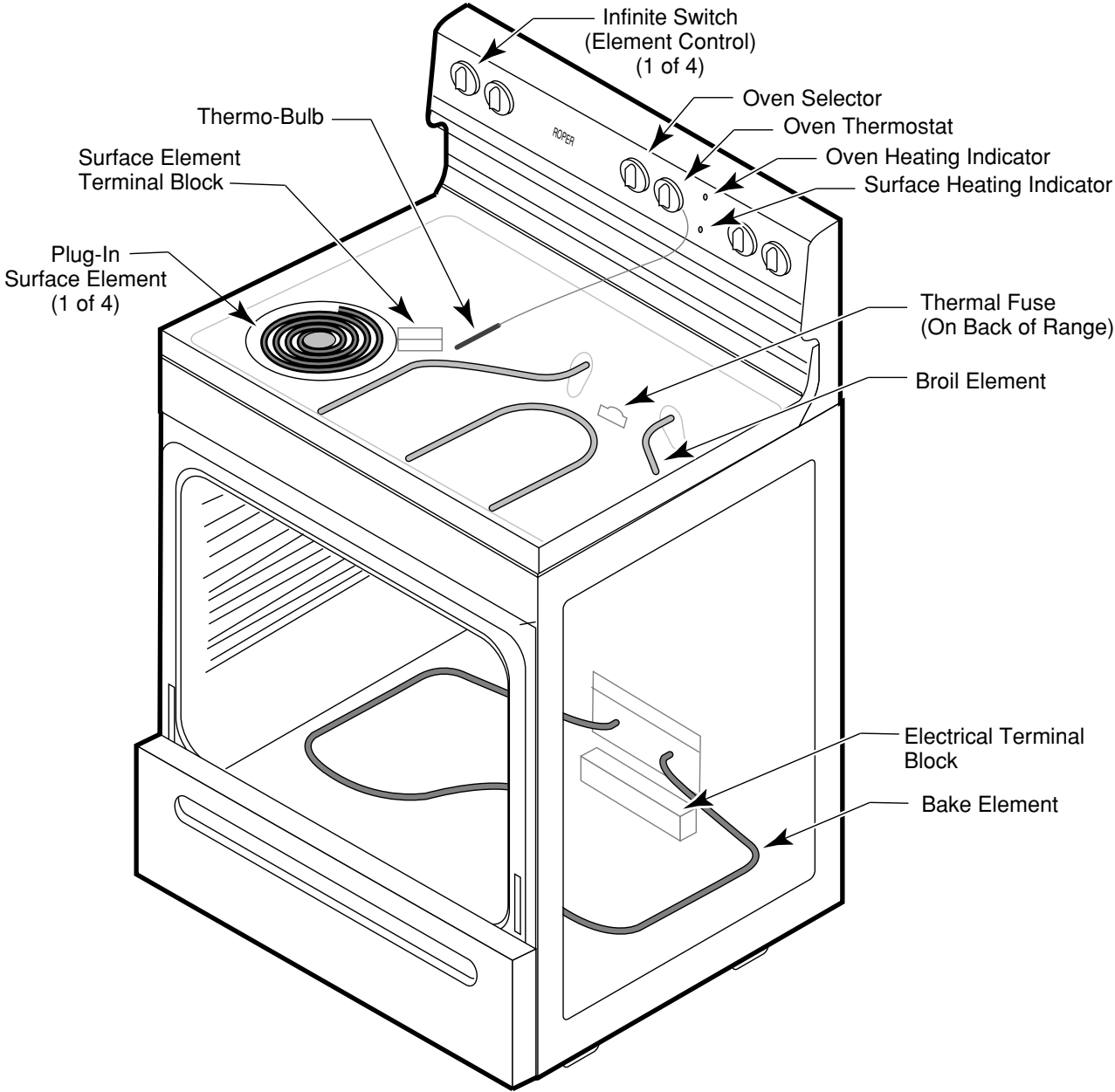
MAJOR COMPONENT LOCATIONS

OBJECTIVE:

To teach the student how to identify the location of each major component in an electric range. These components are the:

- Oven Heating Indicator
- Surface Heating Indicator
- Infinite Switch (Element Control)
- Oven Thermostat & Thermo-Bulb
- Oven Selector
- Thermal Fuse
- Plug-in Surface Element & Terminal Block
- Bake Element
- Broil Element

The illustration below shows the location of the major components in the electric range. Study the illustration until you feel that you can mark the location of these components on a drawing. When you are ready, proceed to the "Performance Check" on the next page.



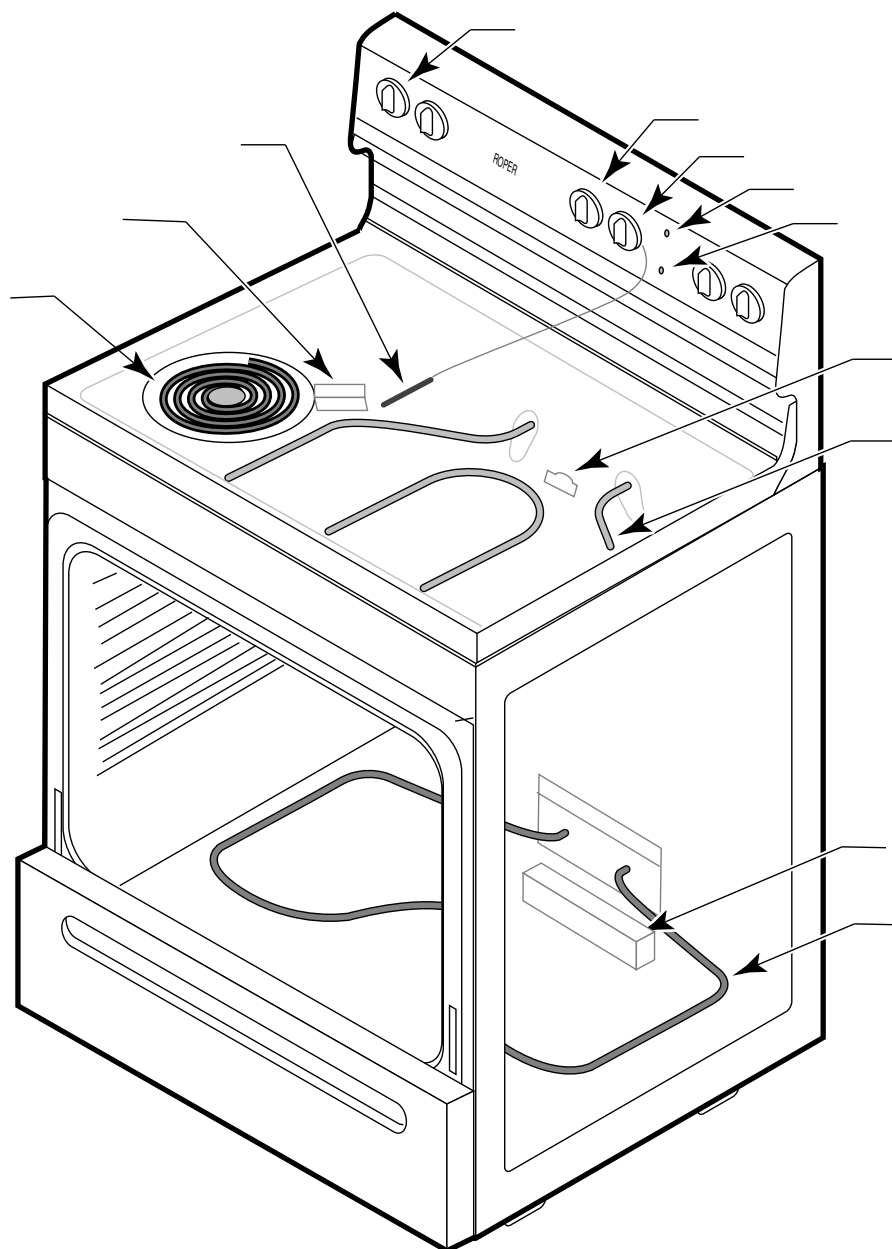
Performance Check

Locate the individual components in the illustration on the next page, and place the letter of each component name next to the arrow. Do not refer back to the example on page 2.

When you are finished, take the book to the instructor, and have the results recorded. After you are signed-off by the instructor, proceed to the next section.

You have four (4) minutes to complete this exercise.

- A. Oven Heating Indicator
- B. Surface Heating Indicator
- C. Infinite Switch (Element Control)
- D. Oven Thermostat & Thermo-Bulb
- E. Oven Selector
- F. Thermal Fuse
- G. Plug-in Surface Element
- H. Surface Element Terminal Block
- I. Broil Element
- J. Bake Element
- K. Electrical Terminal Block



– Section 2 –

COMPONENT ACCESS & TESTING

OBJECTIVES:

Given the customer complaint about an electric range problem, the student should be able to properly diagnose the problem, and then remove and replace the defective component. The service procedure for each of the following components is discussed in this section:

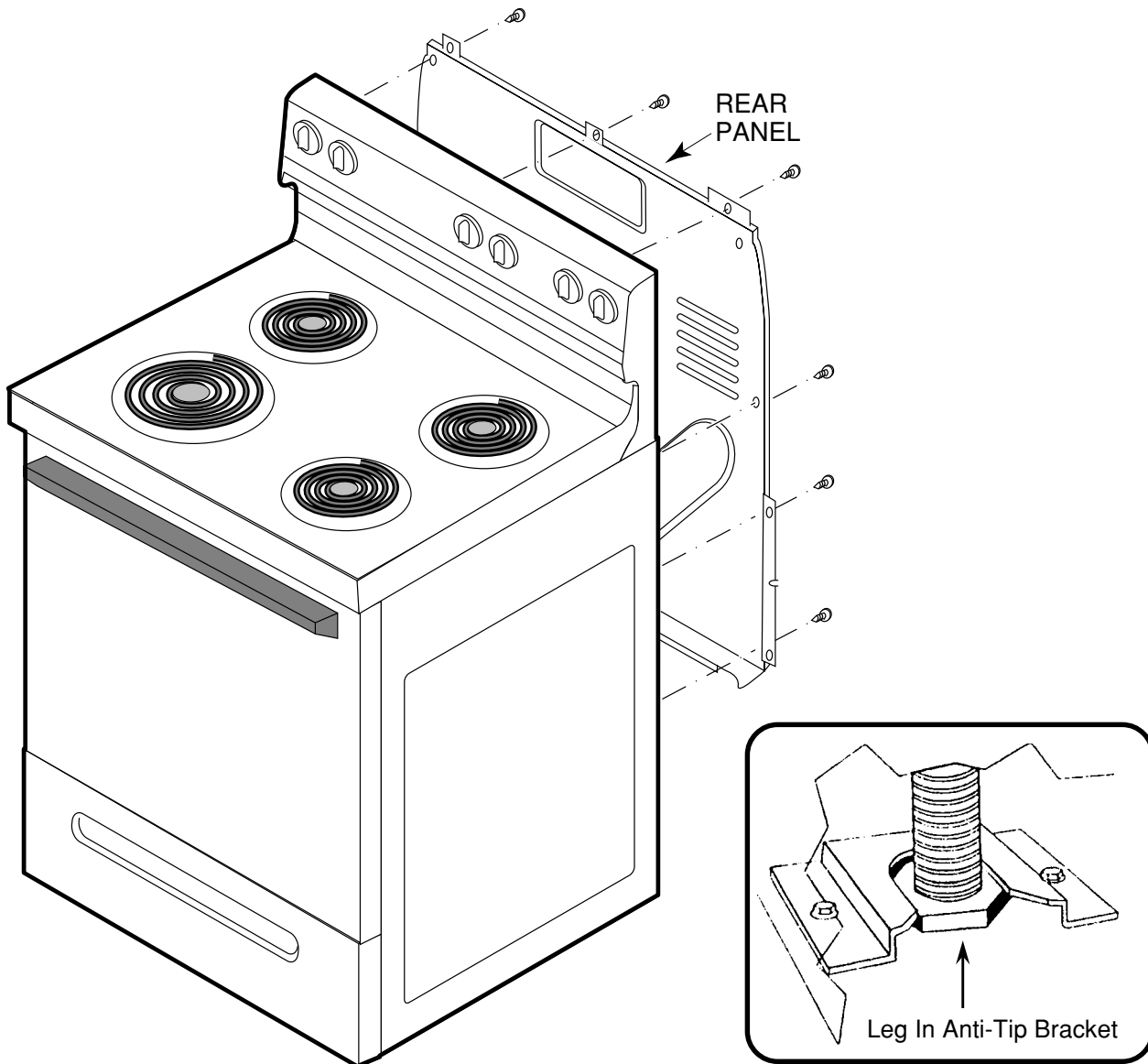
- Oven Heating Indicator
- Surface Heating Indicator
- Infinite Switch (Element Control)
- Oven Thermostat & Thermo-Bulb
- Oven Selector
- Thermal Fuse
- Plug-in Surface Element & Terminal Block
- Bake Element
- Broil Element

MOVING THE RANGE AND REMOVING THE REAR PANEL

1. Unplug the range.

CAUTION: When you work on the range, be careful when handling the sheet metal parts. Sharp edges may be present, and you can cut yourself if you are not careful.

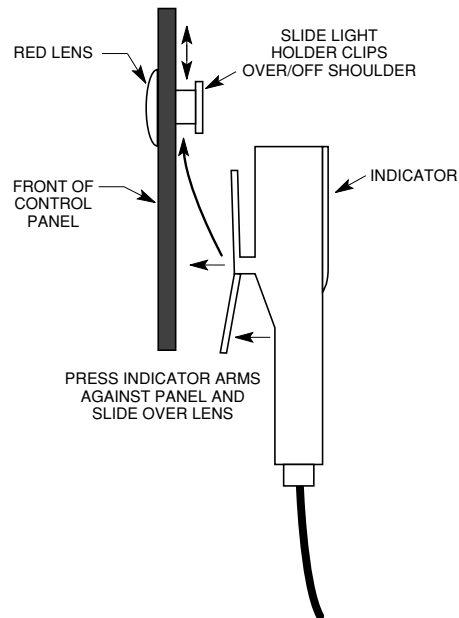
2. To access the rear panel, pull the range forward so that the rear foot disengages from the anti-tip bracket.
3. Remove the rear panel from the range by removing the mounting screws.



IMPORTANT NOTE: When moving the range back into place, make sure that the rear foot engages in the anti-tip bracket. Check to make sure that it is engaged properly by pulling forward on the top of the range. The anti-tip bracket must be installed. If parts are required to install a bracket, call the "Whirlpool Consumer Assistance Center" at: **1-800-253-1301**.

REMOVING THE OVEN HEATING INDICATOR OR SURFACE HEATING INDICATOR

1. Unplug the range.
2. Remove the rear panel from the range.
3. Slide the indicator off the red lens and disconnect the indicator wires.

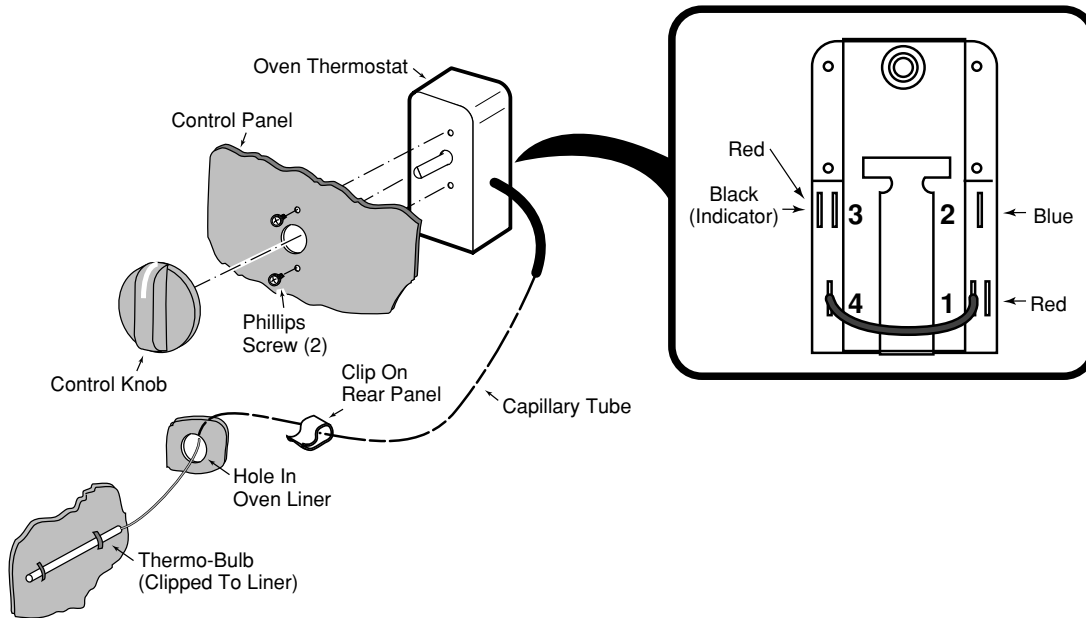


TESTING THE INDICATOR

1. Set the ohmmeter to the R x 10K scale.
2. If not already done, disconnect the indicator light.
3. Touch the meter leads to the wire connectors of the indicator. The meter should indicate $24\text{ k}\Omega$ ($24,000\ \Omega$) $\pm 5\text{ k}\Omega$.

REMOVING THE OVEN THERMOSTAT & THERMO-BULB

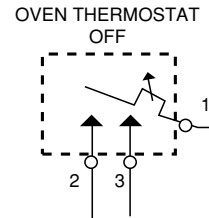
1. Unplug the range.
2. Remove the rear panel from the range.
3. Remove all of the wires from the oven thermostat terminals.
4. Remove the control knob and the two phillips screws from the thermostat.
5. Unclip the thermo-bulb from the oven liner.
6. From the rear of the unit, pull the thermo-bulb and capillary tube through the oven liner, and unclip it from the panel.



TESTING THE OVEN THERMOSTAT

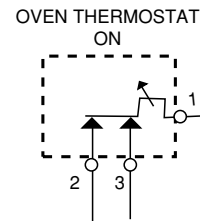
1. Set the ohmmeter to the R x 1 scale.
2. Turn the oven thermostat to OFF.
3. Touch the meter leads to the following terminal connectors. The meter should indicate as follows:

<u>TERMINALS</u>	<u>RESISTANCE</u>
1 - 2	Infinite (Open)
1 - 3	Infinite (Open)
2 - 3	Infinite (Open)

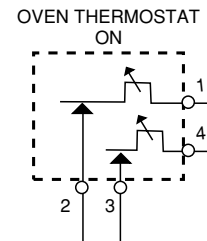
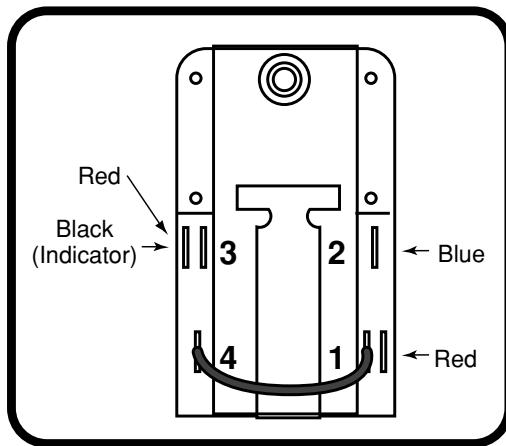


4. Turn the oven thermostat to 350°.
5. Remove the jumper wire from thermostat terminal 1.
6. Touch the meter leads to the following terminal connectors. The meter should indicate as follows:

<u>TERMINALS</u>	<u>RESISTANCE</u>
1 - 2	0 Ω (Closed)
3 - 4	0 Ω (Closed)



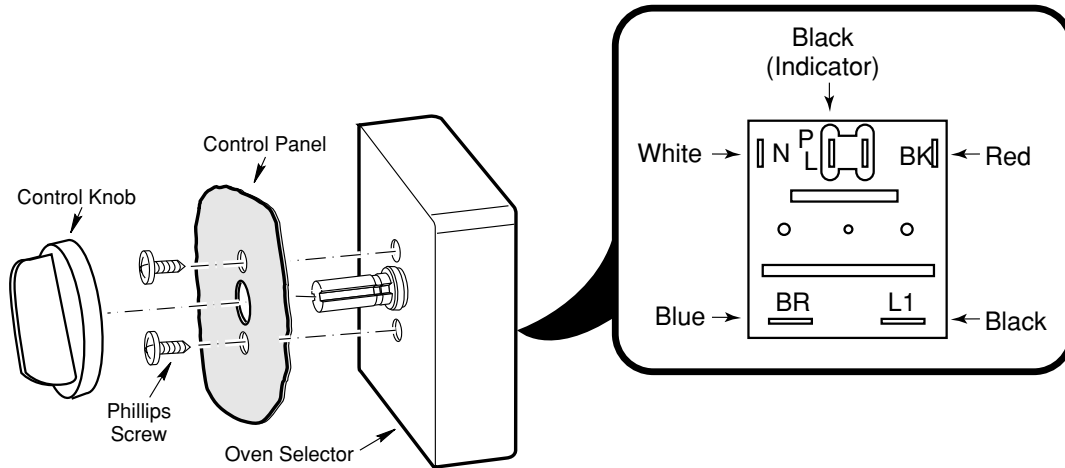
Shown In
Wiring Diagram



Actual Switch
Operation

REMOVING THE OVEN SELECTOR

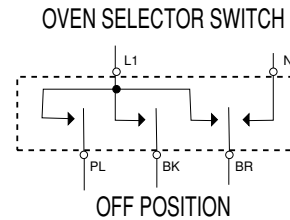
1. Unplug the range.
2. Remove the rear panel from the range.
3. Remove all of the wires from the oven selector terminals.
4. Remove the control knob and the two phillips screws from the oven selector.



TESTING THE OVEN SELECTOR SWITCH

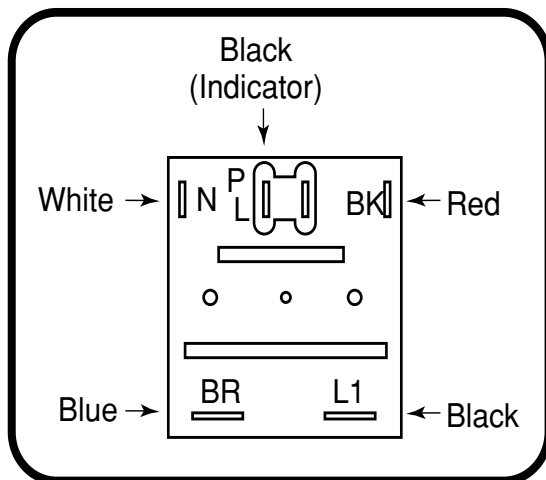
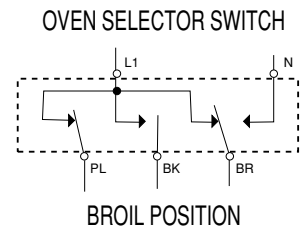
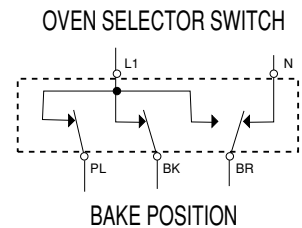
1. Set the ohmmeter to the R x 1 scale.
2. Turn the oven selector switch to OFF.
3. Touch the meter leads to the following terminal connectors. The meter should indicate as follows:

<u>TERMINALS</u>	<u>RESISTANCE</u>
L1 - PL	Infinite
L1 - BK	Infinite
L1 - BR	Infinite



4. Turn the oven selector switch to the following positions and touch the meter leads to the indicated terminal connectors. The meter should indicate as follows:

<u>SWITCH POSITION</u>	<u>TERMINALS</u>	<u>RESISTANCE</u>
Bake	L1 - PL	0 Ω
Bake	L1 - BK	0 Ω
Bake	N - BR	0 Ω
Broil	L1 - PL	0 Ω
Broil	L1 - BR	0 Ω

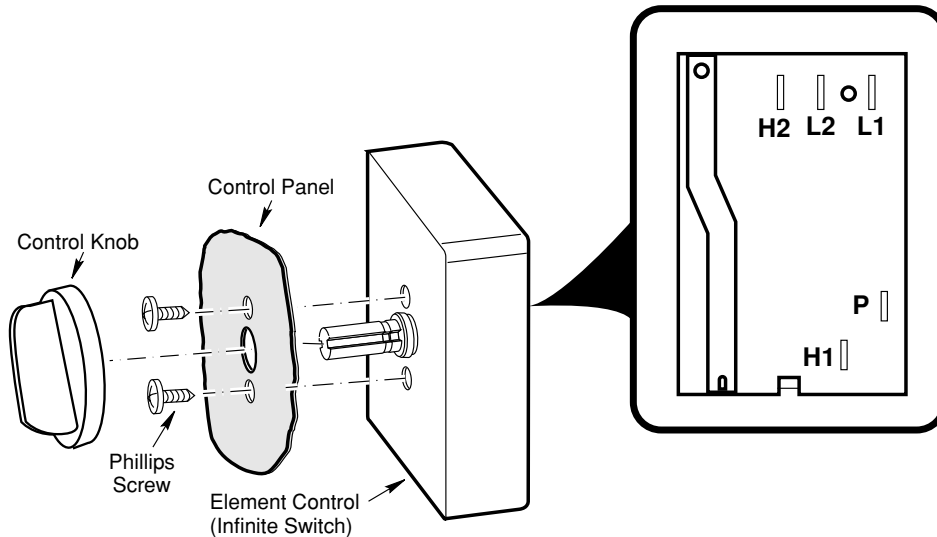


SELECTOR SWITCH OPERATION	
<i>POSITION</i>	<i>CONNECTION</i>
OFF	No Connection
Bake	L1 - BK, L1 - PL, N - BR
Broil	L1 - BR, L1 - PL

(From Wiring Diagram)

REMOVING AN INFINITE SWITCH (ELEMENT CONTROL)

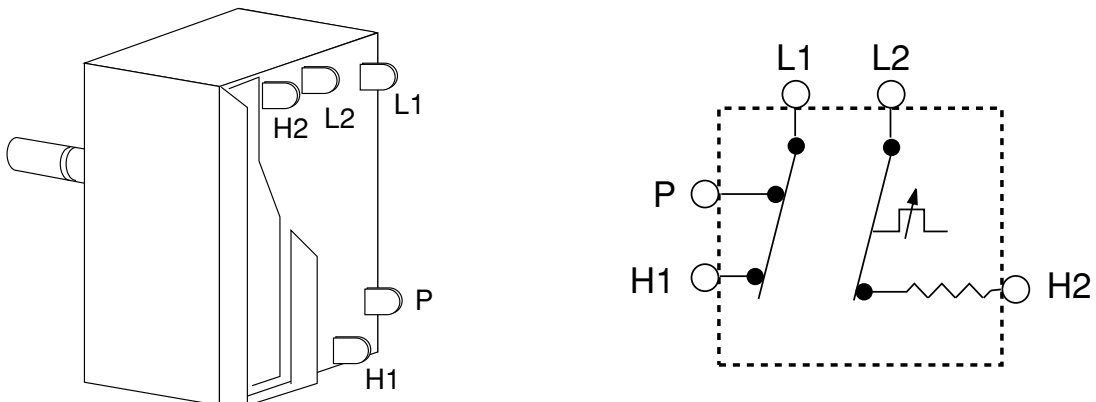
1. Unplug the range.
2. Remove the rear panel from the range.
3. Remove all of the wires from the switch terminals.
4. Remove the control knob and the two phillips screws from the switch.



TESTING THE ELEMENT CONTROL

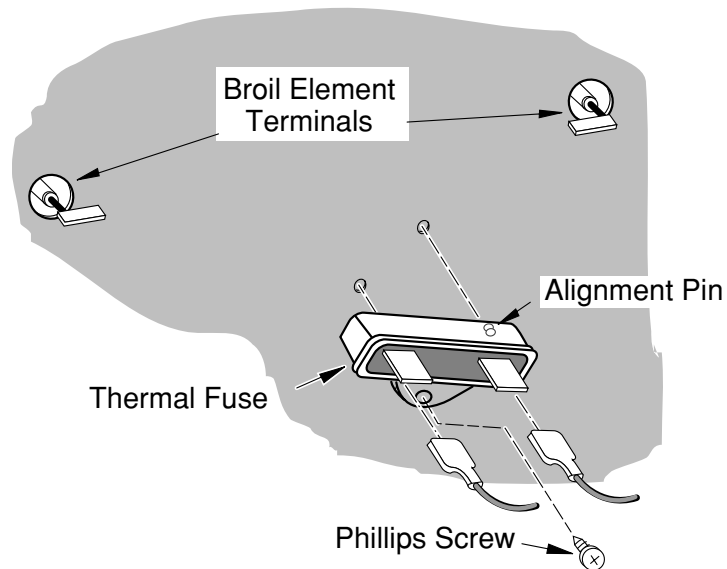
1. Set the ohmmeter to the R x 1 scale.
2. With no power applied, disconnect the wires from the control terminals. Turn the control to the "HI" setting, and you should obtain continuity readings between the following terminals:

- L1 and P
- L1 and H1
- P and H1
- L2 and H2



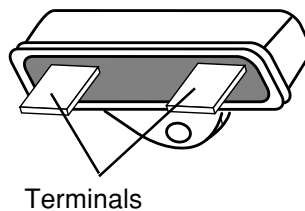
REMOVING THE THERMAL FUSE

1. Unplug the range.
2. Remove the rear panel from the range.
3. Remove all of the wires from the thermal fuse terminals.
4. Remove the phillips screw from the thermal fuse.



TESTING THE THERMAL FUSE

1. Set the ohmmeter to the R x 1 scale.
2. With no power applied, touch the leads of the ohmmeter to the terminals of the thermal fuse, and the meter should show continuity (closed contacts).

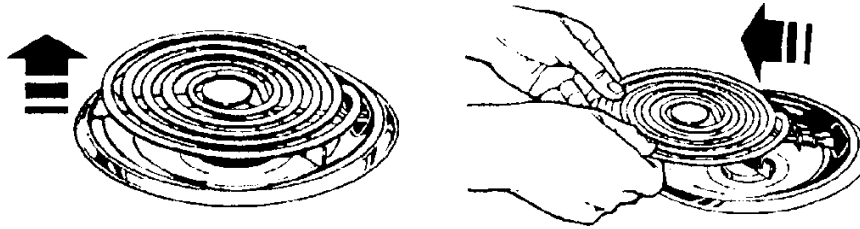


Current Rating = 25 amp @ 120 VAC & 20 amp @ 250 VAC.
Trip Point = 184°C (363°F).

Fuse is normally closed and is not resettable.

REMOVING THE PLUG-IN SURFACE ELEMENT

1. Unplug the range.
2. Push and lift the edge of the plug-in surface element opposite the terminal block just enough to clear the reflector bowl, and then pull the element prongs out of the terminal block.

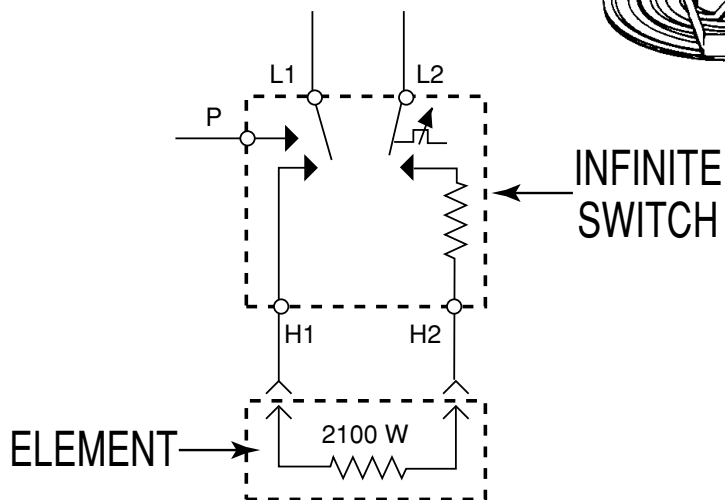
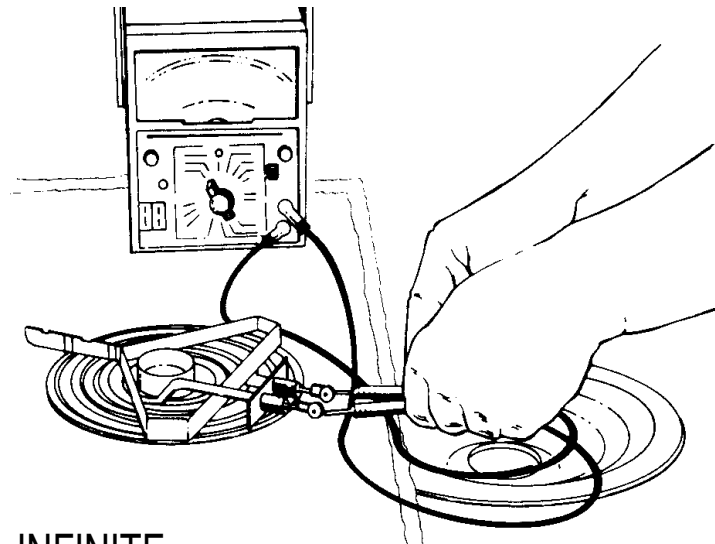


TESTING THE PLUG-IN SURFACE ELEMENT

1. Set the ohmmeter to the R x 1 scale.
2. With the element removed, touch the meter leads to ends of the prongs. The meter should indicate the following (approximate $\pm 20\%$) resistance for the indicated element:

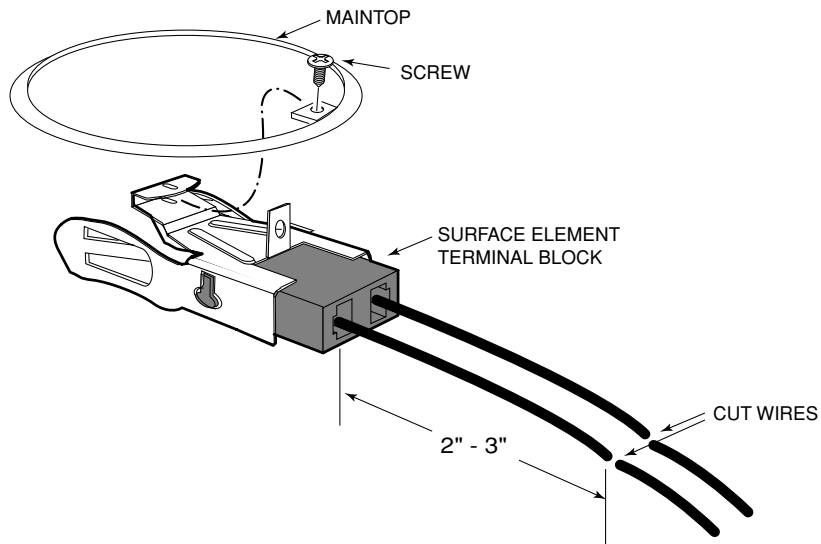
8" Element = 27 Ω

6" Element = 45 Ω



REMOVING A SURFACE ELEMENT TERMINAL BLOCK

1. Unplug the range.
2. Remove the surface element from the terminal block.
3. Remove the screw from the terminal block you wish to service, unhook it from the maintop, and remove it.
4. Cut the two wires approximately 2" - 3" from the edge of the terminal block.



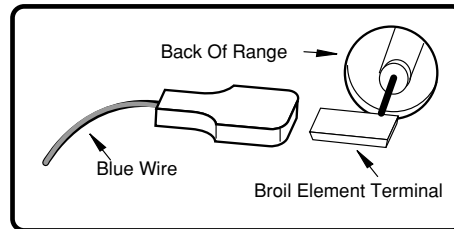
5. Use the "Surface Unit Terminal Block Replacement" (**#330031**), and follow the instructions contained in the package to install the new terminal block.

TESTING A SURFACE ELEMENT TERMINAL BLOCK

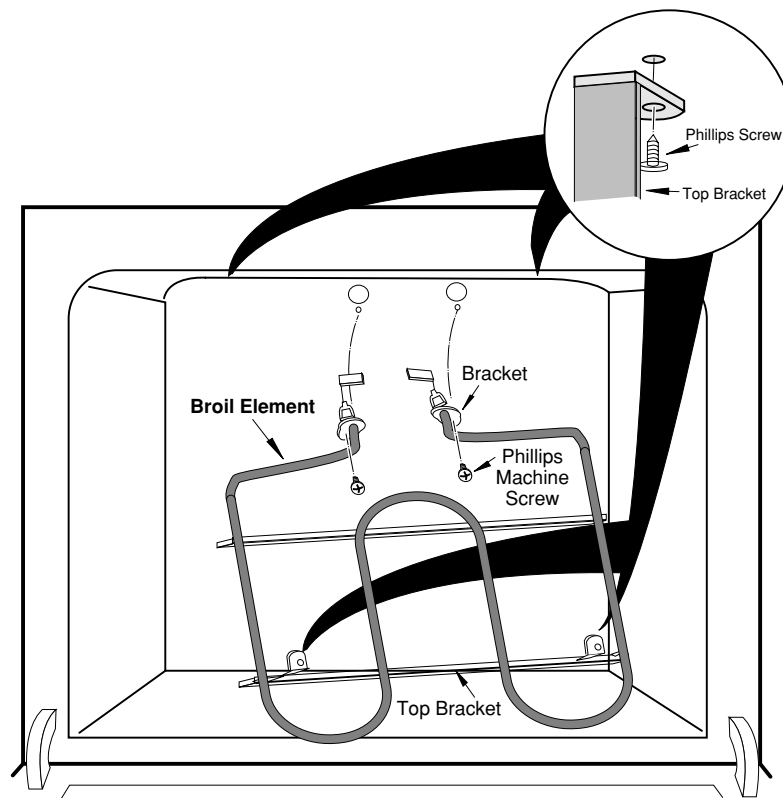
1. Visually inspect the terminal block for the following defects:
 - a) Cracked block.
 - b) Melted block.
 - c) Internal arcing (carbon buildup around terminals).
 - d) Burnt or charred wires.
 - e) Loose connectors.

REMOVING THE BROIL ELEMENT

1. Unplug the range.
2. Remove the oven racks.
3. Remove the rear panel from the range.
4. From behind the range, disconnect the wire connectors from the broil element terminals.



5. From inside the oven, remove the phillips screws from the brackets at the top of the broil element and from the mounting brackets, then pull the element forward so that the flag terminals clear the holes, and remove it.

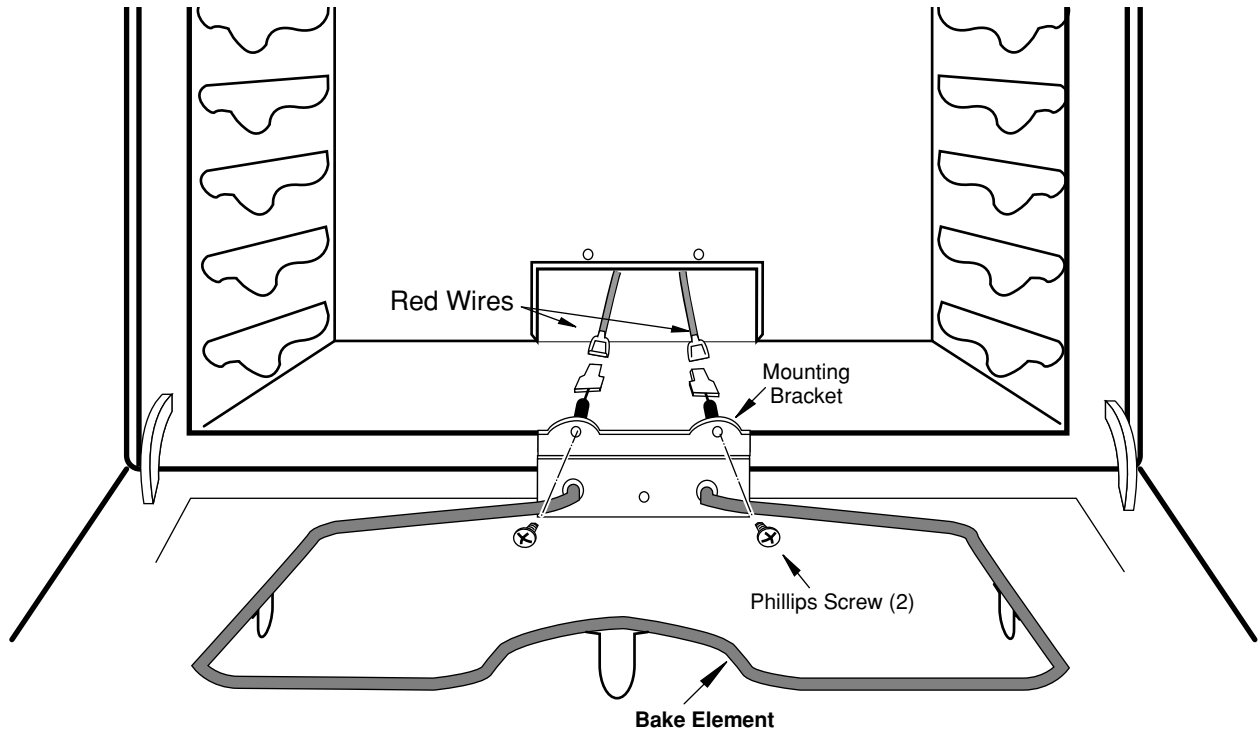


TESTING THE BROIL ELEMENT

1. Set the ohmmeter to the R x 1 scale.
2. Remove the oven racks and the broil element.
3. Touch the meter leads to the terminal connectors of the broil element. The meter should indicate $17 \Omega \pm 20\%$.

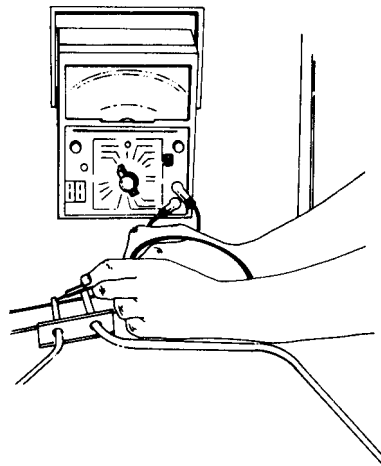
REMOVING THE BAKE ELEMENT

1. Unplug the range.
2. Remove the lower oven racks.
3. Remove the phillips screws from the bake element bracket, pull the bake element forward, and disconnect the wire connectors from the terminals.



TESTING THE BAKE ELEMENT

1. Set the ohmmeter to the R x 1 scale.
2. Remove the oven racks and the bake element.
3. Touch the meter leads to the terminal connectors of the bake element. The meter should indicate 24 ohms $\pm 20\%$.



– Section 3 –

THEORY OF OPERATION

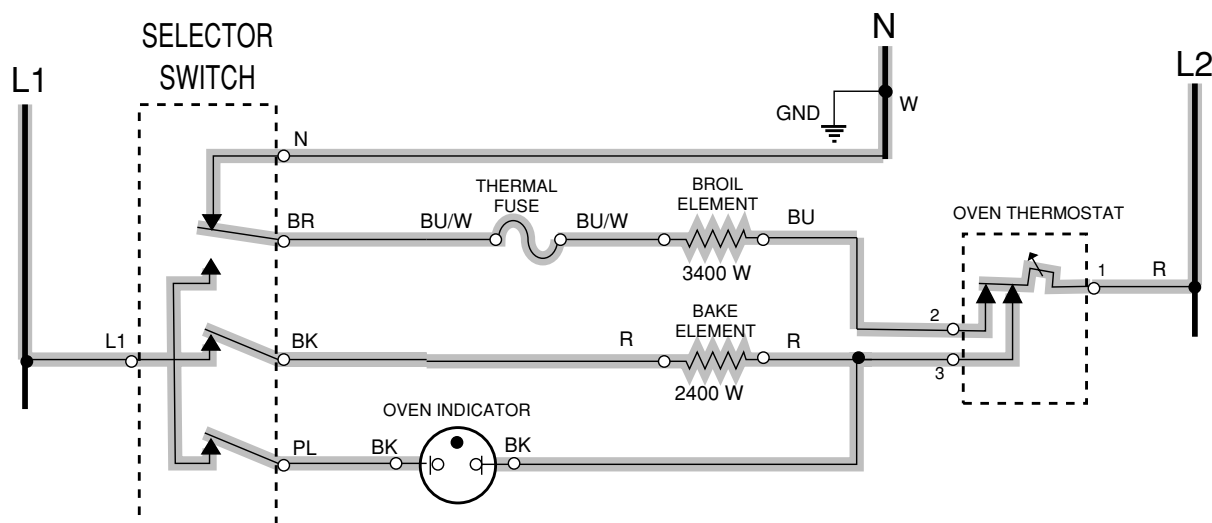
The Bake Function

When the range is plugged in, line voltage from the **L1** side of the line is available to the Selector Switch. To start a BAKE function, set the controls as follows:

- The Oven Selector to BAKE.
- The Oven Thermostat to the desired temperature.

As the selector switch is set, contacts within the switch are closed and provide a circuit to the **L2** side of the line. The following events occur:

- The circuit begins at the **L1** side of the line and goes to the **PL** terminal of the selector switch, which creates a potential circuit for the OVEN “ON” indicator. The oven thermostat also closes a contact to provide a completed circuit to the **L2** side of the line. 240 Volts of alternating current (VAC) is available to run the “ON” indicator light.
- The selector switch also creates a circuit from **L1** to the **BK** terminal and activates the BAKE element through the oven thermostat to **L2**. 240 VAC is also available to operate the bake element.
- When the BROIL element is activated, it provides alternate heat during the bake function. It is not necessary to activate the BROIL element at full power during the bake cycle, because it only needs to **brown the food**. To operate the broil element at less than full power, the thermostat and selector switch provide a circuit to the NEUTRAL side of the line. 120 VAC is provided to the broil element through the closed thermostat contacts and the **BR** to **N** contacts of the selector switch.



- A THERMAL FUSE, located on the rear of the range (see page 2), is installed in the BROIL circuit to prevent excessive amounts of heat buildup, which would occur if the thermostat failed. If temperatures at the back of the range exceed 184°C (363°F), the thermal fuse will open, and interrupt the operation of the broil element. The Bake element will continue to operate. The thermal fuse is non-resettable and it may not be detected as being defective until a Broil cycle is programmed by the customer.

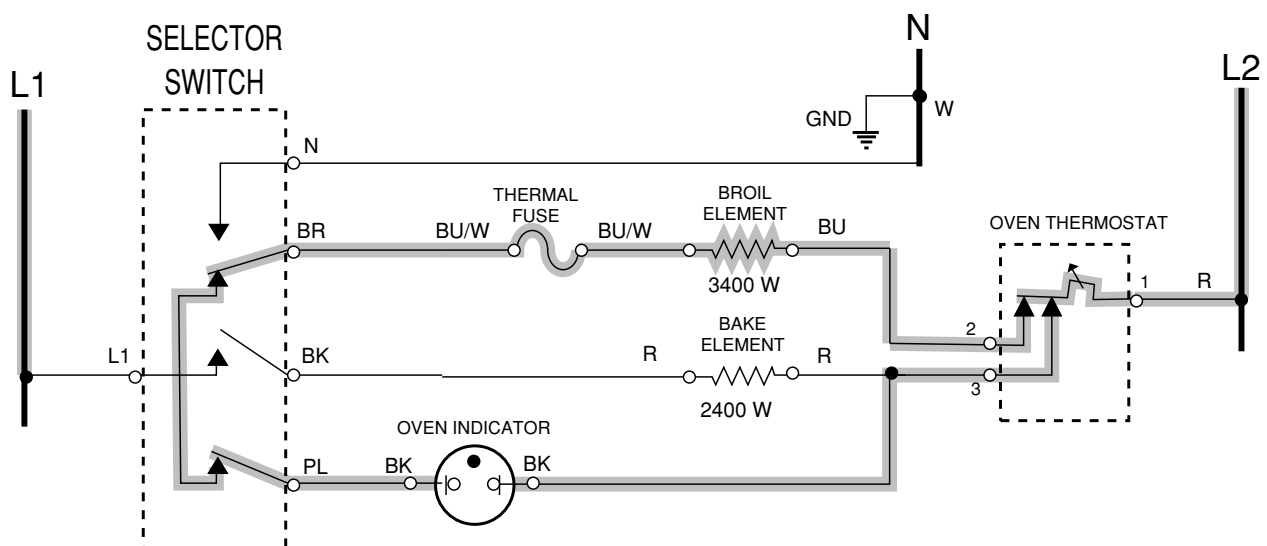
The Broil Function

To start the BROIL function, set the controls as follows:

- The Oven Selector Switch to BROIL
- The Oven Thermostat to BROIL.

As the selector switch is set, contacts within the switch are closed, and provide a circuit to the **L2** side of the line. The following events occur:

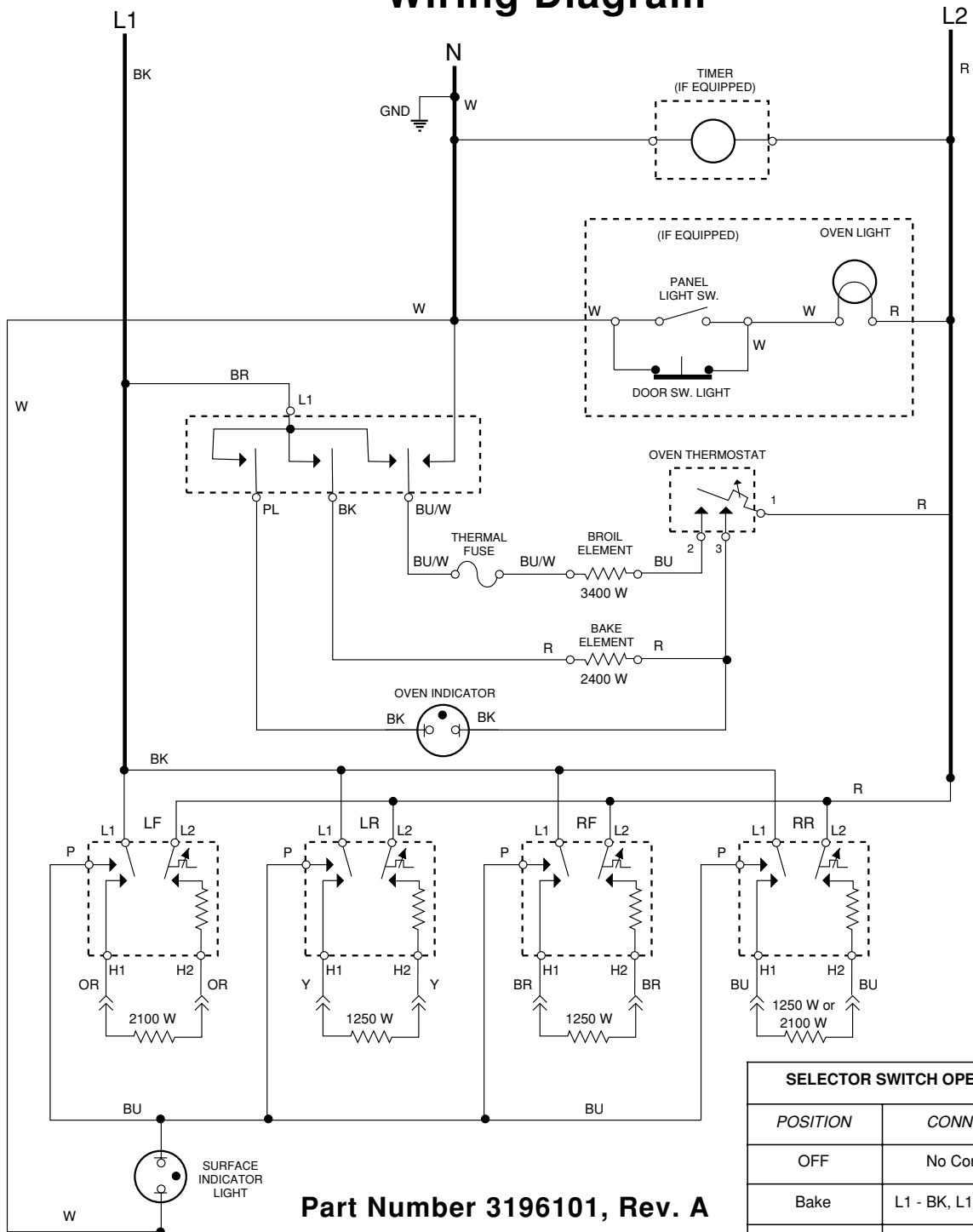
- As in the BAKE mode, the oven “ON” indicator is activated through the **L1-to-PL contacts** of the selector switch and the oven thermostat contact, to the **L2** side of the line. 240 volts of alternating current (VAC) is available to the “ON” indicator light.
- The BROIL element must be **activated at full power** during the BROIL function. The circuit begins at the L1 side of the line, and travels through selector switch contacts **L1-to-BR**, through the THERMAL FUSE and broil element and the closed contacts of the thermostat, to the **L2** side of the line.
- The bake element is not used during the BROIL function.



– Section 4 –

WIRING DIAGRAM & DIAGNOSIS CHARTS

Wiring Diagram



Part Number 3196101, Rev. A

SELECTOR SWITCH OPERATION	
POSITION	CONNECTION
OFF	No Connection
Bake	L1 - BK, L1 - PL, N - BR
Broil	L1 - BR, L1 - PL

Diagnosis Charts

! WARNING

Certain procedures in this section require electrical tests or measurements while power is applied to the range. Exercise extreme caution at all times. If test points are not easily accessible, unplug the range, attach the test equipment, and reapply power for the test.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Oven element smokes when first turned on.	This is normal on a new range. The factory-applied protective coating is burning off. Substance (e.g. food or other material) has spilled onto the element.	Protective coating will burn off in several minutes. Fumes are nontoxic. Let element cool then clean according to Use & Care instructions.
Oven element does not heat.	No line voltage. Loose or bad wiring. Defective element.	Check circuit breaker. Check wiring (see wiring diagram). Check element.
Cooktop element barely heats.	Low line voltage. Loose or bad wiring connection at element or terminal block. Defective cooktop control switch.	Line voltage should be minimum 220-volts ± 10 VAC. If necessary, electrician should repair cause for low line voltage. Check wiring (see wiring diagram). Check switch.
Cooktop element will not heat higher than low-medium.	Low line voltage. Defective cooktop element.	Line voltage should be minimum 220-volts ± 10 VAC. Electrician should repair cause for low line voltage. Check element.
Cooktop element heats up normally, but drops to lower setting automatically.	Customer using improper cookware. Defective cooktop control switch.	Evaluate suitability of cookware. Check switch.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Surface indicator light does not operate.	Loose or bad wiring to indicator light. Defective indicator light. Defective cooktop control switch.	Check wiring (see wiring diagram). Check indicator light. Check switch.
Oven will not bake.	Bake element is defective. Defective selector switch. Loose or bad wiring.	Check bake element. Check switch continuity. Check wiring (see wiring diagram).
Oven does not broil.	Broil element is defective. Defective selector switch. Loose or bad wiring.	Check broil element. Check switch continuity. Check wiring (see wiring diagram).
Overheating or "runaway" oven.	Defective thermostat. Defective thermal fuse.	Check thermostat. Change thermal fuse.
Premature burnout of bake element.	Improper use of oven (e.g. being used to heat the home).	Use oven for baking only.
Damaged oven door gasket.	Improper cleaning.	Do not use harsh abrasives or scouring pads. See Use & Care instructions.
Food is burnt on bottom but not cooked on top.	Defective broil element. Defective selector switch. Defective thermal fuse. Defective thermostat. Loose or bad wiring.	Check broil element. Check selector switch. Replace thermal fuse. Check thermostat. Check wiring (see wiring diagram).