## ⚠WARNING

**Electrical Shock Hazard**

**Disconnect power before servicing.**

**Replace all parts and panels before operating.**

**Failure to do so can result in death or electrical shock.**

### Electrostatic Discharge (ESD) Sensitive Electronics

ESD problems are present everywhere. ESD may damage or weaken the electronic control assembly. The new control assembly may appear to work well after repair is finished, but failure may occur at a later date due to ESD stress.

- Use an anti-static wrist strap. Connect wrist strap to green ground connection point or unpainted metal in the appliance

  *- OR -*

  touch your finger repeatedly to a green ground connection point or unpainted metal in the appliance.
- Before removing the part from its package, touch the anti-static bag to a green ground connection point or unpainted metal in the appliance.
- Avoid touching electronic parts or terminal contacts; handle electronic control assembly by edges only.
- When repackaging failed electronic control assembly in anti-static bag, observe above instructions.

## PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

**a.** Do not operate or allow the oven to be operated with the door open.

**b.** Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:

1. Interlock Operation
2. Proper Door Closing
3. Seal and Sealing Surfaces (Arcing, Wear & Other Damage)
4. Damage to or Loosening of Hinges & Latches
5. Evidence of Dropping or Abuse

**c.** Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, waveguide or transmission line and cavity for proper alignment, integrity and connections.

**d.** Any defective or misadjusted components in the interlock, monitor, door seal, and microwave generation, and transmission systems shall be repaired, replaced, or adjusted by procedures described in service manual before the oven is released to the owner.

**e.** A microwave leakage check to verify compliance with the Federal performance standard should be performed on each oven prior to release to the owner.

**f.** Do not attempt to operate the oven if the door glass is broken.

## DIAGNOSTICS

Before servicing, perform the following checks:

- The most common cause for control failure is corrosion on connectors. Therefore, disconnecting and reconnecting wires will be necessary throughout test procedures.
- Check all connections before replacing components, looking for broken or loose wires, failed terminals, or wires not pressed into connectors far enough.
- All tests/checks should be made with a VOM or DVM having a sensitivity of 20,000 ohms per volt DC or greater.
- Resistance checks must be made with power cord unplugged from outlet, and with wiring harness or connectors disconnected.

## FAILURE/ERROR DISPLAY CODES

NOTES:

- Always disconnect power before touching internal parts of the oven!
- Upon replacement, immediately return old electronic oven control using the mailing label supplied with each new control.
- The following codes are not visible from the front panel. The failure code is displayed on the side of the control that is hidden behind the membrane switch. The control will need to be unscrewed from panel to visually see the hidden display.

| FAULT CODE | ERROR CODE | MEANING OF FAILURE CODE | RECOMMENDED REPAIR PROCEDURE |
|---|---|---|---|
| F0 | E0 | Default F code – no failure | Will only be displayed if user presses and holds UPPER OFF key for 5 seconds and there is no pre-existing fault. Press CANCEL again to clear display. |
| F1 | E0, E1, E2 | Electronic control malfunction | 1. Disconnect power or unplug oven.<br>2. Check jumper wire harness on P5 connector. If OK, replace control. |
| | E3, E4, E5 | Electronic control malfunction | 1. Disconnect power or unplug oven.<br>2. Replace control. |
| F2 | E0 or E1 | Keypad keytail not connected | 1. Disconnect power or unplug oven.<br>2. Check keypad connector for firm connection.<br>3. Press CANCEL. If error code returns, replace keypad. |
| | E3 | Key held down too long, or key is shorted | |
| F3 | E0 | Temp. Sensor opened (lower cavity) | 1. Disconnect power or unplug oven.<br>2. Check resistor in harness between P5-8 to P5-9. Resistance should measure between 1000 Ω –1250 Ω. If not in this range, replace harness.<br>3. If resistance value and connections are good, replace control. |
| | E1 | Temp. Sensor shorted (lower cavity) | |
| | E2 | Temp. Sensor opened (microwave) | 1. Disconnect power or unplug oven.<br>2. Check microwave sensor connection.<br>3. Measure sensor resistance (280k Ω @ 70° F [21° C], 1k Ω @ 392° F [200° C]).<br>4. If resistance is not valid replace sensor.<br>5. If sensor resistance and connections are good, then check for welded-closed relays on the control. If relay shorted, replace control. |
| | E3 | Temp. Sensor shorted (microwave) | |
| F4 | E0 | Function not used | 1. Disconnect power or unplug oven.<br>2. Replace control. |
| F5 | E0 | Function not used | 1. Disconnect power or unplug oven.<br>2. Replace control. |
| F6 | E0 | Function not used | 1. Disconnect power or unplug oven.<br>2. Replace control. |
| | E1 | Microwave cavity over temperature during cooking | 1. Disconnect power or unplug oven.<br>2. Check microwave sensor connection.<br>3. Measure sensor resistance (280k Ω @ 70° F [21° C], 1k Ω @ 392° F [200° C]).<br>4. If resistance is not valid replace sensor.<br>5. If sensor resistance and connections are good, then check for welded-closed relays on the control. If relay shorted, replace control. |
| F8 | E0, E1, E2, E3, E4 | Function not used | 1. Disconnect power or unplug oven.<br>2. Replace control. |

## MICROWAVE OVEN POWER OUTPUT TEST

The power output of the magnetron can be measured by the following test: (for accurate results, the line voltage must be 120 VAC and the oven cavity must be clean).

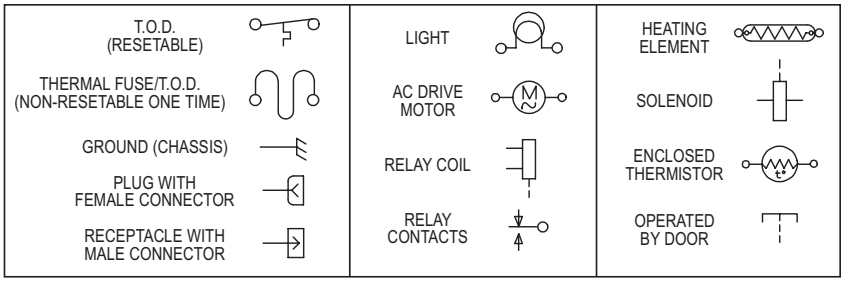
1. Fill a glass measuring cup with 16 oz. (453cc) of tap water. Stir the thermometer through the water until the temperature stabilizes.
2. Place the cup of water in the center of the oven. Operate on HIGH for 60 seconds.
3. Stir the thermometer through the water and record the maximum temperature.
4. Subtract the cold water temperature from the hot water temperature. The normal result should be a 20–38° F (11.1–21.1° C) rise in temperature.

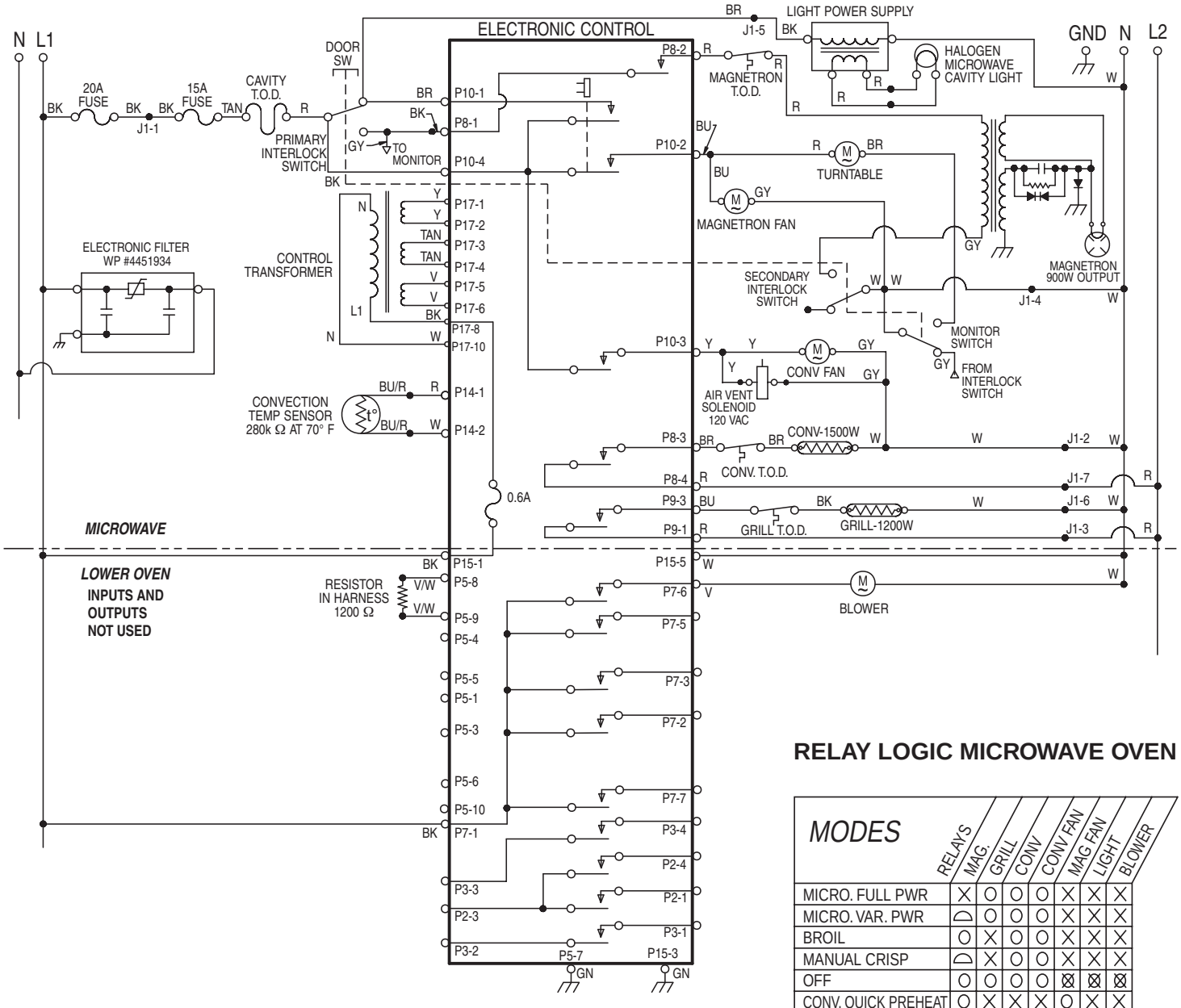
- **NOTE:** Less than a 20° F (11.1° C) temperature rise may indicate an operating voltage of less than 110 volts or a low power output from the magnetron. Cooking time can be adjusted to compensate for either circumstance. Replace the magnetron only if the water temperature rise indicates a power output well beyond the normal result.

# WIRE HARNESS SCHEMATIC

## NOTES:

- DOTS INDICATE CONNECTIONS OR SPLICES.
- CIRCUIT SHOWN IN STANDBY/OFF MODE WITH MICROWAVE OVEN DOOR OPEN.




## RELAY LOGIC MICROWAVE OVEN

| MODES / RELAYS | MAG. | GRILL | CONV | CONV FAN | MAG FAN | LIGHT | BLOWER |
|---|---|---|---|---|---|---|---|
| MICRO. FULL PWR | X | O | O | O | X | X | X |
| MICRO. VAR. PWR | ⌓ | O | O | O | X | X | X |
| BROIL | O | X | O | O | X | X | X |
| MANUAL CRISP | ⌓ | X | O | O | X | X | X |
| OFF | O | O | O | O | ⊠ | ⊠ | ⊠ |
| CONV. QUICK PREHEAT | O | X | X | X | O | X | X |
| CONV. COOK | O | ⌓ | ⊠ | X | O | X | X |
| ULTIMA COOK™ | ⌓ | ⌓ | ⊠ | X | X | X | X |

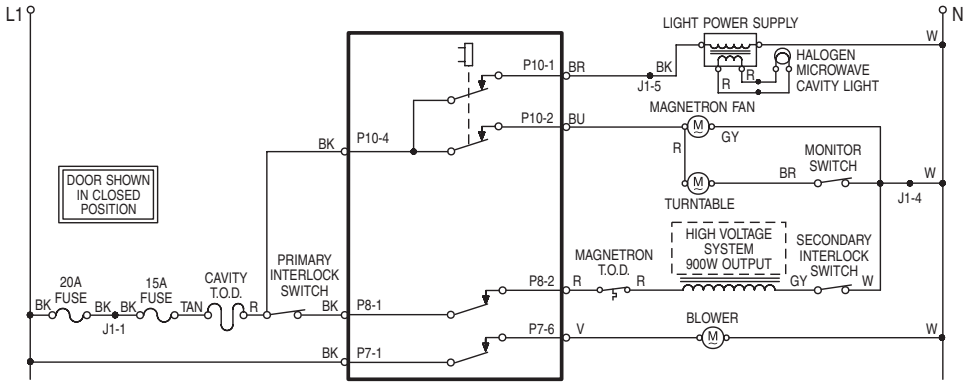
## RELAY LOGIC KEY

O – OFF
X – ON
⌓ – CYCLING (MAX. PERIOD = 23 SEC.)
⊠ – ON OR OFF

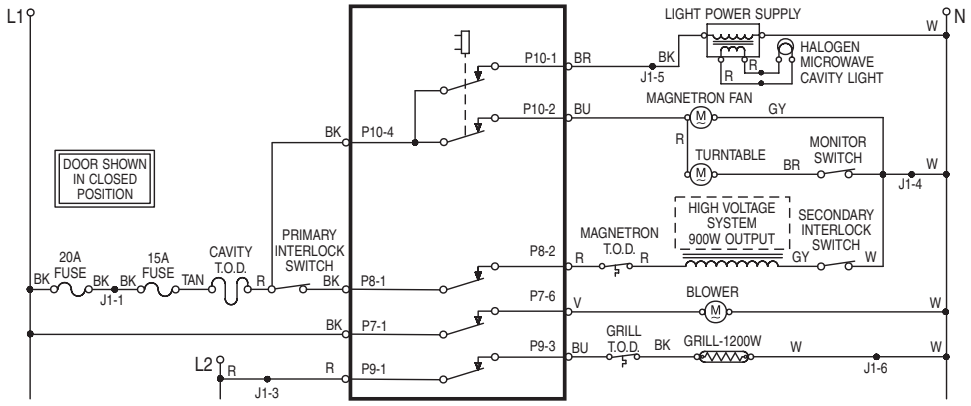
# MICROWAVE STRIP CIRCUITS

The following individual circuits are for use in diagnosis.
Do not continue with the diagnosis of the appliance if a fuse is blown, a circuit breaker is tripped, or if there is less than a 120 volt power supply at the wall outlet.

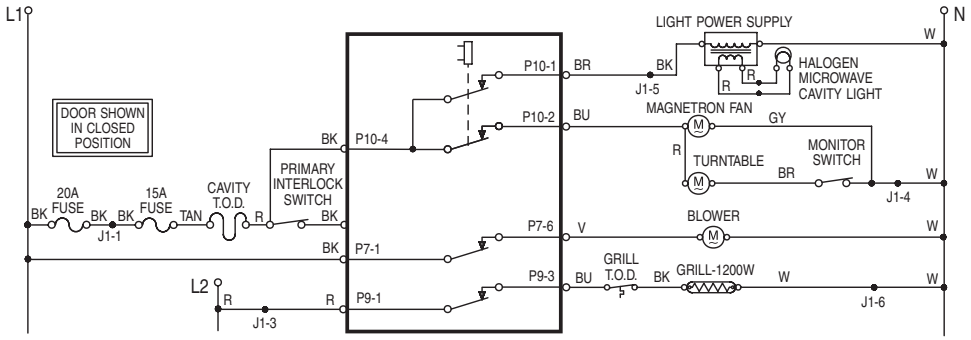
## *MICROWAVE FULL POWER / VARIABLE POWER*



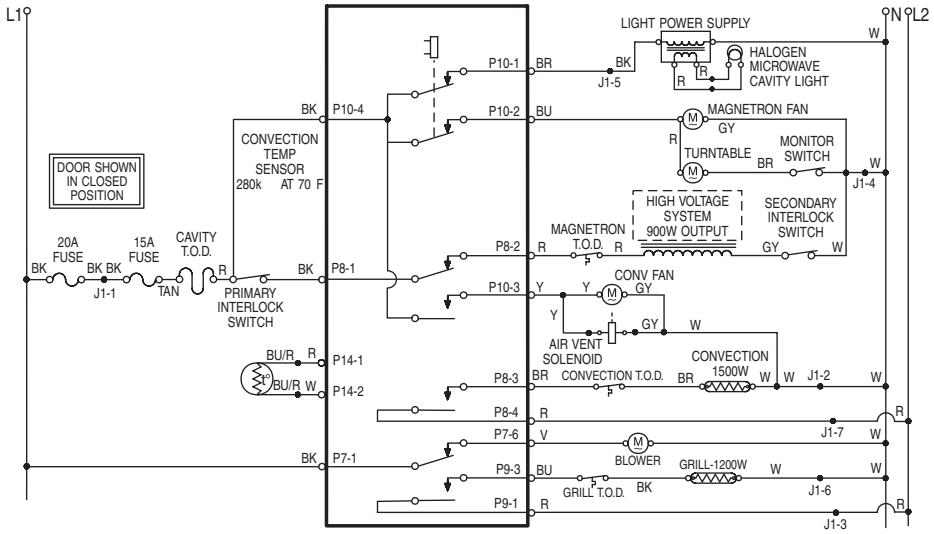

## *MANUAL CRISP - MICROWAVE*




## *BROIL (NO MICROWAVE ENERGY)*



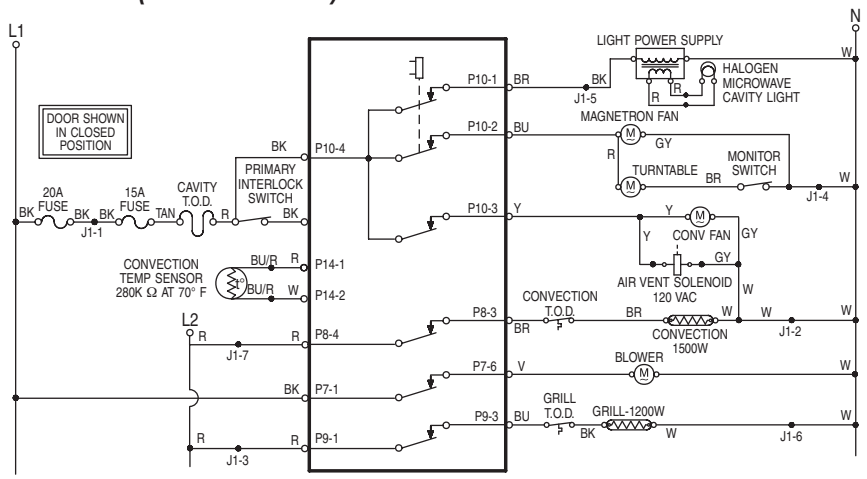

## *ULTIMA COOK™ (FOR MICROWAVE)*



# MICROWAVE STRIP CIRCUITS
**continued**

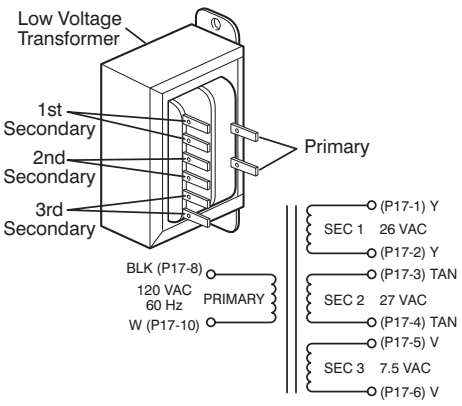
The following individual circuits are for use in diagnosis.
Do not continue with the diagnosis of the appliance if a fuse is blown, a circuit breaker is tripped, or if there is less than a 120 volt power supply at the wall outlet.

## *CONVECT (FOR MICROWAVE)*

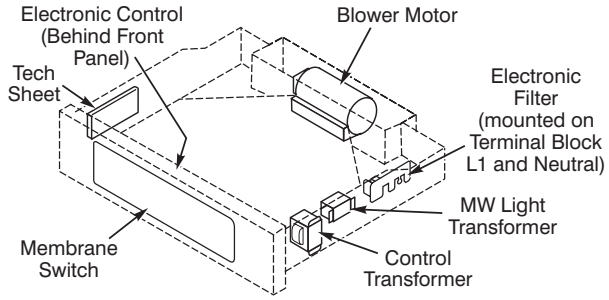


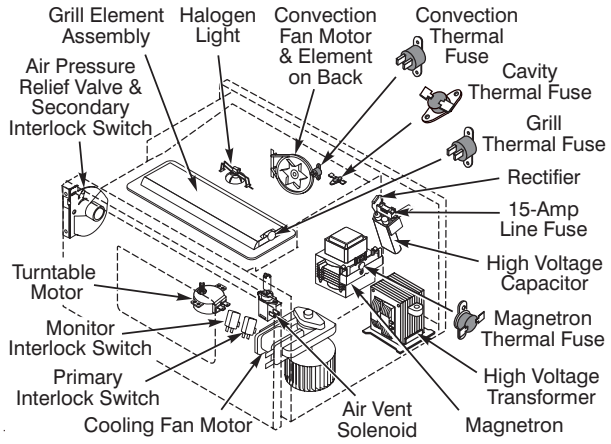

| COMPONENTS | FRONT/REAR SERVICEABLE | CAN BE TESTED AT CONTROL PANEL | |
|---|---|---|---|
| | | CHECK POINTS | RESULTS |
| Electronic control | Front | -- | -- |
| Electronic Filter | Front | -- | -- |
| Membrane switch | Front | -- | -- |
| Control transformer | Top | -- | -- |
| Microwave light transformer | Top | Primary winding | 40 Ω to 45 Ω |
| | | Secondary winding | Less than 1 Ω |
| Lower console blowers | Rear | P7-6 (VT) to Neutral (W) | 10 Ω to 15 Ω |
| Convection fan motor | Rear | P10-3 (Y) to Neutral (W) | 44 Ω |
| Convection ring element | Front | P8-3 (BR) to Neutral (W) | 10 Ω to 20 Ω |

## *CONTROL TRANSFORMER - LOW VOLTAGE*

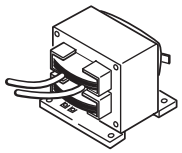
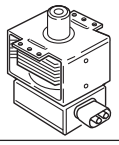
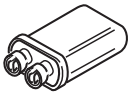
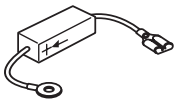
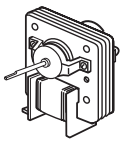
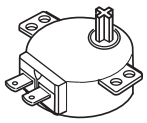
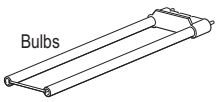
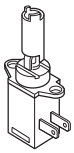



## *MICROWAVE OVEN COMPONENT LOCATIONS*



## TESTING THE MICROWAVE OVEN COMPONENTS

| COMPONENT | TEST PROCEDURE | RESULTS |
|---|---|---|
| HIGH VOLTAGE TRANSFORMER  | 1. Disconnect power or unplug oven.<br>2. Remove the leads from the terminals.<br>3. Set the ohmmeter to Rx1 and touch the leads to the terminals.<br>Primary<br>Secondary<br>Filament to Ground<br>4. Measure resistance (Rx100)<br>Primary<br>Filament | <br><br><br>Normal = Less than 1 Ω.<br>Normal = Less than 1 Ω.<br>Normal = 0 Ω.<br><br>Normal = Infinity.<br>Normal = Infinity. |
| MAGNETRON  | 1. Disconnect power or unplug oven.<br>2. Remove the leads from the terminals.<br>3. Set the ohmmeter to Rx1 and touch the leads to the F and FA terminals.<br>4. Set the ohmmeter to Rx1k and measure filament to chassis. | <br><br><br>Normal = approximately 0 Ω.<br>Normal = Infinity. |
| CAPACITOR  | 1. Disconnect power or unplug oven.<br>2. Remove the leads from the terminals.<br>3. Set the ohmmeter to Rx1k and touch the leads to the terminals.<br>4. Terminal to chassis. | <br><br><br>Normal = Momentarily indicates several ohms, and gradually returns to infinity.<br>Normal = Infinity. |
| RECTIFIER  | 1. Disconnect power or unplug oven.<br>2. Remove the leads from the terminals.<br>3. Set the ohmmeter to Rx1k and measure forward resistance.<br>4. Measure the reverse resistance.<br>**NOTE:** Some inexpensive meters may show infinity in both directions. | <br><br><br>Normal = Continuity.<br>Abnormal = Infinity.<br>Normal = Infinity.<br>Abnormal = Continuity. |
| FAN MOTOR  | 1. Disconnect power or unplug oven.<br>2. Remove the leads from the terminals.<br>3. Set the ohmmeter to Rx1 and touch the leads to the terminals. | <br><br><br>Normal = approximately 25 Ω.<br>Abnormal = Infinity. |
| TURNTABLE MOTOR  | 1. Disconnect power or unplug oven.<br>2. Remove the leads from the terminals.<br>3. Set the ohmmeter to Rx1 and touch the leads to the terminals. | <br><br><br>Normal = approximately 25 Ω.<br>Abnormal = Infinity. |
| THERMAL FUSES  Cavity Thermal Fuse; Grill and Convection Fan Thermal Fuses; Magnetron Thermal Fuse | 1. Disconnect power or unplug oven.<br>2. Remove the leads from the terminals.<br>3. Set the ohmmeter to Rx1 and touch the leads to the terminals.<br>Cavity Thermal Fuse: Open 329° F (165° C)<br>Grill Thermal Fuse: Open 320° F (160° C), Close 284° F (140° C)<br>Magnetron Thermal Fuse: Open 293° F (145° C), Close 257° F (125° C)<br>Convection Fan Thermal Fuse: Open 293° F (145° C), Close 221° F (105° C) | <br><br><br>Normal = Continuity.<br>Abnormal = Infinity. |
| GRILL ELEMENT  Bulbs | 1. Disconnect power or unplug oven.<br>2. Remove the leads from the terminals.<br>3. Set the ohmmeter to Rx1 and touch the leads to the terminals. | <br><br><br>Normal = 14 Ω for both bulbs.<br>Normal = 7 Ω for one bulb.<br>Abnormal = Infinity. |
| AIR VENT SOLENOID  | 1. Disconnect power or unplug oven.<br>2. Remove the lead from one terminal.<br>3. Set the ohmmeter to the Rx1k and touch the leads to the terminals. | <br><br><br>Normal = approximately 1650 Ω.<br>Abnormal = Infinity. |

MANUFACTURED UNDER ONE OR MORE OF
THE FOLLOWING UNITED STATES PATENTS:
4,102,322 4,364,589 4,467,184
OTHER PATENTS PENDING