FOR SERVICE TECHNICIAN'S USE ONLY

⚠ DANGER

Electrical Shock Hazard

Only authorized technicians should perform diagnostic voltage measurements.

After performing voltage measurements, disconnect power before servicing.

Failure to follow these instructions can result in death or electrical shock.

⚠ 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.

Voltage Measurement Safety Information

When performing live voltage measurements, you must do the following:

- **Verify the controls are in the off position so that the appliance does not start when energized.**
- **Allow enough space to perform the voltage measurements without obstructions.**
- **Keep other people a safe distance away from the appliance to prevent potential injury.**
- **Always use the proper testing equipment.**
- **After voltage measurements, always disconnect power before servicing.**

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 and Other Damage)
4. Damage to or Loosening of Hinges and 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.

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FAILURE CODE INDICATIONS

NOTE: Many of the problems listed in the chart below may be solved by power cycling: Unplug microwave oven or disconnect power. After 1 minute, plug in microwave oven or reconnect power.

Display	Likely Failure Condition	Recommended Repair Procedure
"Enter clock"	Power failure	After a power failure, "Enter clock" will be flashing. Press CANCEL to end this indication. The colon will appear when in Standby mode.
F1E4	Microwave ACU PCBA failure	**1.** Unplug microwave oven or disconnect power. **2.** Replace ACU PCBA. **3.** Replace all parts and panels before operating. **4.** Plug in microwave oven or reconnect power.
F2E1	Stuck key failure	**1.** Unplug microwave oven or disconnect power. **2.** Replace keypad. **3.** Replace all parts and panels before operating. **4.** Plug in microwave oven or reconnect power. **5.** If problem persists, refer to "PCBA Pin Voltage Matrix."
F4E4	Humidity sensor error	**1.** Enter the Diagnostics Mode (press CANCEL - CANCEL - START), and then press COOK to display the humidity sensor reading. If display does not show "8891," continue to Step 2. **2.** Unplug microwave oven or disconnect power. **3.** Connect a new humidity sensor to the ACU PCBA P6 connector. **4.** Replace all parts and panels before operating. **5.** Plug in microwave oven or reconnect power. **6.** Enter the Diagnostics Mode (press CANCEL - CANCEL - START), and then press COOK to see if failure code reappears. **NOTE:** There may be a delay (approximately 1 minute, 20 seconds) before the F4E4 failure code is displayed. **7.** If the F4E4 failure code reappears, unplug microwave oven or disconnect power. **8.** Replace ACU PCBA. **9.** Replace all parts and panels before operating. **10.** Plug in microwave oven or reconnect power.
F8E5	Exhaust air template detection failure	**1.** Enter the Diagnostics Mode (press CANCEL - CANCEL - START), and then press OPTIONS/ CLOCK to display the exhaust air temperature sensor reading. Verify the sensor temperature reading is at room temperature (typically 50°F to 90° [10°C to 32°C]) and verify failure code. If failure code matches complaint, continue to Step 2. **2.** Unplug microwave oven or disconnect power. **3.** Disconnect sensor from ACU PCBA. **4.** Measure sensor resistance between connector pins and confirm reading is between 9.5kΩ and 10.5kΩ at room temperature. If measurement is not correct, or if a short or open circuit is found, replace sensor. **5.** Replace all parts and panels before operating. **6.** Plug in microwave oven or reconnect power. **7.** Enter the Diagnostics Mode (press CANCEL - CANCEL - START), and then press CLOCK/ OPTIONS to display the cavity temperature sensor reading. Verify the sensor temperature reading. If it is still not correct, replace ACU PCBA. **8.** If failure does not reappear, stop.

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PRIMARY, SECONDARY, AND MONITOR INTERLOCK SWITCH CHECKOUT PROCEDURES

IMPORTANT: Before checking the interlock switches, unplug microwave oven or disconnect power. Be sure to disconnect all of the wires at the switch being tested before making any continuity readings.

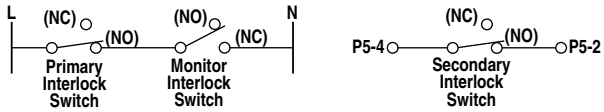
NOTE: The Secondary Interlock Switch is mounted in the door lock switch cradle independent of the Monitor Interlock Switch and Primary Interlock Switch. The Monitor Interlock Switch and the Primary Interlock Switch can be identified by the wire colors that are connected to the terminals of the switches. See the chart below for wire color designation.

Switch	Check By	Door Open	Door Closed
Primary Interlock	**1.** Unplug microwave oven or disconnect power. **2.** Disconnect the wires at the Primary Interlock Switch. **3.** Check from the common terminal (black/brown wires) to the normally open terminal (black/white wires).	-	+
	1. Unplug microwave oven or disconnect power. **2.** Disconnect the wires at the Primary Interlock Switch. **3.** Check from the common terminal (black/brown wires) to the normally closed terminal (orange wire).	+	-
Monitor Interlock	**1.** Unplug microwave oven or disconnect power. **2.** Disconnect the wires at the Monitor Interlock Switch. **3.** Check from the common terminal (white wire) to the normally closed terminal (blue/white wires).	+	-
Secondary Interlock	**1.** Unplug microwave oven or disconnect power. **2.** Disconnect the wires at the Secondary Interlock Switch. **3.** Check from the common terminal (white/blue wires) to the normally open terminal (blue/blue wires).	-	+

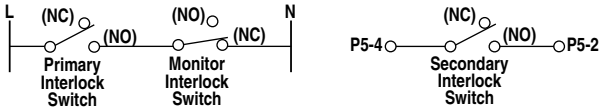
(+) Continuity (-) No Continuity

NOTE: These diagrams are not intended to show a complete circuit; they represent the position of switches during "DOOR OPEN" or "DOOR CLOSED" (continuity checks only).

Door Closed



Door Open



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NOT HEATING TROUBLESHOOTING INSTRUCTION

IMPORTANT: High voltage is present at the magnetron and high-voltage capacitor terminals. Avoid direct contact when power is connected to these components to avoid serious injury or possible death. Always be sure that the high-voltage capacitor is discharged before accessing any of these components.

For a no-heat condition, refer to the following step-by-step instructions:

1. Unplug microwave oven or disconnect power.
2. Discharge the high-voltage capacitor.
3. Disconnect the high-voltage transformer primary windings.
4. Attach the voltmeter leads to the high-voltage transformer primary input wires.
5. Plug in microwave oven or reconnect power.
6. Close door and program the microwave oven to operate for 30 seconds.
7. Press START.
8. Check the input voltage at the high-voltage transformer primary input wires. If the voltage is not close to the rating voltage 120 +/- 15 VAC, unplug microwave oven or disconnect power. Check the circuitry as follows:
   - Measure resistance of the fuse, microswitches, and thermostats. Replace any failed components (refer to the wiring diagram).
   - Check for loose terminals (refer to the wiring diagram). Check all of the terminals on the main route from the power supply to the high voltage transformer.
   - Check for loose or failed connectors on the ACU PCBA (P1, P2, P4). If these check out OK, plug in microwave oven or reconnect power.
   - Check for ACU PCBA failure. Refer to "ACU PCBA Pin Voltage Matrix."
9. If the input voltage at the high-voltage transformer primary input wires is close to the rating voltage 120 +/-15 VAC, unplug microwave oven or disconnect power.
10. Check the power supply components. Refer to "Component Tests."
    - High-voltage transformer
    - High-voltage capacitor
    - High-voltage diode
11. If the power supply components check out OK, check the connection between the magnetron and the high-voltage transformer.
12. If all of the components check out OK, replace the magnetron.
13. Reconnect the high-voltage transformer primary windings.

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ACU PCBA PIN VOLTAGE MATRIX

Check for proper voltage by completing the following steps:

1. Unplug microwave oven or disconnect power.
2. Connect voltage measurement equipment to the terminals listed below. (P1-3, P2-1 are neutral.)
3. Plug in microwave oven or reconnect power, and confirm voltage reading.
4. Unplug microwave oven or disconnect power.

NOTE: For 50V and over, the tolerance is +/-15V. For 0V, the tolerance is +/-3V.

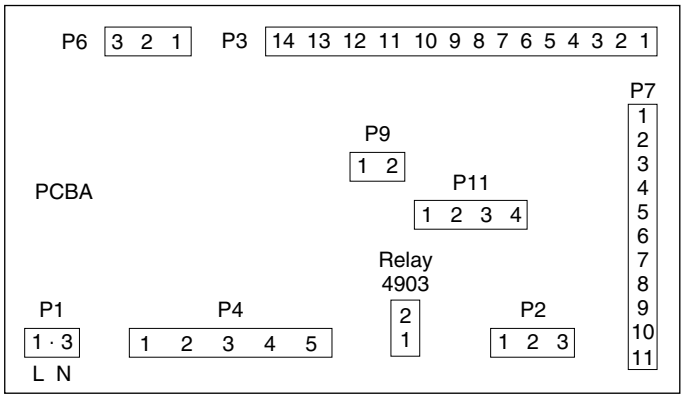
Abbreviations

HL – Hood Light N – Neutral CL – Cavity Light HF – Hood Fan L – Line Voltage TT – Turntable Motor NFS – Neutral for Switch

NOTE: When checking voltage readings on ACU PCBA, connect the grounding test lead of voltmeter to P1-3, P2-1. Use the positive test lead to probe connectors designated below.

		MW Oven Plugged In—Sitting Idle—ACV Readings														MW Oven Running —ACV Readings
Pin Name	Wire Color	Power On, Door Closed	Power On, Door Open	Hood Fan Motor—High	Hood Fan Motor—High, Door Open	Hood Fan Motor—Med-High	Hood Fan Motor—Med-High, Door Open	Hood Fan Motor—Medium	Hood Fan Motor—Medium, Door Open	Hood Fan Motor—Low	Hood Fan Motor—Low, Door Open	Hood Light—High	Hood Light—High, Door Open	Hood Light—Low	Hood Light—Low, Door Open	MW Oven Start
P1-1 (L)	Brown	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
P1-3 (N)	White	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P2-3 (NFS)	White	0	120	0	120	0	120	0	120	0	120	0	120	0	120	3.6
P2-2 (Door)	Orange	0	120	0	120	0	120	0	120	0	120	0	120	0	120	49
P2-1 (N)	Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P4-4 (TT)	Red	0	120	0	120	0	120	0	120	0	120	0	120	0	120	120
P4-5 (CL)	Green	0	120	0	120	0	120	0	120	0	120	0	120	0	120	120
P4-1 (HL)	Yellow	0	0	0	0	0	0	0	0	0	0	120	120	67	67	2.4
P4-2 (HF)	Black	0	0	120	120	92	92	88	88	67	67	0	0	0	0	3.6
P4-3 (HF-R)	Gray	0	0	120	120	93	93	87	87	85	85	0	0	0	0	3.7

CONNECTORS ON ACU PCBA



NOTE: There are purposely empty terminals between each of the numbered terminals on P1 connector.

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TOUCH PANEL

Touch Panel and ACU PCBA Test

To initiate diagnostic routine:

1. Plug in microwave oven or reconnect power and press CANCEL button to Standby (":").
2. Close door, then press CANCEL - CANCEL - START within 3 seconds.

   All display segments will be lit to indicate the Test mode has been entered.
3. Open door. The model number will be displayed.
4. Close door. All display segments will be lit.
5. Press indicated keypad for correct display readout and beep.

NOTE: If the CANCEL button is pressed during this diagnostic routine, you will exit the Test mode.

Key Tables for Test Mode

Key Name	Function	Display	Buzzer
Popcorn	-	key 30	1 beep
Baked Potato	-	key 31	1 beep
Veggie	-	key 2E	1 beep
Keep Warm	-	key 06	1 beep
Reheat	-	key 24	1 beep
Defrost	-	key 25	1 beep
Soften/Melt	-	key 29	1 beep
Cook Time	-	key 21	1 beep
Cook Power	-	key 22	1 beep
Auto Cook	Humidity sensor check	XXX	1 beep
Kitchen Timer on/off	-	key 05	1 beep
Clock/Options	HF NTC Thermistor	XXX	1 beep
Start Add 30 Sec	Software version check	03.00.00*	1 beep
Kids Menu	-	key 37	1 beep
Snack Menu	-	key 38	1 beep
1	Cavity Light and Cooling Fan On	CL	1 beep
2	Cavity Light, Cooling Fan and Turntable On	CL TT	1 beep
3	-	key 36	1 beep
4	-	key 14	1 beep
5	-	key 15	1 beep
6	Hood (Cooktop) Light On (High)	HL HIGH	1 beep
7	Hood (Cooktop) Light On (Low)	HL LOW	1 beep
8	Vent Fan On (High Speed)	HF HIGH	1 beep
9	Vent Fan On (Low Speed)	HF LOW	1 beep
0	Microwave Oven (1000W), CL, TT, and CF On	MW	1 beep
Light off/high/low	-	key 03	1 beep
Turntable	-	key 09	1 beep
4 Speed Fan off/on	-	key 04	1 beep
Cancel	Exit Test Mode	: or xx.xx	1 beep

*May be higher, depending on software upgrades at time of production.

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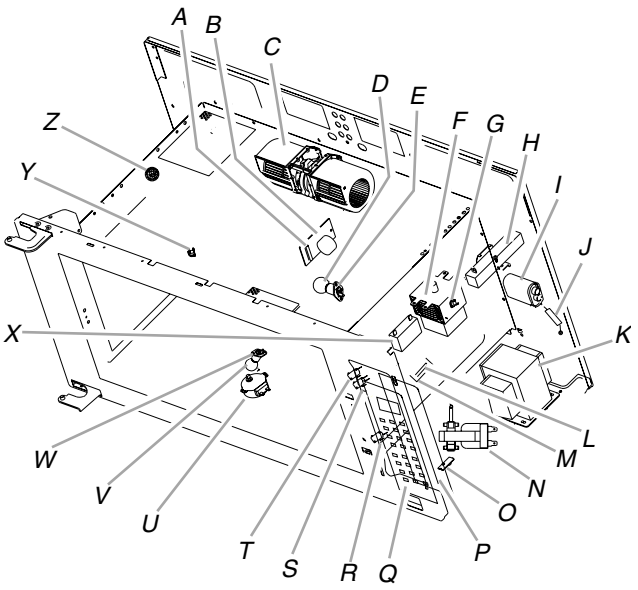
PARTS LAYOUT (NOT TO SCALE)



A. Main fuse (20 amp)
B. AC line filter board
C. Hood fan motor assembly
D. Cavity light
E. Cavity light holder
F. Magnetron
G. Magnetron thermostat—opens at 257ºF (125ºC), closes at 185ºF (85ºC)
H. Power resistor
I. H.V. capacitor
J. H.V. diode
K. H.V. transformer
L. Turbo fuse (20 amp)
M. Turbo fuse holder
N. Cooling fan motor
O. HF NTC thermistor
P. ACU PCBA
Q. Touch panel
R. Secondary interlock switch
S. Monitor interlock switch
T. Primary interlock switch
U. Turntable motor
V. Hood (cooktop) light
W. Hood (cooktop) light holder
X. Motor capacitor
Y. Cavity thermostat—opens at 329°F (165°C), non-resettable
Z. Humidity sensor

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POWER OUTPUT MEASUREMENT

The power output of the magnetron can be measured using the following "Voltage Measurement" and "Output Test." Before you perform the test:

- Make sure that the oven cavity is cool and clean.
- Check the line voltage at the wall outlet while microwave oven is operating. See "Voltage Measurement at Power Source."

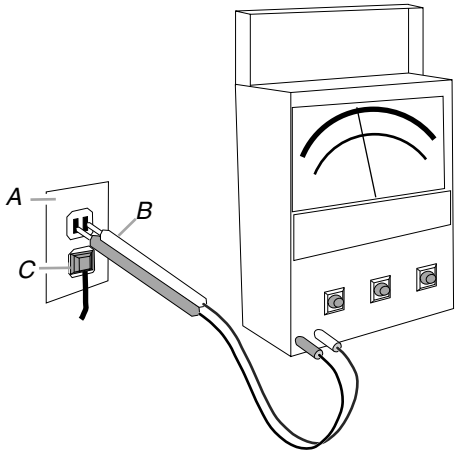
Tools Needed

- 2-cup measuring cup
- Thermometer
- Voltmeter/ohmmeter

Voltage Measurement at Power Source

1. Fill the measuring cup with 2 cups (500 mL) of tap water.
2. Place in the center of the microwave oven cavity.
3. Operate the microwave oven on high power for 1 minute.
4. While the microwave oven is operating, measure the line voltage at the power source. See "Measure Voltage" illustration.
5. Verify the voltage is constant during microwave oven operation. If voltage drops below 108V, contact a qualified electrician to check your electrical supply.
6. Make note of the voltage while the microwave oven is running and proceed to the output test.

Measure Voltage



A. House power supply wall outlet
B. Voltmeter/ohmmeter test leads
C. Microwave oven plug

Output Test

1. Fill the measuring cup with 2 cups (500 mL) of 70ºF (21ºC) tap water.
2. Stir the water with the thermometer to ensure uniform temperature. Add warm or cool water to bring the water to the correct temperature.
3. Place the measuring cup in the center of the microwave oven cavity.
4. Operate the microwave oven on high power for 1 minute.
5. Remove the measuring cup and stir the water with the thermometer for about 20 seconds.
6. Record the temperature of the water.
7. Refer to the model serial tag on the microwave oven to acquire wattage output rating of the microwave oven.
8. Using the following chart, determine if the output of the microwave oven is within the range listed based on the line voltage and wattage rating of the microwave oven.

Water Temperature for Line Voltage and Wattage Rating

Voltage	700W	1000W	1200W
120V	96ºF to 102ºF (36ºC to 39ºC)	110ºF to 116ºF (43ºC to 47ºC)	124ºF to 130ºF (51ºC to 54ºC)
108V	91ºF to 97ºF (33ºC to 36ºC)	101ºF to 107ºF (38ºC to 42ºC)	111ºF to 117ºF (44ºC to 47ºC)

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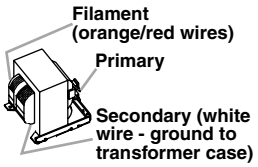
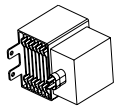
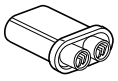
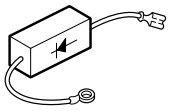
COMPONENT TESTS

IMPORTANT:

- Unplug microwave oven or disconnect power.
- Discharge the high-voltage capacitor and remove the lead wires from the primary winding of the high-voltage transformer before conducting any of the following tests.
- Remove the lead wires from the related component before conducting any of the following tests.
- All operational checks using microwave energy must be done with the microwave oven loaded with a minimum of 8 oz (250 mL) of water in a microwave-safe container.
- Conduct a microwave energy test after performing any tests or repairs to the microwave oven.
- Check that all wire leads are in the correct positions before operating the microwave oven.
- Grasp wire connectors when removing the wire leads from microwave oven parts.
- All testing must be done with an ohmmeter having a sensitivity of 20,000 ohms per volt DC or greater, and powered by at least a 9-volt battery.

Components	Test/Results
H.V. Transformer 	**1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure resistance: ■ Primary winding: Less than 0.5 ohm (approximate) ■ Secondary winding: 120 ohms (approximate) ■ Filament winding: 0 ohms ■ Primary winding to grounding: Normal: Infinite ■ Filament winding to grounding: Normal: Infinite
Magnetron 	**1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure resistance: ■ Filament terminal: Normal: Less than 1 ohm ■ Filament to chassis: Normal: Infinite
H.V. Capacitor 	**1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure resistance: ■ Terminal to terminal: Normal: Momentarily indicates several ohms and then gradually returns to infinite. ■ Terminal to case: Normal: Infinite
H.V. Diode 	**NOTE:** Some inexpensive meters may indicate infinite resistance in both directions. **1.** Unplug microwave oven or disconnect power. **2.** Measure resistance: ■ Forward: Normal: Continuity ■ Reverse: Normal: Infinite
Turntable Motor 	**1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure resistance: ■ Normal: 2.4k to 3.2k ohms (approximate)

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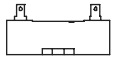
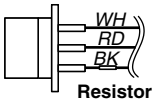
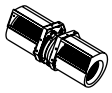
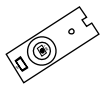
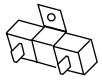
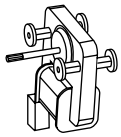
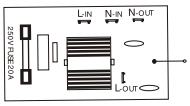
Components	Test/Results
Motor Capacitor 	**1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure resistance: ■ Normal: Momentarily 0 ohms, then goes to infinite
Humidity Sensor  **Resistor**	**1.** Unplug microwave oven or disconnect power. **2.** Remove the 3-pin connector from the electronic control (P6). **NOTE:** Do not remove the attached resistor which is used for internal resistance calibration. **3.** Measure resistance across pins 1 and 3 and across pins 2 and 3: ■ Normal: 2.8k ohms (approximate) at 77ºF (28ºC) +/-18ºF (-10ºC)
Hood Exhaust Fan Motor 	**1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure resistance: ■ High Speed—Normal: Red (R) and Blue (BU) wires: 70 to 100 ohms (approximate); Blue (BU) and Black (BK) wires: 30 to 60 ohms (approximate) ■ Low Speed—Normal: Red (R) and Blue (BU) wires: 70 to 100 ohms (approximate); Blue (BU) and White (W) wires: 50 to 80 ohms (approximate)
HF NTC Thermistor 	**1.** If "NTC SHORT, CALL FOR SERVICE" or "NTC OPEN, CALL FOR SERVICE" scrolls on display, unplug microwave oven or disconnect power. **2.** Measure resistance: ■ Normal: 10k ohms +/-5% at 77ºF (25ºC)
Power Resistor 	**1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure resistance: ■ Normal: 20 ohms/25W
Cooling Fan Motor 	**1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure resistance: ■ Normal: 40 to 60 ohms (approximate)
AC Line Filter Board  	**1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure resistance: ■ Normal: L-IN to L-OUT (coil): Less than 1 ohm; N-IN to N-OUT (coil): Less than 1 ohm
Thermostats  **Cavity Thermostat** **Magnetron Thermostat**	**NOTE:** Refer to "Parts Layout" for opening and closing temperatures. **1.** Unplug microwave oven or disconnect power. **2.** Remove wire leads. **3.** Measure continuity: ■ Normal: Continuity

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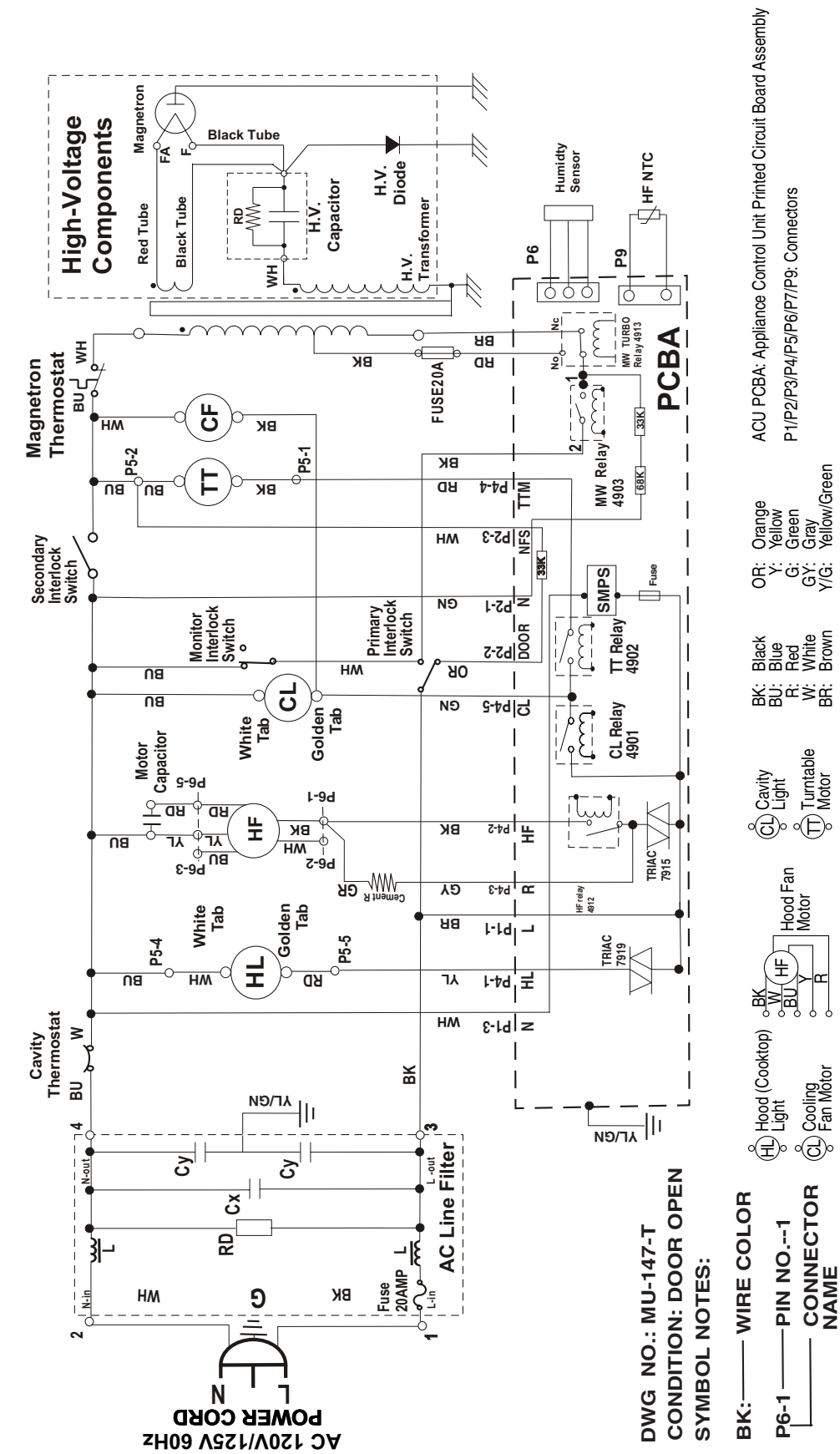
SCHEMATIC DIAGRAM



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