



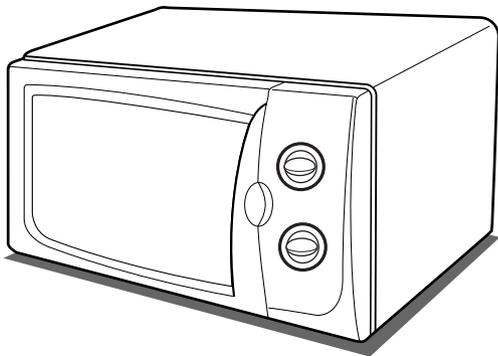
MICROWAVE OVEN

SERVICE MANUAL

MODEL : MB-392AA

CAUTION

BEFORE SERVICING THE UNIT, READ THE
SAFETY PRECAUTIONS IN THIS MANUAL.



SERVICE INFORMATION

TOOLS AND MEASURING INSTRUMENTS

NECESSARY TOOLS

Tools normally used for TV servicing are sufficient. Standard tools are listed below.

- Diagonal pliers
- Long nose pliers
- Phillips screwdriver
- Flat blade screwdriver
- Wrench (size 5mm)
- Nutdriver (size 5mm)
- Adjustable wrench
- Soldering iron
- Solder
- Vinyl insulation tape
- Polishing cloth

NECESSARY MEASURING INSTRUMENTS

- TESTER(VOLTS-DC, AC., Ohmmeter)
- Microwave survey meter
 - Holaday HI-1500
HI-1501
 - Narda 8100
8200
- Inch scale
- 600 cc non conductive material beaker (glass or plastic), inside diameter: approx. 8.5 cm(3¹/₂ in.)
- Cylindrical and made of borosilicate glass vessel. max. thickness: 3 mm outside diameter: approx. 190mm height: approx. 90mm
- Glass thermometer: 100°C or 212°F (1 deg scale)

MICROWAVE LEAKAGE TEST

CAUTIONS

- Be sure to check microwave leakage prior to servicing the oven if the oven is operative prior to servicing.
- The service personnel should inform the manufacture importer, or assembler of any certified oven unit found to have a microwave emission level in excess of 5 mW/cm² and should repair any unit found to have excessive emission levels at no cost to the owner and should ascertain the cause of the excessive leakage. The service personnel should instruct the owner not to use the unit until the oven has been brought into compliance.
- If the oven operates with the door open, the service personnel should:
 - Tell the user not to operate the oven.
 - Contact the manufacturer.
- The service personnel should check all surface and vent openings for microwave leakage.
- Check for microwave leakage after every servicing. The power density of the microwave radiation leakage emitted by the microwave oven should not exceed 4 mW/cm². Always start measuring of an unknown field to assure safety for operating personnel from radiation leakage.

MEASURING MICROWAVE ENERGY LEAKAGE

- Pour 275±15cc of 20±5°C(68±9°F) water in a beaker which is graduated to 600 cc, and place the beaker on the center of the turntable.
- Set the energy leakage monitor to 2,450 MHz and use it following the manufacturer's recommended test procedure to assure correct result.
- When measuring the leakage, always use the 2-inch (5cm) spacer supplied with the probe.
- Operate the oven at its maximum output.
- Measure the microwave radiation using and electromagnetic radiation monitor by holding the probe perpendicular to the surface being measured

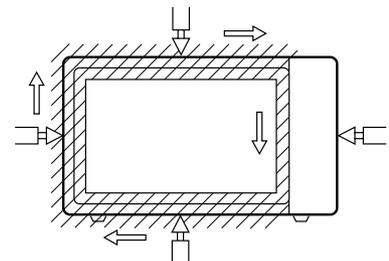
Move probe along shaded area



Probe scanning speed

Less than 2.5 cm/sec

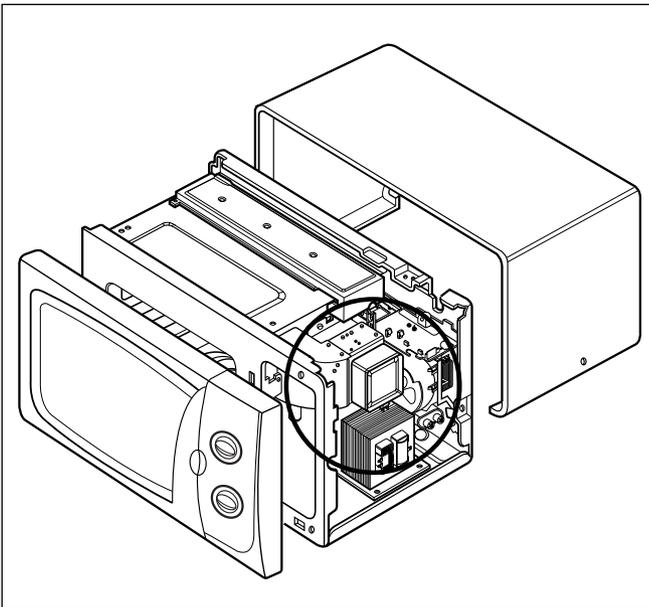
(1in/sec)



MEASUREMENT WITH OUTER CASE REMOVED

- When you replace the magnetron, measure for microwave energy leakage before the outer case is installed and after all necessary components are replaced or adjusted. Special care should be taken in measuring the following parts. (Circled area of below Fig.)
 - Around the magnetron
 - The waveguide

WARNING : AVOID CONTACTING ANY HIGH VOLTAGE PARTS (Magnetron, H.V. Transformer, H.V. Capacitor, H.V. Cable Ass'y, H.V. Circuit Protector)



MEASUREMENT WITH A FULLY ASSEMBLED OVEN

- After all components, including the outer case, are fully assembled, measure for microwave energy leakage around the door viewing window, the exhaust opening, and air inlet openings.
- Microwave energy leakage must not exceed the values prescribed below.

NOTE: Leakage with the outer case removed less than 5 mW/cm.sq. Leakage for a fully assembled oven (Before the latch switch (primary) is interrupted) with the door in a slightly opened position-less than 2 mW/cm.sq.

NOTES WHEN MEASURING

- Do not exceed meter full scale deflection.
- The test probe must be removed no faster than 1 inch/sec (2.5 cm/sec) along the shaded area, otherwise a false reading may result.
- The test probe must be held with the grip portion of the handle. A false reading may result if the operator's hand is between the handle and the probe.
- When testing near a corner of the door, keep the probe perpendicular to the surface making sure the probe horizontally along the oven surface, this may possibly cause probe damage.

RECORD KEEPING AND NOTIFICATION AFTER MEASUREMENT

- After adjustment and repair of any microwave energy interruption or microwave energy blocking device, record the measured values for future reference. Also enter the information on the service invoice.
- The microwave energy leakage should not be more than 4 mW/cm.sq. after determining that all parts are in good condition, functioning properly and genuine replacement parts which are listed in this manual have been used.
- At least once a year, have the electromagnetic energy leakage monitor checked for calibration by its manufacturer.

MEASUREMENT OF MICROWAVE POWER OUTPUT

- Microwave power output measurement is made with the microwave oven supplied at its rated voltage and operated at its maximum microwave power setting with a load of (1000±5) g of potable water.
- The water is contained in a cylindrical borosilicate glass vessel having a maximum material thickness of 3 mm and an outside diameter of approximately 190mm.
- The oven and the empty vessel are at ambient temperature prior to the start of the test.
- The initial temperature (T₁) of the water is (10±2)°C It is measured immediately before the water is added to the vessel. After addition of the water to the vessel, the load is immediately placed on the center of the turntable which is in the lowest position and the microwave power switched on.
- The time T for the temperature of the water to rise by a value ΔT of (10±2)°K is measured, where T is the time in seconds and ΔT is the temperature rise. The initial and final water temperatures are selected so that the maximum difference between the final water temperature and the ambient temperature is 5°K.

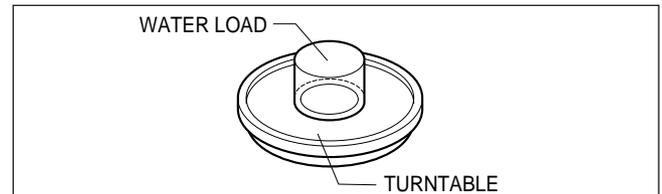
- The microwave power output P in watts is calculated from the following formula :

$$P = \frac{4187 \times (\Delta T) + 0.88 \times (T_2 - T_0) \times M}{T}$$

- T₂: Temperature after heating
- T₀: Temperature after bowl
- M: Weight of bowl

is measured while the microwave generator is operating at full power. Magnetron filament heat-up time is not included. (about 3 sec)

- The water is stirred to equalize temperature throughout the vessel, prior to measuring the final water temperature.
- Stirring devices and measuring instruments are selected in order to minimize addition or removal of heat.



DISASSEMBLY AND ADJUSTMENT

A. OUTER CASE REMOVAL

- 1) Disconnect the power supply cord from the outlet.
- 2) Remove the screws from the rear and along side edges of the case.
The outer case must be moved backward to be lifted off.

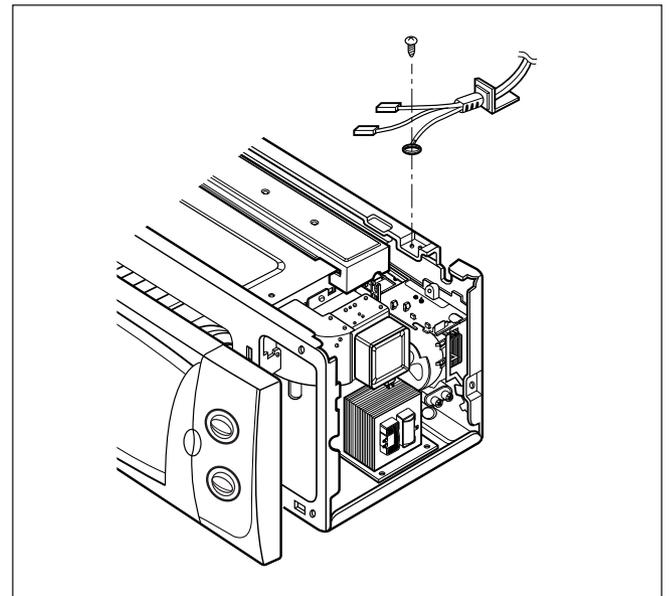
B. POWER SUPPLY CORD

- 1) Remove the outer case.
- 2) Disconnect two terminals, and remove one screw of the earth terminal.

CAUTION: DISCHARGE THE HIGH VOLTAGE CAPACITOR BEFORE SERVICING
(refer to page 2-1)

C. CONTROL PANEL ASSEMBLY

- 1) Disconnect the leadwire from the PCB SUB ASS'Y.
- 2) Remove the screws for the earth and securing the control panel.
- 3) Lift control panel ASS'Y from the oven by the tab unhooked.



D. DOOR GROSS ASSEMBLY REMOVAL

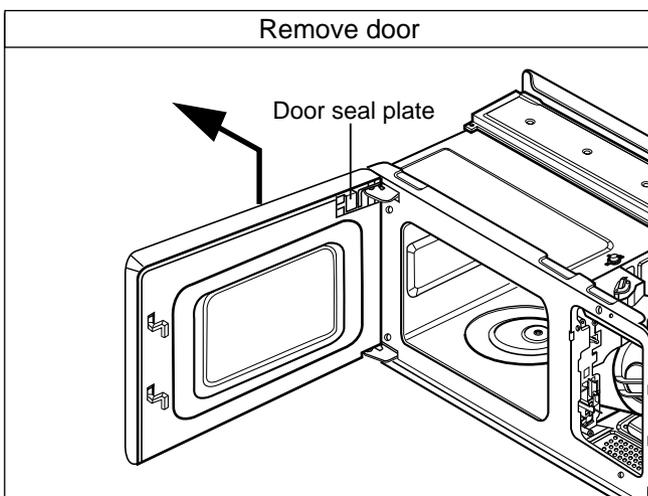
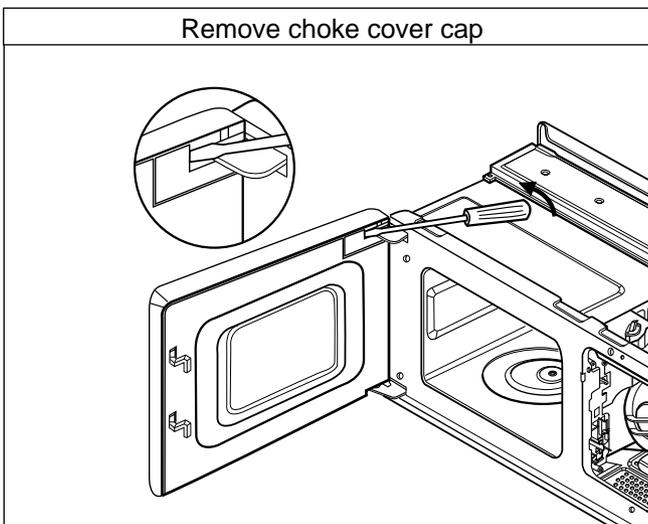
- 1) Open the door.
- 2) Remove the choke cover cap very carefully with a flat-blade screwdriver.

CAUTION : Be careful not to damage door seal plate by screwdriver.

- 3) Lift up and push the door.

NOTE:

1. After replacing the door, be sure to check that the primary switch, monitor switch, and secondary switch operate normally.
2. After replacing the door, check for microwave energy leakage with a survey meter. Microwave energy must be below the limit of 5 mW/cm. (with a 275 ml water load)
3. When mounting the door assembly to the oven assembly, be sure to adjust the door assembly parallel to the chassis. Also adjust so the door has no play between the inner door surface and oven frame assembly. If the door assembly is not mounted properly, microwaves may leak from the clearance between the door and the oven.



E. HIGH VOLTAGE TRANSFORMER REMOVAL

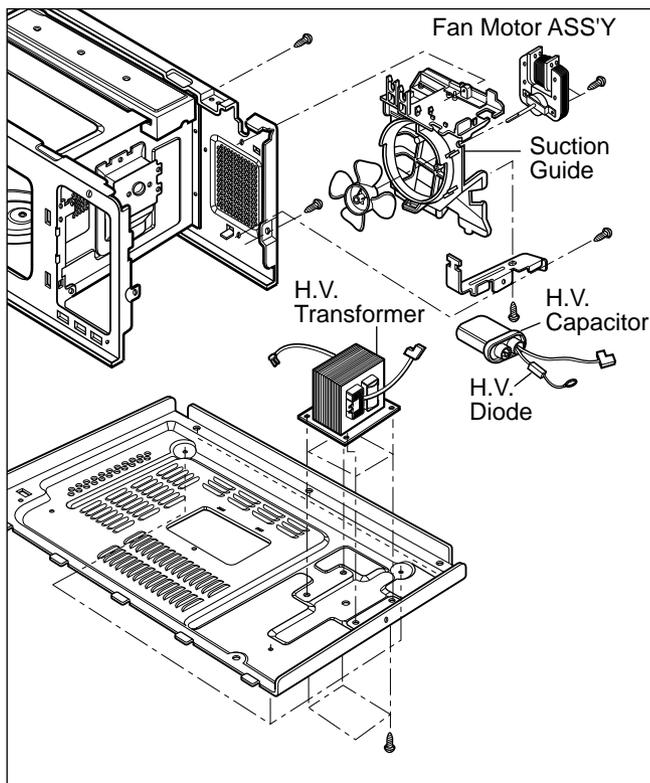
- 1) Discharge the high voltage capacitor.
- 2) Disconnect the leadwire from magnetron, high voltage transformer, and capacitor.
- 3) Remove the screw holding the high voltage transformer to the baseplate.

F. FAN MOTOR ASSEMBLY REMOVAL

- 1) Discharge the high voltage capacitor.
- 2) Disconnect the leadwire from fan motor, noise filter and high voltage capacitor.
- 3) Remove the two screws holding the the suction guide ASS'Y to the oven cavity and remove the high voltage diode earth screw.
- 4) Remove the screw of the capacitor bracket.
- 5) Remove the two screws holding the fan motor ASS'Y to the suction guide ASS'Y.

G. HIGH VOLTAGE CAPACITOR AND DIODE REMOVAL

- 1) Discharge the high voltage capacitor.
- 2) Disconnect the leadwire from fan motor, noise filter and high voltage capacitor.
- 3) Remove the screw holding the suction guide ASS'Y to the oven cavity and remove the high voltage diode earth screw.
- 4) Remove the screw holding the high voltage capacitor bracket.



H. AIR DUCT ASSEMBLY REMOVAL

- 1) Disconnect the leadwire from lamp.
- 2) Remove the mounting screw to Latch Board.

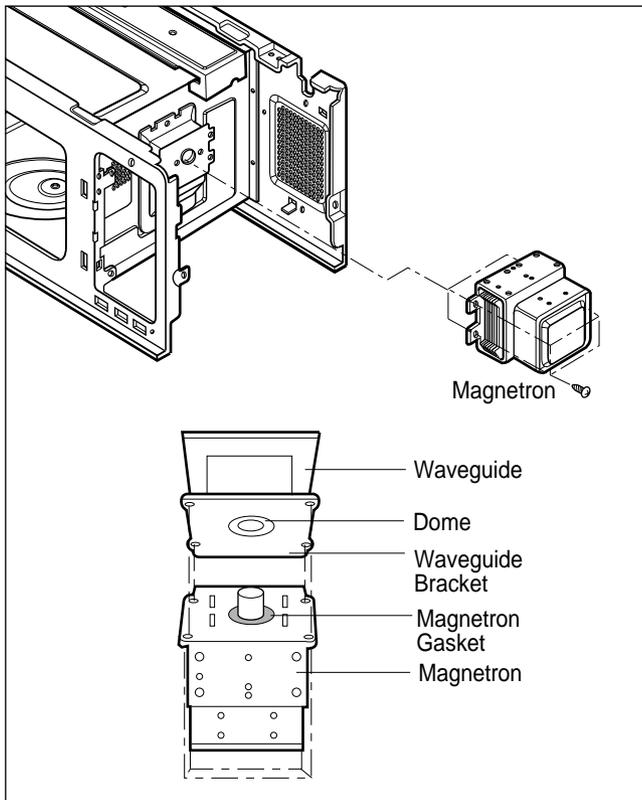
I. MAGNETRON REMOVAL

- 1) Disconnect the leadwire from the high voltage transformer and high voltage capacitor.
- 2) Carefully remove the mounting screws holding the magnetron and the waveguide.
- 3) Remove the magnetron ASS'Y until the tube is clear from the waveguide.

NOTE:

1. When removing the magnetron, make sure its dome does not hit any adjacent parts, or it may be damaged.
2. When replacing the magnetron, be sure to install the magnetron gasket in the correct position and be sure that the gasket is in good condition.
3. After replacing the magnetron, check for microwave leakage with a survey meter around the magnetron. Microwave energy must be below the limit of 5 mW/cm^2 . (With a 275 ml. water load).

Make sure that gasket is rigidly attached to the magnetron. To prevent microwave leakage, tighten the mounting screws properly, making sure there is no gap between the waveguide and the magnetron.

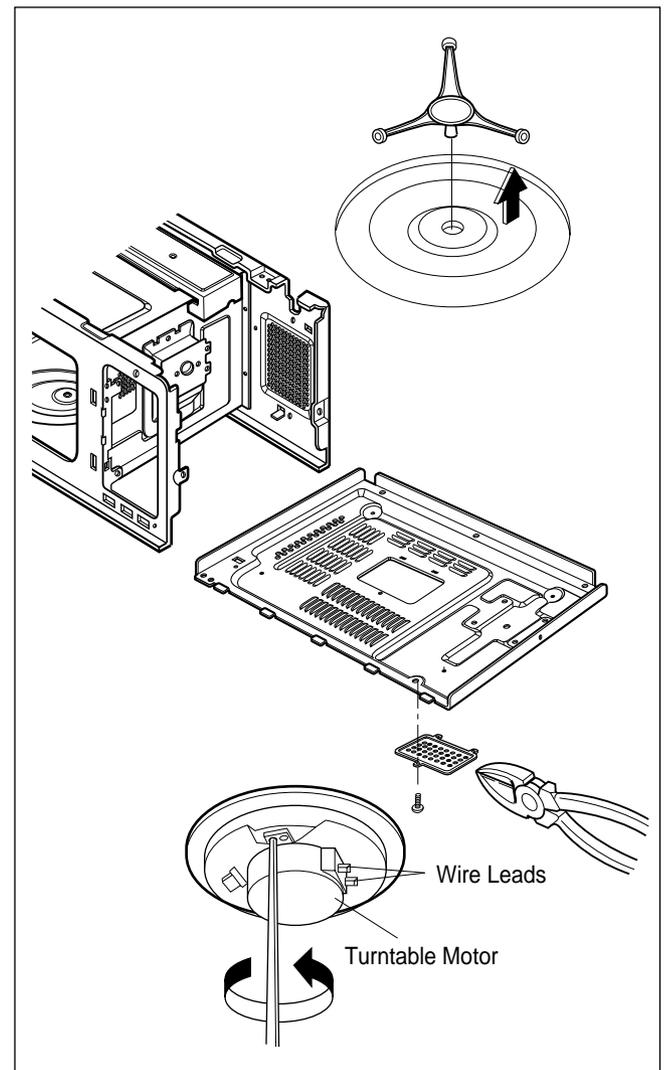


J. REMOVING THE TURNTABLE MOTOR

- 1) Remove the turntable.
- 2) Remove the Rotating Ring.
- 3) Lay the unit down on its back.
- 4) Remove the turntable motor cover.
The turntable base cover is easily removed by pinching the six parts with a wire cutting.
- 5) Disconnect the leadwire from the turntable motor terminals.
- 6) Remove the screw securing the turntable motor to the oven cavity ASS'Y
- 7) After repairing the motor, rotate the removed turntable motor cover.
- 8) Fit the turntable motor cover's projecting part to the base plate slit.

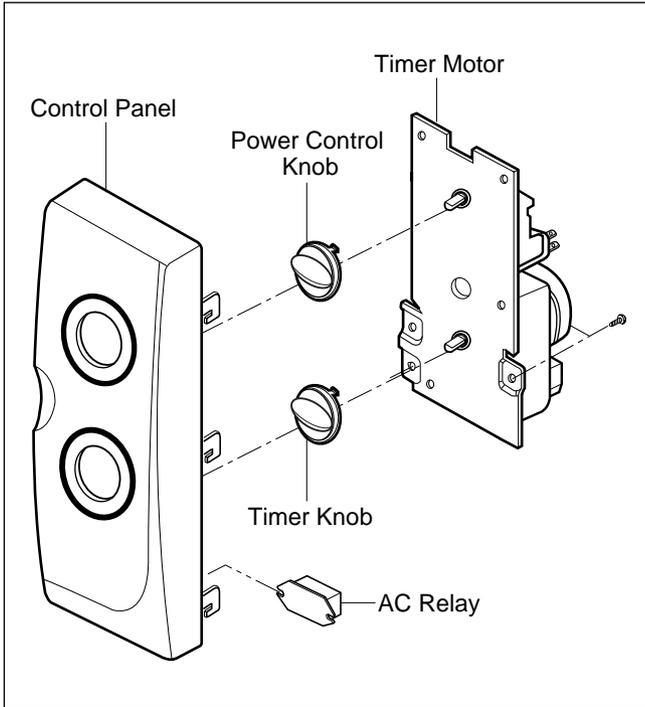
NOTE:

1. Remove the wire lead from the turntable motor VERY CAREFULLY.
2. Be sure to grasp the connector, not the wires, when removing.



K. TIMER MOTOR REMOVAL

- 1) Remove the control panel assembly from the cavity.
- 2) Remove screws which hold the timer motor to the control panel.
- 3) Remove the timer motor from the control panel.
- 4) Remove the power control knob and the timer knob.

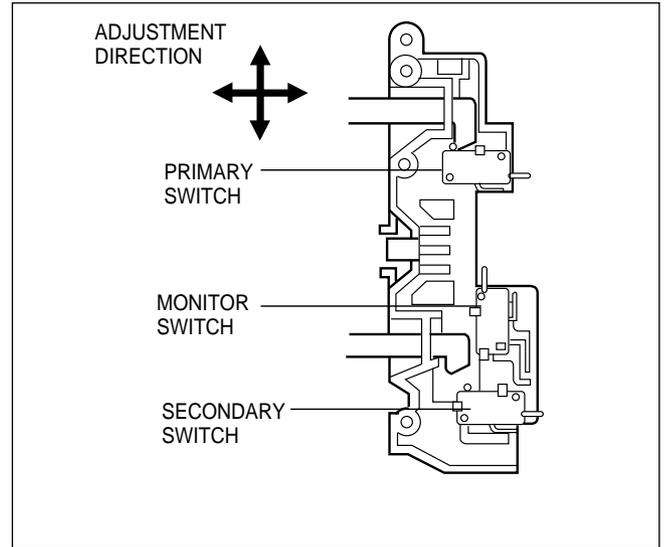


L. INTERLOCK SYSTEM

1) INTERLOCK MECHANISM

The door lock mechanism is a device which has been specially designed to eliminate completely microwave activity when the door is opened during cooking and thus to prevent the danger resulting from the microwave leakage.

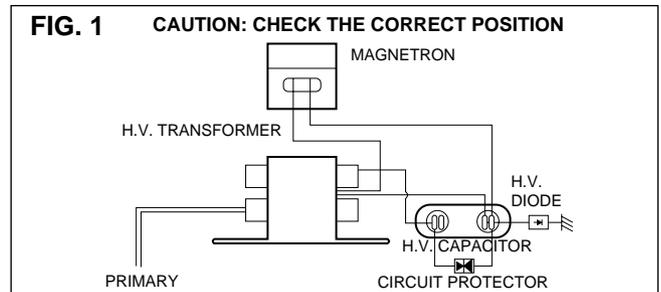
2) MOUNTING OF THE PRIMARY/MONITOR/SECONDARY SWITCHES TO THE LATCH BOARD



3) INSTALLATION AND ADJUSTMENT OF THE LATCH BOARD TO THE OVEN ASSEMBLY

- Mount the latch board to the oven assembly.
- Adjust the latch board in the arrow direction so that oven door will not have any play in it when the door is closed.
- Tighten the mounting screw.
- **Check for play in the door by pushing the door release button. Door movement should be less than 0.5 mm. (1/64 inch)**

Don't push the door release button while making adjustment. Make sure that the latch moves smoothly after adjustment are completed and that the screws are tight. Make sure the primary, monitor, and secondary switches operate properly by following the continuity test procedure.



INTERLOCK CONTINUITY TEST

WARNING : FOR CONTINUED PROTECTION AGAINST EXCESSIVE RADIATION EMISSION, REPLACE ONLY WITH IDENTICAL REPLACEMENT PARTS.

TYPE NO. SZM-V 16-FA-63 OR VP-533A-OF FOR PRIMARY SWITCH
 TYPE NO. SZM-V 16-FA-62 OR VP-532A-OF FOR MONITOR SWITCH
 TYPE NO. SZM-V 16-FA-63 OR VP-533A-OF FOR SECONDARY SWITCH

A. PRIMARY INTERLOCK SWITCH TEST

When the door release button is depressed slowly with the door closed, an audible **click** should be heard at the same time or successively at intervals. When the button is released slowly, the latches should activate the switches with an audible **click**.

If the latches do not activate the switches when the door is closed, the switches should be adjusted in accordance with the adjustment procedure. Disconnect the wire lead from the primary switch. Connect the ohmmeter leads to the common (COM) and normally open (NO) terminal of the switch. The meter should indicate an open circuit in the door open condition. When the door is closed, the meter should indicate a closed circuit.

When the primary switch operation is abnormal, make the necessary adjustment or replace the switch only with the same type of switch.

B. SECONDARY INTERLOCK SWITCH TEST

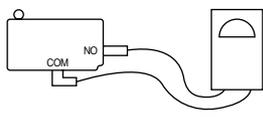
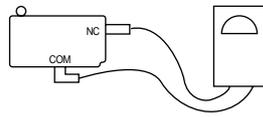
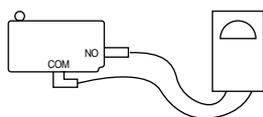
Disconnect the wire lead from the secondary switch.

Connect the ohmmeter leads to the common (COM) and normally open (NO) terminals of the switch. The meter should indicate a open circuit in the door open condition. When the door is closed, meter should indicate an closed circuit. When the secondary switch operation is abnormal, make the necessary adjustment or replace the switch only with the same type of switch.

C. MONITOR SWITCH TEST

Disconnect the wire lead from the monitor switch. Connect the ohmmeter leads to the common (COM) and normally closed (NC) terminals of the switch. The meter should indicate closed circuit in the door open condition. When the door is closed, meter should indicate an open circuit. When the monitor switch operation is abnormal, replace with the same type of switch.

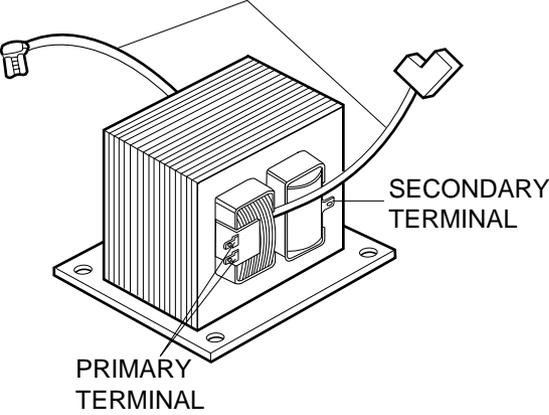
NOTE: After repairing the door or the interlock system, it is necessary to do this continuity test before operating the oven.

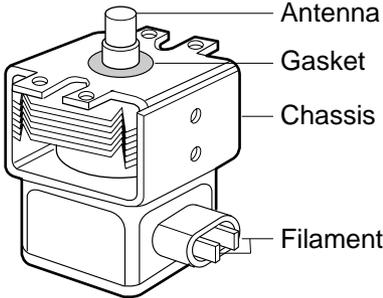
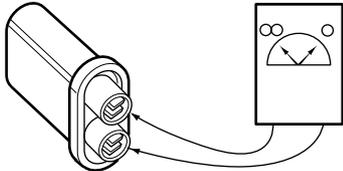
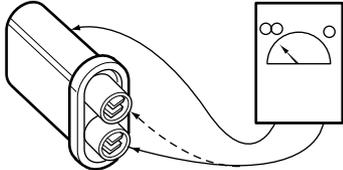
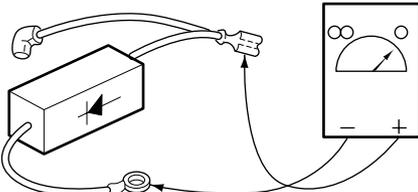
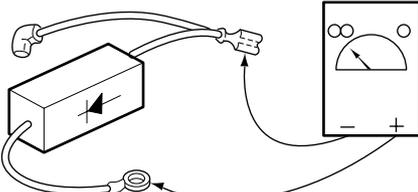
COMPONENTS	TEST PROCEDURE	RESULTS	
		Door open	Door closed
SWITCHES (Wire leads removed)	Check for continuity of the switch with an Ohm-meter		
	Primary Switch 		
	Monitor Switch 		
	Secondary Switch 		
NOTE : After checking for the continuity of switches, make sure that are connected correctly.			

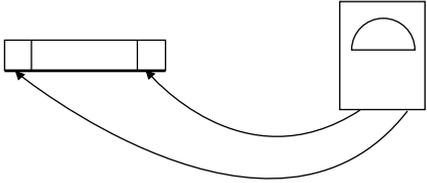
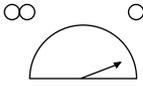
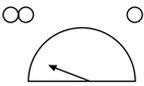
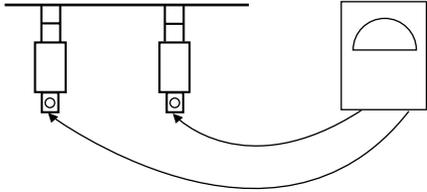
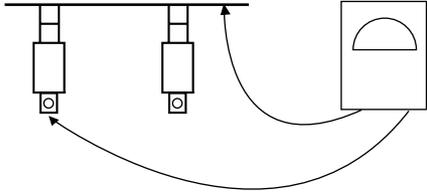
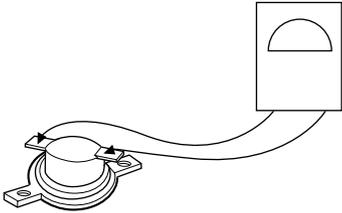
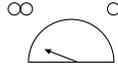
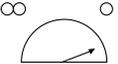
COMPONENT TEST PROCEDURE

CAUTIONS

1. DISCONNECT THE POWER SUPPLY CORD FROM THE OUTLET WHENEVER REMOVING THE OUTER CASE FROM THE UNIT. PROCEED WITH THE TEST ONLY AFTER DISCHARGING THE HIGH VOLTAGE CAPACITOR AND REMOVING THE WIRE LEADS FROM THE PRIMARY WINDING OF THE HIGH VOLTAGE TRANSFORMER. (SEE PAGE 2-1)
2. ALL OPERATIONAL CHECKS WITH MICROWAVE ENERGY MUST BE DONE WITH A LOAD (1 LITER OF WATER IN CONTAINER) IN THE OVEN.

COMPONENTS	TEST PROCEDURE	RESULTS
<p>HIGH VOLTAGE TRANSFORMER (Wire leads removed)</p>	 <p>1. Measure the resistance. (Ohm-meter scale: Rx1 and Rx100)</p> <ul style="list-style-type: none"> • Primary winding • Secondary winding • Filament winding <p>2. Measure the resistance. (Ohm-meter scale: Rx1000)</p> <ul style="list-style-type: none"> • Primary winding to ground • Filament winding to ground 	<p>Approx.: 2.5 Ω Approx.: 110 Ω Less than: 0.4 Ω</p> <p>Normal: ∞ Normal: ∞</p>
<p>MAGNETRON (Wire leads removed)</p>	<p>1. Measure the resistance. (Ohm-meter scale: Rx1)</p> <ul style="list-style-type: none"> • Filament terminal <p>2. Measure the resistance. (Ohm-meter scale: Rx1000)</p> <ul style="list-style-type: none"> • Filament to chassis 	<p>Normal: Less than 1 Ω</p> <p>Normal: ∞</p>

COMPONENTS	TEST PROCEDURE	RESULTS
	 <p>NOTE: When testing the magnetron, be sure to install the magnetron gasket in the correct position and be sure that the gasket is in good condition.</p>	
HIGH VOLTAGE CAPACITOR	<p>Measure the resistance. (Ohm-meter scale: Rx1000) • Terminal to terminal.</p> 	Normal: Momentarily indicates several ohms, and then gradually returns to infinite.
	<p>Measure the resistance. (Ohm-meter scale: Rx1000) • Terminal to case.</p> 	Normal: ∞
HIGH VOLTAGE DIODE	<p>Measure the continuity (Forward). (Ohm-meter scale: Rx10000)</p> 	Normal: Continuity. Abnormal: ∞
NOTE : Some inexpensive meters may indicate infinite resistance in both direction.	<p>Measure the continuity (Reverse). (Ohm-meter scale: Rx10000)</p> 	Normal: ∞ Abnormal: Continuity.

COMPONENTS	TEST PROCEDURE	RESULTS	
FUSE	Check for continuity of the fuse with an multi-meter. 	Normal	Abnormal
	NOTE: If the fuse is blown, check the primary, the secondary, and the monitor switches, H.V.D. and H.V.C. before replacing the fuse. If the fuse is blown by improper switch operation replace the defective switch and the fuse at the same time. Replace just the fuse if the switches operate normally.		
HEATER ELEMENT (Wire leads removed.)	Measure the resistance. (Multi-meter scale: Rx1) 	Normal: *Grill heater Approx. 50 Ω (at 20 ~ 30°C)	
	Measure the resistance with 500V-100M ohm insulation resistance meter. 	Normal: more than 200 MΩ	
	NOTE: Make sure heater is fully cooled when tested.		
GRILL THERMOSTAT		0°C~Approx.90°C	Approx.90°C
OVEN THERMOSTAT			
MAGNETRON		0°C~Approx.145°C	Approx.145°C
THERMOSTAT			

COMPONENTS	TEST PROCEDURE	RESULTS									
<p>TIMER MOTOR (Wire leads removed)</p>	<p>Check for continuity of timer motor with an ohm-meter. (Remove wire leads from timer motor)</p>	<table border="1" data-bbox="1225 236 1501 300"> <tr> <td></td> <td>Turn On</td> <td>Turn Off</td> </tr> </table> <table border="1" data-bbox="1225 300 1501 421"> <tr> <td>A</td> <td></td> <td></td> </tr> </table> <table border="1" data-bbox="1225 421 1501 519"> <tr> <td>B</td> <td colspan="2">Approx. 22 KΩ</td> </tr> </table> <p>Note : A is timer ON, OFF switch. B is power supply terminal of the timer motor. C is defrost switch.</p>		Turn On	Turn Off	A			B	Approx. 22 K Ω	
	Turn On	Turn Off									
A											
B	Approx. 22 K Ω										
<p>FAN MOTOR (Wire leads removed)</p>	<p>Measure the resistance. (Ohm-meter scale: R x 1)</p>	<p>Normal:</p> <table border="1" data-bbox="1107 987 1399 1119"> <tr> <td>A ~ B</td> <td>A ~ C</td> </tr> <tr> <td>30 ~ 50 Ω</td> <td>300~500 Ω</td> </tr> </table> <p>Abnormal: ∞ or several Ω</p>	A ~ B	A ~ C	30 ~ 50 Ω	300~500 Ω					
A ~ B	A ~ C										
30 ~ 50 Ω	300~500 Ω										
<p>TURNTABLE MOTOR (Wire leads removed)</p>	<p>Measure the resistance. (Ohm-meter scale: R x 1000)</p>	<p>Normal: Approx. 100~200 Ω Abnormal: ∞ or several Ω</p>									
<p>NOTE : • A MICROWAVE LEAKAGE TEST MUST ALWAYS BE PERFORMED WHEN THE UNIT IS SERVICED FOR ANY REASON. • MAKE SURE THE WIRE LEADS ARE IN THE CORRECT POSITION. • WHEN REMOVING THE WIRE LEADS FROM THE PARTS, BE SURE TO GRASP THE CONNECTOR, NOT THE WIRES.</p>											

TROUBLE SHOOTING

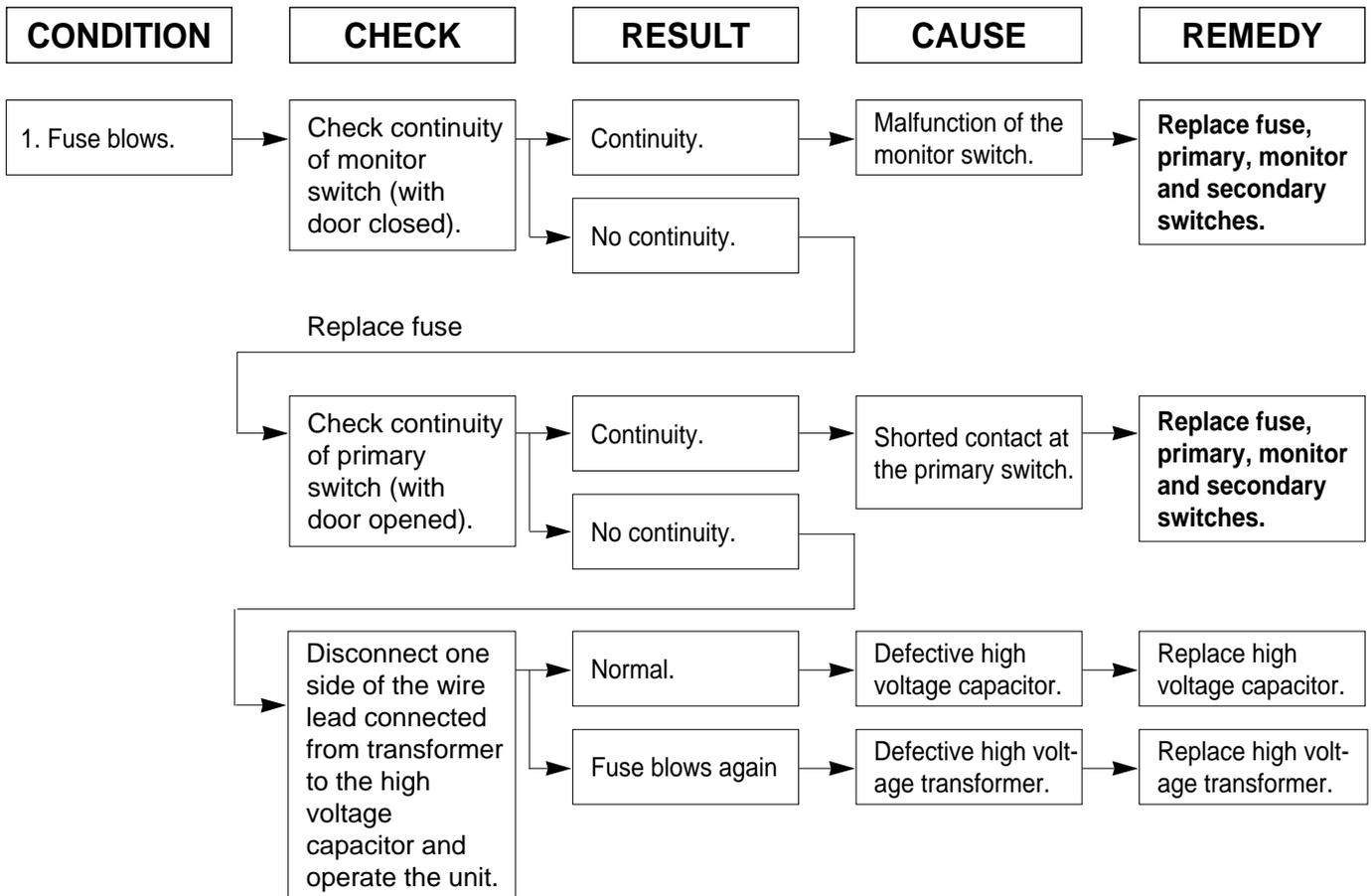
WHEN YOU GET A COMPLAINT FROM YOUR CUSTOMER, EVALUATE THE COMPLAINT CAREFULLY. IF THE FOLLOWING SYMPTOMS APPLY, PLEASE INSTRUCT THE CUSTOMER IN THE PROPER USE OF THE MICROWAVE OVEN. THIS CAN ELIMINATE AN UNNECESSARY SERVICE CALL.

CAUTIONS

1. Check grounding before checking for trouble.
 2. Be careful of the high voltage circuit.
 3. Discharge the high voltage capacitor. (See page 2-1)
 4. When checking the continuity of the switches or of the high voltage transformer, disconnect one lead wire from these parts and then check continuity with the AC plug removed. To do otherwise may result in a false reading or damage to your meter.
 5. Do not touch any part of the circuitry on the digital programmer circuit since static electric discharge may damage this control panel.
- Always touch yourself ground while working on this panel to discharge any static charge built up in your body.

CONDITION	CAUSE	REMEDY
Microwave oven does not work.	Inserting many plug into one plug outlet and using them at the same time (causes overloading).	Avoid using other electrical appliances when you use the microwave oven.
	Microwave oven plug is not inserted tightly.	Insert microwave oven plug securely.
Output power is too low.	Low AC input voltage.	Use the microwave oven at adequate line voltage.
	Food temperature is too low.	This may not be a defect. It is possible that the food should be cooked for a longer time period.
Sparks occurring.	Using metallic ware and allowing it to touch the oven wall.	Do not use metallic ware for cooking except where noted in the cooking guide.
	Ceramic ware trimmed in gold or silver powder is used.	Do not use any type of cookware with metallic trimming.
Uneven cooking.	Inconsistent intensity of microwave by their characteristics.	<ol style="list-style-type: none"> 1. Wrap the thinner part with aluminum foil. 2. Use plastic wrap or lid. 3. Stir once or twice while cooking soup, cocoa or milk, etc.

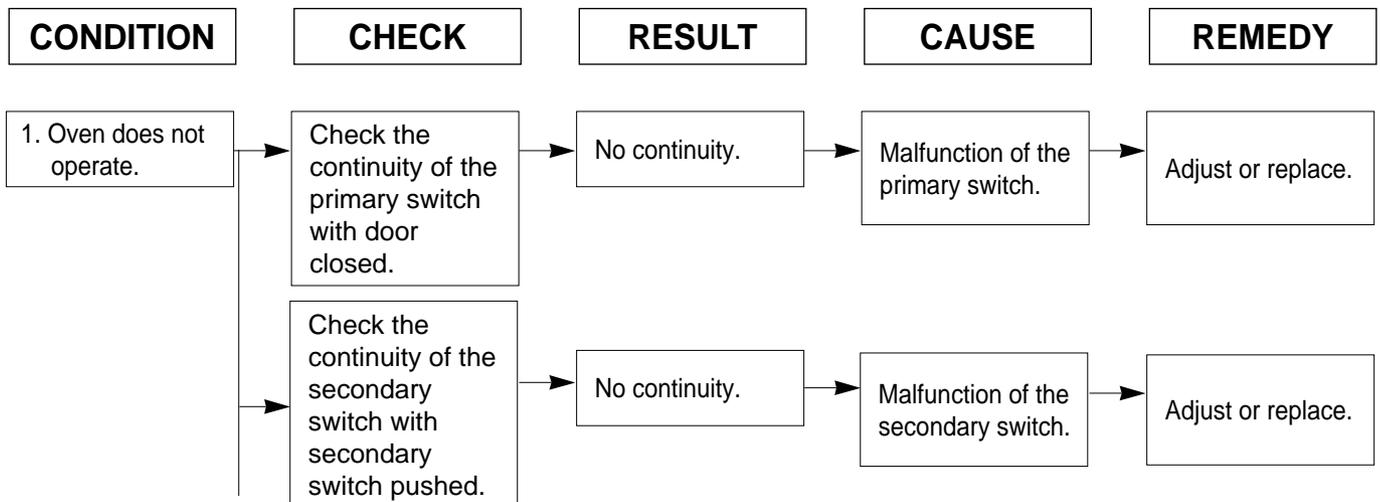
(TROUBLE 1) Oven lamp does not turn on when the timer knob is pushed with door closed.



This fuse is a special type of fuse which is kept as spare part by the importer.

NOTE : All these switches must be replaced at the same time.

(TROUBLE 2) Oven does not start even though the timer is set.



CONDITION	CHECK	RESULT	CAUSE	REMEDY
	Check the continuity of the timer switch contacts.	No continuity.	Malfunction of the timer switch.	replace.
	Check the continuity of the thermostat.	No continuity.	Faulty thermostat.	replace.

(TROUBLE 3) Output power is low.

CONDITION	CHECK	RESULT	CAUSE	REMEDY
Output is low	Check the power source voltage oscillating.	Lower than 207V.	Decrease in power source voltage with load.	Suggest customer contact local electric power utility co. or qualified electrician.
		Normal		
	Measure the magnetron's output(See test procedure).	Less than 8.5°C.	Faulty magnetron.	

(TROUBLE 4) Grill.

CONDITION	CHECK	RESULT	CAUSE	REMEDY
1. Heater is not operating.	Heater.	Abnormal.	Malfunction the heater.	Replace.
		Normal.		
	Thermostat (Grill)	Abnormal.	Malfunction the thermostat.	Replace.
		Normal.		
	Wire connection.	No continuity.	Open or loosen.	Replace.

(TROUBLE 5) Oven does not cook at all even though turntable rotates.

CONDITION	CHECK	RESULT	CAUSE	REMEDY
No microwave oscillation.	Check the power control switch (cooking state).	No continuity.	Malfunction of the power control switch.	Replace the power control switch.
		Continuity.		
	Check the monitor resistor.	Abnormal or burn out.	Defective monitor resistor.	Replace.
	Check the AC relay.	Abnormal	Defective AC relay.	Replace.
		Normal		
	Check H.V. transformer.	Abnormal	Open the secondary winding of the high voltage transformer or faulty insulation of filament winding.	Replace .
	Check H.V. diode.	Abnormal	Shorted H.V. diode	Replace .
	Check H.V. capacitor.	Abnormal	Faulty capacitor.	Replace .
	Magnetron	Abnormal	Faulty magnetron.	Replace .