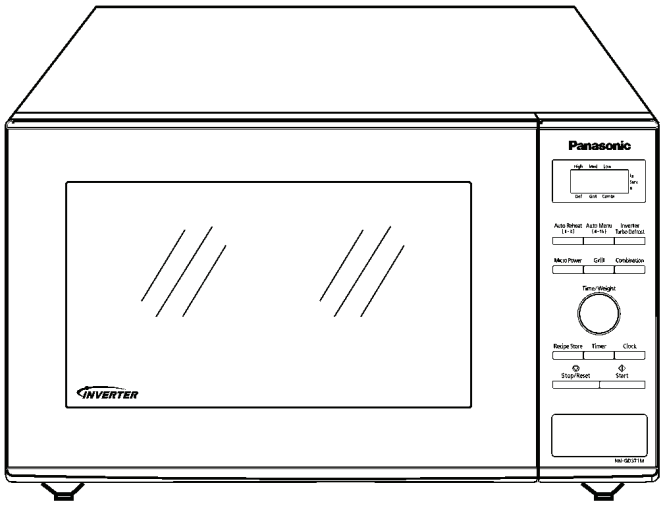
ORDER NO.PAPMOSH1208050CE

Service Manual

Microwave Oven



NN-GD371M

KPQ(Kuwait, Doha, Qatar, Oman, Bahrain, Pakistan)

Specification

Models		NN-GD371M
Power Source:		230-240V AC Single Phase, 50Hz
Power Consumption:	Microwave	1150W
	Heater	1050W
Output:	Microwave	950W
	Heater	1000W
Microwave Frequency:		2450MHz
Timer:		90 min.00sec (HIGH/MAX Power Level) 30 min.00sec (Other Power Level)
Outside Dimensions:		488mm(W) x 395mm(D) x 279mm(H)
Oven Cavity Dimensions:		315mm(W) x 353mm(D) x 178mm(H)
Weight:		10kg
PbF		This product with PbF
Specifications subject to change without notice.		

Panasonic®

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

WARNING

1. This product should be serviced only by trained, qualified personnel.
2. Check for radiation leakage before and after every servicing according to the "procedure for measuring radiation leakage."
3. If the unit cannot be repaired on site, advise the customer not to use until unit is repaired.
4. There are special components used in the microwave oven which are important for safety. These parts are marked with a ⚠ on the replacement parts list. It is essential that these critical parts be replaced only with the manufacture's specified parts to prevent microwave leakage, shock, fire, or other hazards. Do not modify the orginal design.

This service manual covers products for following markets.
When troubleshooting or replacing parts, please refer to the country/area identifications shown below for your applicable product specification.

KPQ ..... For Kuwait, Doha, Qatar, Oman, Bahrain, Pakistan

CAUTION

About lead free solder (PbF)

Distinction of PbF PCB: PCBs (manufactured) using lead free solder will have a PbF stamp on the PCB.

Caution:
- Pb free solder has a higher melting point than standard solder; Typically the melting point is 30 - 40˚C higher. Please use a high temperature soldering iron. In case of the soldering iron with temperature control, please set it to 370 ± 10˚C.
- Pb free solder will tend to splash when heated too high (about 600˚C).

DANGER OF HIGH VOLTAGE AND HIGH TEMPERATURE (HOT/LIVE) OF THE INVERTER POWER SUPPLY (U)

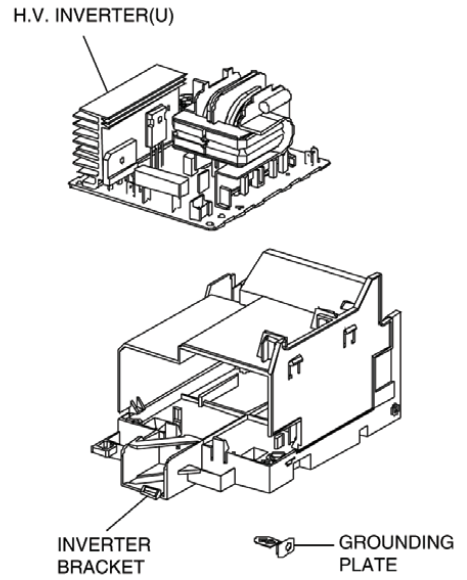
INVERTER WARNING

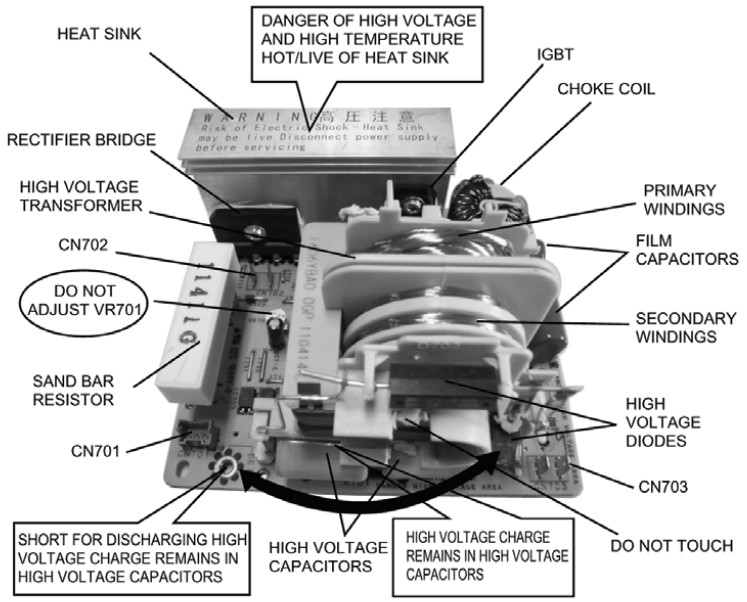
This Inverter board looks like a regular PCB. However, this PCB drives the magnetron tube with extremely high voltage and high current. Improper handling can result in an electrical shock or burns, which might lead to injury or death.

IT HAS:
1. **Very high voltage and high current circuits.**
   It functions the same as the high voltage transformer and high voltage capacitor in ordinary microwave ovens.
2. **Aluminum heat sink that is energized with very high voltage and high heat energy.**
3. **Very high voltage which may remain in circuitry even when oven is off. High voltage charge may remain in the capacitors on the board.**

DO NOT:
* 1. **Do not touch circuitry because it has very hot (high voltage) circuitry. Even when replacing board, extreme care should be taken to avoid possible electric shock hazards. High voltage charge may remain in circuits.**
* 2. **Do not touch aluminum heat sink because it is energized with very high voltage and is also very hot in high heat energy.**
* 3. **Do not try to adjust or tamper with preset control on the Inverter board because it is very dangerous to adjust without proper test equipment.**
* 4. **Do not test oven while Inverter grounding plate or screws are loose. It is very dangerous to operate H.V. Inverter Circuit (U) with loose mounting screws or if improperly grounded.**

INVERTER POWER SUPPLY



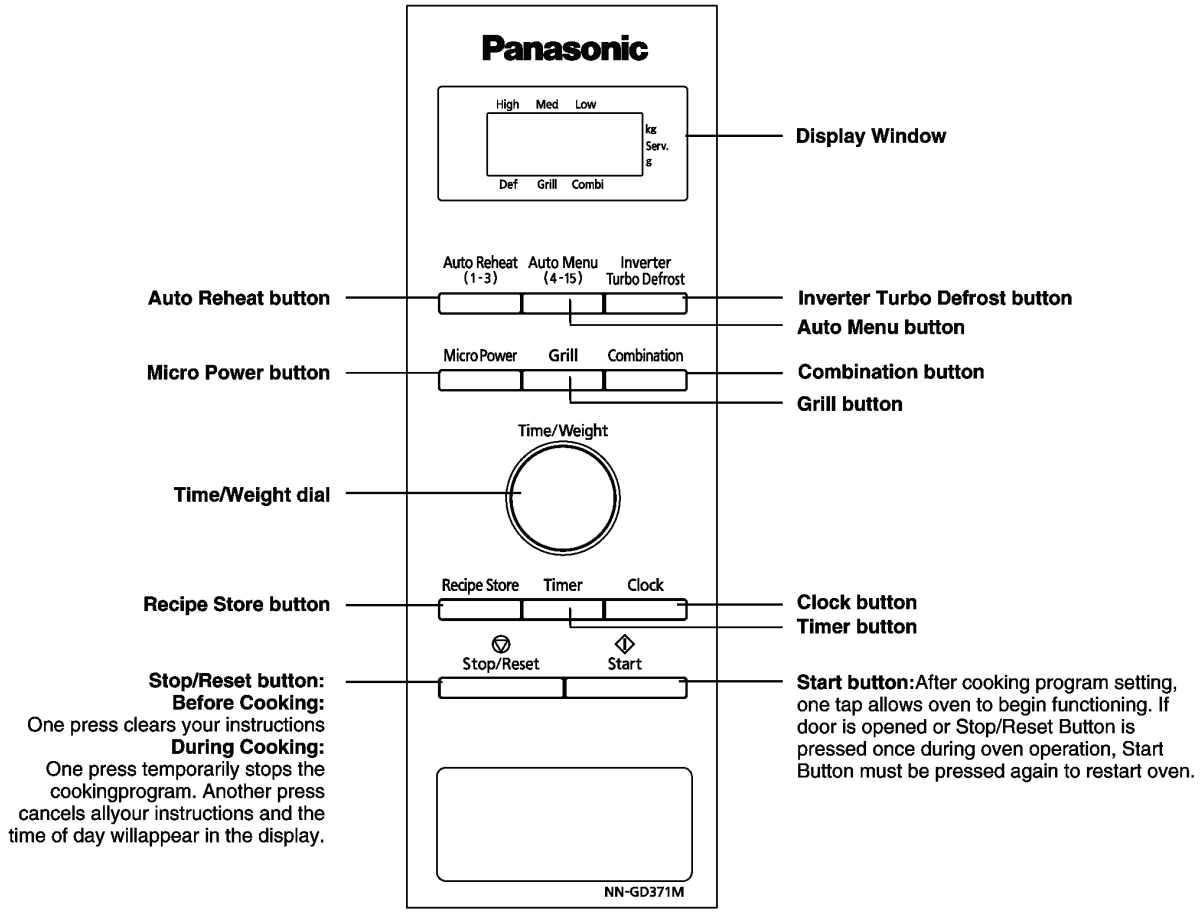


CONTENTS

1 FEATURE CHART

FEATURE \ MODEL	GD371M
3 Stage Cooking	○
Microwave	○
Grill	○
Combination	○
Auto Weight	○
Auto Weight Turbo Defrost	○
Delay / Stand	○
Clock	○
Memory	○
Child Safety Lock	○

2 CONTROL PANEL

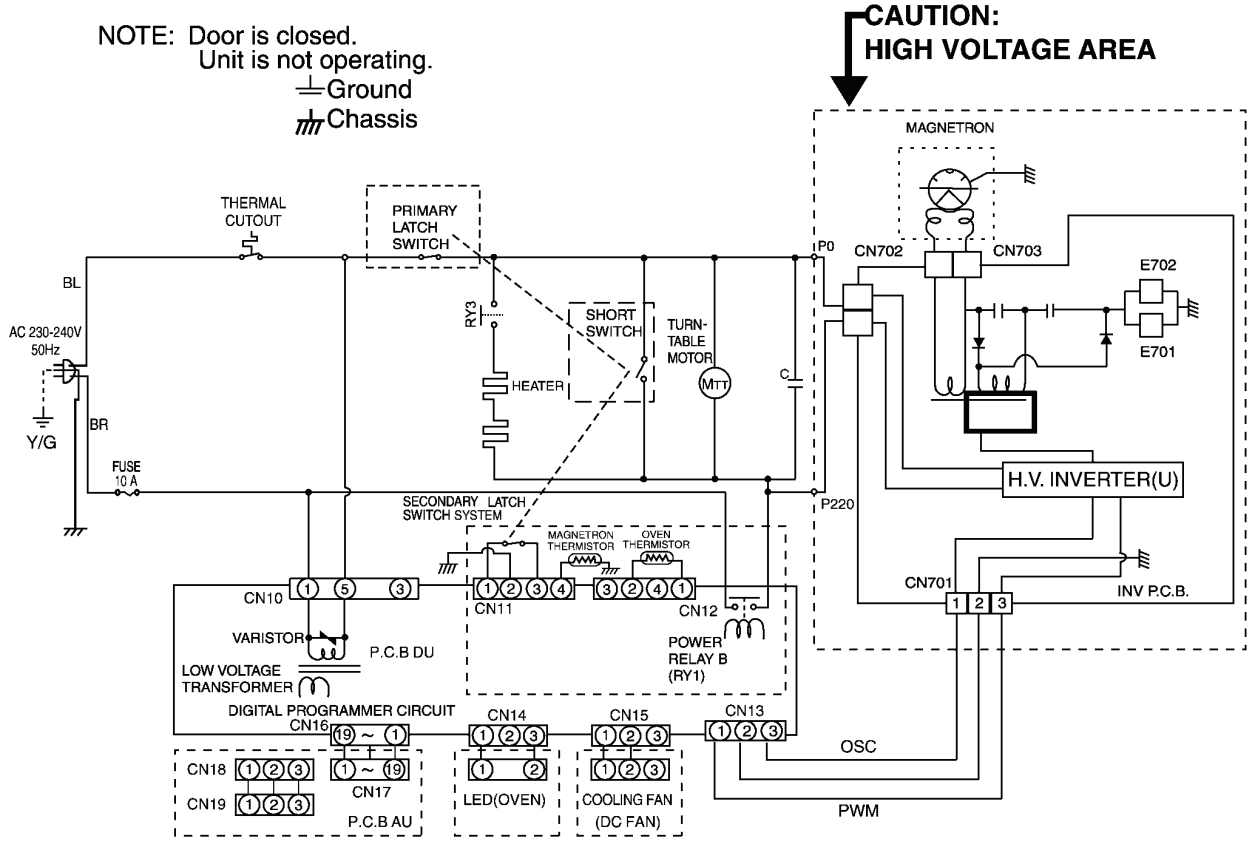


Beep Sound:
When a button is pressed correctly, a beep sound will be heard. If a button is pressed and no beep is heard, the unit did not or could not accept the instruction. The oven will beep twice between programmed stages. At the end of any completed program, the oven will beep 5 times.

Note:
If an operation is set and Start button is not pressed, after 6 minutes, the oven will automatically cancel the operation. This display will revert back to clock or colon mode.

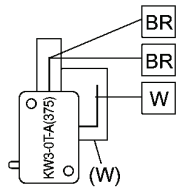
This oven is equipped with an energy saving function:
1. When in stand-by mode the brightness of the display will be reduced.
2. The oven will enter stand-by mode, when first plugged in and immediately after the last operation has completed.

3 SCHEMATIC DIAGRAM

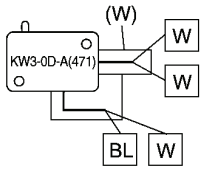


WIRING DIAGRAM

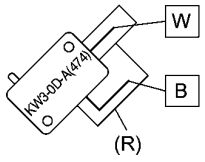
NOTE: * When replacing, check the lead wire color as shown.
***Colors shown by ( ) indicate colors of lead wire connector housing.**



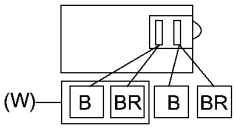
SHORT SWITCH
TOP



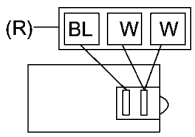
PRIMARY
LATCH SWITCH
MIDDLE



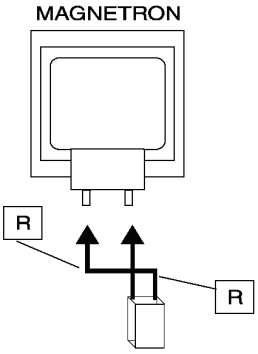
SECONDARY
LATCH SWITCH
BOTTOM

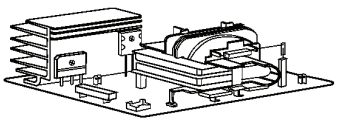


POWER RELAY (RY1)



POWER RELAY (RY3)





HIGH VOLTAGE INVERTER(U)

WARNING: H.V.

SYMBOL	COLOR
OR	ORANGE
BL	BLUE
BR	BROWN
W	WHITE
Y	YELLOW
R	RED
GR	GRAY
B	BLACK
G	GREEN
N	NATURAL

(S-BB2)

4 DESCRIPTION OF OPERATING SEQUENCE

4.1. Variable power cooking control

High Voltage Inverter Power Supply (U) controls output power by the signal from Digital Programmer Circuit (DPC). Power relay always stay on, but PWM (Pulse Width Modulation) signal controls microwave output power.

NOTE:

The ON/OFF time ratio does not correspond with the percentage of microwave power since approximately 2 seconds are required for heating of magnetron filament.

Variable Power Cooking

POWER SETTING	OUTPUT POWER(%) APPROX.	MANUAL MICROWAVE DUTY	
		ON(Sec.)	OFF(Sec.)
HIGH	100%	22	0
MEDIUM-HIGH	65%	22	0
MEDIUM	50%	22	0
MEDIUM-LOW	30%	22	0
DEFROST	30%	14	8
LOW	20%	13	9

4.2. Inverter power supply circuit

The Inverter Power Supply circuit powered from the line voltage, 230-240V 50Hz AC input supplies 4,000V DC to the magnetron tube, and functions in place ofthe H.V. transformer, the H.V. capacitor and H.V. diode.

1. The AC input voltage 230-240V 50Hz is rectified to DC voltage immediately.
2. DC voltage will be supplied to the switching devices called IGBT. These devices are switched ON-OFF by the 20 to 40 kHz PWM (pulse width modulation) signal from the microcomputer in the DPC.
3. This drives the High voltage transformer to increase voltage up to 2,000V AC.
4. Then the half-wave doubler voltage rectifier circuit, consisting of the H.V. diodes and capacitors, generates the necessary 4,000V DC needed for the magnetron.
5. Output power of the magnetron tube is always monitored by the signal output from the current transformer built into the inverter circuit.
6. This signal is fed back to the microcomputer in the DPC to determine operating conditions and output necessary to control PWM signal to the Inverter Power Supply for control of the output power.

4.3. Turbo defrost, Auto cook

When the Auto Control feature is selected and the [Start] pad is tapped:

1. The digital programer circuit determines the power level and cooking time to complete cooking and indicates the operating state in the display window.
2. When cooking time in the display window has elapsed, the oven turns off automatically by a control signal from the digital programmer circuit.

Turbo Defrost

WEIGHT SELECTED	COOKING TIME
1.0KG	13min. 10sec.

Auto Reheat(Meal)

WEIGHT SELECTED	COOKING TIME
800g	8min. 00sec.

4.4. Grill cooking control

Grill cooking is accomplished by upper heaters only. One grill cooking cycle is 33 seconds.

1. During grill cooking, the digital programmer circuit controls power relay RY3´s ON-OFF time. In all three grill cooking categories, power relay RY1 always stay ON, but RY3´s ON-OFF time are shown in Figure.

GRILL CATEGORY	GRILL (RY3)		MICROWAVE (DUTY)	
	ON (sec.)	OFF (sec.)	ON (sec.)	OFF (sec.)
1	33	0	0	33
2	24	9		

4.5. Combination Cooking

Combination cooking is accomplished by microwave and grill cooking (upper heaters) being done synchronously during one combination cooking cycle. One combination cooking cycle is 33 seconds.

1. During combination cooking, the digital programmer circuit controls power relay RY3 & RY1´s duty ON-OFF time. In all three combination cooking categories, power relay RY3 & RY1's duty ON-OFF time are as shown in Figure.

COMBINATION CATEGORY	GRILL(RY3)		MICROWAVE(DUTY)	
	ON(sec.)	OFF(sec.)	ON(sec.)	OFF(sec.)
1	33	0	22	0
2	33	0	22	0
3	28	5	22	0

5 CAUTIONS TO BE OBSERVED WHEN TROUBLESHOOTING

Unlike many other appliances, the microwave oven is a high voltage, high current device. It is free from danger in ordinary use, though extreme care should be taken during repair.

⚠ CAUTION

Servicemen should remove their watches and rings whenever working close to or replacing the magnetron.

5.1. Check the grounding

Do not operate on a two wire extension cord. The microwave oven is designed to be grounded when used. It is imperative, therefore, to ensure the appliance is properly grounded before beginning repair work.

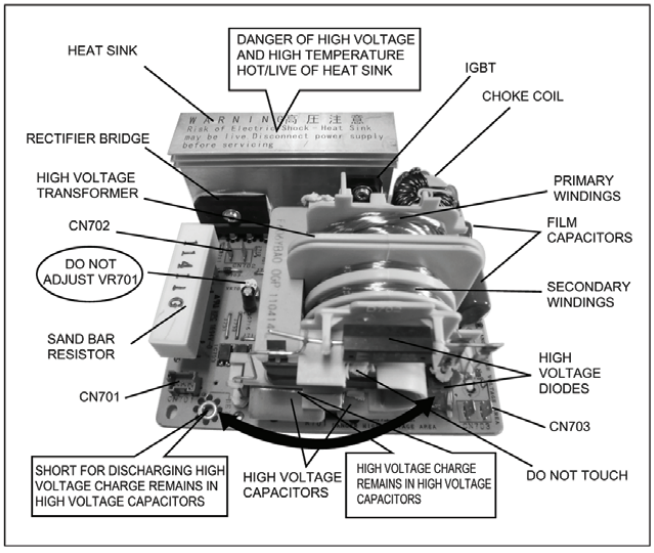
5.2. Inverter warnings

⚠ WARNING HIGH VOLTAGE AND HIGH TEMPERATURE (HOT/LINE) OF THE INVERTER POWER SUPPLY (U)

The high voltage inverter power supply generates very high voltage and current for the magnetron tube. Though it is free from danger in ordinary use, extreme care should be taken during repair.

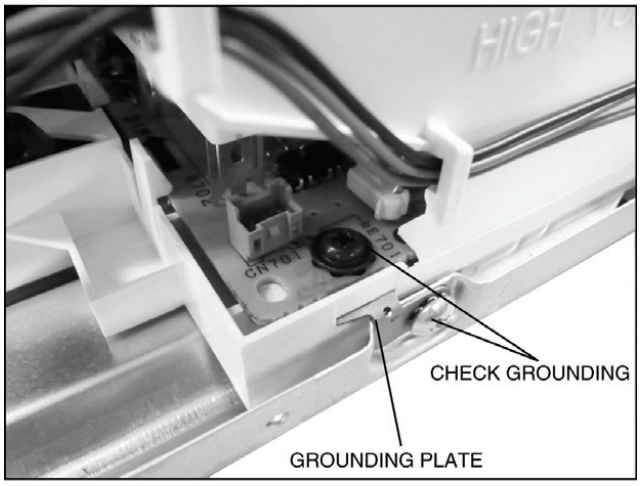
The aluminum heat sink is also energized with high voltage (HOT), do not touch when the AC input terminals are energized. The power device Collector is directly connected to the aluminum heat sink.

The aluminum heat sink may be HOT due to heat energy, therefore, extreme care should be taken during servicing.



⚠ WARNING FOR INVERTER POWER SUPPLY (U) GROUNDING

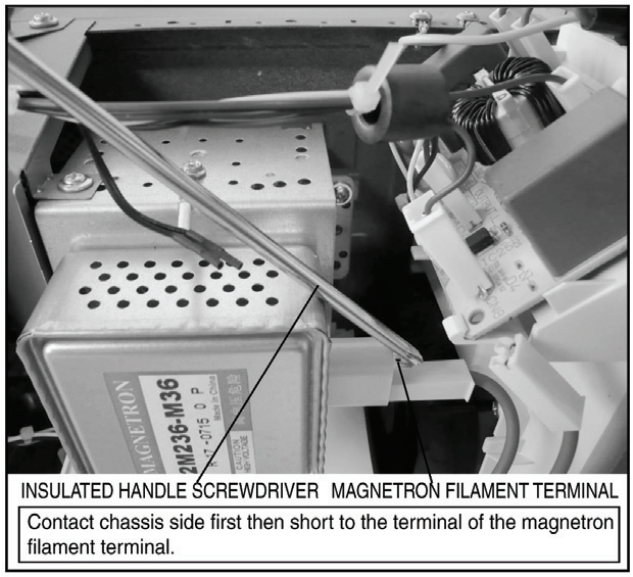
Check the high voltage inverter power supply circuit grounding. The high voltage inverter power supply circuit board must have a proper chassis ground. The inverter grounding bracket must be connected to the chassis. If the inverter board is not grounded it will expose the user to very high voltages and cause extreme DANGER! Be sure that the inverter circuit is properly grounded via the inverter earth bracket.



⚠ WARNING DISCHARGE THE HIGH VOLATGE CAPACITORS

For about 30 seconds after the oven is turned off, an electric charge remains in the high voltage capacitors of the inverter power supply circuit board.

When replacing or checking parts, remove the power plug from the outlet and short the inverter output terminal of the magnetron filament terminals to the chassis ground with an insulated handle screwdriver to discharge. Please be sure to contact the chassis ground side first and then short to the output terminal.



⚠ WARNING

There is high voltage present with high current capabilities in the circuits of the primary and secondary windings, choke coil and heat sink of the inverter. It is extremely dangerous to work on or near these circuits with the oven energized. DO NOT measure the voltage in the high voltage circuit including the filament voltage of the magnetron.

⚠ WARNING

Never touch any circuit wiring with your hand or with an insulated tool during operation.

5.3. Part replacement.

When troubleshooting any part or component is to be replaced, always ensure that the power cord is unplugged from the wall outlet.

5.4. When the 10A fuse is blown due to the malfunction of the short switch:

⚠ **WARNING**

When the 10A 250V fuse is blown due to the malfunction of the interlock monitor switch, replace all of the components (primary latch switch, secondary latch switch, short switch and power relay RY1).

1. This is mandatory. Refer to “measurements and adjustments” for the location of these switches.
2. When replacing the fuse, confirm that it has the appropriate rating for these models.
3. When replacing faulty switches, be sure the mounting tabs are not bent, broken or deficient in their ability to hold the switches.

5.5. Avoid inserting nails, wire etc. through any holes in the unit during operation.

Never insert a wire, nail or any other metal object through the lamp holes on the cavity or any holes or gaps, because such objects may work as an antenna and cause microwave leakage.

5.6. Verification after repair

1. After repair or replacement of parts, make sure that the screws of the oven, etc. are neither loose nor missing. Microwave energy might leak if screws are not properly tightened.
2. Make sure that all electrical connections are tight before inserting the plug into the wall outlet.
3. Check for microwave energy leakage.

CAUTION OF MICROWAVE RADIATION LEAKAGE

USE CAUTION NOT TO BECOME EXPOSED TO RADIATION FROM THE MICROWAVE MAGNETRON OR OTHER PARTS CONDUCTING MICROWAVE ENERGY

IMPORTANT NOTICE

The following components have potentials above 2000V while the appliance is operated.

- Magnetron
- High voltage transformer (Located on inverter (U))
- High voltage diodes (Located on inverter (U))
- High voltage capacitors (Located on inverter (U))

Pay special attention to these areas.

When the appliance is operated with the door hinges or magnetron installed incorrectly, the microwave leakage can exceed more than 5mW/cm^2. After repair or exchange, it is very important to check if the magnetron and the door hinges are correctly installed.

5.7. Sharp edges

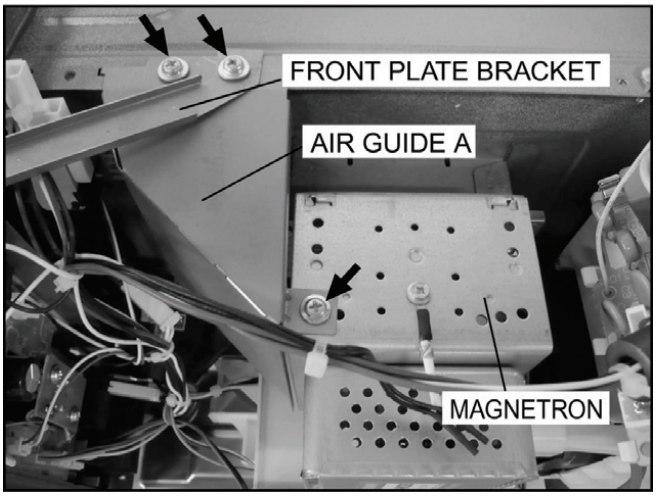
⚠ **CAUTION**

Please use caution when disassembling or reassembling internal parts. Some exposed edges may be sharp to the touch and can cause injury if not handled with care.

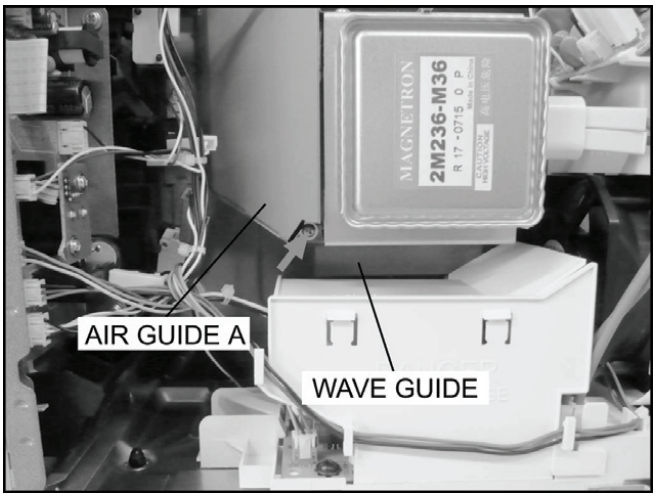
6 DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

6.1. Magnetron

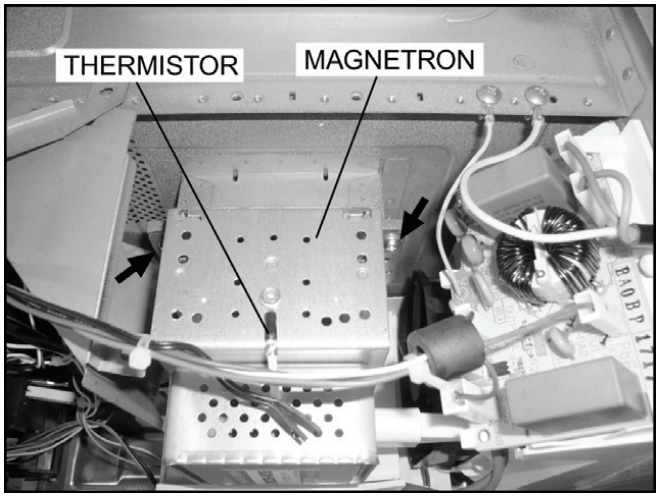
1. Discharge the high voltage capacitor.
2. Remove 1 screw holding front plate bracket on cavity top plate.
3. Remove 2 screws holding air guide A on cavity top plate and on magnetron.



4. Remove 1 screw holding air guide A on the wave guide, then remove the air guide A.



5. Remove 1 screw holding thermistor on the magnetron.
6. Remove 2 screws holding the magnetron.



⚠ **NOTE:**

After replacement of the magnetron,tighten mounting screws properly, making sure there is no gap between the waveguide and the magnetron to prevent microwave leakage.

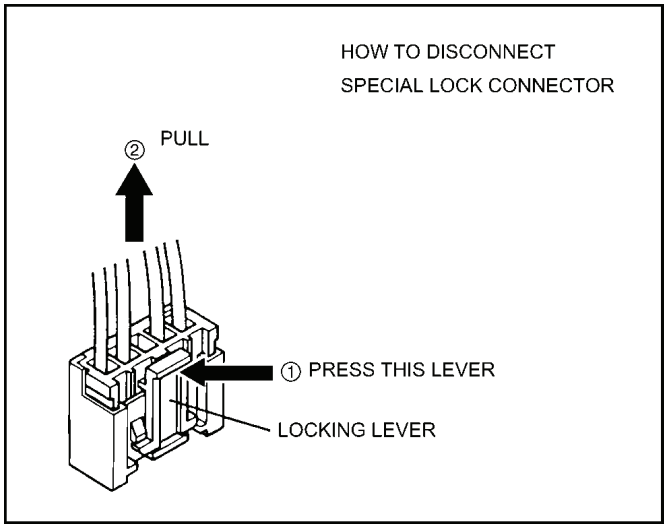
⚠ CAUTION
When replacing the magnetron, be sure the antenna gasket is in place.

6.2. Digital programmer circuit (D.P.C)

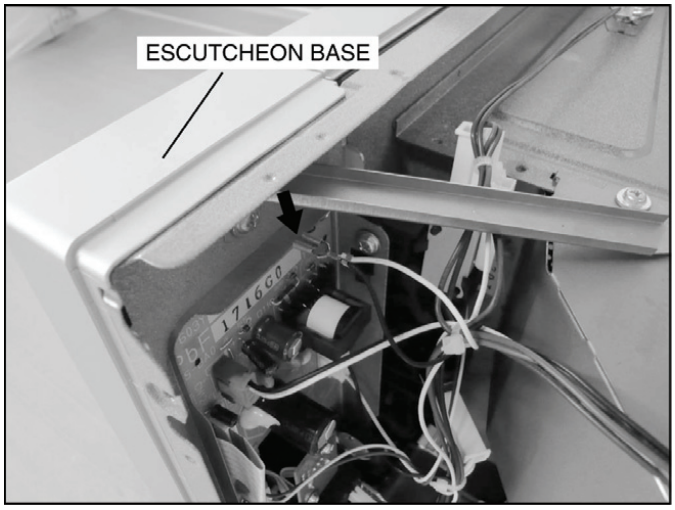
⚠ **CAUTION:**

Be sure to ground any static electric charge built up in your body before handling the D.P.C..

1. Disconnect all connectors from D.P.C. board.



2. Disconnect 1 grounding connector from cavity front plate.



3. Disconnect connector CN701 from H.V. inverter.

6.3. Low voltage transformer and/or power relays (RY1)

⚠ **CAUTION:**

Be sure to ground any static electric charge built up in your body before handling the DPC.

1. Using solder wick or a desoldering tool and 30W soldering iron carefully remove all solder from the terminal pins of the low voltage transformer and/or power relays.

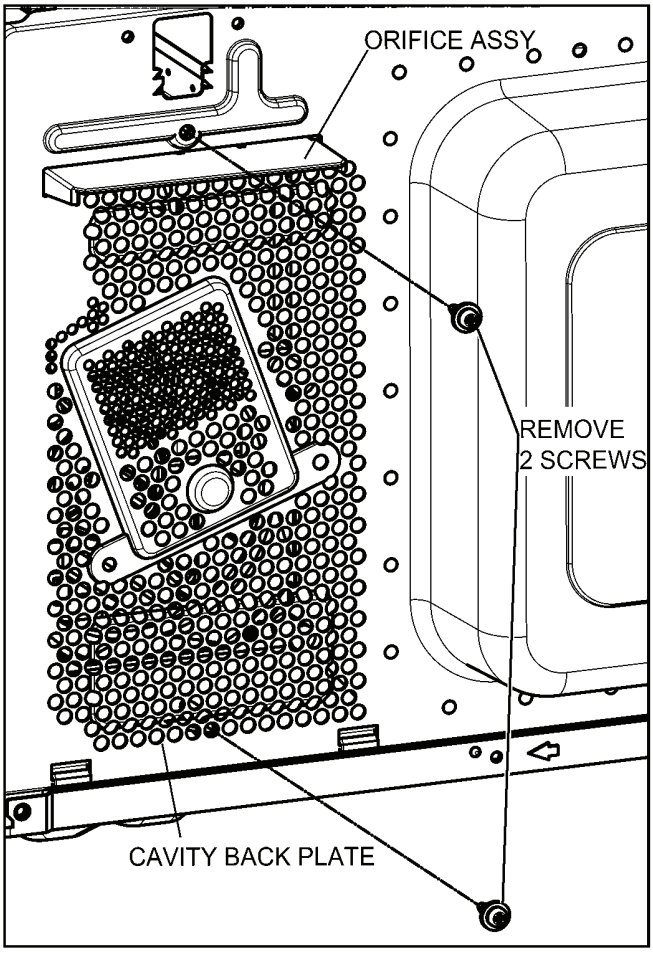
   NOTE:

   Do not use a soldering iron or desoldering tool of more than 30 watts on D.P.C. contacts.

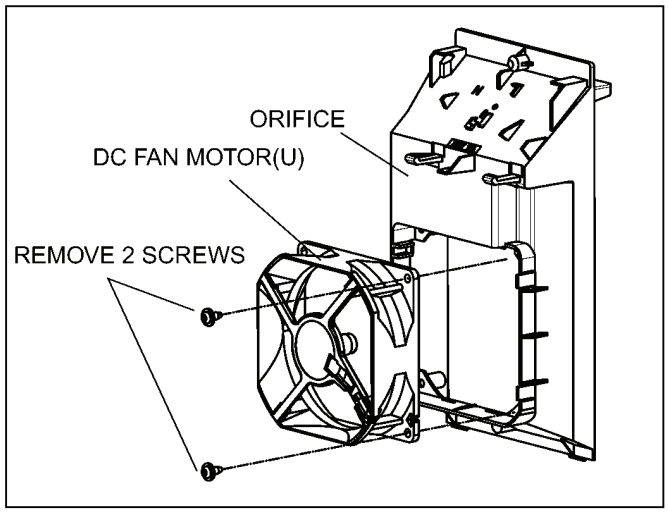
2. With all the terminal pins cleaned and separated from D.P.C. contacts, remove the defective transformer/power relays, Replace components making sure all terminal pins are inserted completely resolder all terminal contacts carefully.

6.4. DC fan motor

1. Disconnect DC fan motor connect CN15 from DPC board DU.
2. Remove 2 screws holding orifice assy and detach the orifice assy from oven assy.

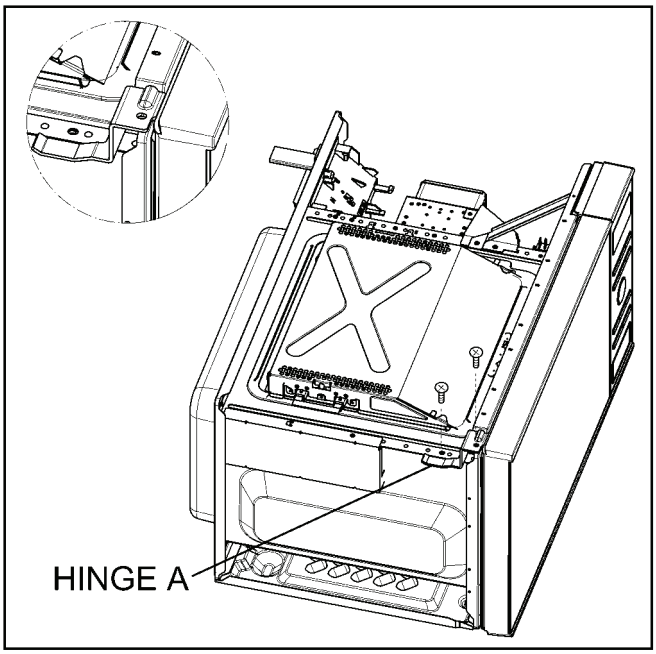


3. Remove 2 screws holding DC fan motor(U) on orifice assy and detach the fan motor from orifice assy.



6.5. Door assembly

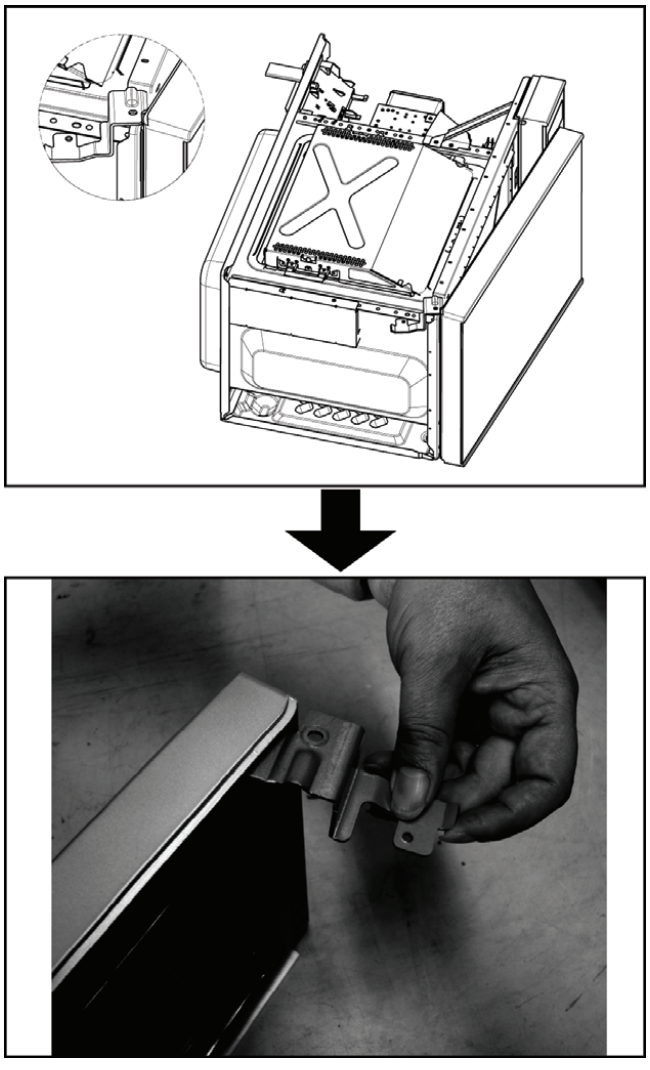
1. Support the door, remove 2 screws holding hinge A.



2. Open the door, remove door(U) and hinge A from cavity.

NOTE:

Support the door before opening.



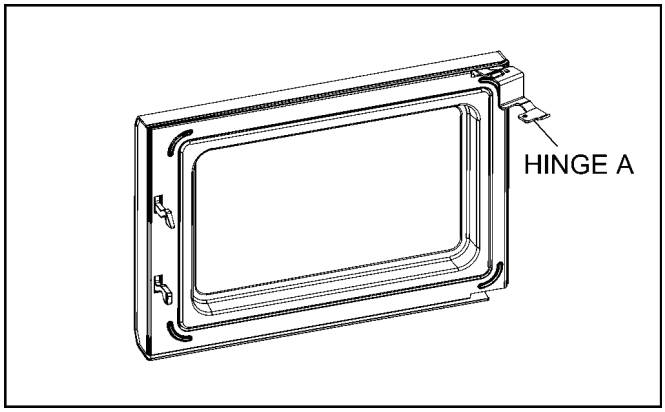
3. Remove door C from door A (U) & door E by carefully pulling outward starting from upper right hand corner using a flat blade screwdriver.
4. Separate door E from tabs on door A (U) and remove door A (U).
5. Remove door key and door key spring from door E.
6. Replace other components.

To re-install components:

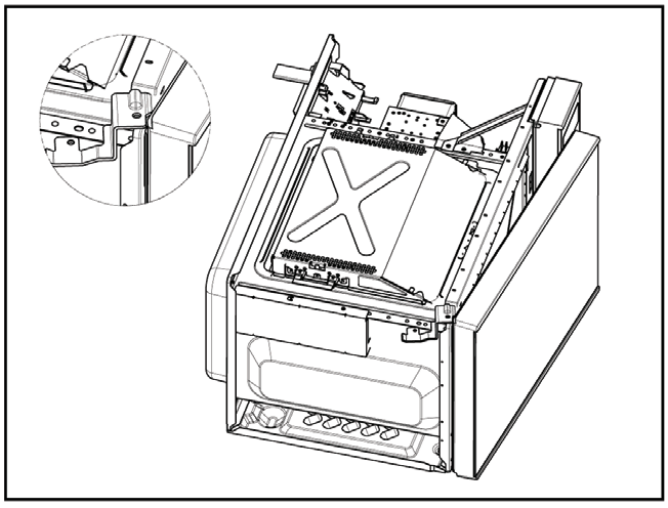
NOTE:

After replacement of the defective component parts of the door, reassemble it properly and adjustment so as to prevent an excessive microwave leakage. Adjustment of the door assembly (Refer page 18).

7. Place the hole of hinge A into the door's upper hinge pin.



8. Use your left index finger to support the door's lower hinge pin while guiding the door's hinge A into the cavity slot. Then lower your finger to seat the door onto the hinge.



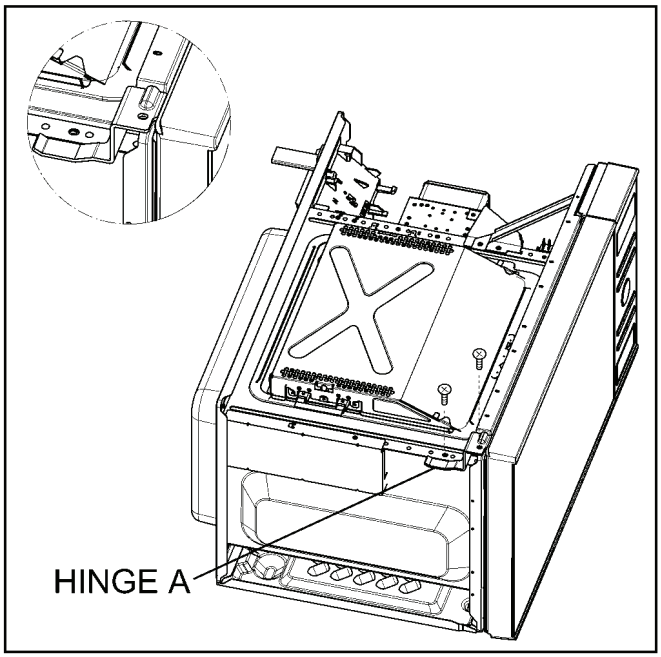
NOTE:

Door alignment is crucial. If door is misaligned, apply pressure until alignment is achieved.

NOTE:

Adjust so that the upper portion of the door will touch firmly to the oven cavity front plate, without pushing the door. If the door assembly is not mounted properly, microwave power may leak from the clearance between the door and oven.

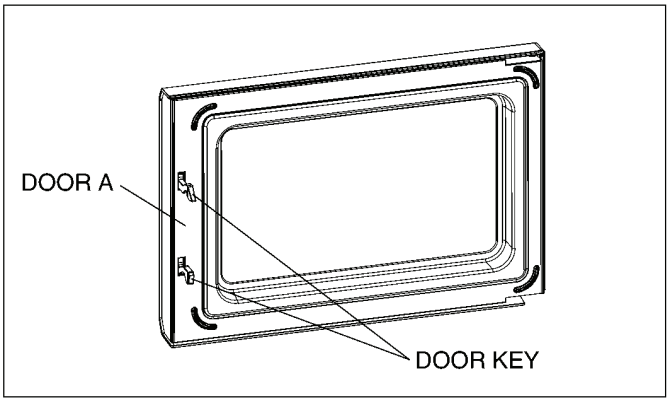
9. Tighten 2 mounting screws.

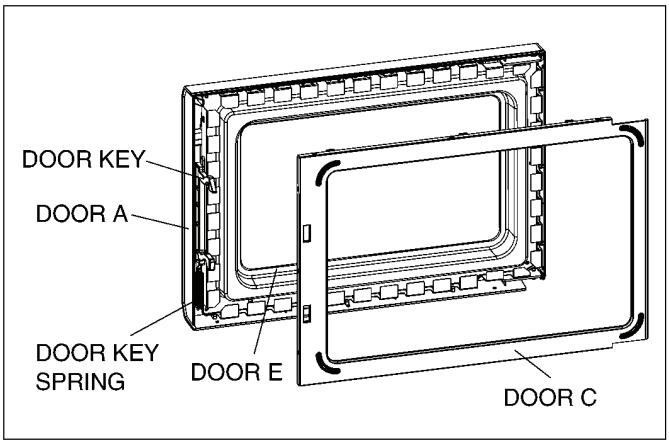


Be sure the gap between door E and cavity front plate will be 0.3~0.7mm.

NOTE:

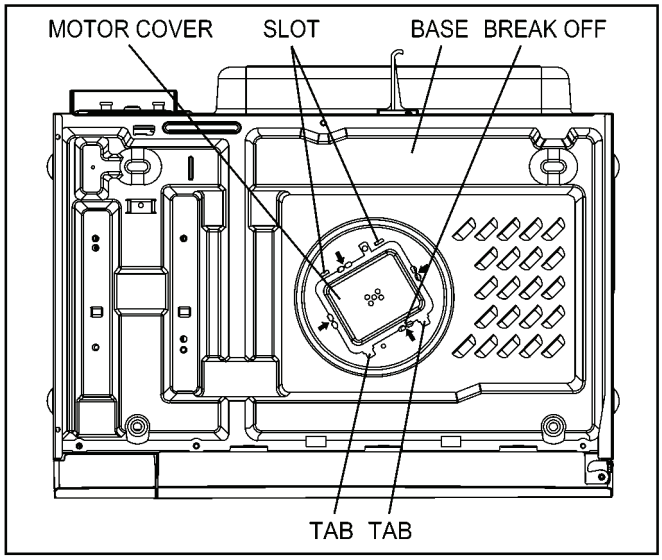
Always perform the microwave leakage measurement test after installation and adjustment of door assembly.





6.6. Turntable motor

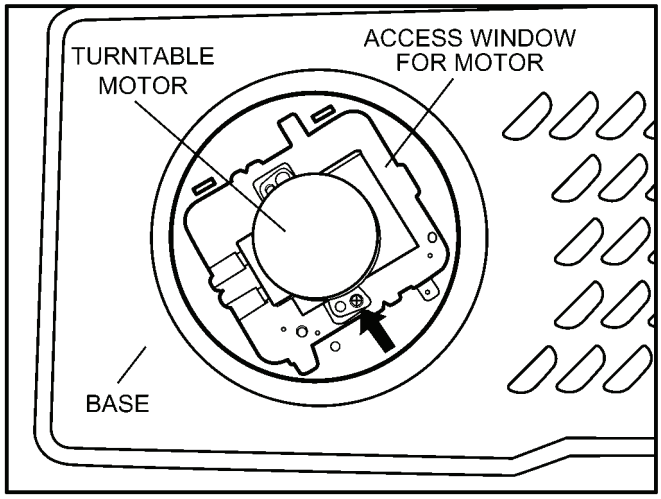
1. Remove the motor cover by breaking off at the 4 spots indicated by arrows with a cutter or the like.



NOTE:

After removing the motor cover, be sure that cut portions are properly trimmed off or bent to the inside so that no sharp edges will be exposed to outside.

2. Disconnect 2 lead wires connected to the turntable motor.
3. Remove the turntable motor by removing 1 screw.

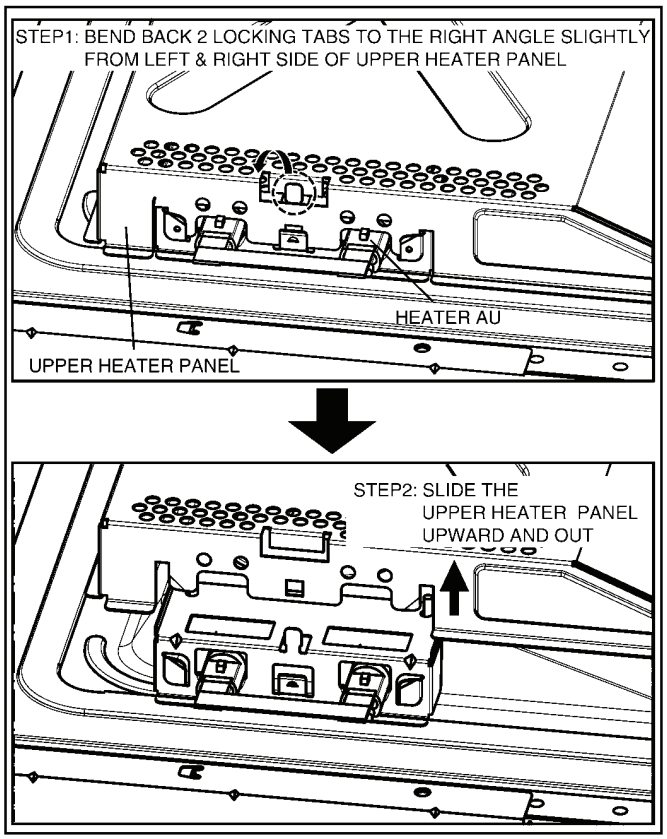


NOTE:

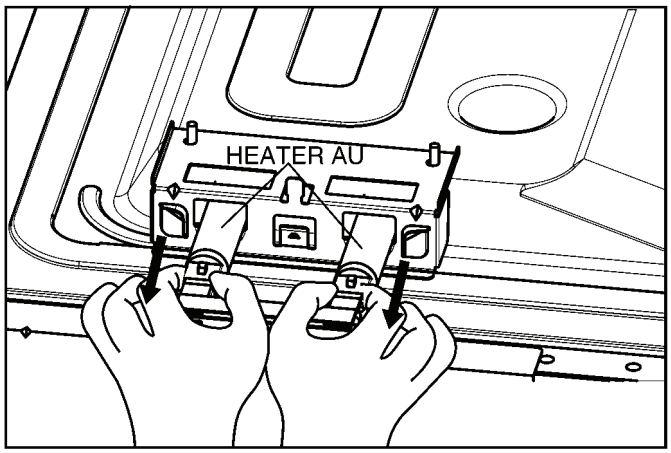
After reinstalling the new turntable motor and reconnecting the 2 lead wires, reinstall the motor cover by rotating it around 180°, tucking the 2 tabs under the base into the 2 provided slots, then screw the single tab to the base using a 4mm x 6mm screw.

6.7. Quartz heater

1. Disconnect lead wires from both side of heater terminals.
2. Bend back 2 locking tabs from left and right side of upper heater panel respectively. Then slide the upper heater panel upward and out.

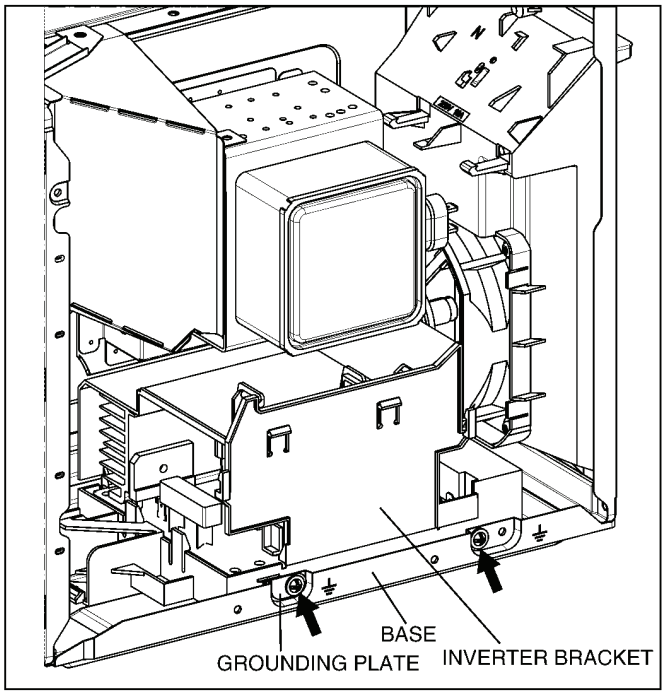


3. Remove the heater by pulling it out from the cavity left side.

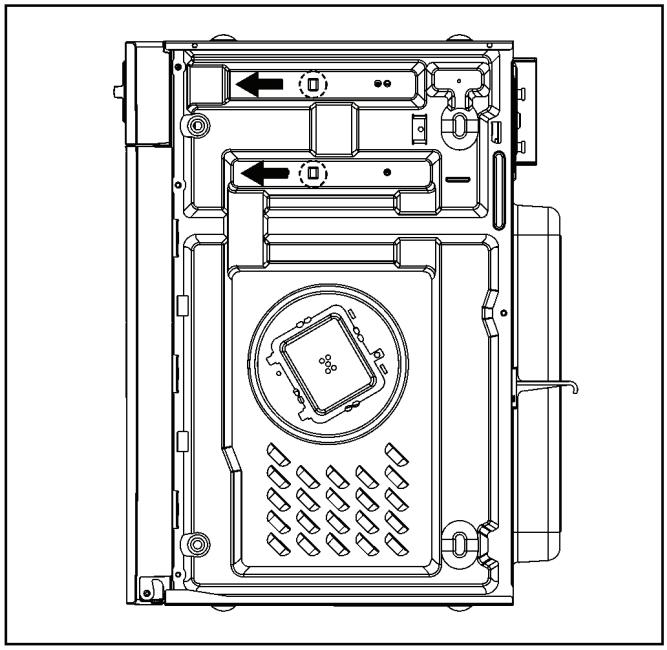


6.8. H.V. Inverter Power Supply

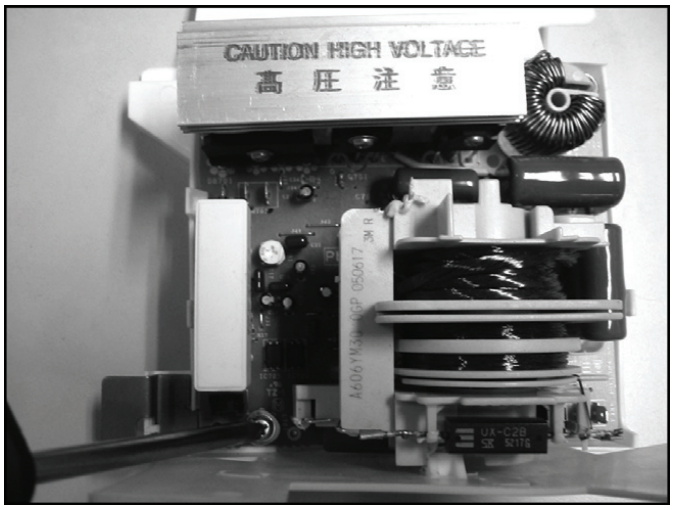
1. Disconnect 2 high voltage lead wires from magnetron filament terminals.
2. Unplug connector CN701 & CN702 from H.V. Inverter board.
3. Remove 1 screw holding gro unding plate on the base.
4. Remove 1 screw holding inverter bracket on the base.

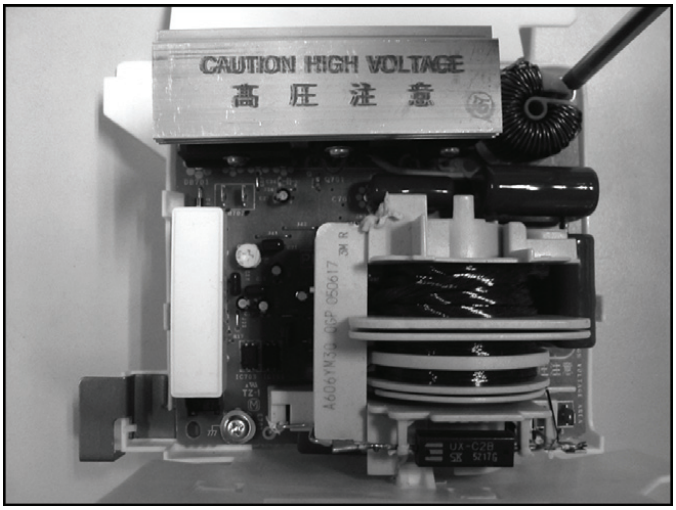


5. Slide 2 locking tabs of inverter bracket at the bottom of the base in direction of arrows.



6. Remove 2 screws holding H.V. inverter on the inverter bracket.





7 COMPONENT TEST PROCEDURE

⚠ WARNING

1. High voltage is present at the output terminals of the High Voltage Inverter (U) including aluminum heat sink during any cook cycle.
2. It is neither necessary nor advisable to attempt measurement of the high voltage.
3. Before touching any oven components, or wiring, always unplug the power cord and discharge the high voltage capacitors.

7.1. Primary, Secondary Latch Switch interlocks & Power Relay RY1

1. Unplug lead connectors to Power Relay RY1 and verify open circuit of the Power Relay RY1 1-2 terminals.
2. Unplug lead connectors to Primary Latch Switch and Secondary Latch Switch.
3. Test the continuity of switches at door opened and closed positions with ohm meter (low scale).

   Normal continuity readings should be as follows.

	Door Closed	Door Opened
Primary Latch Switch	0Ω (Close)	∞Ω(Open)
Secondary Latch Switch	0Ω (Close)	∞Ω(Open)
Power Relay RY1	∞Ω (Open)	∞Ω(Open)

7.2. Short switch & monitor

1. Unplug lead wires from Inverter Power Supply (U) primary terminals.
2. Connect test probes of ohm meter to the disconnected leads which were connected to Inverter Power Supply (U).
3. Test the continuity of short switch with door opened and closed positions using lowest scale of the ohm meter.

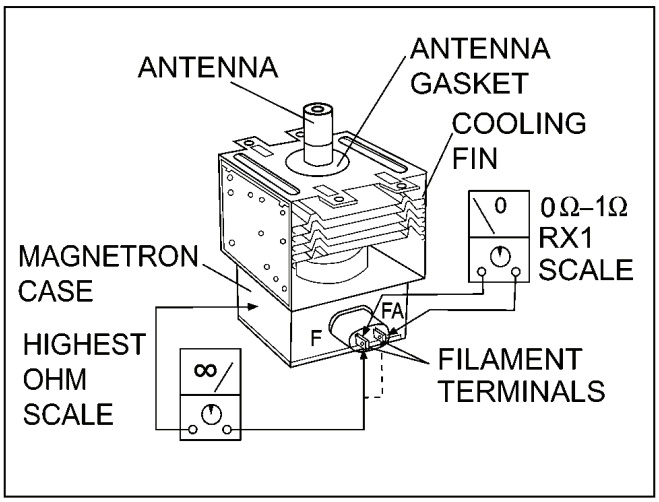
   Normal continuity readings should be as follows.

Door Opened	Door Closed
0Ω(Close)	∞Ω(Open)

7.3. Magnetron

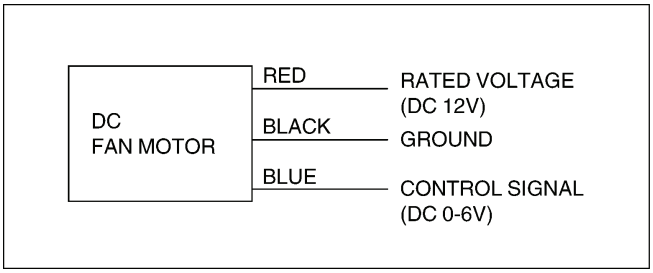
Continuity checks can only indicate an open filament or a shorted magnetron. To diagnose for an open filament or shorted magnetron.

1. Isolate magnetron from the circuit by disconnecting the leads.
2. A continuity check across magnetron filament terminals should indicate one ohm or less.
3. A continuity check between each filament terminal and magnetron case should read open.



7.4. DC fan motor

1. connection



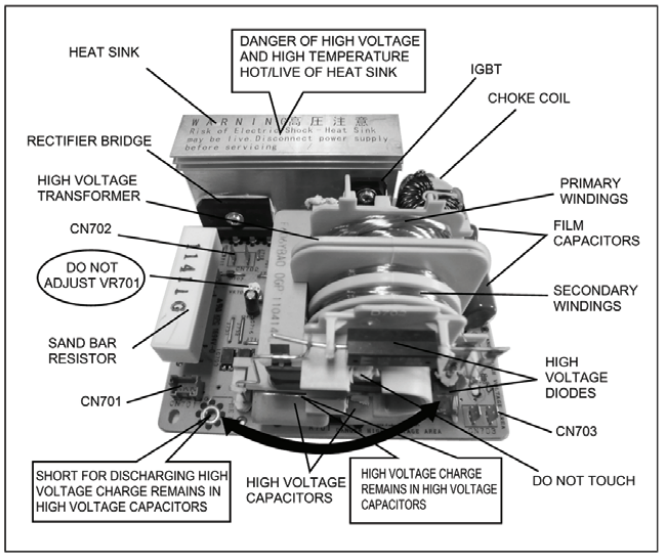
2. Control wire of fan motor should accept PWM control.

   Fan motor´s spin speed is controlled by this PWM siginal.

   PWM frequency is from 18KHz to 30 KHz. If the PWM control wire open, fan motor will spin at maximum speed.

7.5. Inverter power supply (U)

DO NOT try to REPAIR H.V. Inverter power supply (U).Replace complete H.V. Inverter(U) Unit.



WARNING: HIGH VOLTAGE

Test if failure codes H95, H97 or H98 appear when performing the following procedure. It is recommended to use an AC line input current ammeter for testing.

Test 1

1. With the oven unit's AC power supply cord is unplugged from the wall outlet, unplug the 2 pin H.V. connector CN703 from the magnetron tube.
2. Place 1 liter of water load into oven cavity.
3. Plug in the oven's AC power supply cord into outlet.
4. Program DPC.
   a. Press [Clock] button once.
   b. Press [Timer] button once.
   c. Press [Start] button once.
   d. Press [Micro Power] button once.
5. Program oven at High power for 1 minute and press [Start] button.
   a. After approximately 23 seconds, oven stops operating.
   b. During oven operation, the input current is approximately 0.5 to 1A. If both a and b are OK, proceed to test 2.

	INPUT CURRENT	FAILURE CODE
Unplug CN703	0.5 to 1A	Oven stops in 23 seconds after started.

Test 2

Continued from Test 1

1. Unplug the oven's AC power supply cord from outlet.
2. Unplug 3 pin connector CN701. CN703 remains unplugged.
3. Plug in the oven's AC power supply cord into outlet.
4. Program DPC.
   a. Press [Clock] button once.
   b. Press [Timer] button once.
   c. Press [Start] button once.
   d. Press [Micro Power] button once.
5. Program oven at High power for 1 minute and press [Start] button.
   a. After approximately 3 seconds, oven stops operating.
   b. During oven operation, the input current is approximately 0.4A.

	INPUT CURRENT	FAILURE CODE
Unplug CN701	≃ 0.4A	Oven stops in 3 seconds after started.

If both a and b check OK, the Inverter Power Supply (U) can be determined to be OK.

7.6. Temperature thermistor

The thermistor that is attached to the magnetron detects the temperature of the magnetron and will stop magnetron operation when overheating is detected. A normal thermistor´s resistance is 35KΩ to 110KΩ for an ambient temperature range of 10-30 degree C.

If the resistance reading is out of the range stated here, the thermistor is detective and must be replaced.

It is also possible to display thermistor level by taking the following steps.

1. Program the DPC into TEST MODE (Plug-in oven → press [Clock] button once → press [Timer] button once → press [Start] button once → press [Micro Power] button once).
2. Program oven at Standing Time for 1 minute and press [Start] button.
3. Press [Micro Power] once, the thermistor level reading will shown on the display.

   The normal reading should be in the range of 16-230.

8 MEASUREMENTS AND ADJUSTMENTS

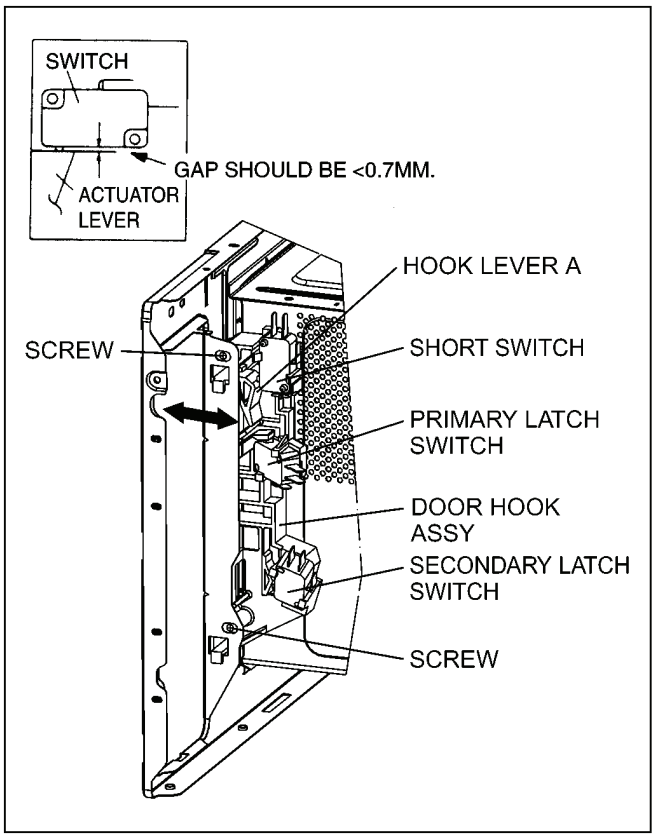
8.1. Adjustment of Primary latch switch, Secondary latch switch and Short switch.

1. Mount the Primary latch swith, the Secondary latch switch and the Short switch to the door hook assembly as shown in ILL.

   NOTE:

   No specific individual adjustments during installation of the Primary latch switch, Secondary latch switch or Short switch to the door hook are required.

2. When mounting the door hook assembly to the oven assembly, adjust the door hook assembly by moving it in the direction of the arrows in the illustration so that the oven door will not have any play in it. Check for play in the door by pulling the door assembly. Make sure that the latch keys move smoothly after adjustment is completed. Completely tighten the screws holding the door hook assembly to the oven assembly.
3. Reconnect the short switch and check the coninuity of the monitor circuit and all latch switches again by following the component test procedures.



8.2. Measurement of microwave output

The output power of the magnetron can be determined by performing IEC standard test procedures. However, due to the complexity of IEC test procedures, it is recommended to test the magnetron using the simple method outlined below.

Necessary Equipment:

- 1 liter beaker
- Glass thermometer
- Wrist watch or stopwatch

NOTE:

Check the line voltage under load.Low voltage will lower the magnetron output. Take the temperature readings and heating time as accurately as possible.

1. Fill the beaker with exactly one liter of tap water. Stir the water using the thermometer and record the water's temperature. (recorded as T1).
2. Place the beaker on the center of glass tray.
   Set the oven for High power and heat it for exactly one minute.
3. Stir the water again and read the temperature of the water. (recorded as T2).
4. The normal temperature rise at High power level for each model is as shown in table.

TABLE (1L-1min. test)

RATED OUTPUT	TEMPERATURE RISE
900W	Min.8.0°C
1000W	Min.8.5°C

9 TROUBLESHOOTING GUIDE

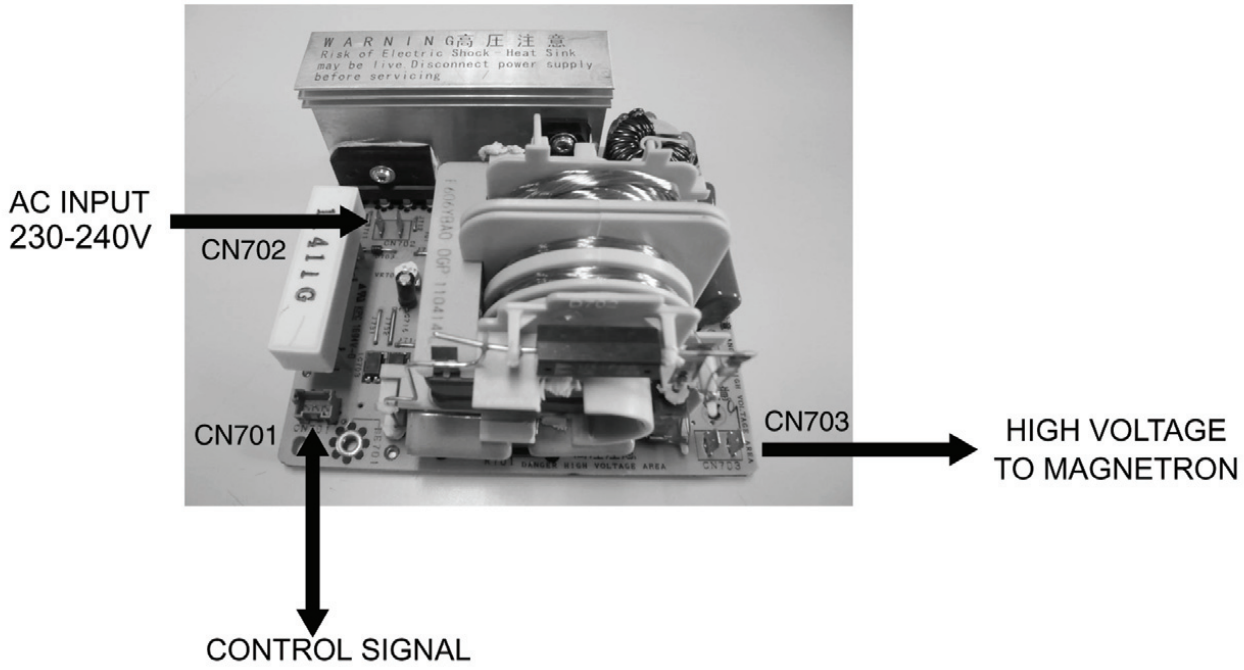
⚠ DANGER: HIGH VOLTAGES

1. **DO NOT RE-ADJUST PRESET CONTROL on the H.V.Inverter (U).** It is very dangerous to repair or adjust without proper test equipment because this circuit generates very large current and high voltage. Operating a misaligned inverter circuit is dangerous.
2. Ensure proper grounding before troubleshooting.
3. Be careful of the high voltage circuitry, taking necessary precautions when troubleshooting.
4. Discharge high voltage remaining in the H.V.Inverter (U).
5. When checking the continuity of the switches or the H.V.Inverter, disconnect one lead wire from these parts and then check continuity with the AC plug removed. Doing otherwise may result in a false reading or damage to your meter. When disconnecting a plastic connector from a terminal, you must hold the plastic connector instead of the lead wire and then disconnect it, otherwise lead wire may be damaged or the connector cannot be removed.
6. Do not touch any parts of the circuitry on the digital programmer circuit, since static electric discharge may damage this control panel. Always touch ground while working on this panel to discharge any static charge in your body.
7. 230-240V AC is present on the digital programmer circuit (Terminals of power relay's and primary circuit of Digital Programmer Circuit). When troubleshooting, be cautious of possible electrical shock hazard.

Before troubleshooting, operate the microwave oven following the correct operating procedures in the instruction manual in order to find the exact cause of any trouble, since operator error may be mistaken for the oven's malfunction.

9.1. (Troubleshooting) Oven stops operation during cooking

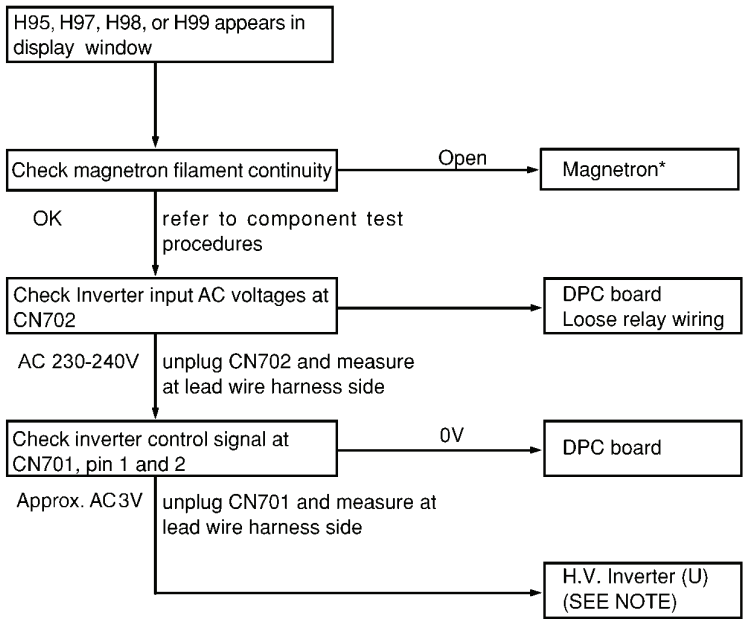
	SYMPTOM	CAUSE	CORRECTIONS
1.	**Oven stops in 3 seconds** after pressing [Start] button	No 230-240V AC is supplied to H.V.Inverter (U) CN702 terminals	1. Latch Switch 2. Power relay RY1 3. Loose lead wire connector CN701, CN702 4. H.V. Inverter (U)
	Oven stops in 23 seconds after pressing [Start] button	H.V.Inverter (U) operates by the control signals from DPC but magnetron is not oscillating	1. Magnetron 2. Loose lead wire connector CN703
2.	No display and no operation at all. Fuse is blown.	Most probably loose connection of connectors, or door latch mechanism is not adjusted properly	1. Align door, Door Latch Switches 2. Loose wiring connectors



	SYMPTOM	CAUSE	CORRECTIONS
1.	Oven is dead. Fuse is OK. No display and no operation at all.	1. Open or loose lead wire harness 2. Open thermal cutout / thermistor 3. Open low voltage transformer 4. Defective DPC	Check thermal cutout is defective.
2.	No display and no operation at all. Fuse is blown.	1. Shorted lead wire harness 2. Defective primary latch switch (NOTE 1) 3. Defective monitor interlock switch (NOTE 1) 4. Defective Inverter Power Supply (U)	Check adjustment of primary, secondary latch switch and monitor interlock switch including door.
		NOTE 1: All of these switches must be replaced at the same time. Check continuity of power relay RY1 contacts (between 1 and 2) and if it has continuity, replace power relay RY1 also.	
3.	Oven does not accept key input (Program)	1. Key input is not in proper sequence 2. Open or loose connection of membrane key button to DPC (Flat cable) 3. Shorted or open membrane key board 4. Defective DPC	Refer to operation procedure. Refer to DPC troubleshooting.
4.	Timer starts count down but no microwave oscillation. (No heat while oven lamp and fan motor turn on)	1. Off-alignment of primary latch switch 2. Open or loose connection of high voltage circuit especially magnetron filament circuit NOTE: Large contact resistance will cause lower magnetron filament voltage and cause magnetron to have lower output and/or be intermittent. 3. Defective high voltage component H.V. Inverter Power Supply (U) Magnetron 4. Open or loose wiring of power relay RY1 5. Defective primary latch switch 6. Defective DPC or power relay RY1	Adjust door and latch switches. Check high voltage component according to component test procedure and replace if it is defective. Refer to DPC troubleshooting
5.	Oven can program but timer does not start countdown.	1. Open or loose wiring of secondary latch switch 2. Off-alignment of secondary latch switch 3. Defective secondary latch switch	
6.	Microwave output is low. Oven takes longer time to cook food.	1. Decrease in power source voltage 2. Open or loose wiring of magnetron filament circuit.(Intermittent oscillation) 3. Aging change of magnetron	Consult electrician
7.	Fan motor turns on and turntable motor rotates when door is opened.	1. Low voltage transformer on DPC.	
8.	Oven does not operate and return to plugged in mode as soon as [Start] button is pressed.	1. Defective DPC	Check grounding connector on escutcheon base.
9.	Loud buzzing noise can be heard.	1. Loose fan and fan motor	
10.	Turntable motor does not rotate.	1. Open or loose wiring of turntable motor 2. Defective turntable motor	
11.	Oven stops operation during cooking.	1. Open or loose wiring of primary and secondary latch switch 2. Operation of thermal cutout	Adjust door and latch switches.
12.	Heater does not turn on	1. Open or loose wiring of heater 2. Defective heater 3. Defective power relay 4. Defective DPC	

9.2. Troubleshooting of inverter circuit (U) and magnetron

This oven is programmed with a self diagnostics failure code system which will help for troubleshooting. H95, H97, H98 and H99 are the provided failure codes to indicate magnetron and inverter circuit problem areas. This section explains failure codes of H95, H97, H98 and H99. First, you must program the DPC into TEST MODE, press [Clock] button once → press [Timer] button once → Press [Start] button once → press [Micro Power] button once. Program unit for operation. H95, H97, H98, H99 appears in display window a short time after [Start] button is pressed and there is no microwave oscillation.



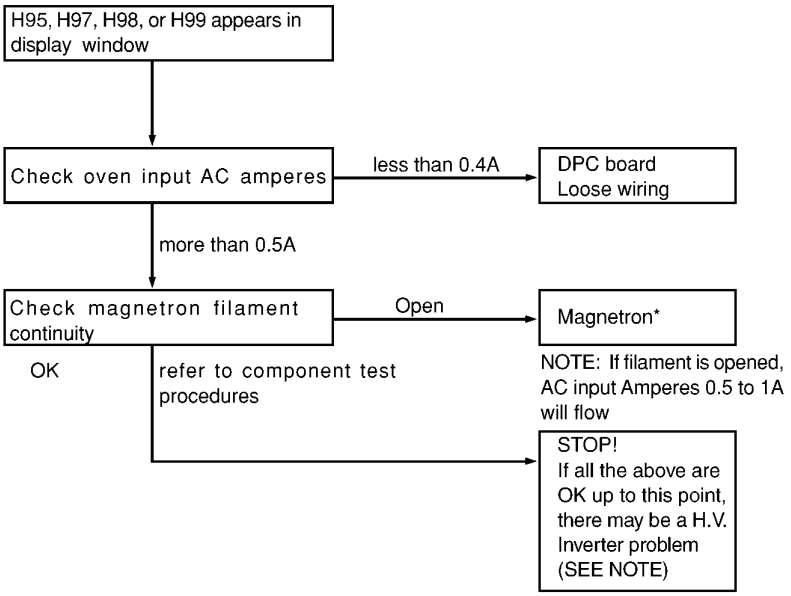
⚠ WARNING: DO NOT try to repair this Inverter Power Supply (U) and also DO NOT RE-ADJUST PRESET CONTROL on the board. It is very dangerous to repair or adjust without proper test equipment because this circuit generates very high voltage and very large current. Off alignment of inverter board operation is dangerous. Operating a misaligned Inverter circuit is dangerous due to the very high voltage and current that is produced by this board. Defective boards must be replaced with a new one.

* Check magnetron filament for open or short to case before proceeding to determine a good magnetron.

NOTE: After check, unplug unit to reset to normal operation mode.

Alternate way to troubleshoot oven with AC Ampere meter used

H95, H97, H98, H99 appears in display window a short time after [Start] button is pressed and no microwave oscillation with AC Ampere meter used for troubleshooting.



NOTE: After check, unplug unit to reset to normal operation mode.

9.3. Trouble related to Digital Programmer Circuit

SYMPTOM	STEP	CHECK	RESULT	CAUSE/CORRECTIONS
No display when oven is first plugged in	1	Fuse pattern of D.P.C.	Normal	→Step2
			Open	Replace D.P.C. or Fuse Pattern
	2	Low voltage transforment (L.V.T.) secondary voltage	Abnormal 0V	L.V.T.
			Normal	→Step3
	3	IC10 pin5 voltage	Abnormal	IC10, ZD10
			Normal=5V	IC1, CX320, Display
No key input	1	Touch switch continuity	Abnormal	Touch switch
			Normal	IC1
No beep sound	1	IC1 pin 62 voltage	Abnormal	IC1
			Normal=5V	BZ210, Q210
No microwave oscillation at any power	1	IC1 pin 27 voltages while operation at high power	Abnormal	IC1
			Normal=5V	→Step2
	2	Collector of Q220 voltage	Abnormal	Q220 and /or Q221, Q222, Q225, Q227
			Normal≈0.7V	→Step3
	3	Short circuit between collector and emitter of Q220	Still not turn on	RY1
			RY1 turns on	Q220 and /or Q221, Q222, Q225, Q227
Dark or unclear display	1	Replace display and check operation	Normal	Display
			Abnormal	IC1
Missing or lighting of unnecessary segment	1	Replace IC1 and check operation	Normal	IC1
			Abnormal	Display
H95/H97/H98 appears in window and oven stops operation.Program High power for 1 minute and conduct following test quickly, unless H95/H97/H98 appears and oven stops	1	Unplug CN702 (2 pin) connector and measure voltage between terminals	Abnormal=0V	1. Latch Switch 2. D.P.C. /Power Relay
			Normal=230-240V	→Step2
	2	Unplug CN701 (3 pin) connector and measure pin3 voltage	Abnormal=0V	D.P.C.
			Approx. AC 3V	Magnetron

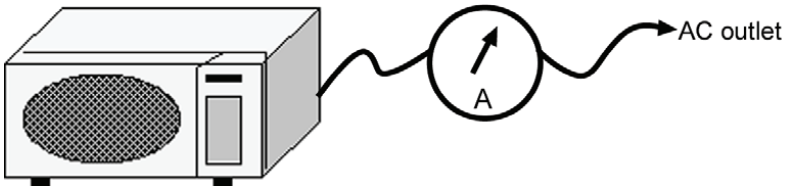
9.4. Simple way of H.V. Inverter/magnetron troubleshooting

Purpose:

Simple way **(3/23 seconds rule)** of identifying whether it's Magnetron, Inverter, or others.

Set-up:

The unit under question is connected through the Ammeter as shown below.



Procedure:

Follow the matrix table below to identify the problem source.

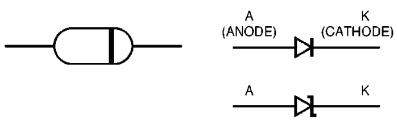
Note:

Do not replace both Inverter board and Magnetron simultaneously and automatically without going through this procedure.

Power will:	Ammeter reading is:	To do:	Remedy:
Shut off in 23 seconds after "Start".	1. Between 0.5A and 1.0A.	Check and repair open magnetron circuit	Open magnetron wiring between Inverter and magnetron terminal.
	2. Between 1.0A and 2.0A.	Check continuity of D702 in Inverter PCB.	
		⇩	
		1. D702 shorted	Replace **H.V.Inverter** (F606YBA00GP)
		2. D702 is OK	Replace **magnetron**
Shut off in 3 seconds after "Start"	1. Less than 0.5A	Check open circuit: Latch Switch, DPC, Power Relay and CN701	Replace defective component(s), or correct switch, cables and connectors.

9.5. How to check the semiconductors using an OHM meter

Diode



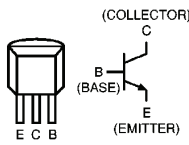
	FORWARD	REVERSE
A-K	SMALL	∞

Transistor

NPN Transistor

2SC·····

2SD·····

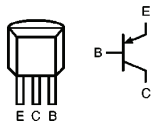


	FORWARD	REVERSE
B-E	SMALL	∞
B-C	SMALL	∞
C-E	∞	∞

PNP Transistor

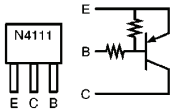
2SA·····

2SB·····



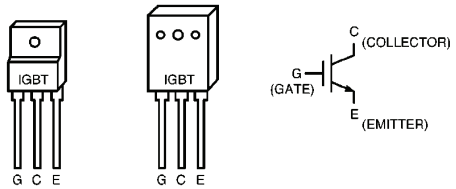
	FORWARD	REVERSE
B-E	SMALL	∞
C-B	SMALL	∞
C-E	∞	∞

Digital Transistor
PNP Transistor



	FORWARD	REVERSE
E-B	10kΩ ~ 30kΩ	10kΩ ~ 30kΩ
C-B	50kΩ ~ 90kΩ	∞
C-E	40kΩ ~ 80kΩ	∞

IGBT
(INSULATED GATE BIPOLAR TRANSISTOR)



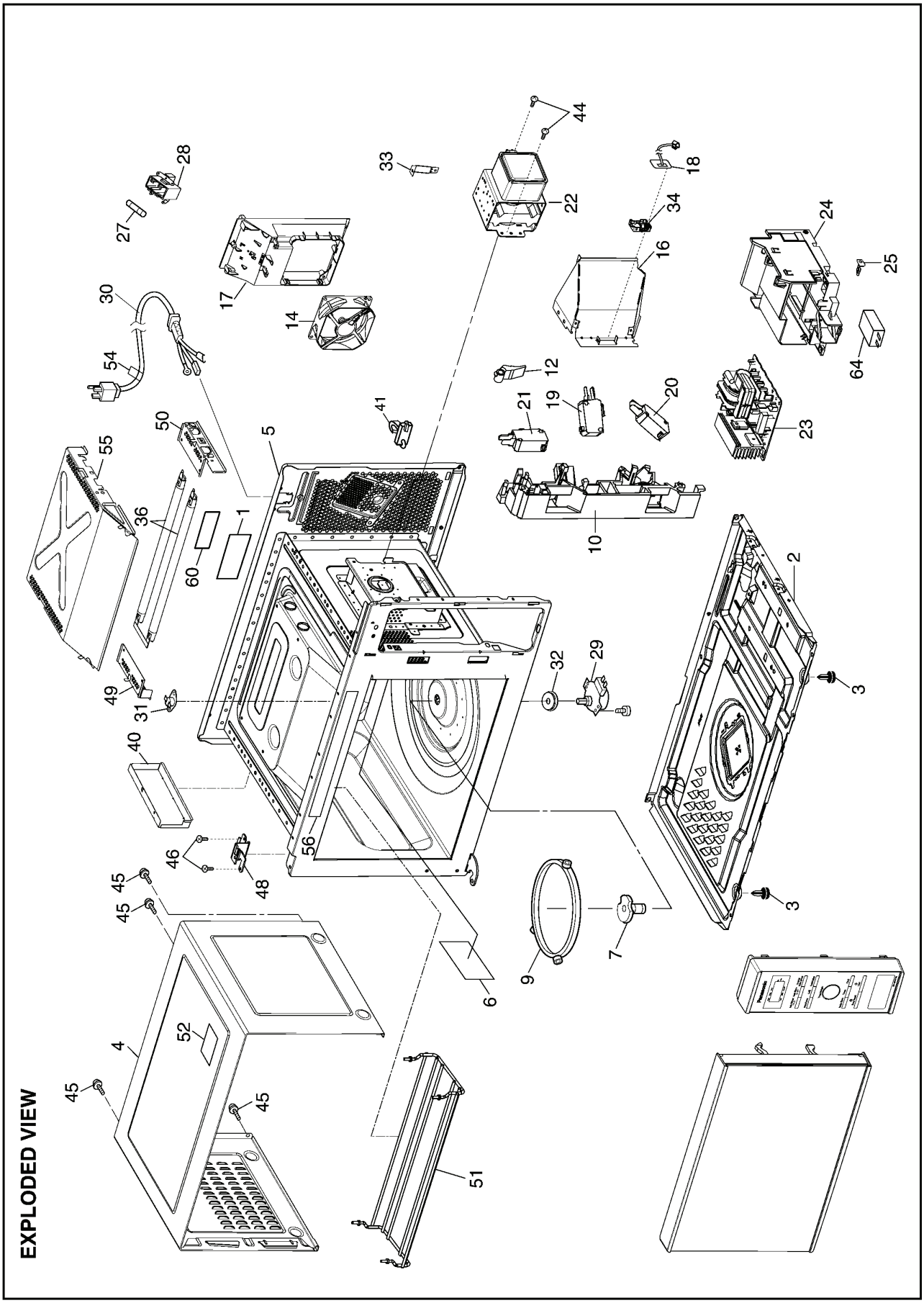
	FORWARD	REVERSE
E-C	SMALL	∞
E-G	∞	∞
C-G	∞	∞

9.6. H.V. INVERTER MAIN PARTS LIST (F606YBA00GP)

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
Q701		Z1JAEV000003	IGBT	1	
C701		ZCWHC3B104JA	FILM CAPACITOR	1	0.1µF,1000VDC
C702		ZCWF4305N851	FILM CAPACITOR	1	3µF,250VDC
DB701		Z0FBBQ000006	RECTIFIER BRIDGE	1	
L701		Z5020W100AP	CHOKE COIL	1	
R702		Z0CM562JA002	SAND BAR RESISTOR	1	
T701		Z609ABA00GP	TRANSFORMER	1	(INCLUDING D701,D702,C706,C707)
D701,D702		Z0FBAZ000003	DIODE	2	
C706		Z0C3F562A002	FILM CAPACITOR	1	5600PF/3KV
C707		Z0C3F822A002	FILM CAPACITOR	1	8200PF/3KV

10 EXPLODED VIEW AND PARTS LIST

10.1. EXPLODED VIEW



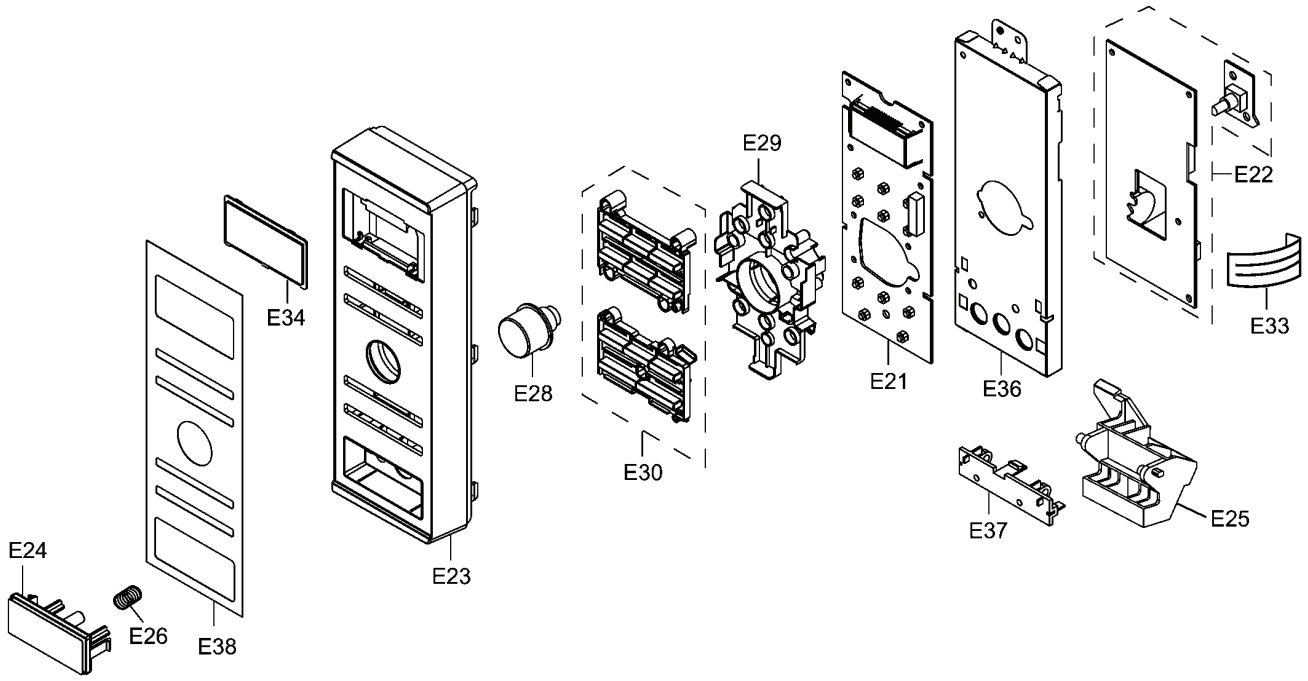
10.2. PARTS LIST

NOTE:

1. When ordering replacement part(s), please use part number(s) shown in this part list.
   Do not use description of the part.
2. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety.
   When replacing any of these components, use only manufacture's specified parts.

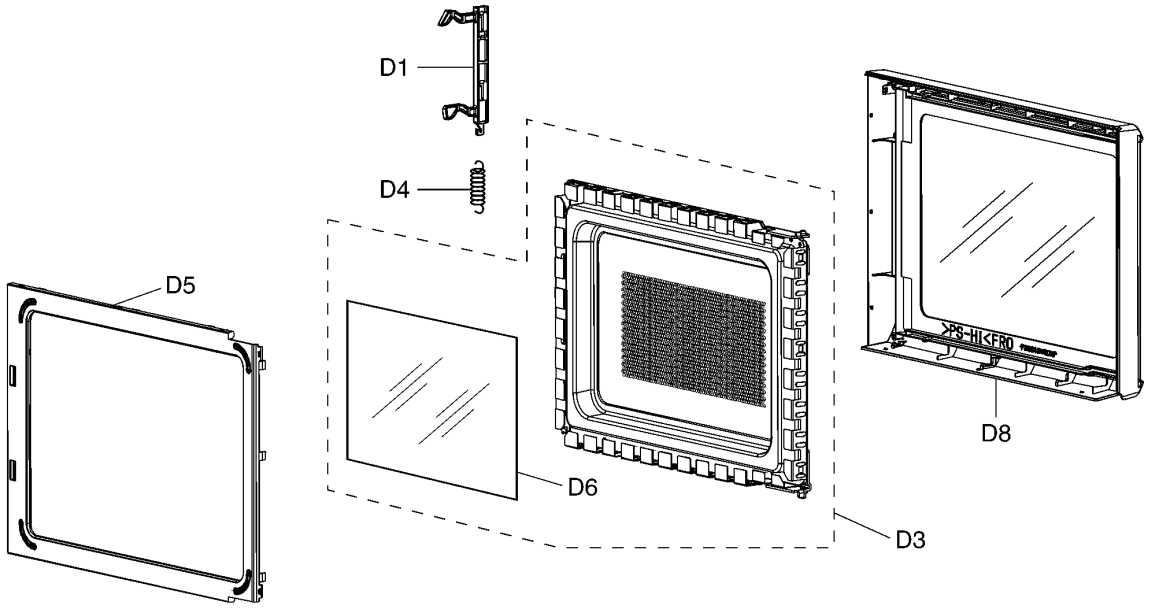
Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
1		F00066V00HP	CAUTION LABEL	1	
2		F10019V00XP	BASE	1	
3		F10089W40HPS	RUBBER FOOT	2	
4		F1009BB10SEP	CABINET BODY	1	
5	⚠	F200ABB10EP	OVEN	1	
6		F20559V00XP	COVER	1	
7		F21319W10XP	PULLY SHAFT	1	
9		F290D9W00XP	ROLLER RING (U)	1	
10	⚠	F30209V10XP	DOOR HOOK	1	
12		F31369V00XP	HOOK LEVER A	1	
14		F4001BA00BP	DC FAN MOTOR (U)	1	DC12V
16		F4025BA00EP	AIR GUIDE A	1	
17		F4144BA00EP	ORIFICE	1	
18		F605SBA00BP	D.P.CIRCUIT (HU)	1	LED LAMP INSIDE
19	⚠	F61425U30XN	MICRO SWITCH	1	(PRIMARY LATCH SWITCH)
20	⚠	F61415U30XN	MICRO SWITCH	1	(SECONDARY LATCH SWITCH)
21	⚠	F61785U30XN	MICRO SWITCH	1	(SHORT SWITCH)
22	⚠	2M236-M36R	MAGNETRON	1	
23	⚠	F606YBA00GP	H.V.INVERTER(U)	1	
24		F6585BA00EP	INVERTER BRACKET	1	
25		F66629W40HP	GROUNDING PLATE	1	
27	⚠	F62309W40HP	FUSE	1	10A
28		F62319V00XP	FUSE HOLDER	1	
29		F63269W00XP	TURNTABLE MOTOR	1	
30	⚠	F900C9V20HP	AC CORD W/PLUG	1	
31	⚠	F61456N60AP	THERMAL CUTOUT	1	150°C OPEN, -20°C CLOSE
32		F21766S10XP	SEAL	1	
33		F2034BA00EP	FRONT PLATE BRACKET	1	
34		F6726BA00EP	LED COVER	1	
36		F630G9W40YP	HEATER (AU)	1	
40		F2237BB10EP	LEFT HEATER PANEL	1	
41		F11409W00XP	STOPPER	1	
44		XTWFL4+12T	SCREW	2	FOR MAGNETRON
45		XTWBFE4+8D	SCREW	4	FOR CABINET BODY
46		XTWFA4+12LR	SCREW	2	FOR HINGE A
48		F30069V00XP	HINGE A	1	
49		F6461BB10EP	HEATER MOUNTING PLATE B	1	
50		F6460BB10EP	HEATER MOUNTING PLATE A	1	
51		F67359W00XP	HEATER PROTECTOR	1	
52		F01508G60HP	NO TOUCHING LABEL	1	
54		F02395E20KN	AC CORD CAUTION LABEL	1	
55		F2278BB10EP	UPPER HEATER PANEL	1	
56		F0334BB20KT	MENU LABEL	1	
60		F0007BB20SKP	NAME PLATE	1	
64		MKPX2335K	CAPACITOR	1	

10.3. ESCUTCHEON BASE ASSEMBLY



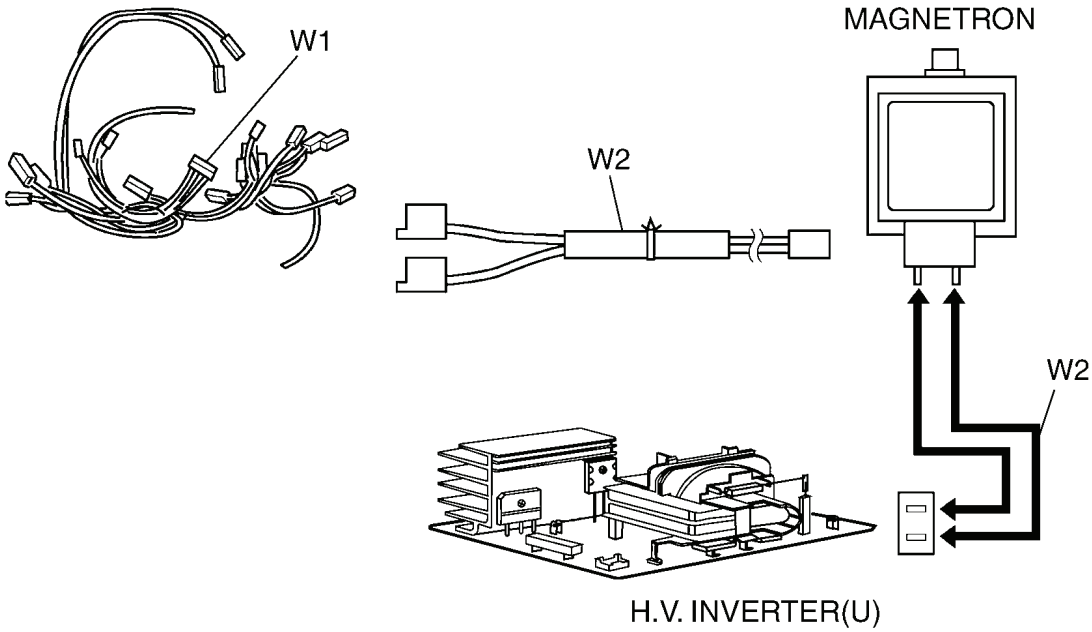
Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
E21		F603LBB20KP	D.P.CIRCUIT (AU)	1	
E22		F603YBB20HP	D.P.CIRCUIT (DU)	1	
E23		F8034BA10SBP	ESCUTCHEON BASE	1	
E24		F891PBA40BZP	DOOR OPENING BUTTON (U)	1	
E25		F8256BA00EP	DOOR OPENING LEVER	1	
E26		F80375K00AP	COOK BUTTON SPRING	1	
E28		F803G9M60SBP	POP-OUT DIAL (U)	1	
E29		F8018BA00EP	DIAL SUPPORT	1	
E30		F8298BA10SBP	BUTTON	1	
E33		F66168J00XP	FLAT CABLE	1	
E34		F8126BB20PT	DISPLAY WINDOW	1	
E36		F8127BA10BP	BACK PANEL	1	
E37		F8257BA10BP	LEVER BRACKET	1	
E38		F8337BB20BPT	MEMBRANE SHEET	1	

10.4. DOOR ASSEMBLY



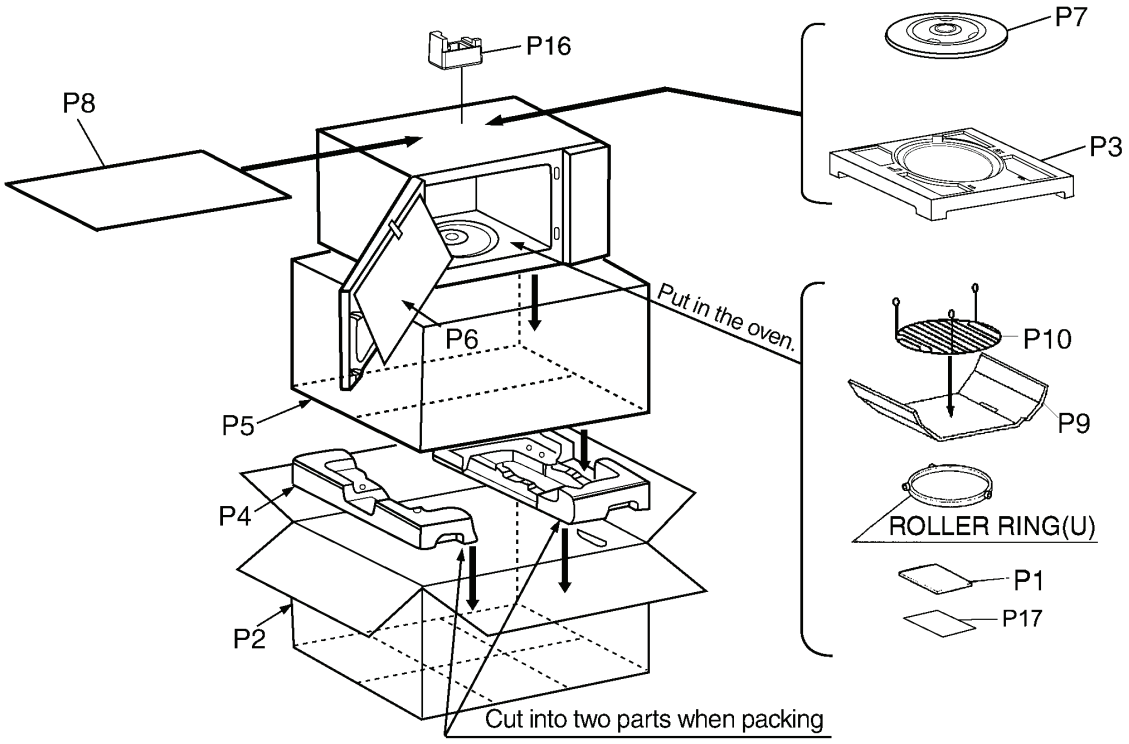
Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
D1		F3018BA70AP	DOOR KEY A	1	
D3	⚠	F302KBA00EP	DOOR E (U)	1	
D4		F30215G10XN	DOOR KEY SPRING	1	
D5	⚠	F30859V00XP	DOOR C	1	
D6	⚠	F3145BA00EP	DOOR SCREEN A	1	
D8	⚠	F302ABB20SZP	DOOR A (U)	1	

10.5. WIRING MATERIALS



Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
W1		F030ABB20HP	LEAD WIRE HARNESS	1	
W2		F030EBA00EP	H.V.LEAD WIRE	1	

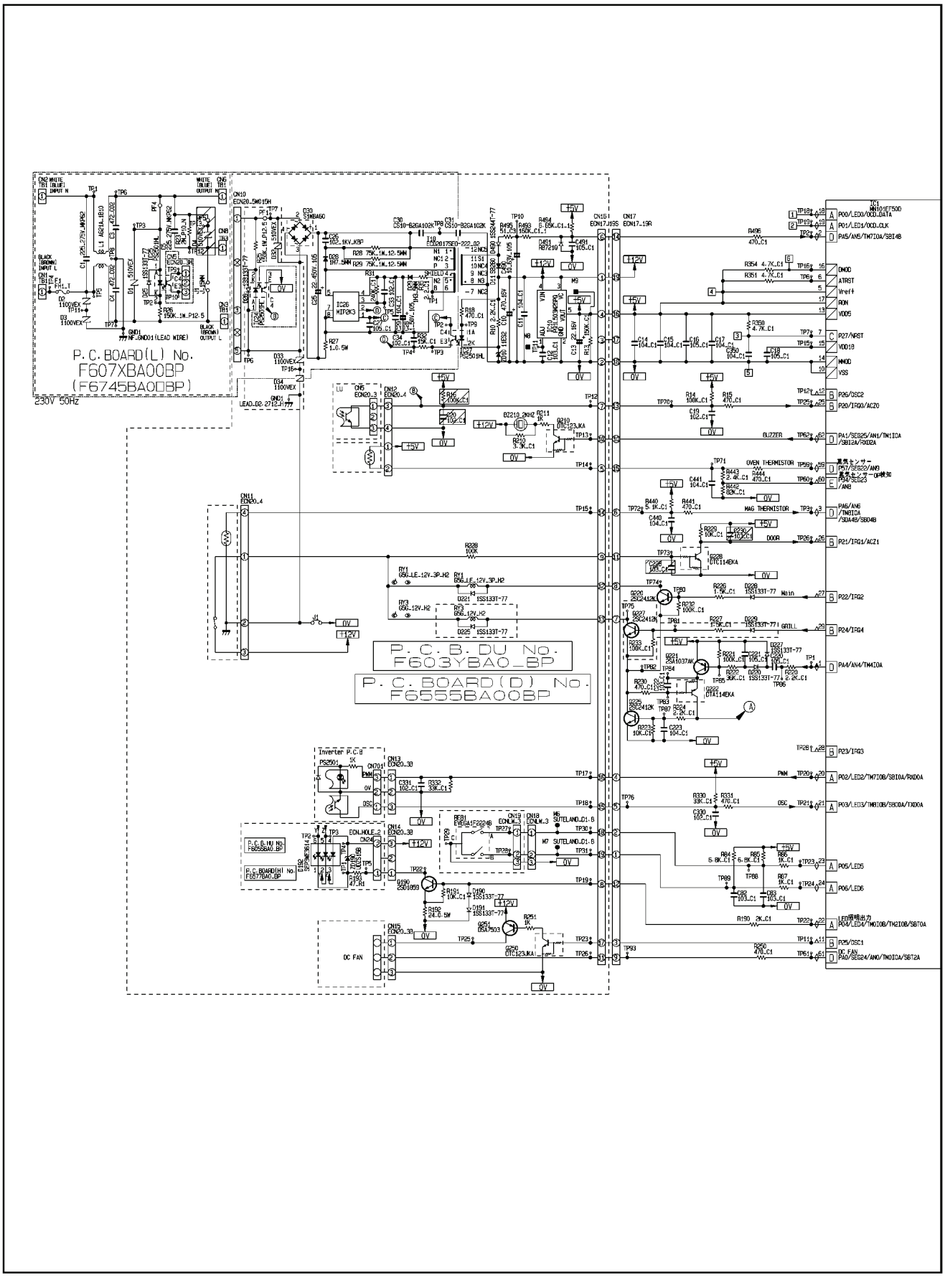
10.6. PACKING AND ACCESSORIES

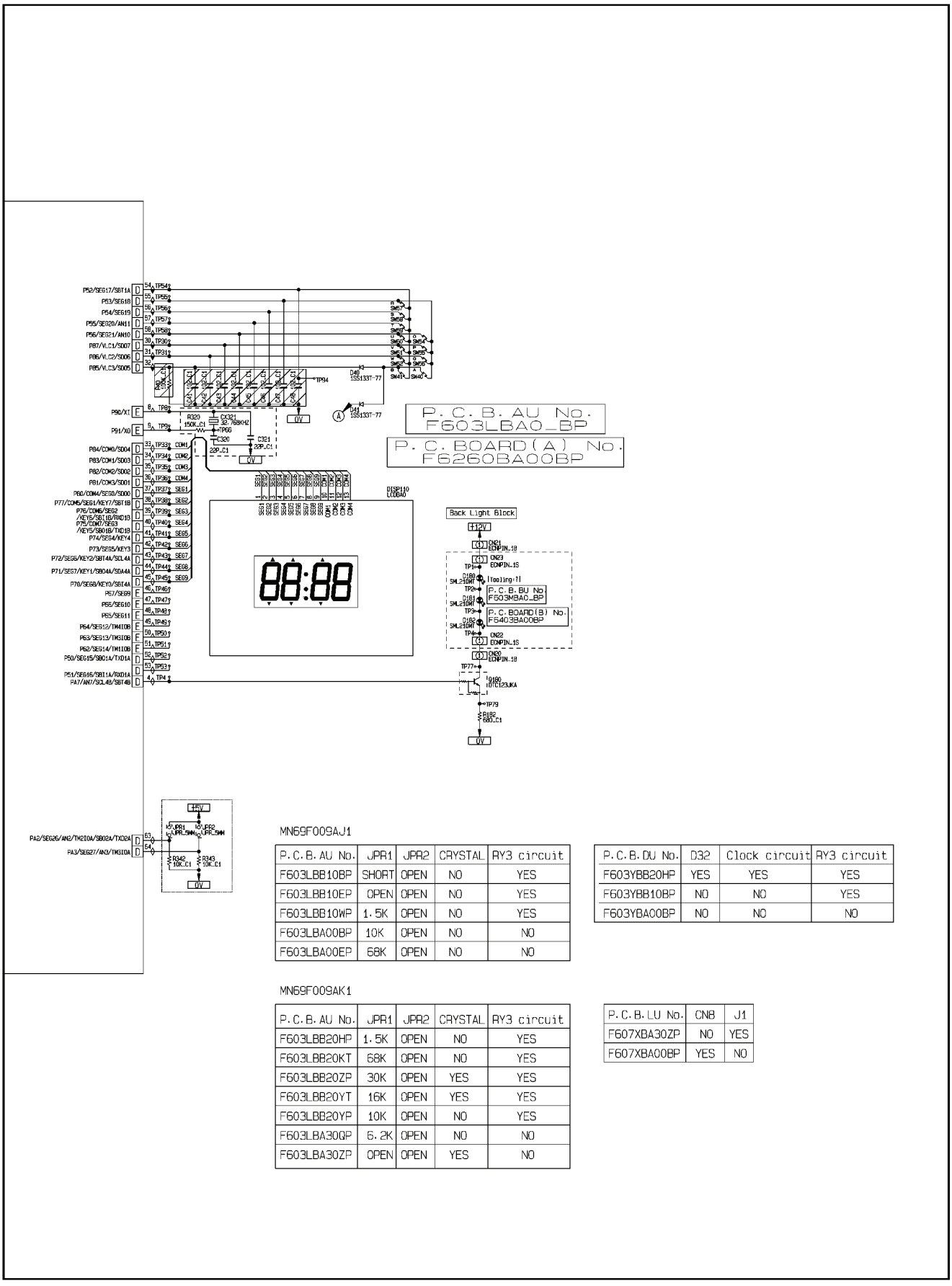


Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
P1		F0003BB20KT	INSTRUCTION MANUAL	1	
P2		F0102BB20SKP	PACKING CASE,PAPER	1	
P3		F01049V00XP	UPPER FILLER	1	
P4		F01059V00XP	LOWER FILLER	1	
P5		F01068100XN	P.E.BAG	1	
P6		F01075G10XN	DOOR SHEET	1	
P7		A0601BA00EP	COOKING TRAY	1	
P8		F01924T00AP	SHEET	1	
P9		F01085G50XN	RACK PACKING	1	
P10		F060V8H00BP	OVEN RACK	1	
P16		F01099V20HP	FOAM	1	
P17		F0445BB20BKT	OVERLAY	1	

11 DIGITAL PROGRAMMER CIRCUIT

11.1. SCHEMATIC DIAGRAM





MN69F009AJ1

P.C.B. AU No.	JPR1	JPR2	CRYSTAL	RY3 circuit
F603LBB10BP	SHORT	OPEN	NO	YES
F603LBB10EP	OPEN	OPEN	NO	YES
F603LBB10WP	1.5K	OPEN	NO	YES
F603LBA00BP	10K	OPEN	NO	NO
F603LBA00EP	68K	OPEN	NO	NO

P.C.B. DU No.	D32	Clock circuit	RY3 circuit
F603YBB20HP	YES	YES	YES
F603YBB10BP	NO	NO	YES
F603YBA00BP	NO	NO	NO

MN69F009AK1

P.C.B. AU No.	JPR1	JPR2	CRYSTAL	RY3 circuit
F603LBB20HP	1.5K	OPEN	NO	YES
F603LBB20KT	68K	OPEN	NO	YES
F603LBB20ZP	30K	OPEN	YES	YES
F603LBB20YT	16K	OPEN	YES	YES
F603LBB20YP	10K	OPEN	NO	YES
F603LBA30QP	6.2K	OPEN	NO	NO
F603LBA30ZP	OPEN	OPEN	YES	NO

P.C.B. LU No.	CN8	J1
F607XBA30ZP	NO	YES
F607XBA00BP	YES	NO

11.2. PARTS LIST

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
BZ210		L0DDEA000014	BUZZER	1	2.0KHz
DISP110		L5AYAYY00096	LCD	1	
		F66177D60AP	LCD HOLDER	1	
		F67525E20XN	DIFFUSION SHEET	1	
IC1		MN69F009AK2	L.S.I.	1	
D25		D4EAY511A148	ZENER RESISTOR	1	510V
D26,D27		D4EAY112A036	ZENER RESISTOR	2	1100V
RY1,RY3		K6B1AYY00129	POWER RELAY	2	
ZD10		B0BA01000049	ZENER DIODE	1	
T10		G4DYA0000310	LOW VOLTAGE TRANSFORMER	1	
SW40,SW41,SW54-SW62		EVQ11L05R	SWITCH	11	
RE81		EVEJ1HF2224M	REVOLVING ENCODER	1	