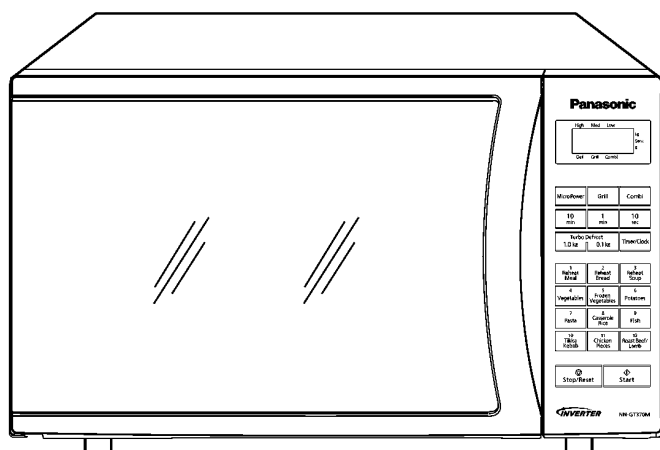


Service Manual

Microwave Oven

NN-GT370M



KTE (UAE)
PTE (Iran)
ZPE (CIS Countries)

Specifications:

Model:		NN-GT370M
Specifications:		
Power Source:		220V AC Single Phase, 50Hz for KTE, PTE, ZPE models
Power Consumption:	Microwave	1100W
	Heater	1050W
Output:	Microwave	950W
	Heater	1000W
Microwave Frequency:		2450MHz
Timer:		30 Min. / Stage (HIGH Power Level) ~ 3 Stage Maximum 99 Min. 59 Sec. / Stage (Other Power Level) ~ 3 Stage Maximum
Outside Dimensions:		488mm(W) x 279mm(H) x 405mm(D)
Oven Cavity Dimensions:		315mm(W) x 178mm(H) x 353mm(D)
Net Weight:		10 kg
PbF		This product with PbF
Specifications subject to change without notice.		

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 original 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.

KTE For UAE

PTE For Iran

ZPE For CIS Countries

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 $370 \pm 10^{\circ}\text{C}$.

● 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.

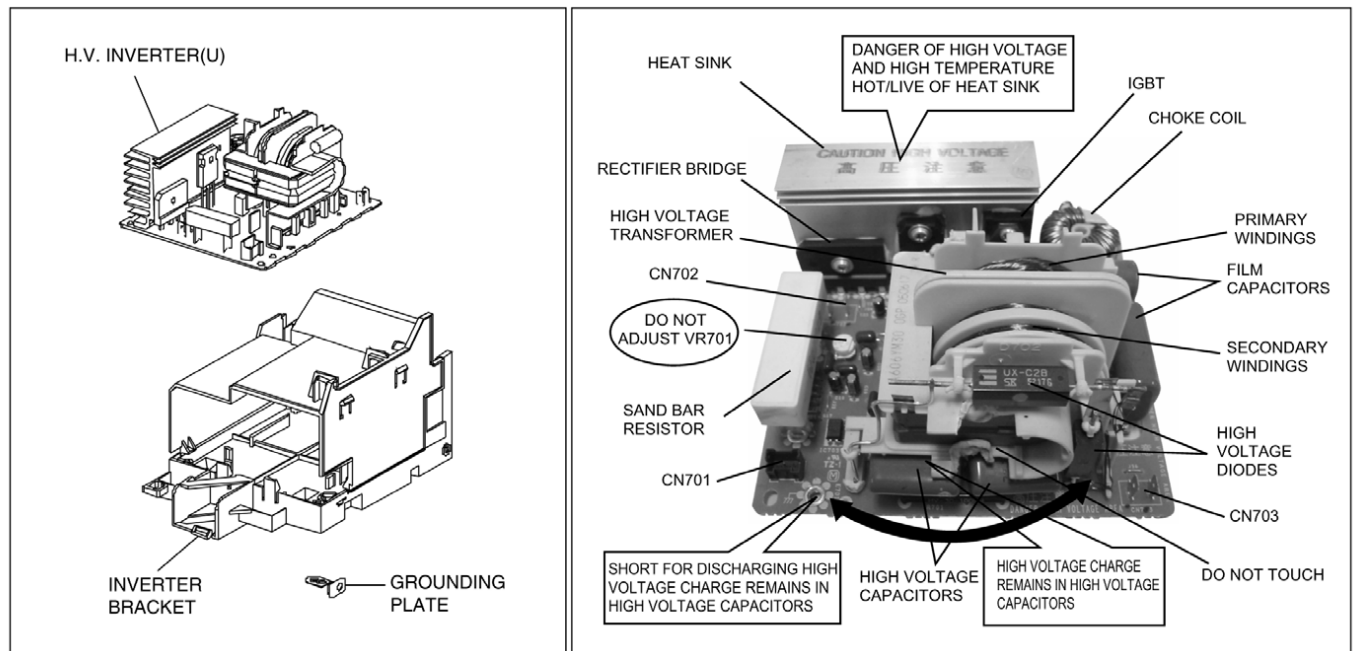
It functions the same as the high voltage transformer and high voltage capacitor in ordinary microwave ovens.

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



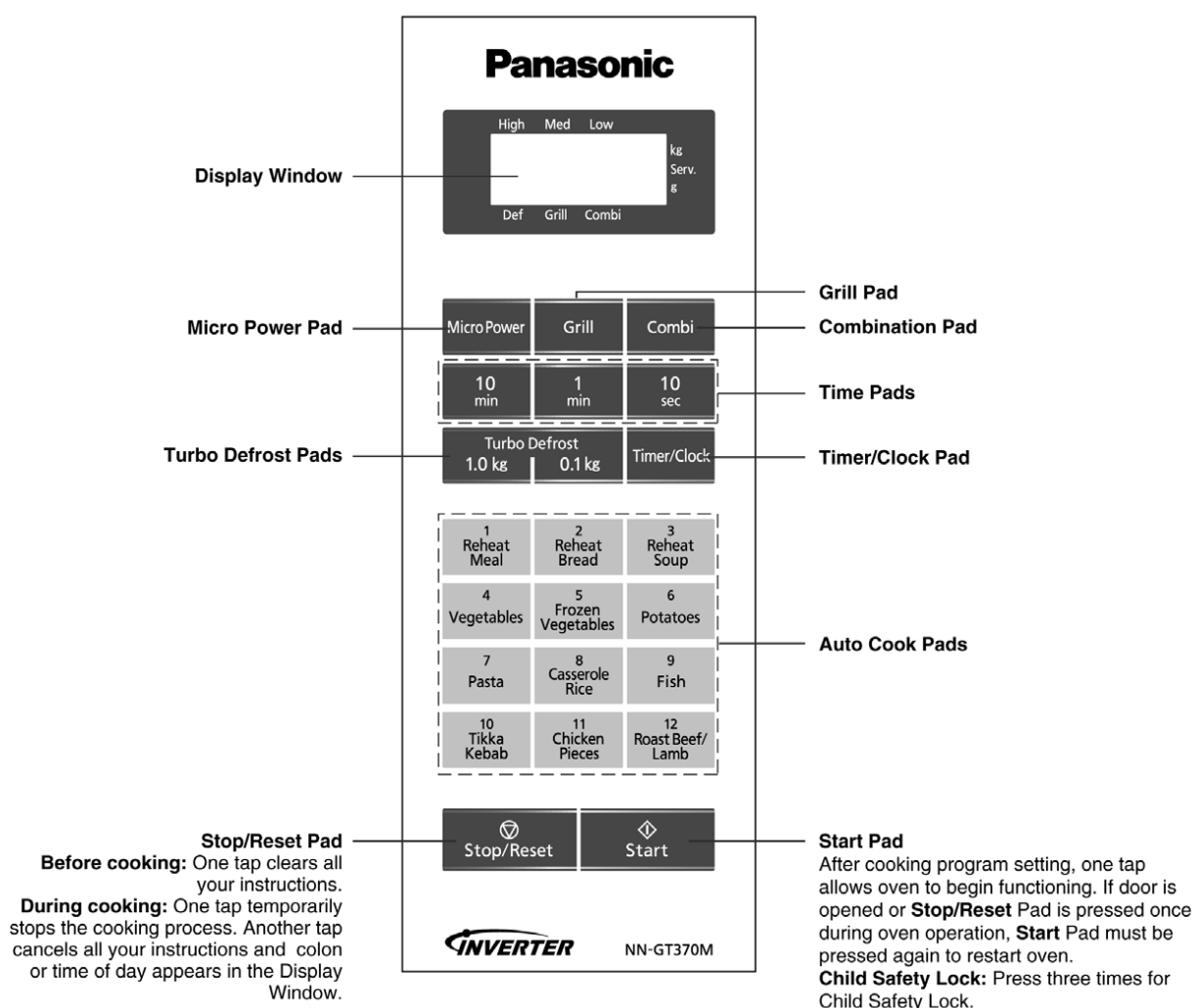
CONTENTS

	Page		Page
1 FEATURE CHART	5	6.8. H.V. Inverter Power Supply	16
2 CONTROL PANEL	5	7 COMPONENT TEST PROCEDURE	17
3 SCHEMATIC DIAGRAM	6	7.1. Primary, Secondary Latch Switch interlocks & Power Relay RY1	17
3.1. NN-GT370M KTE/PTE	6	7.2. Short switch & monitor	17
3.2. NN-GT370M ZPE	7	7.3. Magnetron	17
4 DESCRIPTION OF OPERATING SEQUENCE	8	7.4. Inverter power supply (U)	18
4.1. Variable power cooking control	8	7.5. Temperature thermistor	18
4.2. Inverter power supply circuit	8	8 MEASUREMENTS AND ADJUSTMENTS	19
4.3. Turbo defrost, Auto cook	8	8.1. Adjustment of Primary latch switch, Secondary latch switch and Short switch.	19
4.4. Grill cooking control	8	8.2. Measurement of microwave output	19
4.5. Combination Cooking	8	9 TROUBLESHOOTING GUIDE	20
5 CAUTIONS TO BE OBSERVED WHEN TROUBLESHOOTING ..	9	9.1. (Troubleshooting) Oven stops operation during cooking ..	20
5.1. Check the grounding	9	9.2. Troubleshooting of inverter circuit (U) and magnetron	22
5.2. Inverter warnings	9	9.3. Trouble related to Digital Programmer Circuit	23
5.3. Part replacement.	10	9.4. Simple way of H.V. Inverter/magnetron troubleshooting ..	24
5.4. When the 10A fuse is blown due to the malfunction of the short switch:	10	9.5. How to check the semiconductors using an OHM meter ..	24
5.5. Avoid inserting nails, wire etc. through any holes in the unit during operation.	10	9.6. H.V. Inverter main parts list (F606YM300BP)	25
5.6. Verification after repair	10	10 EXPLODED VIEW AND PARTS LIST	26
5.7. Sharp edges	10	10.1. EXPLODED VIEW	26
6 DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE ..	11	10.2. PARTS LIST	27
6.1. Magnetron	11	10.3. DOOR ASSEMBLY	29
6.2. Digital programmer circuit (D.P.C) & Membrane switch ..	11	10.4. ESCUTCHEON BASE ASSEMBLY	30
6.3. Low voltage transformer and/or power relays (RY1)	12	10.5. WIRING MATERIALS	31
6.4. Fan motor	13	10.6. PACKING AND ACCESSORIES	32
6.5. Door assembly	13	11 DIGITAL PROGRAMMER CIRCUIT	33
6.6. Turntable motor	15	11.1. SCHEMATIC DIAGRAM	33
6.7. Quartz heater	15	11.2. PARTS LIST	35

1 FEATURE CHART

FEATURE	MODEL	GT370M
3 Stage Cooking		○
Microwave		○
Grill		○
Combination		○
Auto Weight		○
Auto Weight Turbo Defrost		○
Delay / Stand		○
Clock		○
Child Safety Lock		○

2 CONTROL PANEL



Beep Sound:

When a pad is pressed correctly, a beep sound will be heard. If a pad 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:

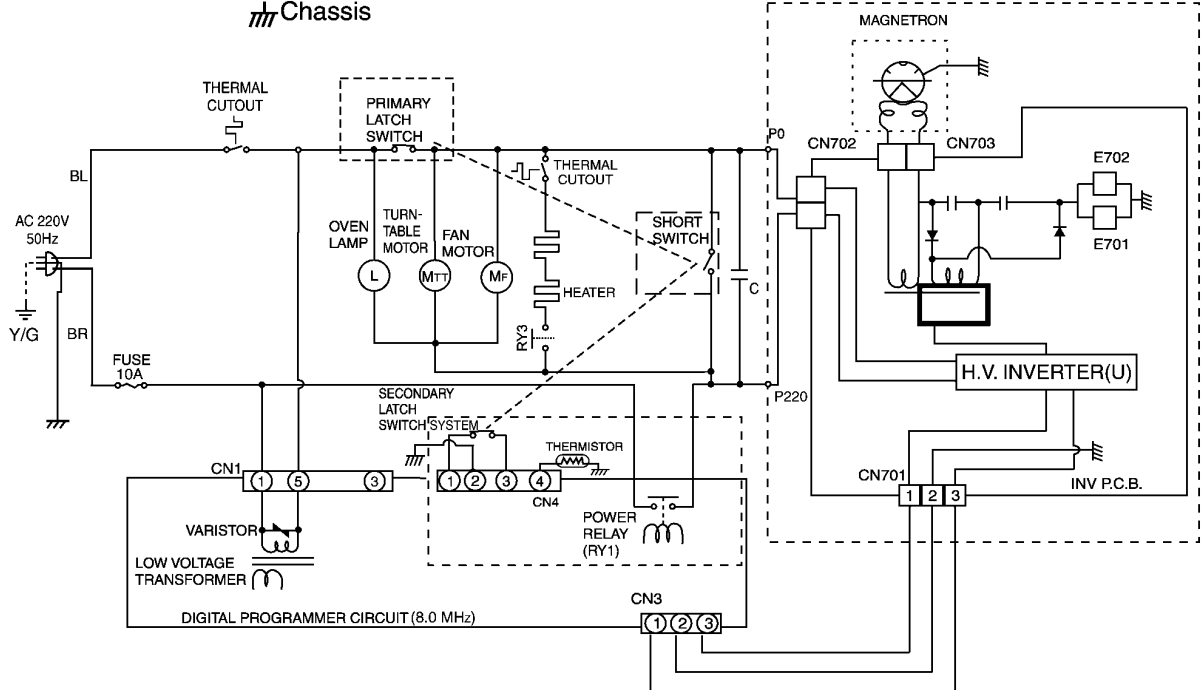
If an operation is set and Start pad is not pressed, after 6 minutes, the oven will automatically cancel the operation. This display will revert back to clock or colon mode.

3 SCHEMATIC DIAGRAM

3.1. NN-GT370M KTE/PTE

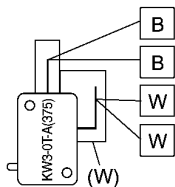
NOTE: Door is closed.
Unit is not operating.
⏏ Ground
▨ Chassis

CAUTION:
HIGH VOLTAGE AREA

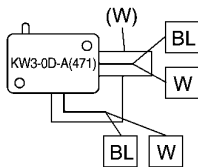


WIRING DIAGRAM

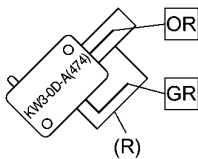
NOTE: * When replacing, check the lead wire color as shown.
*Colors shown by () indicate colors of lead wire connector housing.



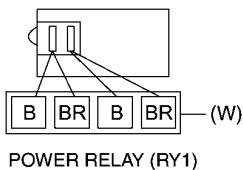
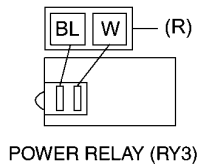
SHORT SWITCH TOP



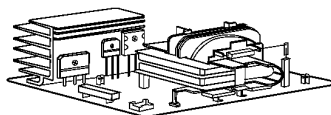
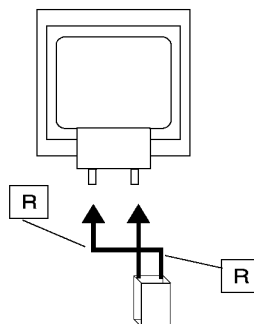
PRIMARY LATCH SWITCH MIDDLE



SECONDARY LATCH SWITCH BOTTOM



MAGNETRON



HIGH VOLTAGE INVERTER(U)

WARNING: H.V.

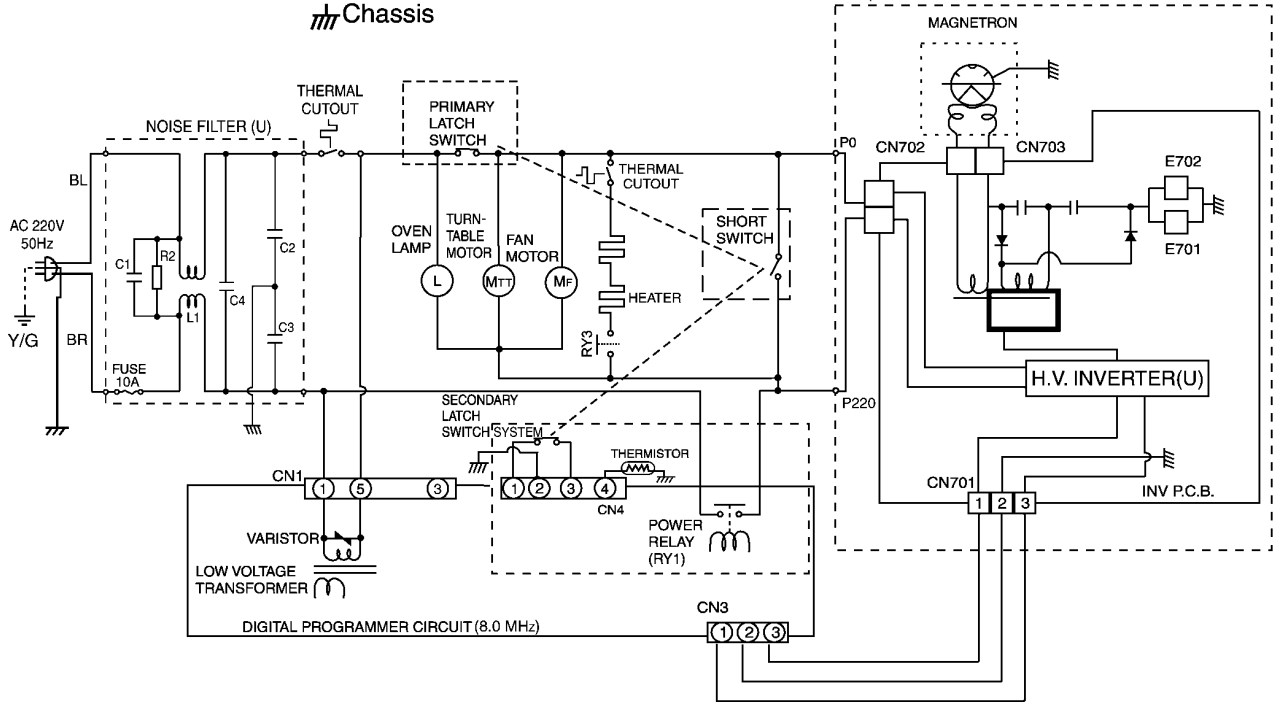
SYMBOL	COLOR
OR	ORANGE
BL	BLUE
BR	BROWN
W	WHITE
Y	YELLOW
R	RED
GR	GRAY
B	BLACK
G	GREEN
N	NATURAL

(S-9W4)

3.2. NN-GT370M ZPE

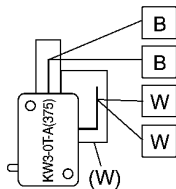
NOTE: Door is closed.
Unit is not operating.
 Ground
 Chassis

CAUTION:
HIGH VOLTAGE AREA

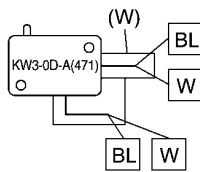


WIRING DIAGRAM

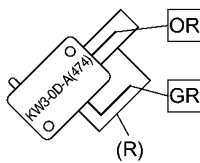
NOTE: * When replacing, check the lead wire color as shown.
*Colors shown by () indicate colors of lead wire connector housing.



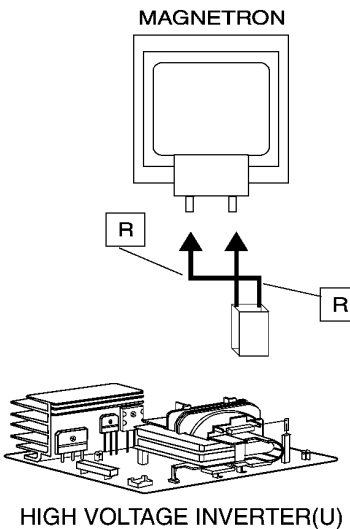
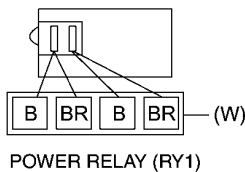
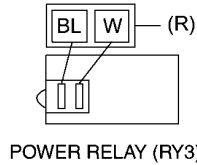
SHORT SWITCH TOP



PRIMARY LATCH SWITCH MIDDLE



SECONDARY LATCH SWITCH BOTTOM



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-9W4)

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%	17	5
LOW	20%	13	9

4.2. Inverter power supply circuit

The Inverter Power Supply circuit powered from the line voltage, 220V 50Hz AC input supplies 4,000V DC to the magnetron tube, and functions in place of the H.V. transformer, the H.V. capacitor and H.V. diode.

1. The AC input voltage 220V 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 programmer 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	14min. 30sec.

Auto Reheat

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	27	6	6	27
2	21	12	12	21
3	14	19	19	14

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.

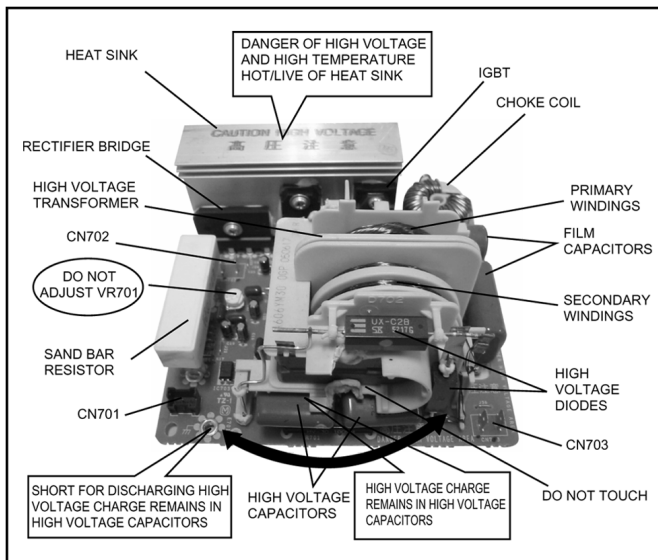
5.2. Inverter warnings

⚠ 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.

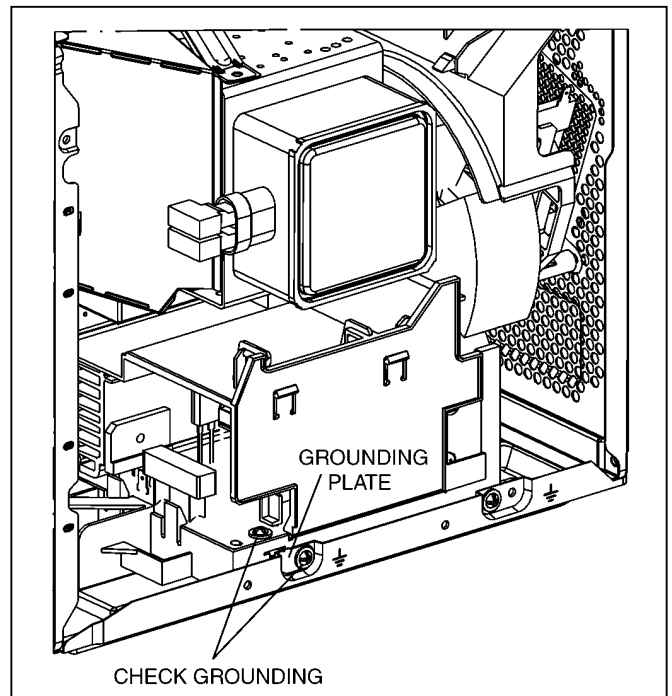
The aluminum heat sink is also energized with high voltage (HOT), do not touch when the AC input terminals are energized. The power device Collector is directly connected to the aluminum heat sink.

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

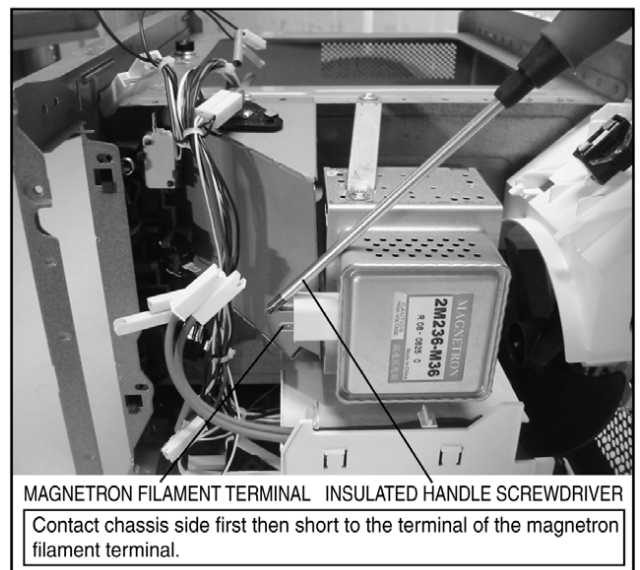
Check the high voltage inverter power supply circuit grounding. The high voltage inverter power supply circuit board must have a proper chassis ground. The inverter grounding bracket must be connected to the chassis. If the inverter board is not grounded it will expose the user to very high voltages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



⚠ WARNING DISCHARGE THE HIGH VOLTAGE 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 $5\text{mW}/\text{cm}^2$. After repair or exchange, it is very important to check if the magnetron and the door hinges are correctly installed.

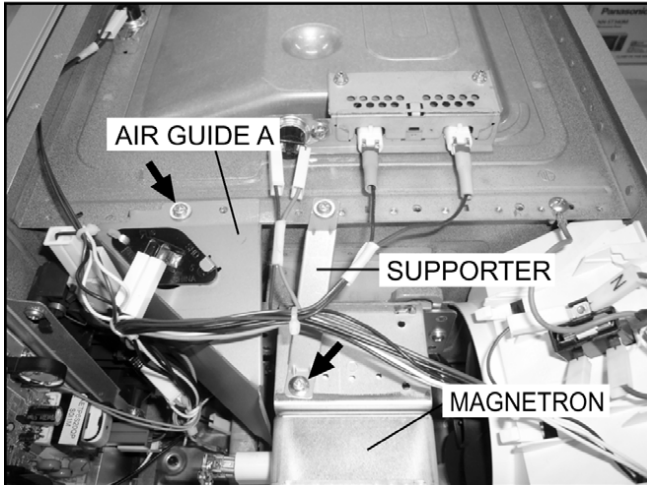
5.7. Sharp edges**⚠ CAUTION**

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.

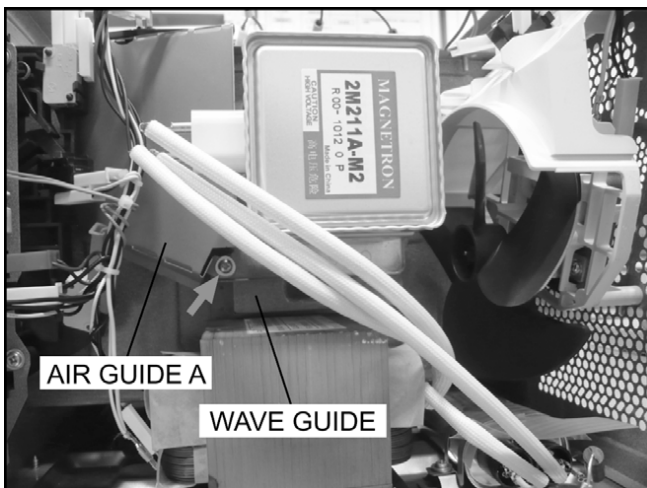
6 DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

6.1. Magnetron

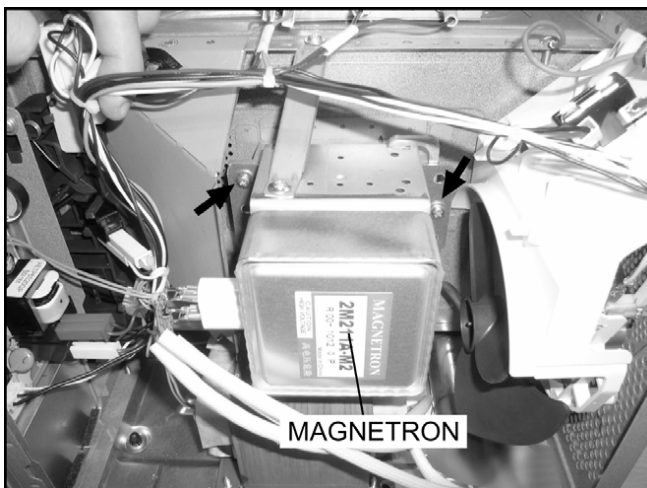
1. Discharge the high voltage capacitor.
2. Remove 1 screw holding supporter on the magnetron.
3. Remove 1 screw holding air guide A on cavity top plate.



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.

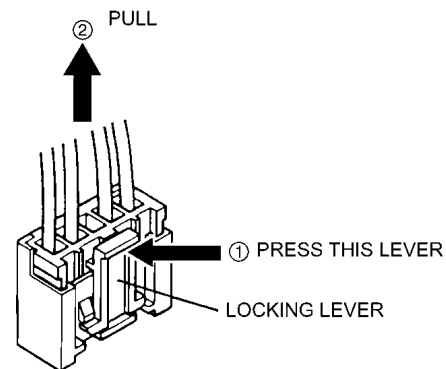
6.2. Digital programmer circuit (D.P.C.) & Membrane switch

NOTE:

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

1. Remove 1 screw holding escutcheon base on cavity front plate.
2. Disconnect all connectors from D.P.C. board.

HOW TO DISCONNECT
SPECIAL LOCK CONNECTOR



3. Disconnect red case connector from secondary latch switch.
4. Remove 5 screws holding D.P.C. board on escutcheon base.

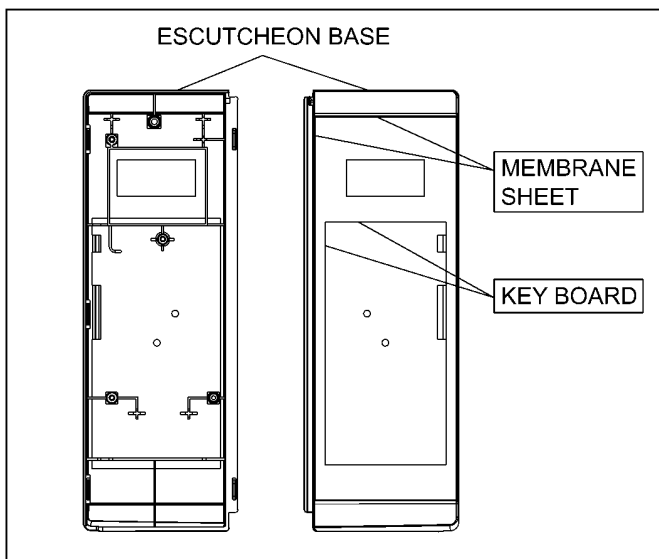
5. Separate D.P.C board from tabs on the escutcheon base and remove D.P.C board.

To replace membrane key board

6. Remove 1 screw holding back plate and bracket on escutcheon base, then remove back plate and bracket.
7. Use tools such as knife etc. to lift the edge of membrane sheet and peel off escutcheon sheet & key board membrane completely from escutcheon base.

NOTE:

- The membrane key board is attached to the escutcheon base with double faced adhesive tape. Therefore, applying hot air such as using a hair dryer is recommended for smoother removal.
- When installing the new key board membrane, make sure that the surface of escutcheon base is clean to prevent a malfunction or shorted contacts.



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

NOTE:

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

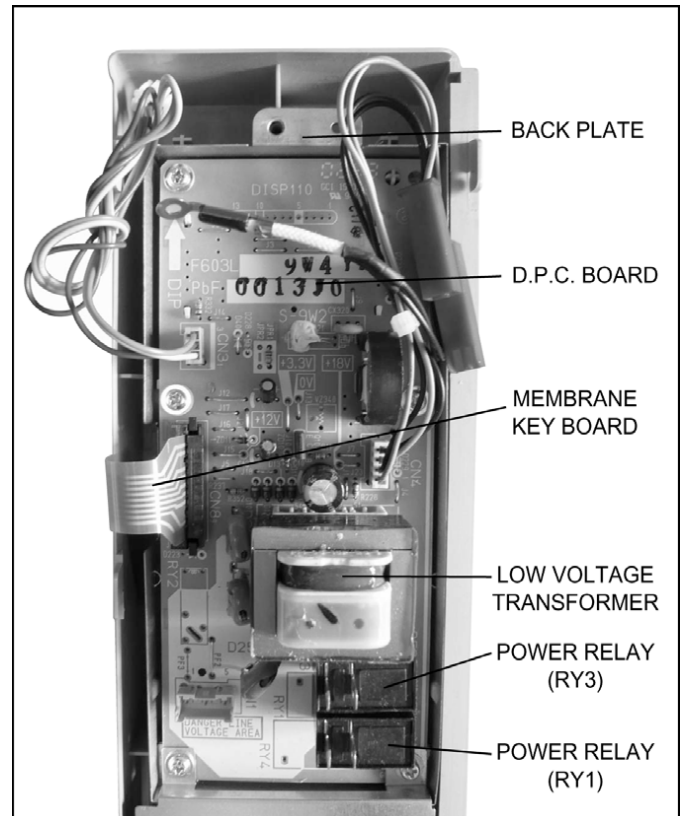
1. Disconnect all connectors from D.P.C. board.
2. Remove 5 screws holding D.P.C. board on escutcheon base.
3. Replace D.P.C. board.

(A) 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:

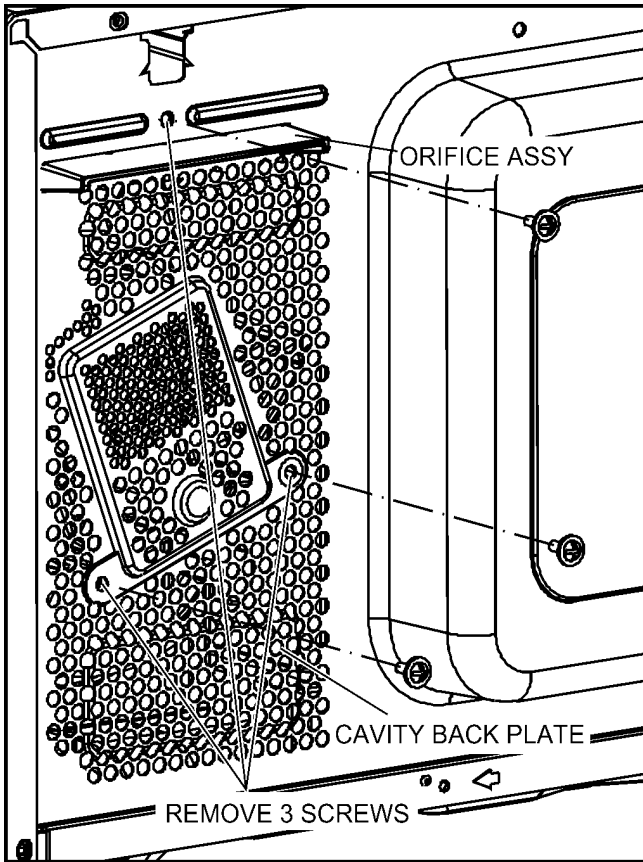
Do not use a soldering iron or desoldering tool of more than 30 watts on D.P.C. contacts.

(B) 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.

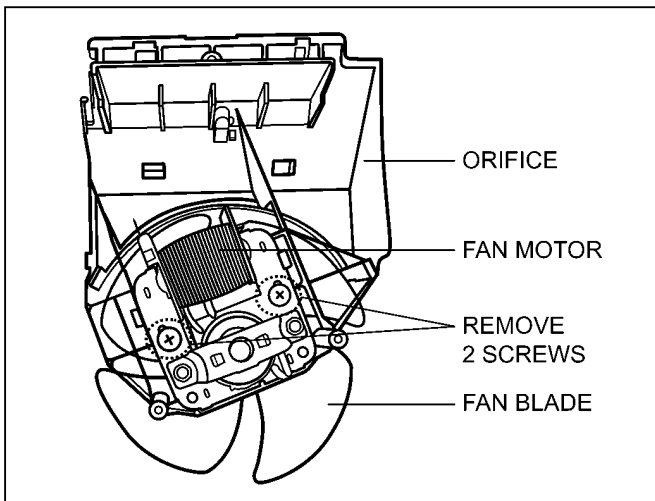


6.4. Fan motor

1. Disconnect 2 lead wires from fan motor terminals.
2. Remove 3 screws holding orifice assy and detach the orifice assy from oven assy.

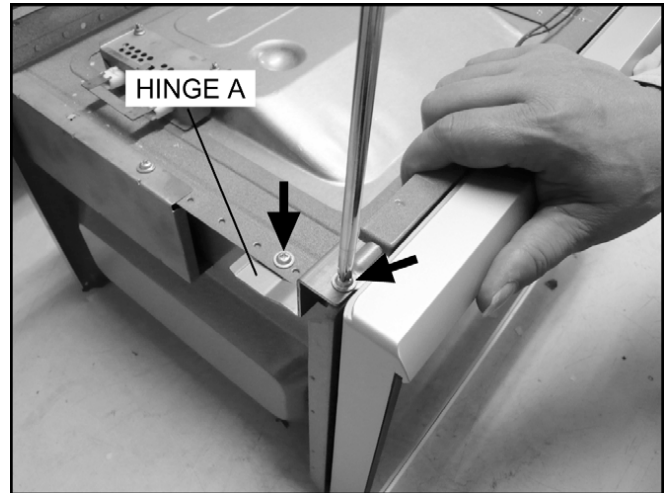


3. Remove fan blade from the motor shaft by pulling it straight out.
4. Remove 2 screws holding fan motor on orifice assy and detach the fan motor from orifice assy.



6.5. Door assembly

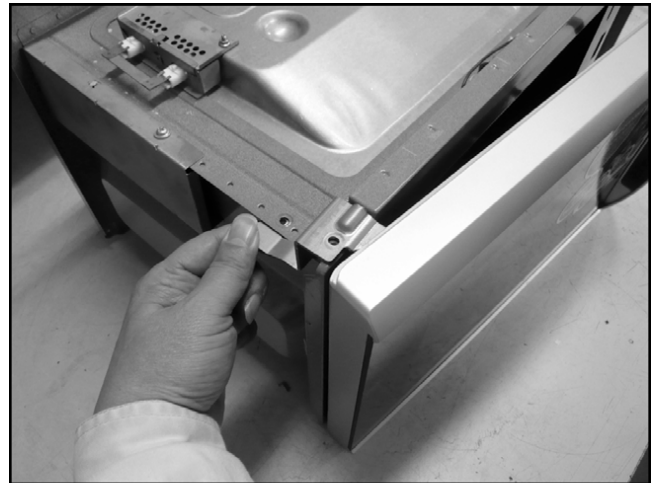
1. Support the door, remove 2 screws holding hinge A.



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.

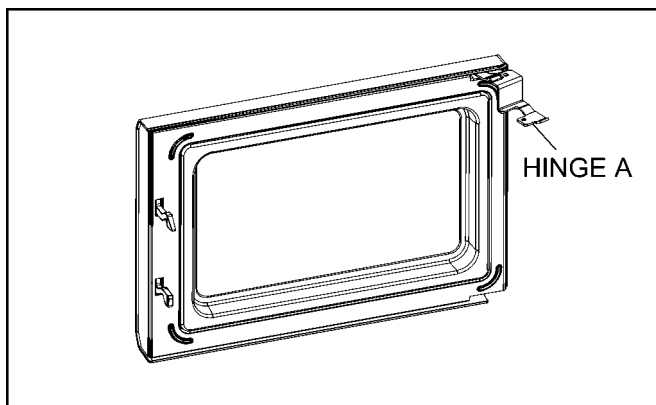
6. Replace other components.

To re-install components:

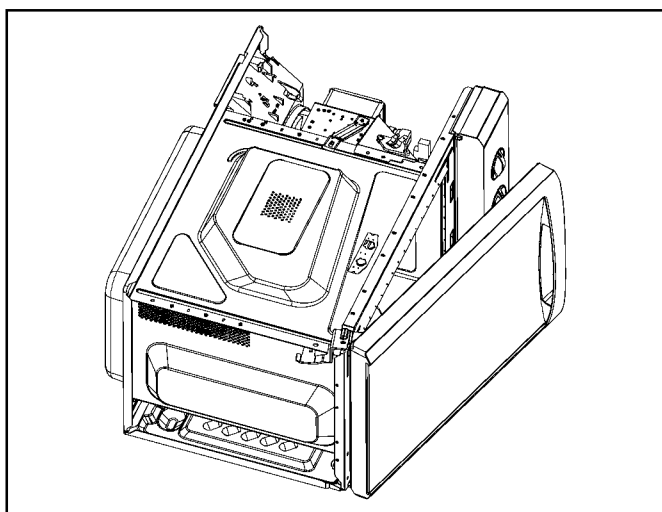
NOTE:

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 19).

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.



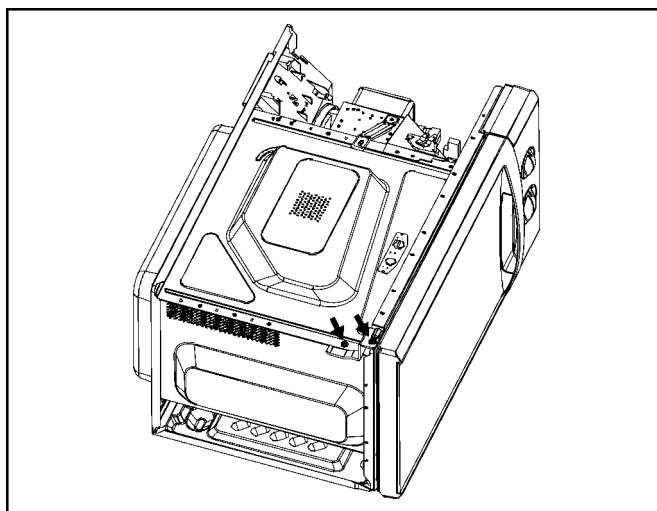
NOTE:

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.

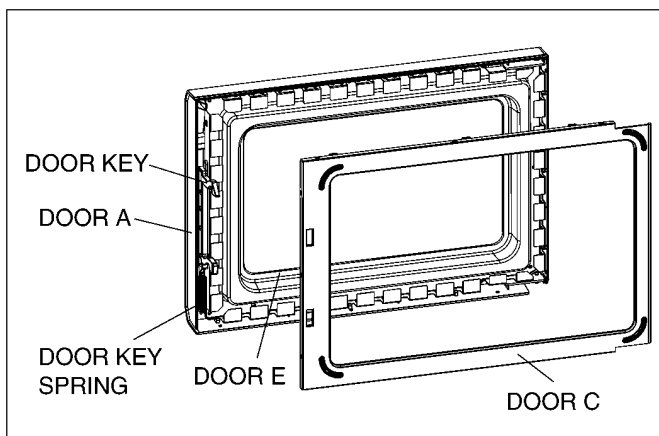
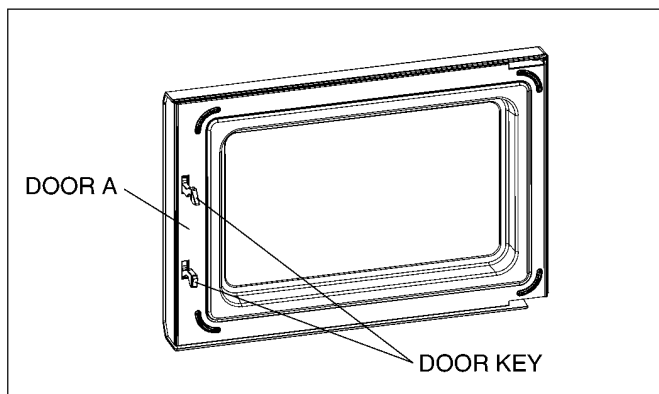
9. Tighten 2 mounting screws.



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

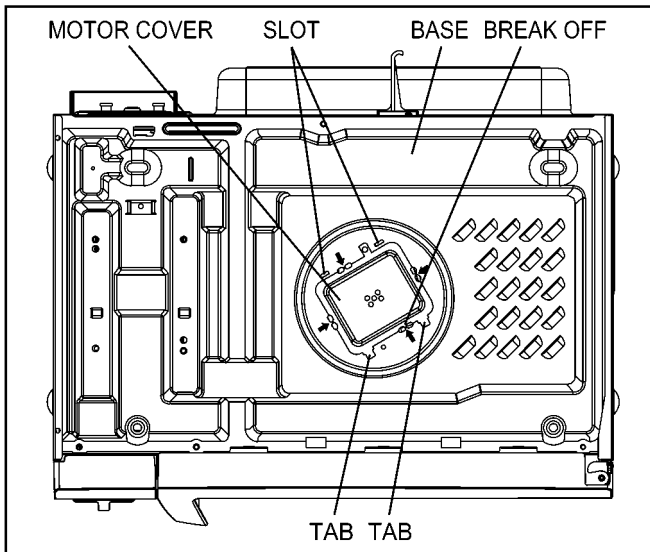
NOTE:

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



6.6. Turntable motor

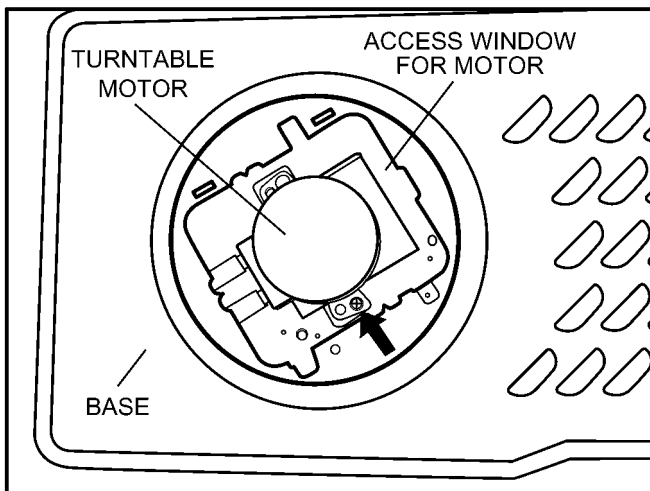
1. Remove the motor cover by breaking off at the 4 spots indicated by arrows with a cutter or the like.



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.

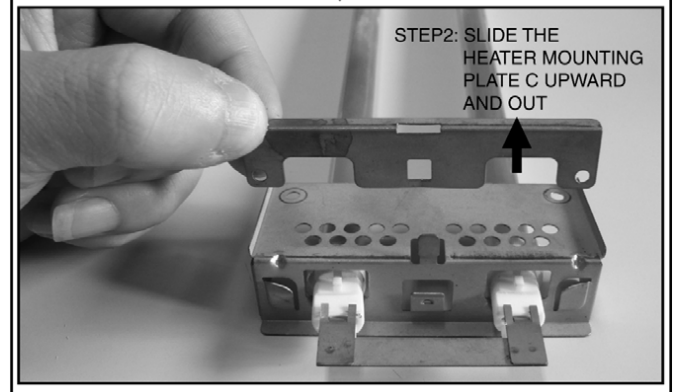
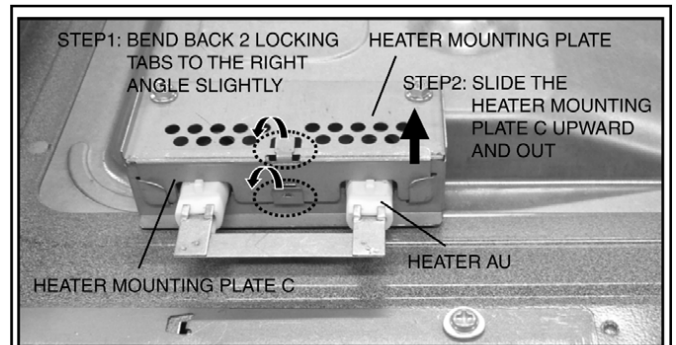


NOTE:

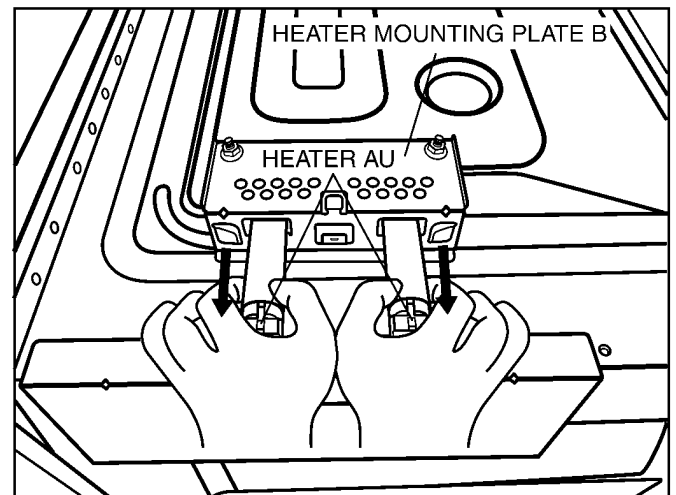
After reinstalling the new turntable motor and reconnecting the 2 lead wires, reinstall the motor cover by rotating it around 180°, tucking the 2 tabs under the base into the 2 provided slots, then screw the single tab to the base using a 4mm x 6mm screw.

6.7. Quartz heater

1. Disconnect lead wires from both side of heater terminals.
2. Bend back 2 locking tabs on heater mounting plate A & B respectively. Then slide the heater mounting plate C upward and out.

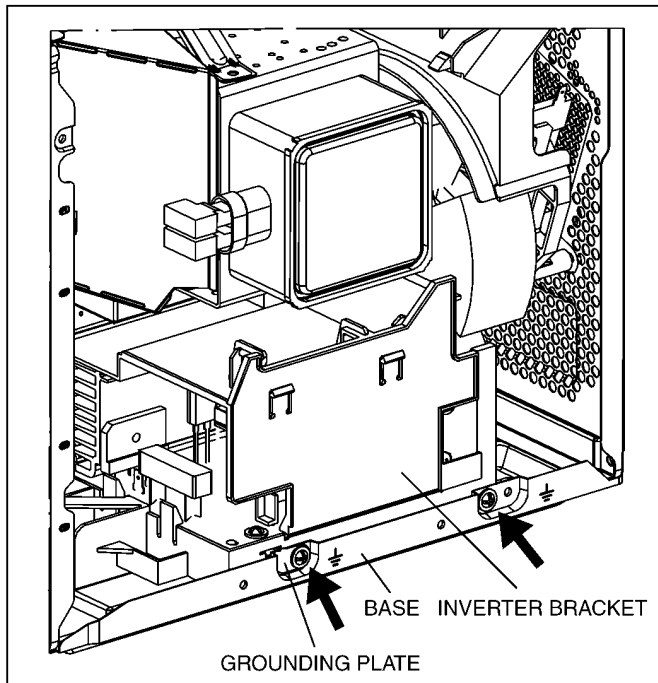


3. Remove the heater by pulling it out from the cavity left side.

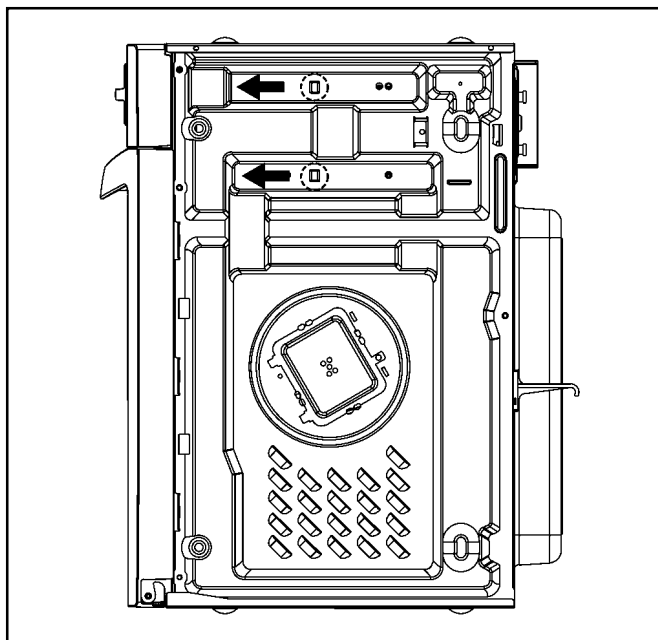


6.8. H.V. Inverter Power Supply

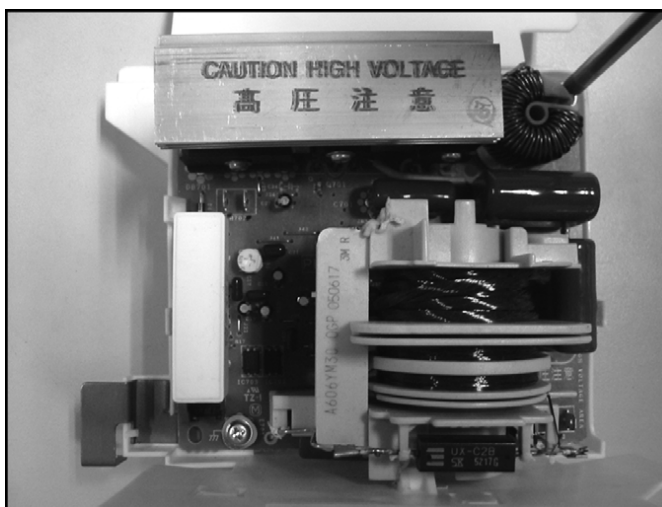
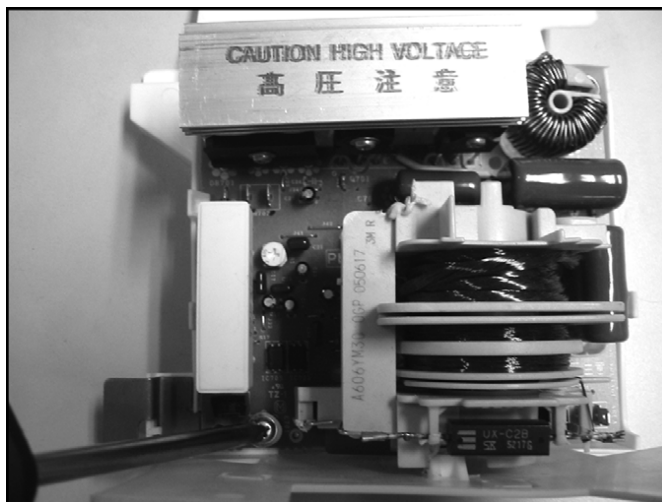
1. Disconnect 2 high voltage lead wires from magnetron filament terminals.
2. Unplug connector CN701 & CN702 from H.V. Inverter board.
3. Remove 1 screw holding grounding plate on the base.
4. Remove 1 screw holding inverter bracket on the base.



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.

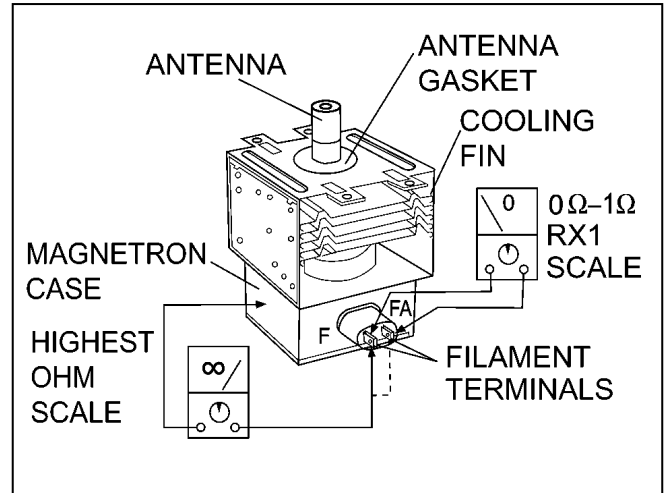
Normal continuity readings should be as follows.

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

7.3. Magnetron

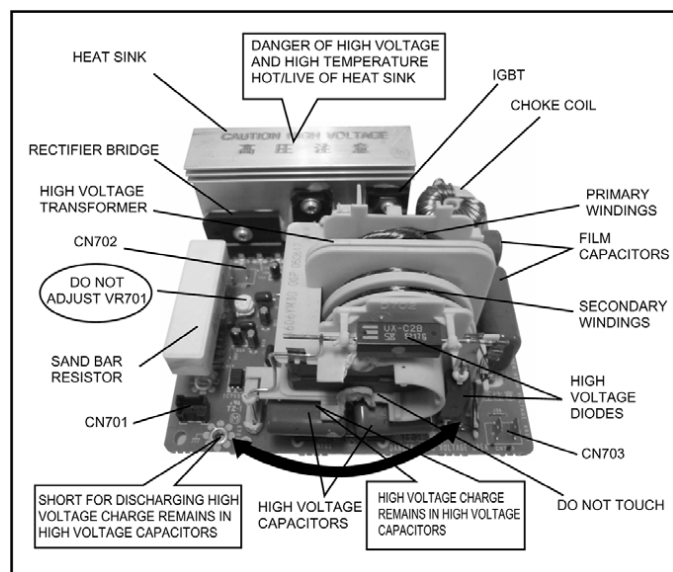
Continuity checks can only indicate an open filament or a shorted magnetron. To diagnose for an open filament or shorted magnetron.

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. 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 **Timer/Clock** pad twice.
 - b. Press **Start** pad once.
 - c. Press **Micro Power** pad once.
5. Program oven at High power for 1 minute and press [Start] pad.
 - 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 **Timer/Clock** pad once.
 - b. Press **Start** pad once.
 - c. Press **Micro Power** pad once.

5. Program oven at High power for 1 minute and press [Start] pad.

- 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.

7.5. 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 defective 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 **Timer/Clock** pad twice → press **Start** pad once → press **Micro Power** pad once).
2. Program oven at Standing Time for 1 minute and press [Start] pad.
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

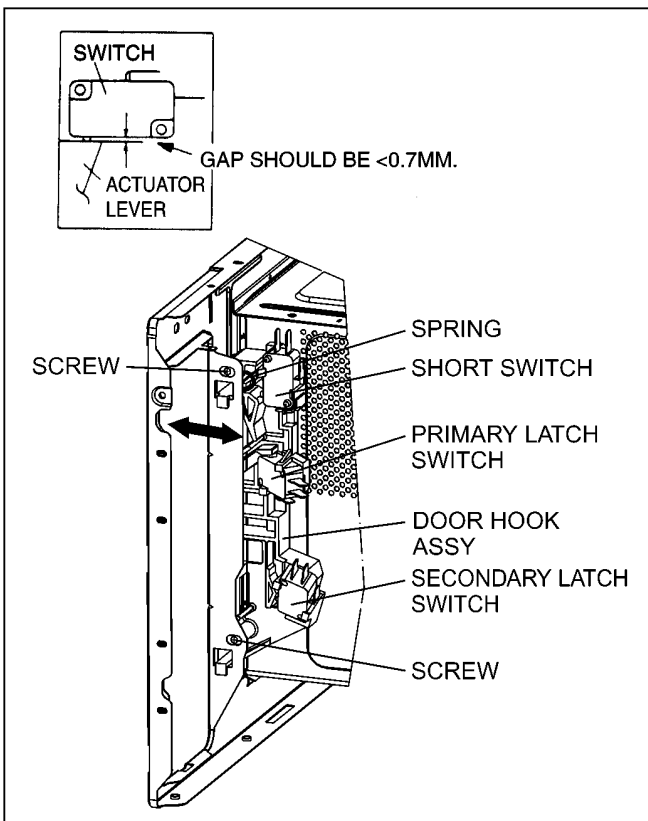
8.1. Adjustment of Primary latch switch, Secondary latch switch and Short switch.

1. Mount the Primary latch switch, 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 continuity 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

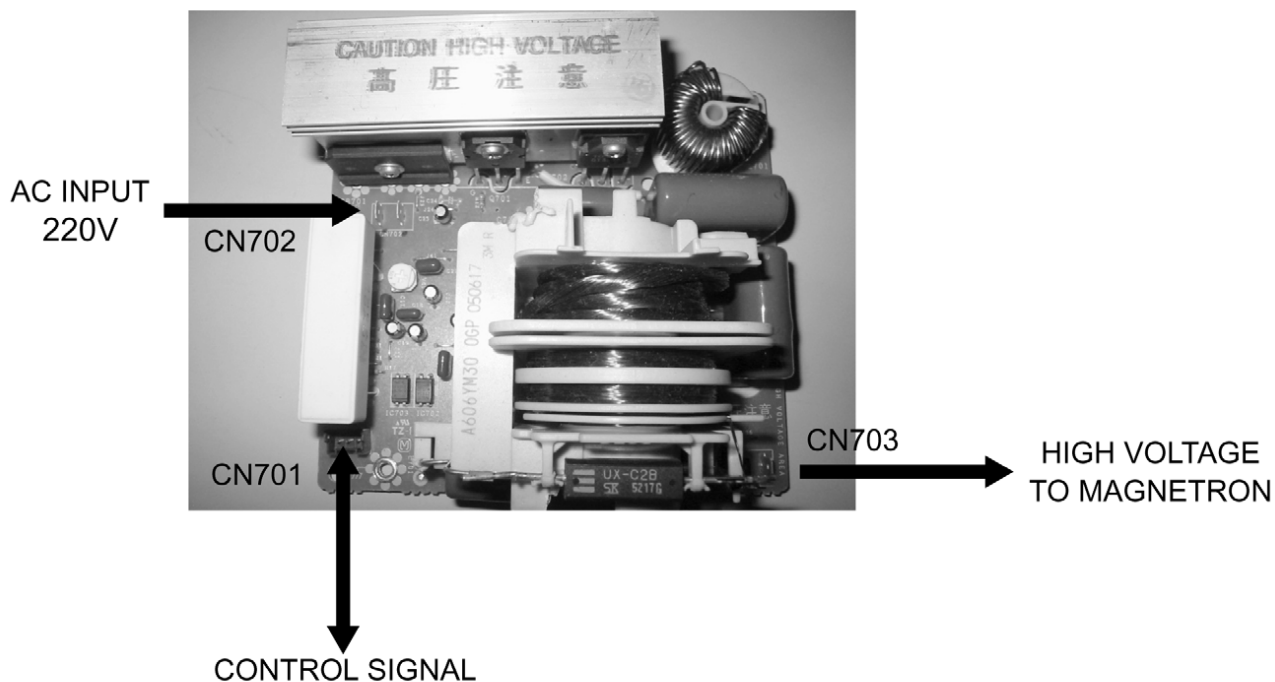
⚠ DANGER: HIGH VOLTAGES

- 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.
- Ensure proper grounding before troubleshooting.
- Be careful of the high voltage circuitry, taking necessary precautions when troubleshooting.
- Discharge high voltage remaining in the H.V.Inverter (U).
- 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.
- 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.
- 220V 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

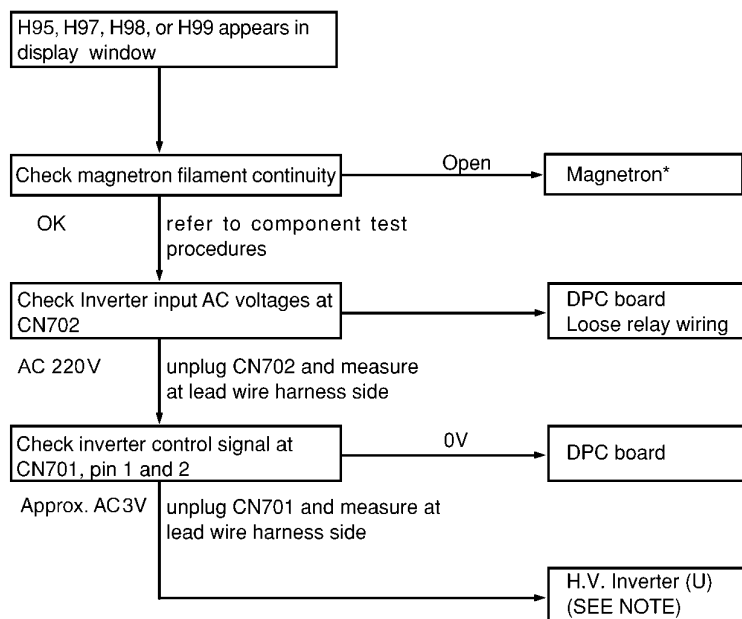
	SYMPTOM	CAUSE	CORRECTIONS
1.	Oven stops in 3 seconds after pressing [Start] pad	No 230-240V AC is supplied to H.V.Inverter (U) CN702 terminals	1. Latch Switch 2. Power relay RY1 3. Loose lead wire connector CN701, CN702 4. H.V. Inverter (U)
	Oven stops in 23 seconds after pressing [Start] pad	H.V.Inverter (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) 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.	Check adjustment of primary, secondary latch switch and monitor interlock switch including door.
3.	Oven does not accept key input (Program)	1. Key input is not in proper sequence 2. Open or loose connection of membrane key pad to DPC (Flat cable) 3. Shorted or open membrane key board 4. Defective DPC	Refer to operation procedure. Refer to DPC troubleshooting.
4.	Fan motor turns on when oven is plugged in with door closed.	1. Misadjustment or loose wiring of secondary latch switch 2. Defective secondary latch switch 3. Door switch CN4	Adjust door and latch switches.
5.	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
6.	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	
7.	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
8.	Fan motor turns on and turntable motor rotates when door is opened.	1. Low voltage transformer on DPC.	
9.	Oven does not operate and return to plugged in mode as soon as [Start] pad is pressed.	1. Defective DPC	Check grounding connector on escutcheon base.
10.	Loud buzzing noise can be heard.	1. Loose fan and fan motor	
11.	Turntable motor does not rotate.	1. Open or loose wiring of turntable motor 2. Defective turntable motor	
12.	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.
13.	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 **Timer/Clock** pad twice → Press **Start** pad once → press **Micro Power** pad once. Program unit for operation. H95, H97, H98, H99 appears in display window a short time after [Start] pad is pressed and there is no microwave oscillation.



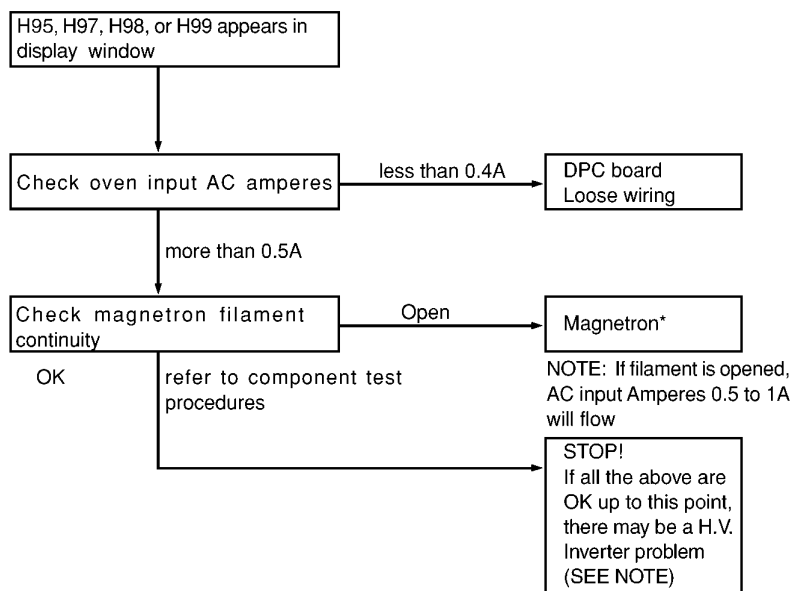
⚠ WARNING: DO NOT try to repair this Inverter Power Supply (U) and also DO NOT RE-ADJUST PRESET CONTROL on the board. It is very dangerous to repair or adjust without proper test equipment because this circuit generates very high voltage and very large current. Off alignment of inverter board operation 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] pad is pressed and no microwave oscillation with AC Ampere meter used for troubleshooting.



NOTE: If filament is opened, AC input Amperes 0.5 to 1A will flow

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 transform (L.V.T.) secondary voltage	Abnormal 0V	L.V.T.
	3	IC1 pin23 voltage	Normal	→Step3
			Abnormal	Q11, ZD11, Q10, ZD10
No key input	1	Membrane switch continuity	Abnormal	IC1, CX320, Display
			Normal=3.3V	Membrane switch
No beep sound	1	IC1 pin 1 voltage	Abnormal	IC1
			Normal=3.3V	BZ210, Q210
No microwave oscillation at any power	1	IC1 pin 20 voltages while operation at high power	Abnormal	IC1
	2	Collector of Q220 voltage	Normal=3.3V	→Step2
			Abnormal	Q220 and /or Q221, Q222, Q225, Q227
	3	Short circuit between collector and emitter of Q220	Normal≈0.7V	→Step3
			Still not turn on	RY1
Dark or unclear display	1	Replace display and check operation	RY1 turns on	Q220 and /or Q221, Q222, Q225, Q227
			Normal	Display
Missing or lighting of unnecessary segment	1	Replace IC1 and check operation	Abnormal	IC1
			Normal	IC1
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	Display
			Abnormal=0V	1. Latch Switch 2. D.P.C. /Power Relay
	2	Unplug CN701 (3 pin) connector and measure pin3 voltage	Normal=220V	→Step2
			Abnormal=0V	D.P.C.
			Approx. AC 3V	Magnetron

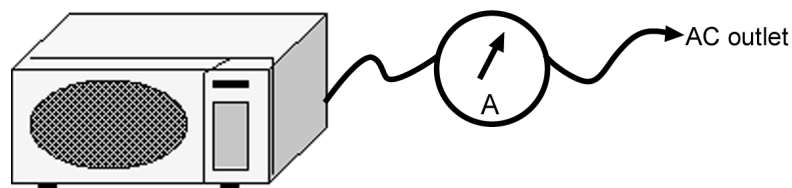
9.4. Simple way of H.V. Inverter/magnetron troubleshooting

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.

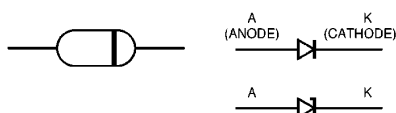
Note:

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 CN703	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 (F606YM300BP)
		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, CN701 and CN702	Replace defective component(s), or correct switch, cables and connectors.

9.5. How to check the semiconductors using an OHM meter

Diode



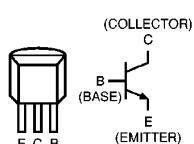
	FORWARD	REVERSE
A-K	SMALL	∞

Transistor

NPN Transistor

2SC.....

2SD.....

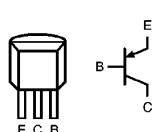


	FORWARD	REVERSE
B-E	SMALL	∞
B-C	SMALL	∞
C-E	∞	∞

PNP Transistor

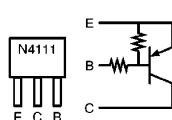
2SA.....

2SB.....



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

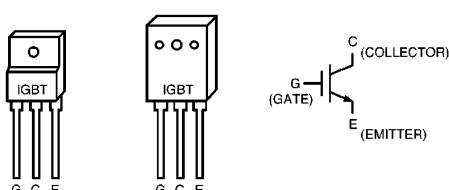
Digital Transistor PNP Transistor



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

IGBT

(INSULATED GATE BIPOLAR TRANSISTOR)



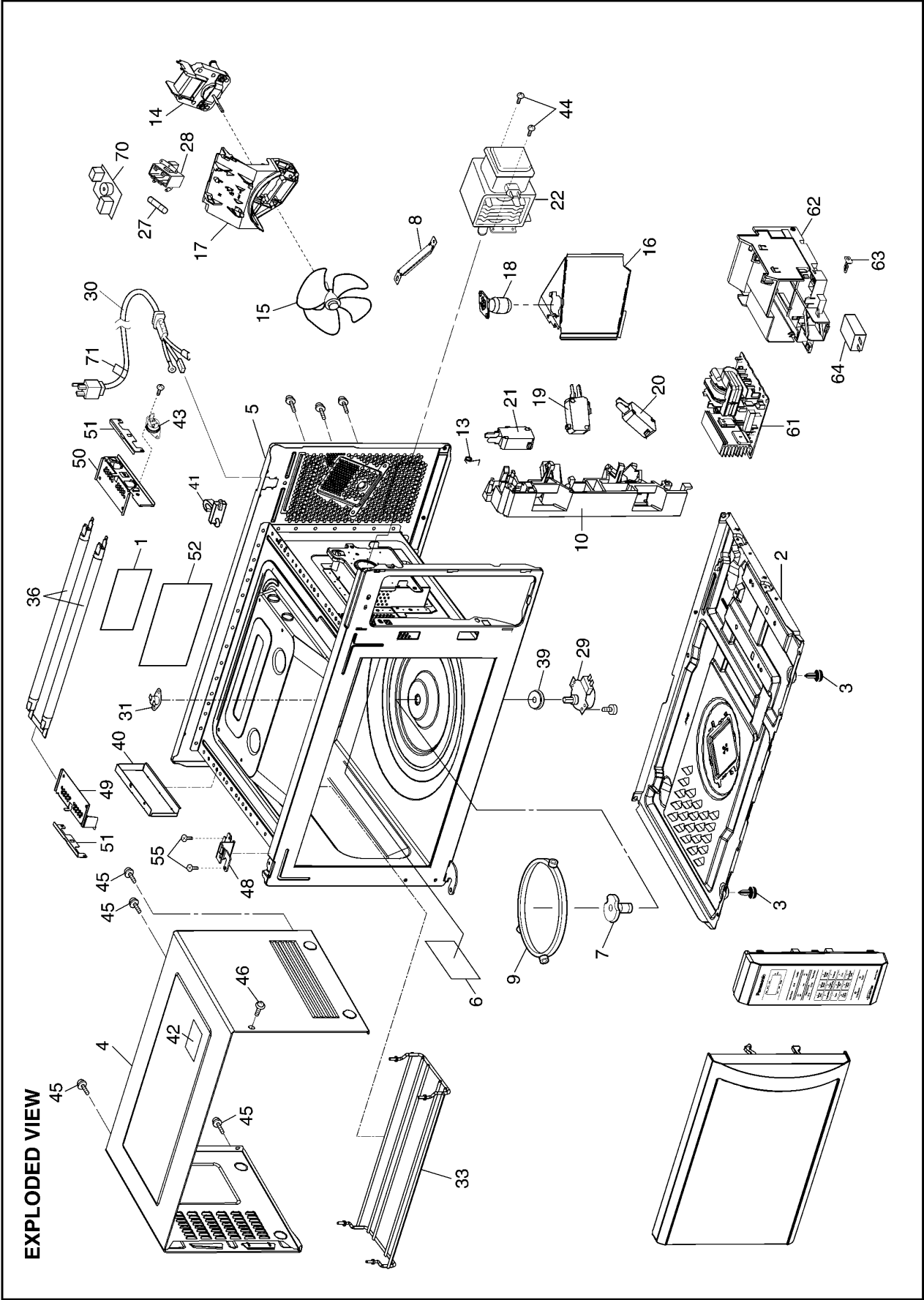
	FORWARD	REVERSE
E-C	SMALL	∞
E-G	∞	∞
C-G	∞	∞

9.6. H.V. Inverter main parts list (F606YM300BP)

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
Q701		A691EM300BP	IGBT	1	
Q702			IGBT	1	
C701		ECWF5184N300	FILM CAPACITOR	1	
C702		ECQE2505T869	FILM CAPACITOR	1	
C703		ECWF2395N632	FILM CAPACITOR	1	
DB701		B0FBBQ000007	RECTIFIER BRIDGE	1	
L701		F5020M300XN	CHOKE COIL	1	
R702		D0CM352JA002	SAND BAR RESISTOR	1	
T701		A609A7F40QP	TRANSFORMER	1	(INCLUDING D701,D702,C706,C707)
D701,D702	⚠	B0FBAZ000002	DIODE	2	
C706		F0C3F562A002	FILM CAPACITOR	1	5600PF, 3KV
C707		F0C3F432A002	FILM CAPACITOR	1	4300PF, 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:

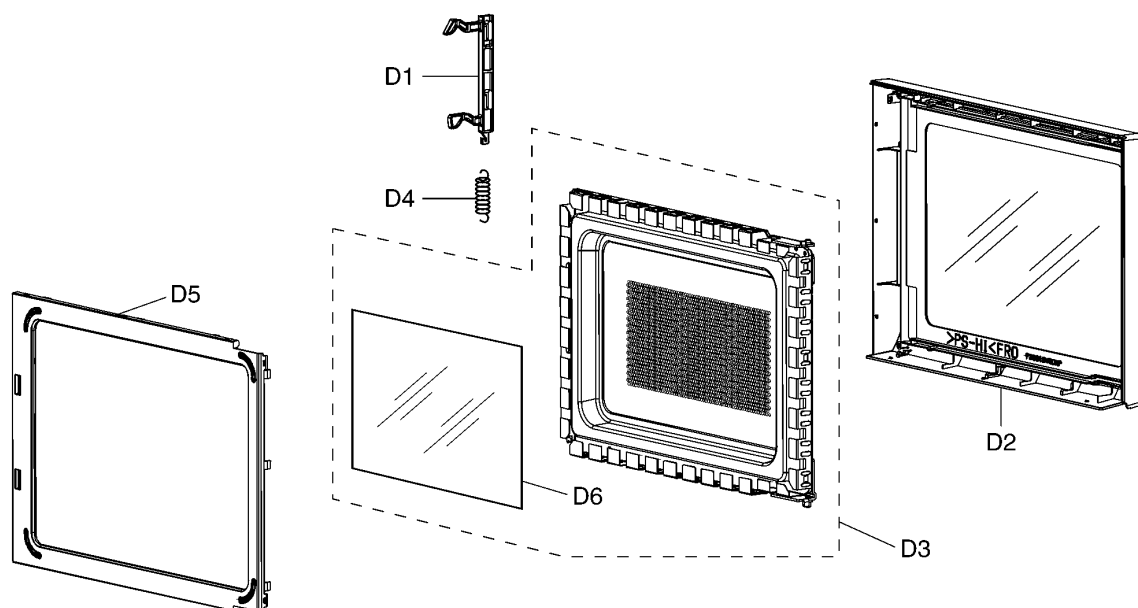
Components identified by $\triangle$ mark have special characteristics important for safety.

When replacing any of these components, use only manufacture's specified parts.

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
1		F00079W40SKT	NAME PLATE	1	KTE
1		F00079W40SPT	NAME PLATE	1	PTE
1		F00079W40SZP	NAME PLATE	1	ZPE
2		F10019V00XP	BASE	1	
3		F10089W40HPS	RUBBER FOOT	2	
4		F10099W40SHP	CABINET BODY	1	
5	$\triangle$	F200A9W00XP	OVEN	1	
6		F20559V00XP	COVER	1	
7		F21319W00XP	PULLY SHAFT	1	
8		F20349V00XP	SUPPORTER	1	
9		F290D9W00XP	ROLLER RING (U)	1	
10	$\triangle$	F30209V00XP	DOOR HOOK	1	
13		F30799V00XP	SPRING	1	
14		F400A9V00XP	FAN MOTOR	1	
15		F4008-1N00	FAN BLADE	1	
16		F40259V00XP	AIR GUIDE A	1	
17		F41449V00XP	ORIFICE	1	
18		F612E7X50BP	INCANDESCENT LAMP (U)	1	
19	$\triangle$	F61425U30XN	MICRO SWITCH B	1	(PRIMARY LATCH SWITCH)
20	$\triangle$	F61415U30XN	MICRO SWITCH A	1	(SECONDARY LATCH SWITCH)
21	$\triangle$	F61789V00XP	SHORT SWITCH	1	(SHORT SWITCH)
22	$\triangle$	2M236-M36R	MAGNETRON	1	
27	$\triangle$	F62309W40HP	FUSE	1	10A
28		F62319V00XP	FUSE HOLDER	1	KTE, PTE
29		F63266S30XP	TURNTABLE MOTOR	1	
30	$\triangle$	F900C9V20HP	AC CORD W/PLUG	1	KTE
30	$\triangle$	F900C9V20ZP	AC CORD W/PLUG	1	PTE, ZPE
31	$\triangle$	F61456N60AP	THERMAL CUTOUT	1	150°C OPEN, -20°C CLOSE
33		F67359W00XP	HEATER PROTECTOR	1	
36		F630G9W00XP	HEATER	1	
39		F21766S10XP	SEAL	1	
40		F22379W00XP	LEFT HEATER PANEL	1	
41		F11409W00XP	STOPPER	1	
42		F01508G60HP	NO TOUCHING LABEL	1	
43		F61459W40HP	THERMAL CUTOUT	1	105°C OPEN, 95°C CLOSE
44		XTWFL4+12T	SCREW	2	FOR MAGNETRON
45		XTWBF4+8D	SCREW	4	FOR CABINET BODY
46		XTC4+10BFN	SCREW	1	FOR CABINET BODY SIDE (UPPER SIDE)
48		F30069V00XP	HINGE A	1	
49		F64619W00XP	HEATER MOUNTING PLATE B	1	
50		F64609W00XP	HEATER MOUNTING PLATE A	1	
51		F64629W00XP	HEATER MOUNTING PLATE C	2	
52		F15609W40HP	ALUMINIUM SHEET	1	KTE, PTE
52		F15609W40ZP	ALUMINIUM SHEET	1	ZPE
55		XTWFA4+12LR	SCREW	2	FOR HINGE A
61	$\triangle$	F606YM300BP	H.V. INVERTER (U)	1	
62		F65859W40HP	INVERTER BRACKET	1	
63		F66629W40HP	GROUNDING PLATE	1	
64		MKPx2335K	CAPACITOR	1	KTE, PTE

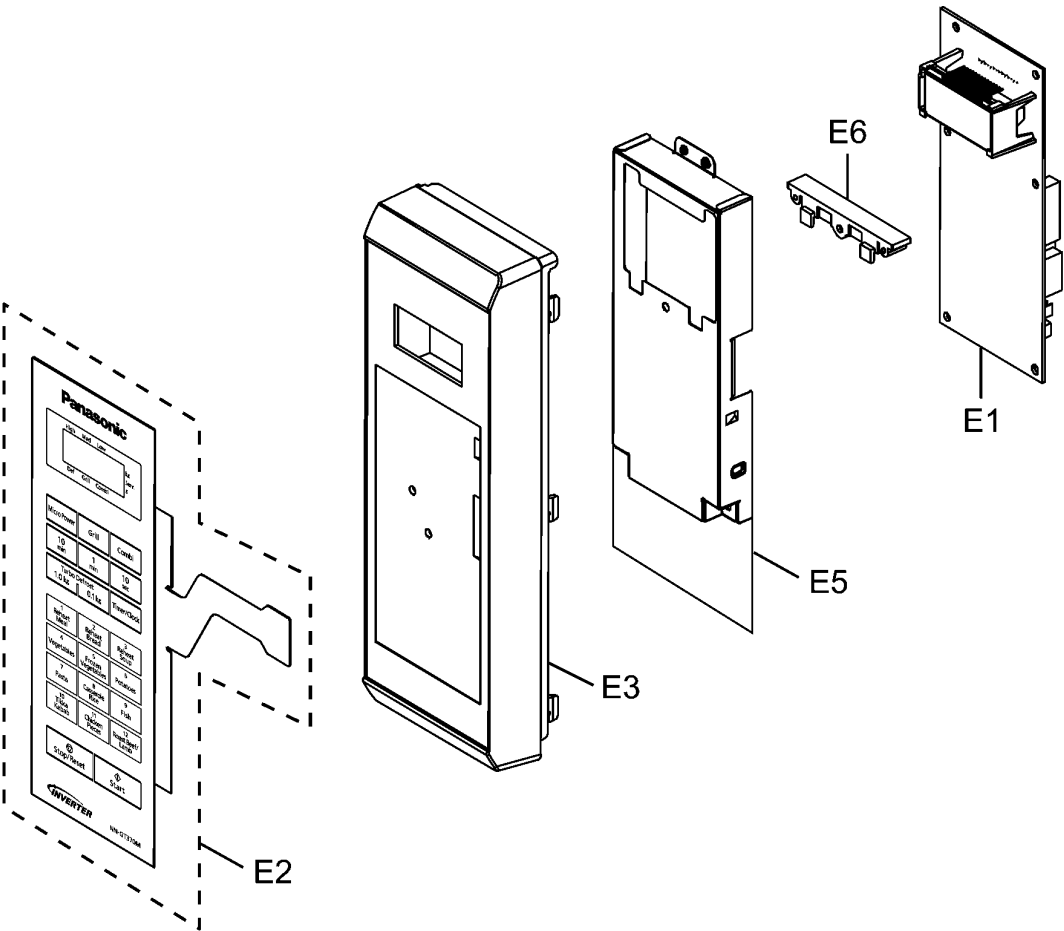
Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
70		F692Y9W40ZP	NOISE FILTER (U)	1	ZPE
71		F02395E20KN	CORD CAUTION LABEL	1	KTE,PTE

10.3. DOOR ASSEMBLY



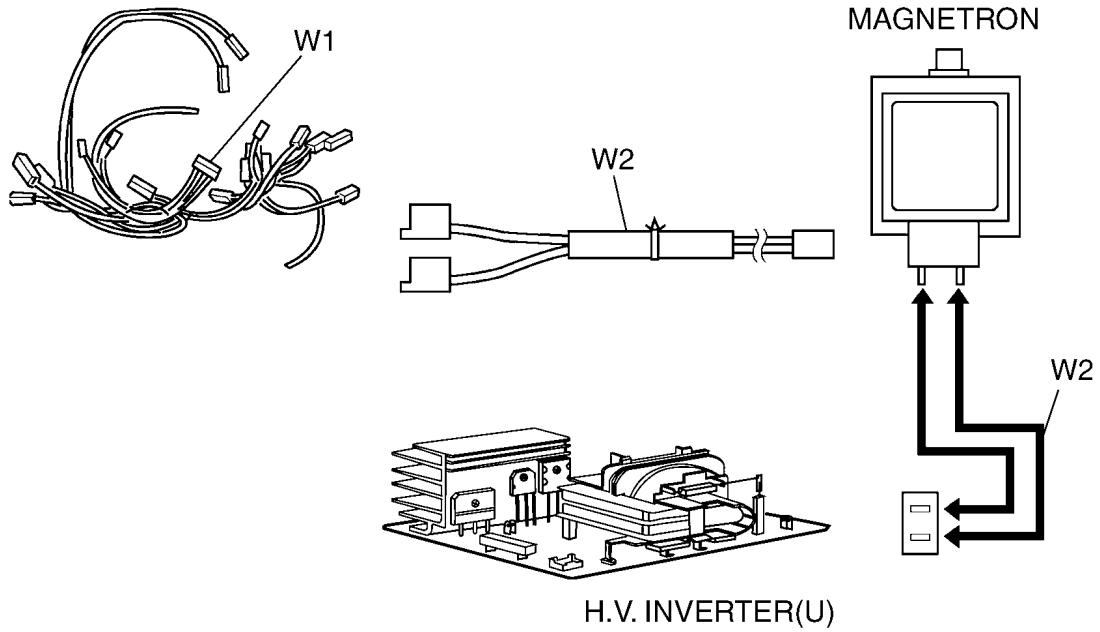
Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
D1		F30189V00XP	DOOR KEY A	1	
D2	⚠	F302A9V00KXP	DOOR A (U)	1	
D3	⚠	F302K9V00XP	DOOR E (U)	1	
D4		F30215G10XN	DOOR KEY SPRING	1	
D5	⚠	F30859V00XP	DOOR C	1	
D6	⚠	F31459W00XP	DOOR SCREEN A	1	

10.4. ESCUTCHEON BASE ASSEMBLY



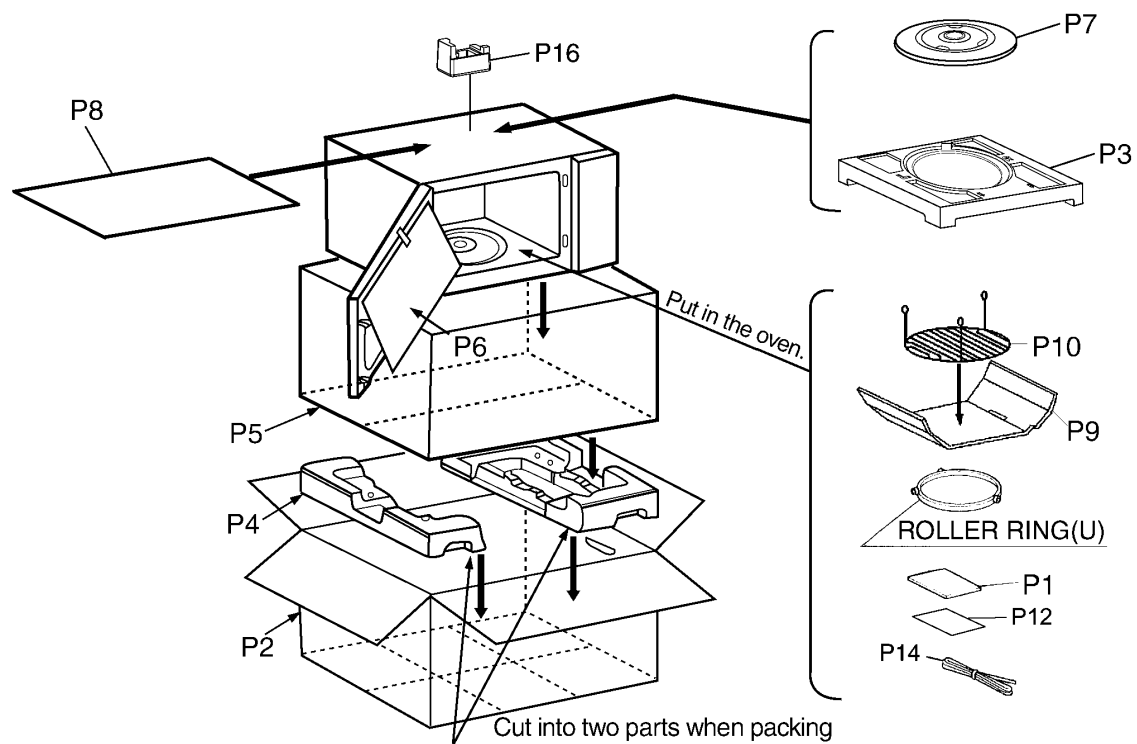
Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
E1	F603L9W40PT	D.P.CIRCUIT (AU)	1	KTE,PTE
E1	F603L9W40ZP	D.P.CIRCUIT (AU)	1	ZPE
E2	F630Y9W40KKT	MEMBRANE SWITCH	1	KTE,PTE
E2	F630Y9W40KZP	MEMBRANE SWITCH	1	ZPE
E3	F80349V30SHP	ESCUTCHEON BASE	1	
E5	F81279V30AP	BACK PLATE	1	
E6	F66139V30HP	BACKSTOP	1	

10.5. WIRING MATERIALS



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
W1	F030A9W40HP	LEAD WIRE HARNESS	1	KTE, PTE
W1	F030A9W40ZP	LEAD WIRE HARNESS	1	ZPE
W2	F030E7K10XP	H.V. LEAD WIRE	1	

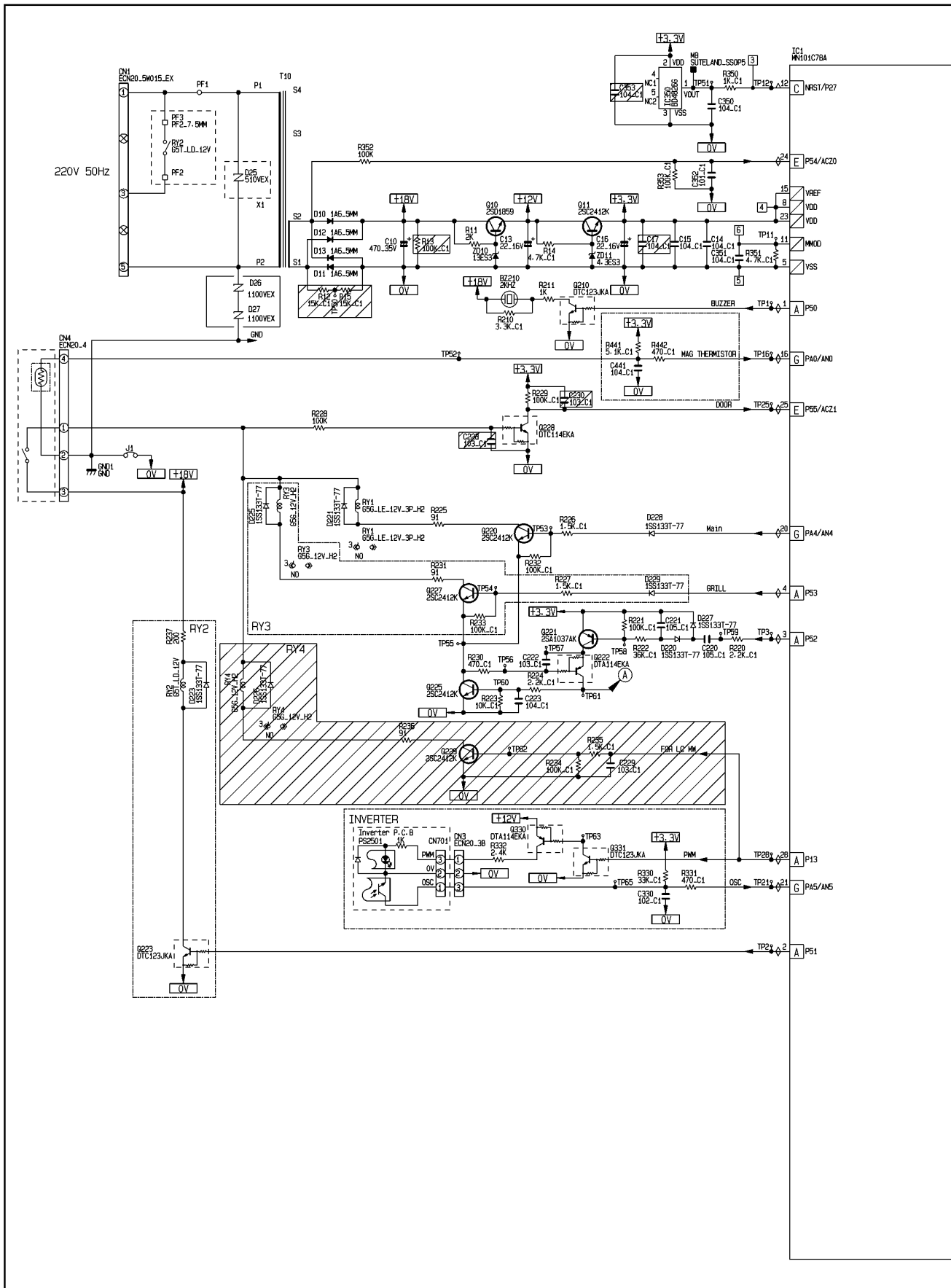
10.6. PACKING AND ACCESSORIES

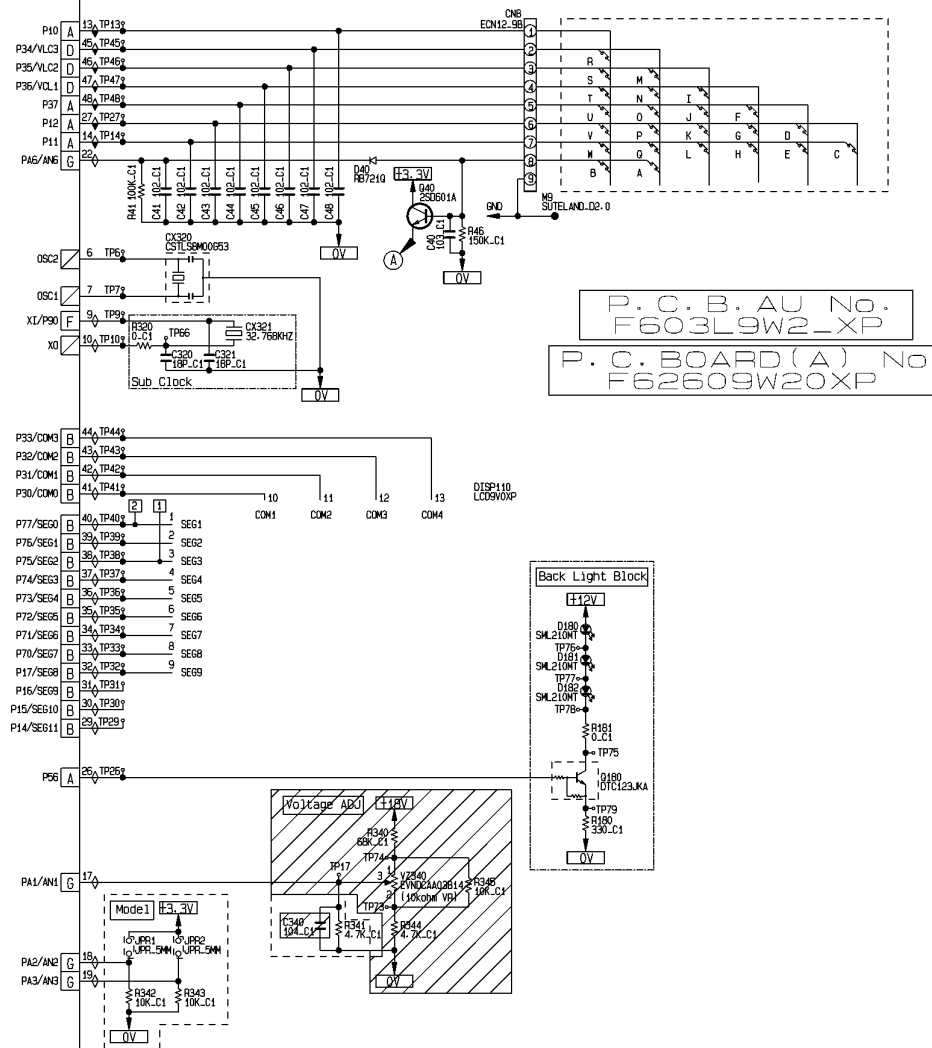


Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
P1	F00039W40KP	INSTRUCTION MANUAL	1	KTE, PTE
P1	F00039W40ZP	INSTRUCTION MANUAL	1	ZPE
P2	F01029W40SKT	PACKING CASE, PAPER	1	KTE, PTE
P2	F01029W40SZP	PACKING CASE, PAPER	1	ZPE
P3	F01049V00XP	UPPER FILLER	1	
P4	F01059V00XP	LOWER FILLER	1	
P5	F01068100XN	P.E. BAG	1	
P6	F01075G10XN	DOOR SHEET	1	
P7	F06019W00XP	COOKING TRAY	1	
P8	F01924T00AP	SHEET	1	
P9	F01085G50XN	RACK PACKING	1	
P10	F060V8H00BP	OVEN RACK	1	
P12	F04459W40SKT	OVERLAY	1	KTE, PTE
P16	F01099V20HP	FOAM	1	

11 DIGITAL PROGRAMMER CIRCUIT

11.1. SCHEMATIC DIAGRAM





	P. C. B. AU No.	JPR2	JPR1	RY2	RY3	RY Type	INVERTER	MAG THERMISTOR	Sub CLOCK	T10	C10	R11	R225 R231	R237	D25	R341
LC	F603L9V30HP	OPEN	OPEN	○	—	12V	—	—	—	6S200P	470uF 35V	2K	91	200	○	—
	F603L9V30YP	OPEN	68K	○	—		—	—	—						—	
	F603L9V30YT	OPEN	30K	○	—		—	—	○						—	
	F603L9V30ZP	OPEN	10K	○	—		—	—	○						—	
	F603L9V30KT	OPEN	6.2K	○	—		—	—	—						—	
	F603L9V30ST	OPEN	3.3K	○	—		—	—	—						—	
	F603L9V30KP	OPEN	1.5K	○	—		—	—	—						○	
	F603L9W20XP	OPEN	SHORT	○	○	18V	—	—	—	5L010P	220uF 50V	10K	47	—	○	4.7K
INV	F603L9W40HP	OPEN	OPEN	—	○		○	○	—						—	
	F603L9W40YP	OPEN	68K	—	○		○	○	—						—	
	F603L9W40YT	OPEN	10K	—	○		○	○	○						○	
	F603L9W40ZP	OPEN	1.5K	—	○		○	○	○						—	
	F603L9W40PK	OPEN	SHORT	—	○		○	○	—						—	
	F603L9W40TU	OPEN	3.3K	—	○		○	○	—						○	

11.2. PARTS LIST

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
BZ210	L0DDEA000014	BUZZER	1	2.0KHz
C10	F2A1H221B549	AL CHEM CAPACITOR	1	220pF/50V
C13,C16	F2A1C220B624	AL CHEM CAPACITOR	2	22pF/16V
CX320	H2B800400007	CERAMIC RESONATOR	1	8.00MHz
DISP110	L5AYAYY00070	LCD	1	
	F66179V30HP	LCD HOLDER	1	
D220,D221,D225,D227-D229	B0AACK000004	DIODE	6	
D10-D13	B0EAKT000025	DIODE	4	
D25	D4EAY511A036	ZENER RESISTOR	1	510V (KTE,PTE)
D26,D27	D4EAY112A036	ZENER RESISTOR	2	1100V (KTE,PTE)
IC1	MN101C78ABK1	L.S.I.	1	
IC350	C0EBE0000401	IC	1	
Q10	B1BAAJ000003	TRANSISTOR	1	
RY1,RY3	AEBGJQC25F18	POWER RELAY	2	
ZD10	B0BA01000049	ZENER DIODE	1	
ZD11	B0BA4R400002	ZENER DIODE	1	
T10	G4C3AAH00008	LOW VOLTAGE TRANSFORMER	1	