

ORDER NO.PHAMOS0609045C3

# Service Manual

## Microwave Oven

Model No. **NN-CS596A**  
**NN-CS596S**

HPE(Hong Kong)

YPQ(Singapore)

MPQ(Malaysia)

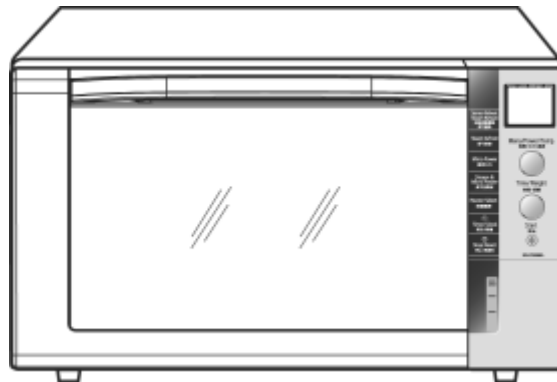
YTE(Others)

KTE(UAE)

PTE(Iran)

QPQ(Australia & New Zealand)

ZPE(CIS Countries)



## Specification

Models		NN-CS596A	NN-CS596S
Power Source:		230V AC Single Phase, 50Hz .....For QPQ Model 240V AC Single Phase, 50Hz .....For MPQ, YPQ Models 220V AC Single Phase, 50Hz .....For KTE, ZPE, HPE, YTE, PTE Models	
Power Requirement:	Microwave	950W	950W
	Ceramic Heater (1pc)	450W	450W
	Ceramic Heater (2pcs)	900W	900W
	Convection Heater	1400W	1400W
Output:	Microwave	1000W	1000W
	Ceramic Heater (1pc)	450W	450W
	Ceramic Heater (2pcs)	900W	900W
	Convection Heater	1400W	1400W
Microwave Frequency:		2450MHz	
Timer:		90 Min. 00 Sec.	
Outside Dimensions:		523mm(W) x 505mm(D) x 320mm(H)	
Oven Cavity Dimensions:		354mm(W) x 343mm(D) x 205mm(H)	
Weight:		22kg	
PbF		This product with PbF	
Specifications subject to change without notice.			


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### **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.

HPE ..... For Hongkong  
 YPQ ..... For Singapore  
 MPQ ..... For Malaysia  
 YTE ..... For Others  
 KTE ..... For UAE  
 PTE ..... For Iran  
 QPQ ..... For Australia & New Zealand  
 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 ± 10°C.
  - Pb free solder will tend to splash when heated too high (about 600°C).

# Panasonic®

## 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. **NEW H.V.**

IT HAS: 1. Very high voltage and high current circuits.

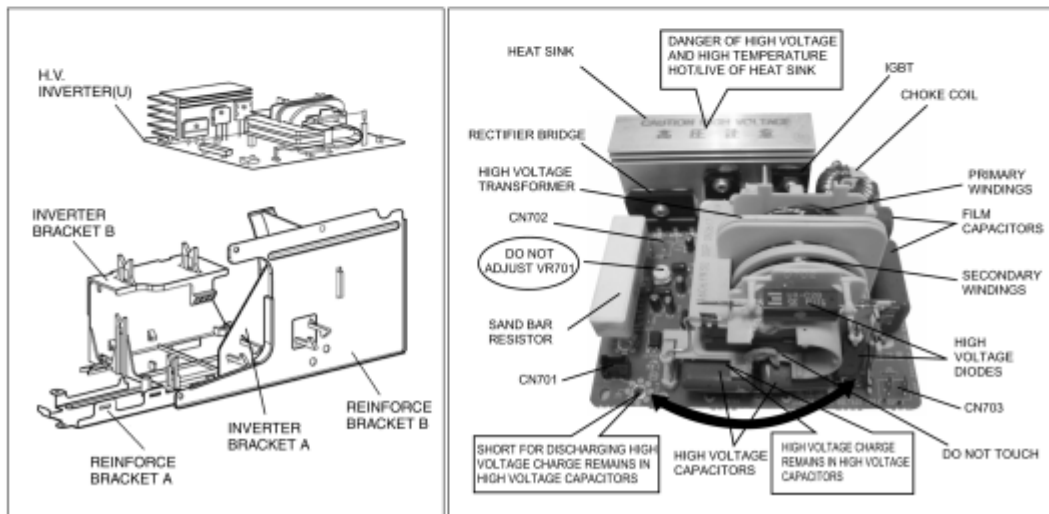
It functions the same as the high voltage transformer and high voltage capacitor in ordinary microwave ovens.

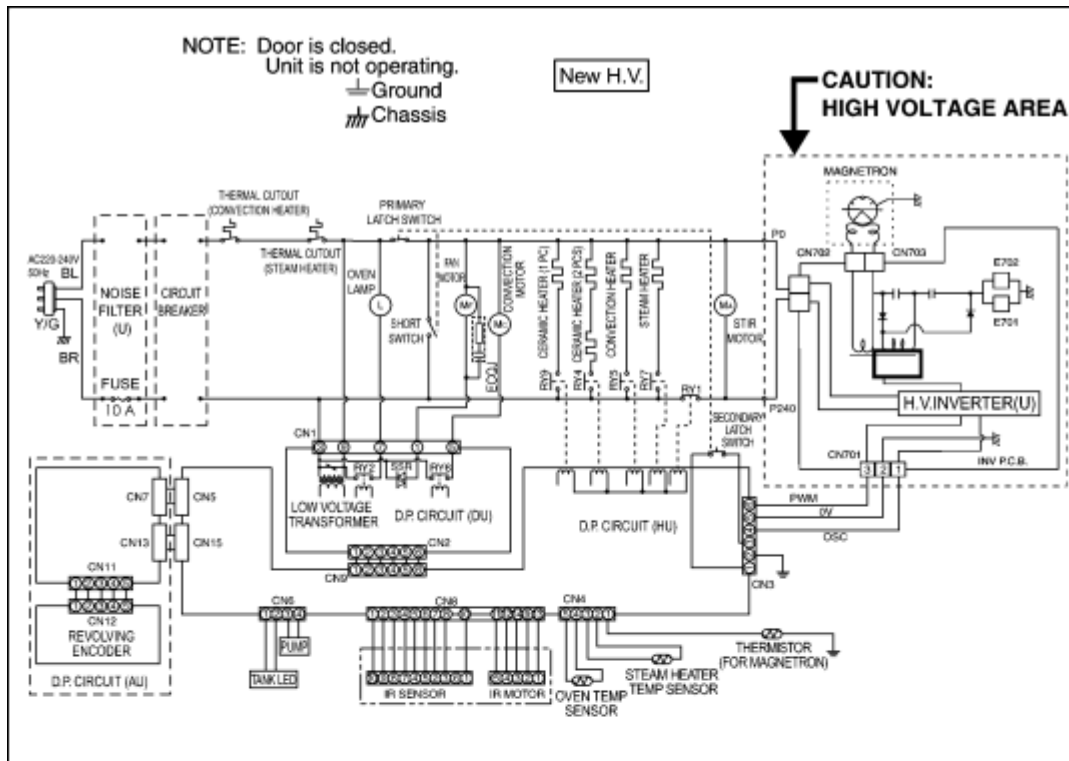
2. Aluminum heat sink that is energized with very high voltage and high heat energy.
3. Very high voltage which may remain in circuitry even when oven is off. High voltage charge may remain in the capacitors on the board.

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.

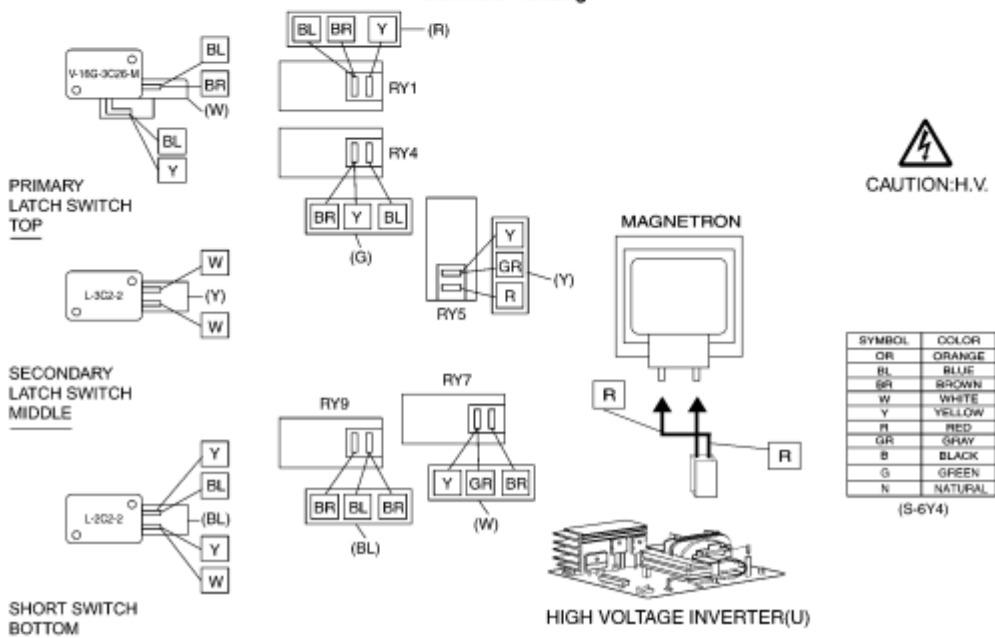
### INVERTER POWER SUPPLY





#### WIRING DIAGRAM

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



## 2 DESCRIPTION OF OPERATING SEQUENCE

### 2.1 Variable power cooking control

High Voltage Inverter Power Supply (U) controls output power by the signal from Digital Programmer Circuit (DPC). Power relay always stays 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	70%	22	0
MEDIUM	55%	22	0
MEDIUM-LOW	40%	22	0
LOW	20%	13	9
DEFROST	30%	17	5

### 2.2 Inverter power supply circuit **NEW H.V.**

The Inverter Power Supply circuit powered from the line voltage, 220-240V 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 220-240V 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.

### 2.3 Steam defrost, Auto cook & Steam reheat

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. Table shows the corresponding cooking times for respective serving by categories.

**Steam Defrost**

SELECTED WEIGHT	COOKING TIME
1.0 kg	15 min.50 sec.

**Auto Cook (Vegetable)**

SELECTED WEIGHT	COOKING TIME
100 g	1 min.30 sec.

2. When cooking time in the display window has elapsed, the oven turns off automatically by a control signal from the digital programmer circuit.

## 2.4 Convection & Grill Convection cooking control

1. After selecting desired oven cavity temperature of Convection/Grill Convection (the range of selected oven temp is 100°C-300°C) and pressing [Start] pad, a high level signal comes out of the micro computer and applies to power relays, RY5 and RY9.
2. When RY5 & RY9 are switched to ON, power source voltage is applied to the convection heater & upper heater (middle one), and the heaters turn on.
3. The digital programmer circuit senses the oven cavity temperature through oven temp sensor (thermistor). When the oven temperature reaches the set temperature, DPC stops supplying high level signal to the power relays, and the heaters turn off.
4. After the convection heater and upper heater (middle one) turn off, the oven temperature will continue increasing for a while and then decrease as shown in Figure.

**NOTE:**

- For "CONVECTION" function, after preheating, RY9 would no longer be switched to ON.
- For "GRILL CONVECTION" function after preheating, RY9 would always stay ON even if the oven temp exceeds the set temp.

**NOTE:**

1. If only convection heater works, convection motor would rotate for 5 minute after cooking to cool oven and electric components.
2. After convection or grill convection cooking, fan motor rotates for 5 minutes to cool oven and electric components.

## 2.5 Combination cooking control

1. During combination cooking, the digital programmer circuit controls power relay RY9's ON-OFF time. In all three combination cooking categories, power relay RY1 always stay on, but RY9's ON-OFF time as shown in Figure.

COMBINATION CATEGORY	GRILL(RY9)		MICROWAVE (RY1)
	ON (sec.)	OFF (sec.)	
1	33	0	ON
2	24	9	ON
3	18	15	ON

## 2.6 Grill cooking control

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

- During grill cooking, the digital programmer circuit controls power relay RY4 & RY9's ON-OFF time (RY4 & RY9's ON-OFF state is synchronous). In all three grill cooking categories, power relay RY1 always stay OFF, but RY4 & RY9's ON-OFF time are shown in Figure.

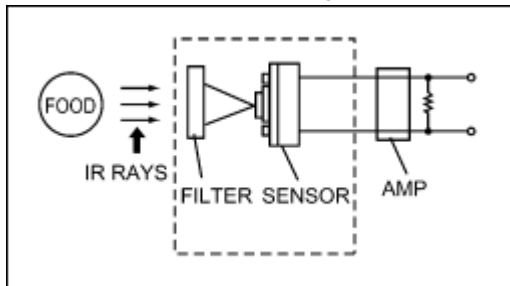
GRILL CATEGORY	GRILL (RY4 & RY9)		MICROWAVE (RY1)
	ON (sec.)	OFF (sec.)	
1	33	0	OFF
2	24	9	OFF
3	18	15	OFF

## 2.7 IR reheat

The temperature of food being heated is detected by an infrared (IR) sensor and you do not have to set time.

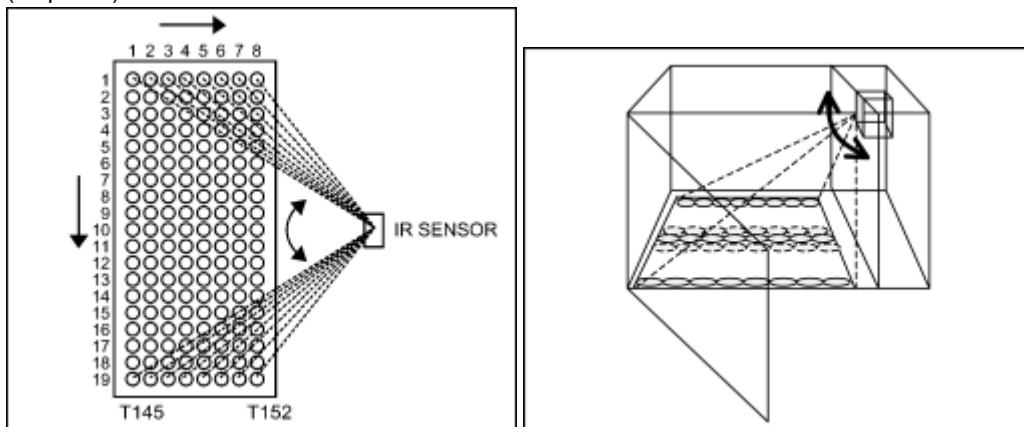
### 2.7.1 How to read temperature by IR sensor

IR sensor can read food temperature without touching, IR rays are emitted from food. IR sensor is to generate temperature related electric signal output and microcomputer is to convert actual temperature.



### 2.7.2 Operation

IR sensor is mounted on top right of oven cavity through the hole. It scans all over cooking shelf. IR sensor has 8 eyes and can read oven shelf left to right at the time. Then IR sensor is designed to scan front to back to cover all over shelf. (19 points)



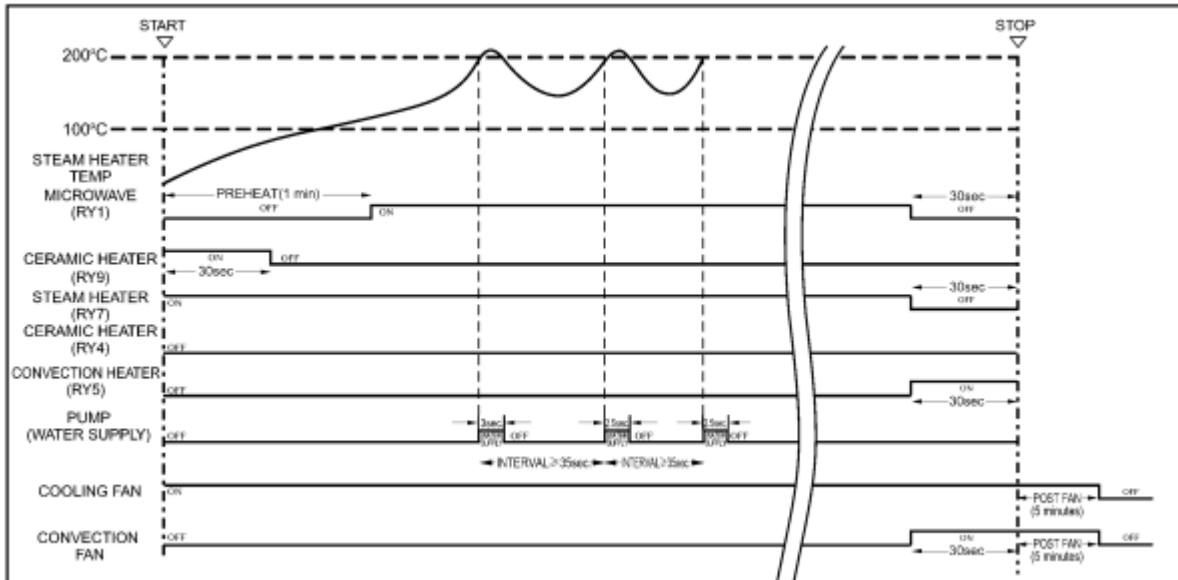
## 2.8 Steam function (micro steam)

### 2.8.1 Water Supply

Water in water tank will be pumped out and supply to the steam generation heater located inside back bottom of oven cavity.

### 2.8.2 Operation

When pressing [start] pad, oven preheat will start and then water supply begins. It will take 1 minute for preheating. When preheat is completed, it will turn into actual cooking process. During heating, the temperature sensor (Thermistor) located on steam heater will monitor steam heater temperature and when it exceeds 200°C, the additional water will be supplied to maintain moisture/steam within oven cavity.





# 3 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 whenever working close to or replacing the magnetron.

## 3.1 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.

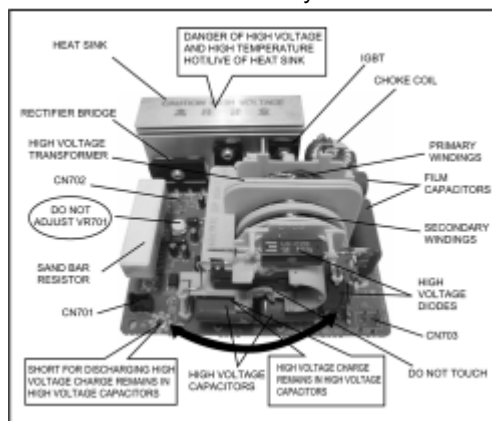
## 3.2 Inverter warnings

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

The High Voltage Inverter Power Supply handles 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.

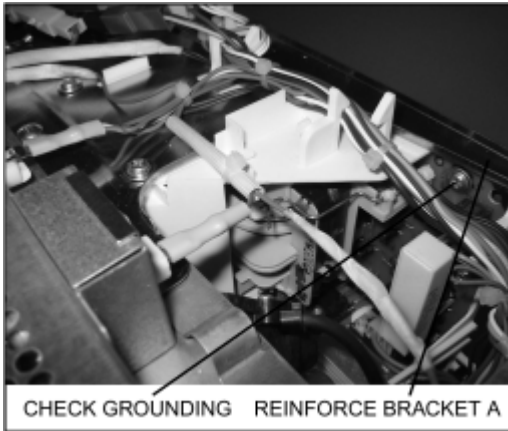
The aluminum heat sink may be HOT due to heat energy, therefore, extreme care should be taken during servicing.



H.V. Inverter warning

### 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 grounding bracket.

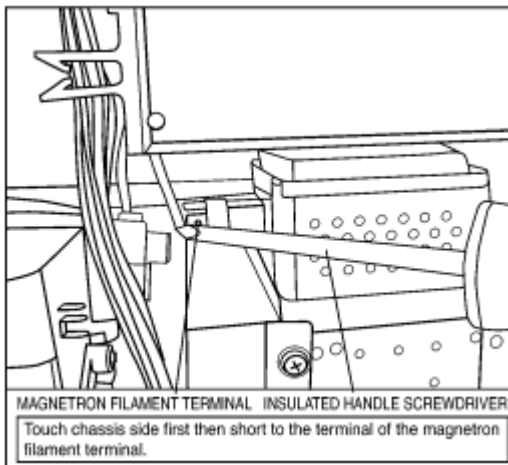


Grounding of the inverter circuit board

#### **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 in 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 touch the chassis ground side first and then short to the output terminals.



Discharging the high voltage capacitors

#### **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.

### **3.3 Confirm before repair**

1. Before repair or replacement of parts, ensure to take out the water tank from microwave oven. Furthermore, use drainage function, to drain the water remaining in the water pipes and tubes into oven cavity.
2. Wipe up the oven cavity.

#### **WARNING**

Before beginning repair work, make sure that there is no water in microwave oven, otherwise the water might invade the electric parts and will cause short circuit even result in electric shock.

### **3.4 Part replacement**

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

### 3.5 When the 10A fuse is blown due to the operation of the short switch

#### WARNING

When the 10A 220V fuse is blown due to the operation of the interlock monitor switch, replace all of the components (primary latch switch, short switch and power relay B (RY1)).

1. This is mandatory. Refer to “adjustments and measurements” 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.

### 3.6 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.

### 3.7 Confirm after repair

1. After repair or replacement of parts, make sure that the screws of the oven, etc. are neither loose or missing. Microwave 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. (Refer to procedure for measuring microwave energy leakage).

#### CAUTION MICROWAVE RADIATION

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.

#### IMPORTANT NOTICE

**After repair or replacement of parts, make sure that all the water pipes and tubes are properly connected, otherwise the water might invade the electric parts and will cause short circuit even result in electric shock.**

### 3.8 Sharp edges

#### CAUTION

Please use caution when unpacking, installing or moving the unit, as some exposed edges may be sharp to the touch and cause injury if not handled with care.

# 4 DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

## CAUTION

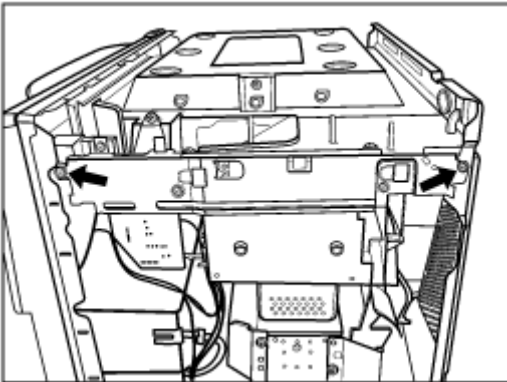
1. Before repair or replacement of parts, ensure to take out the water tank from microwave oven.
2. After removing the water tank, select "drainage" function to drain the water remaining in the water pipes and tubes into oven cavity forcibly. (Operating method: keep pressing [Steam/Defrost] pad for more than 2 seconds). Then wipe up the oven cavity.
3. The above procedure is to prevent the water from invading the electric parts and resulting in short circuit even electric shock.

## CAUTION

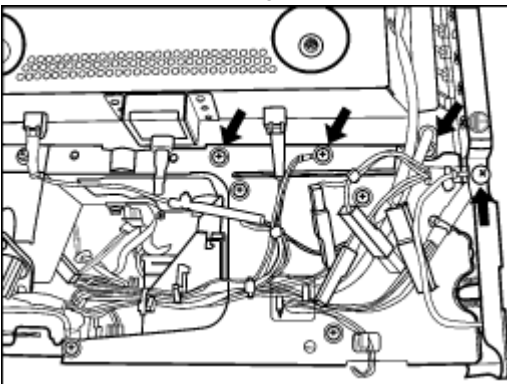
After repair or replacement of parts, make sure that all the water pipes and tubes are properly connected, otherwise the water might invade the electric parts and will cause short circuit even result in electric shock.

## 4.1 Magnetron

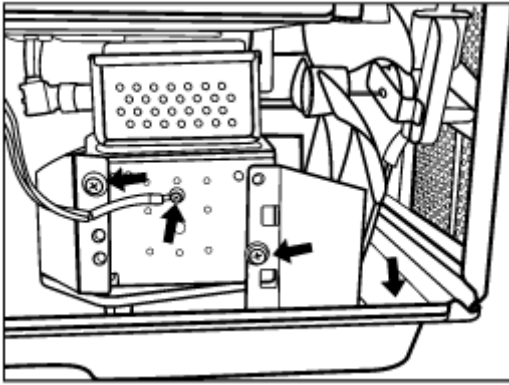
1. Discharge the high voltage capacitor.
2. Remove 2 screws holding reinforce bracket A on oven cavity.



3. Remove 2 screws holding reinforce bracket B on oven cavity.



4. Remove 1 screw holding oven thermistor on cavity top plate.
5. Release lead wire harness from locking tabs on inverter bracket A.
6. Disconnect 2 high voltage lead wires from magnetron filament terminals.
7. Remove 1 screw holding thermistor on magnetron.
8. Remove 1 screw holding air guide A on magnetron, then remove air guide A.



9. Remove 2 screws holding air guide B on magnetron & on base plate respectively, then remove air guide B.
10. Disconnect 2 lead wires from fan motor terminals.
11. Disconnect lead wires from noise filter (U) terminals.
12. Release locking tabs of reinforce bracket A hanging on both sides of oven cavity, then withdraw the reinforce bracket A outside slightly.

**NOTE:**

**Pay attention to the sharp edges of reinforce bracket A.**

13. Hold the reinforce bracket A, then remove 4 screws holding magnetron.

**NOTE:**

**After replacement of the magnetron, tighten mounting screws properly in an x pattern, 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.

**CAUTION**

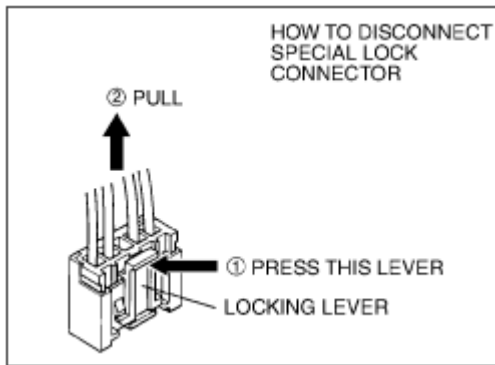
When connecting 2 filament lead wires to the magnetron terminals, be sure to connect the lead wires in the correct position. The lead wire of high voltage transformer should be connected to "F terminal" and the lead wire from high voltage capacitor should be connected to "FA terminal".

## 4.2 Digital programmer circuit (D.P.C) AU, (D.P.C.) HU, membrane key board and power relay

**NOTE:**

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

1. Remove water tank from escutcheon base.
2. Keep pressing [Steam/Deforst] pad for more than 2 seconds to drain the water remaining in the water pipes and tubes into oven cavity.
3. Pull out tube A connecting to pump from copper pipe.
4. Remove wiring connectors CN3, CN4, CN6, CN8, CN9 and all connectors connecting to power relays from D.P.C. board HU.



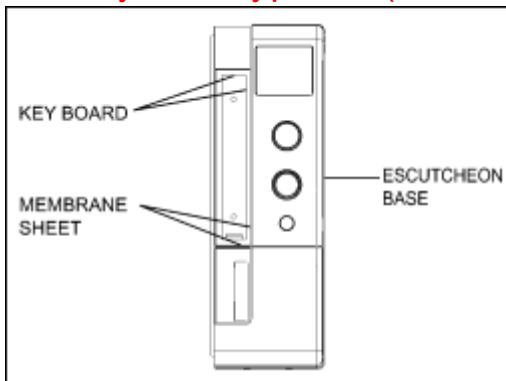
5. Remove 1 grounding screw holding escutcheon base's earth lead (yellow) on reinforce bracket A. (This step just for model NN-CS596A)
6. Remove 1 screw holding escutcheon base on cavity front plate.
7. Open the door of oven, slide the escutcheon base upward and out slightly.
8. Remove connector CN6 connecting pump-LED (U) from D.P.C. board HU.
9. Remove 2 flat cables connecting between D.P.C. board HU and AU from connectors CN5 & CN15 on D.P.C. board HU by pulling upward slightly.
10. Remove 2 screws holding D.P.C. board HU on escutcheon base, then remove D.P.C. board HU.
11. Remove 4 screws holding backstop on escutcheon base. (This step just for model NN-CS596A)
12. Remove 2 screws holding D.P.C. board AU (big one) on escutcheon base.
13. Release locking tabs holding D.P.C. board AU (big one) on escutcheon base then remove 5 screws holding D.P.C. board AU (small one) on backstop to remove D.P.C. board AU.

#### To replace membrane key board

14. Use tools such as knife etc. to lift the edge of escutcheon sheet and peel off escutcheon sheet and membrane key board completely from escutcheon base.

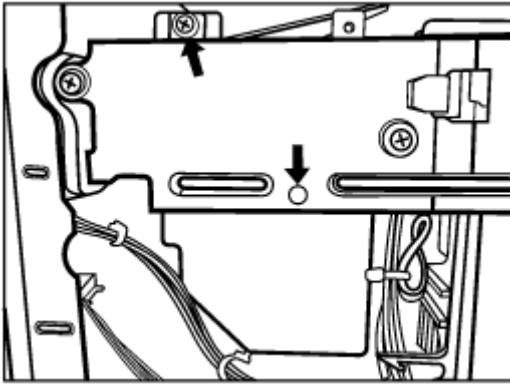
#### NOTE:

1. 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.
2. When installing new membrane key board, make sure that the surface of escutcheon base is cleaned sufficiently so that any problems (shorted contacts or uneven surface) can be avoided.



## 4.3 Digital programmer circuit (D.P.C.) DU and low voltage transformer

1. Remove connectors CN1 & CN2 from D.P.C. board DU.
2. Remove 1 screw holding D.P.C. board DU on reinforce bracket A.
3. Use tools such as pincers to reject the tab of plastic bracket.
4. Remove D.P.C. board DU.



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

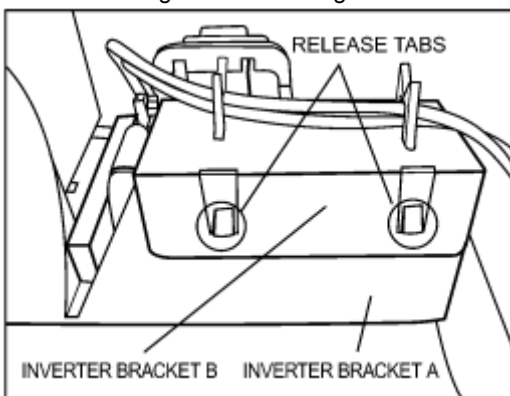
**NOTE:**

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

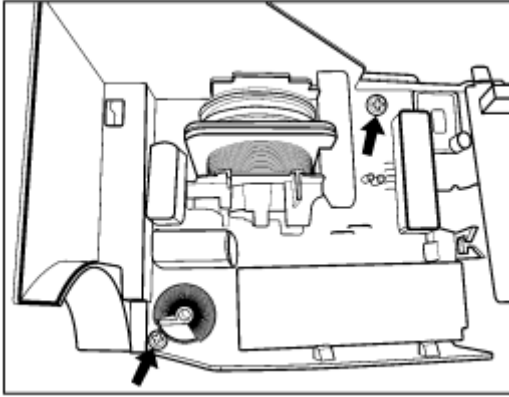
6. With all the terminal pins cleaned and separated from D.P.C. contacts, remove the defective transformer/power relays. Replace components making sure all terminal pins are inserted completely, then resolder all terminal contacts carefully.

## 4.4 H.V. Inverter

1. Discharge high voltage remaining in high voltage capacitor.
2. Remove 2 screws holding reinforce bracket A on oven cavity.
3. Remove 1 screws holding reinforce bracket B on cavity top plate.
4. Remove 1 screw holding oven thermistor on cavity top plate.
5. Release lead wire harness from locking tabs on Inverter bracket A.
6. Disconnect 2 lead wires from noise filter (U) terminals.
7. Disconnect 2 lead wires from fan motor terminals.
8. Disconnect 2 lead wires from the harness of noise filter (U), which connecting to both "Negative" and "live" lead of circuit breaker.
9. Disconnect 2 high voltage lead wires from magnetron filament terminals.
10. Unplug connector CN701 & CN702 from H.V. Inverter board.
11. Remove 1 screw holding Inverter guide bracket on reinforce bracket B, then release locking tabs, detach Inverter guide bracket.
12. Release locking tabs connecting Inverter bracket A with Inverter bracket B detach bracket A & B.



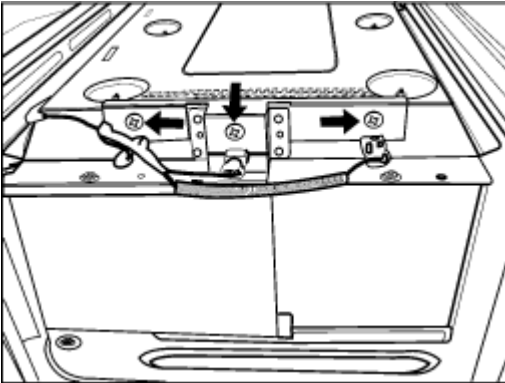
13. Remove 2 screws holding H.V. Inverter on Inverter bracket.



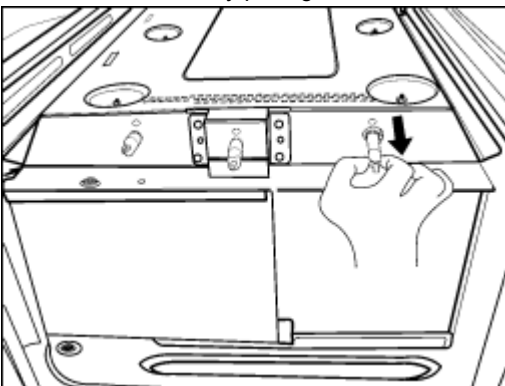
## 4.5 Upper heaters

There are two kinds of heater on the top of oven cavity. Both the front one & back one are 450W/110V heaters, and the middle one is 450W/220V heater.

1. Disconnect lead wires from both sides of 3 upper heaters.
2. Remove 3 screws holding heater support from the left side of microwave oven.



3. Remove the heater by pulling it out.



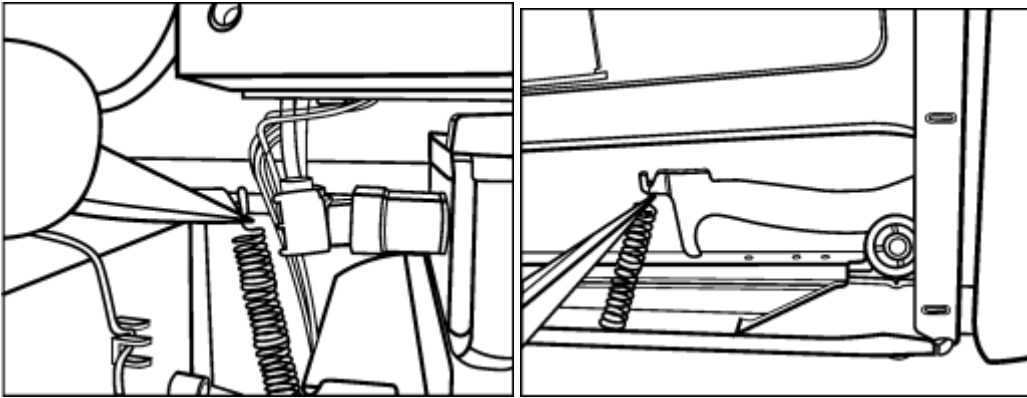
## 4.6 Door assembly

1. Remove left and right door key springs from door arm with plier.

### NOTE:

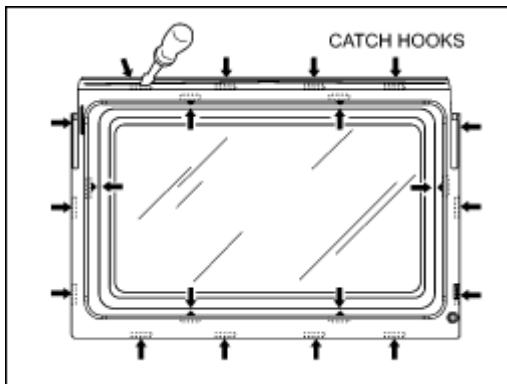
Please support door before operation.





#### To remove door C and door A (U)

- Insert flat blade screwdriver to release hinge pin from left hinge.
- Release catch hooks between door C and door A, to detach the door C.



Release catch hooks.

#### 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 22).

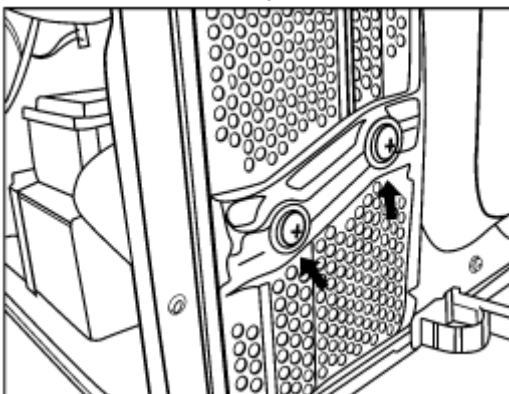
2. When mounting the door to the oven, be sure to adjust the door parallel to the cavity front plate by moving hinges back or front.

#### NOTE:

Upper portion of door A should firmly touch the cavity front plate without pushing.

## 4.7 Fan motor

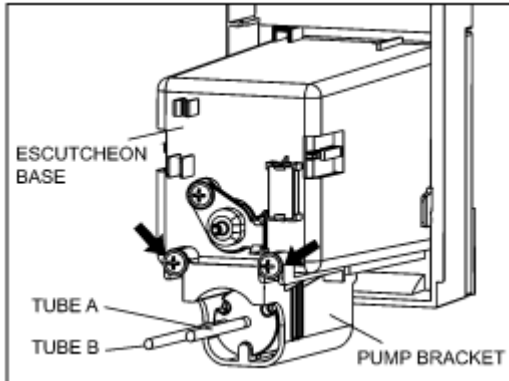
1. Disconnect 2 lead wires from fan motor terminals.
2. Remove 2 screws holding air guide B on magnetron & on base plate respectively, then remove air guide B.
3. Remove 2 screws holding fan motor and detach fan motor from oven assy.



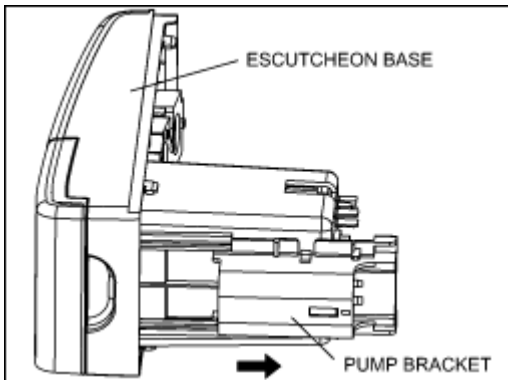
4. Remove fan blade from fan motor shaft by pulling it straight out.

## 4.8 Pump

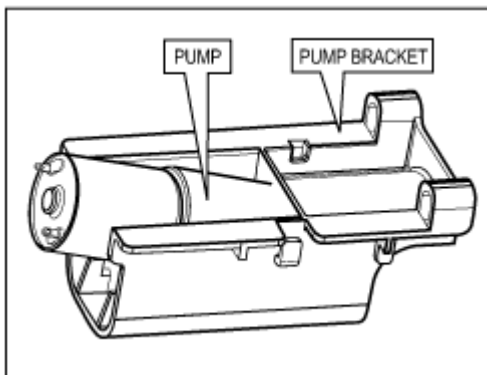
1. Remove water tank from escutcheon base.
2. Keep pressing [Steam/Deforst] pad for more than 2 seconds to drain the water remaining in the water pipes and tubes into oven cavity.
3. Pull out tube A connecting to pump from copper pipe.
4. Remove all wiring connectors from D.P.C board AU.
5. Remove 1 grounding screw holding on cavity front plate.
6. Open the door of oven, slide the escutcheon base upward and out slightly.
7. Pull out tube B from inlet of pump.
8. Remove 2 screws holding pump bracket on escutcheon base.



9. Draw out pump bracket from bottom rail of escutcheon base.



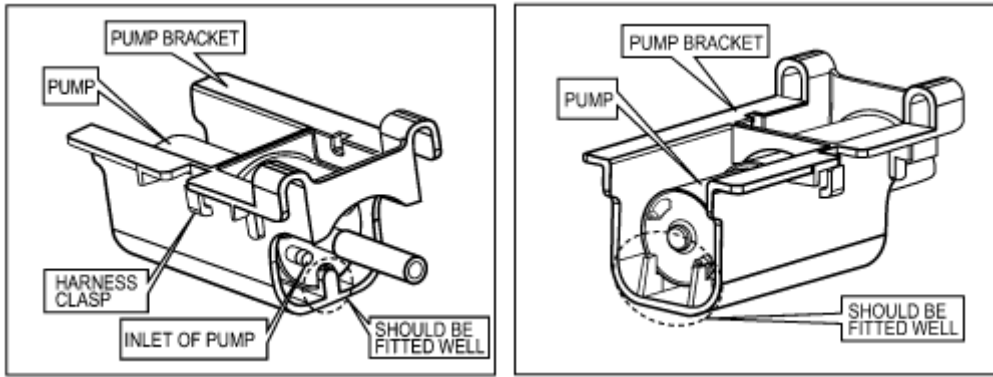
10. Uplift the afterbody of pump slightly to release the tabs of pump bracket, then draw out pump.



11. Pull out tube A from outlet of pump.

### To install pump

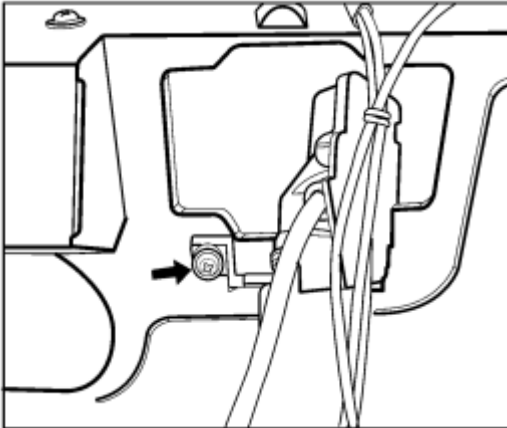
1. Insert pump into pump bracket (Inlet of pump should be close to harness clasp of pump bracket).
2. Please confirm it is located properly after installing.

**NOTE:**

After repairing, when insert copper pipe into tube A, make sure the inserted depth is no less than 9 mm to prevent tube A from slipping.

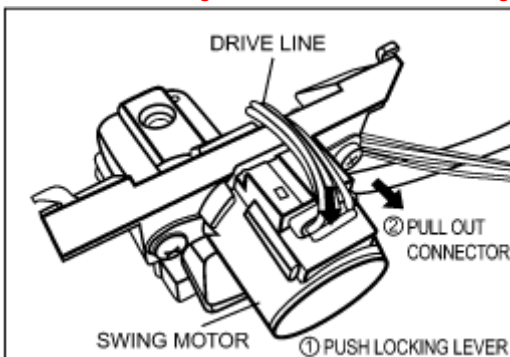
## 4.9 IR sensor

1. Disconnect connector CN8 from D.P.C. board HU.
2. Remove 1 screw holding IR sensor (U) on right heater panel.



### To replace swing motor of IR sensor

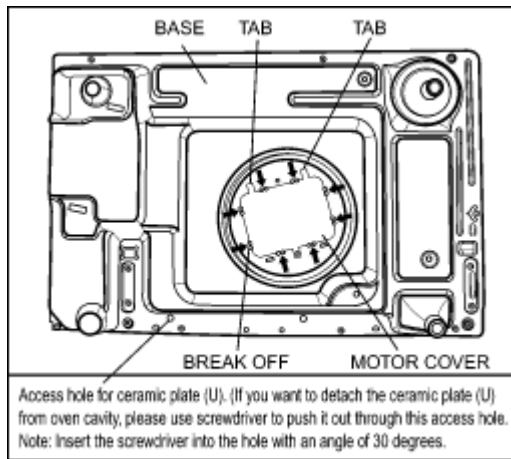
1. Release the locking lever of connector on swing motor, then remove drive line.



2. Remove 2 screws holding swing motor on motor mounting plate.
3. Remove swing motor from IR sensor assy.

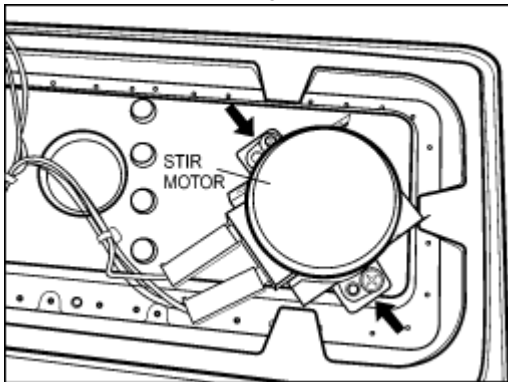
## 4.10 Stir motor

1. Remove the motor cover by breaking off at the 8 spots indicated by arrows with a cutter or the like.

**NOTE:**

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

2. Disconnect 2 lead wires from stir motor terminals.
3. Remove 2 screws holding stir motor.

**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 in the 2 provided slots, then screw the single tab to the base using a screw.**

## 4.11 Heater DU (steam heater)

1. Remove water tank from escutcheon base.
2. Keep pressing [Steam/Deforst] pad for more than 2 seconds to drain the water remaining in the water pipes and tubes into oven cavity.
3. Remove tubes from both ends of copper pipe.
4. Remove 1 screw holding air guide B on the base.
5. Remove left and right door key springs from door arm.

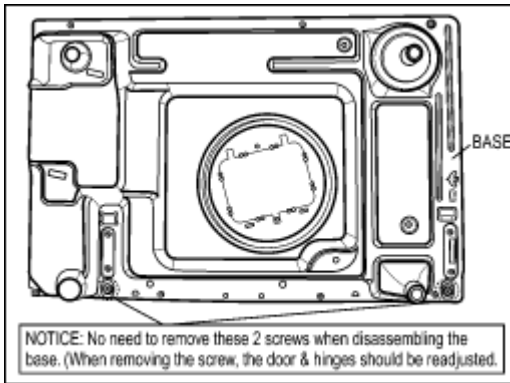
**NOTE:**

**Please support door before operation.**

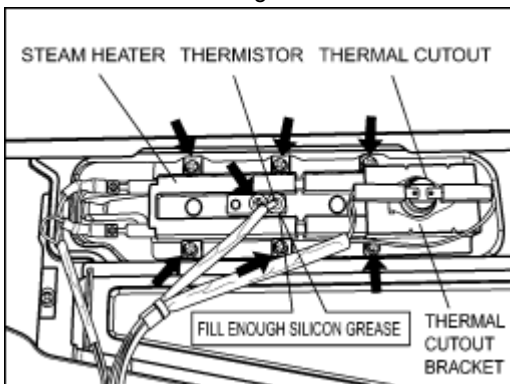
6. Turn over the microwave oven and remove all screws holding base on oven assy & two hinges.

**NOTE:**

**Do not remove two screws holding left and right hinge on the bottom of cavity front plate.**



7. Remove base from oven assy.
8. Disconnect 2 lead wires from heater DU terminals.
9. Remove 1 screw holding thermistor on heater DU.



10. Remove 6 screws holding heater DU & thermal cutout bracket on the bottom of oven assy.

#### To install heater DU

#### NOTE:

1. Please spread silicon grease evenly between the interface of heater DU and bottom of oven cavity. (about 0.3mm thickness), this is for good conductivity.
2. Tighten 6 screws and make sure there is no gap between heater DU and bottom of oven cavity.
3. Do not forget to screw the thermal cutout bracket along with heater Du.

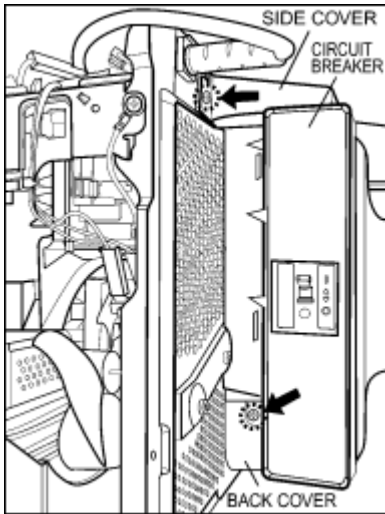
#### To install thermistor

#### NOTE:

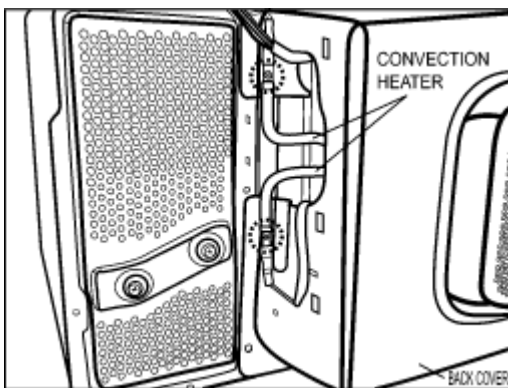
Before installing thermistor, please fill enough silicon grease into the installation hole of heater DU for good conductivity.

## 4.12 Convection motor and convection heater

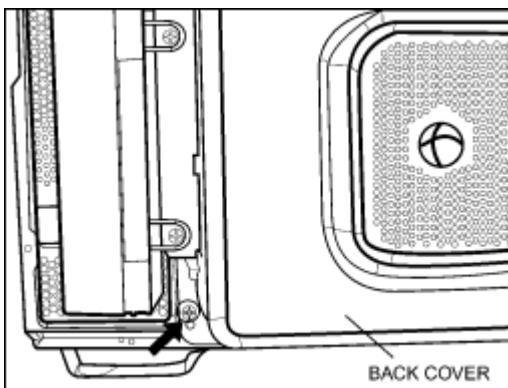
1. Disconnect 2 lead wires from the harness of noise filter (U), which connect to both "Negative" and "live" lead of circuit breaker. (black and white connectors)
2. Disconnect 2 lead wires from circuit breaker harness connecting to main lead wire harness. (blue and yellow connectors)
3. Remove 1 screw holding side cover on cavity back plate.



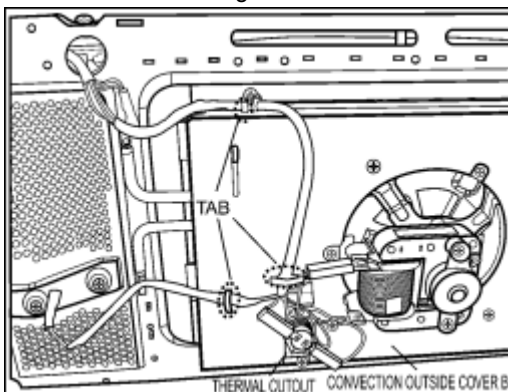
4. Remove 1 screw holding side cover on the side of back cover, then remove side cover & circuit breaker.
5. Disconnect 2 lead wires from convection heater terminals.



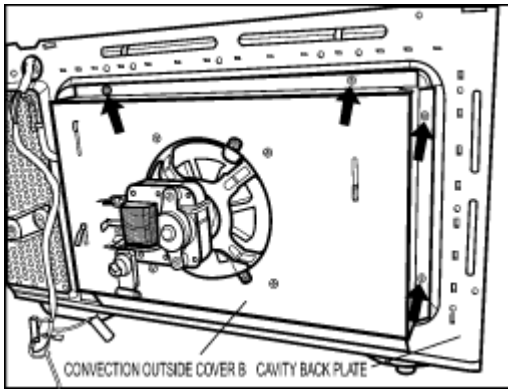
6. Remove 1 screw holding back cover on the lower of back plate, then remove back cover and back cover C module.



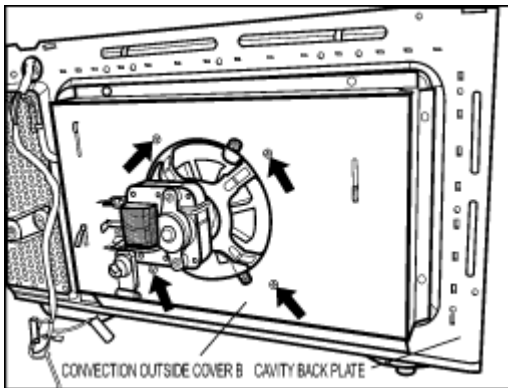
7. Release 3 tabs holding harness on connection outside cover B.



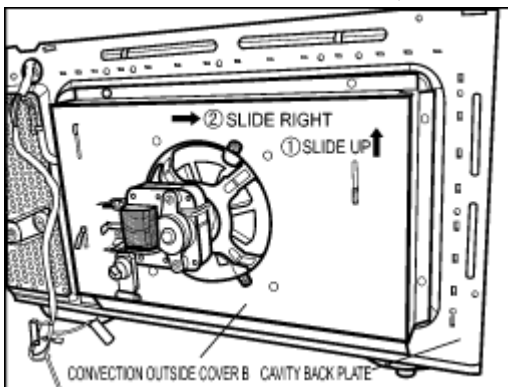
8. Disconnect 2 lead wires from thermal cutout and convection motor terminals respectively.
9. Remove 4 screws holding convection outside cover B on cavity back plate.



10. Remove 4 screws on the face of convection outside cover B.

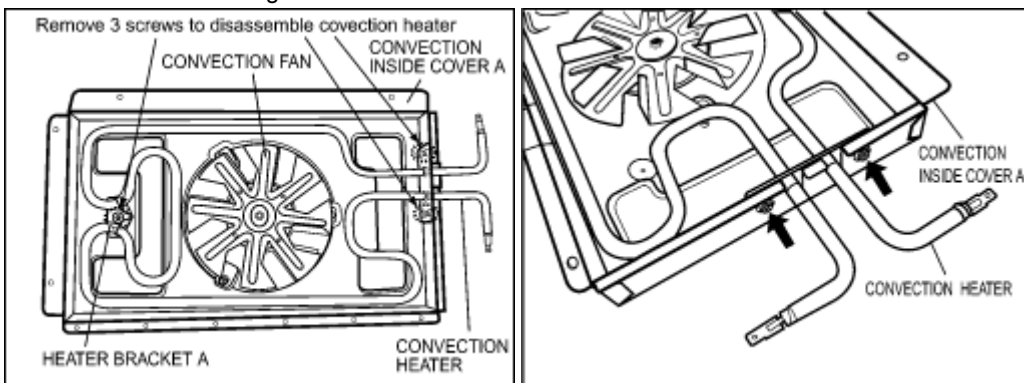


11. Release tabs between side of convection outside cover B and cavity back plate, then remove the convection outside cover B.
12. Slide the convection inside cover A upward then rightward and out, then remove the module, which consists of convection inside cover A, convection motor and convection heater.



#### To replace convection heater

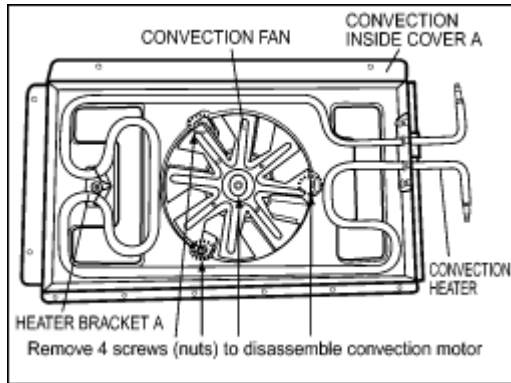
13. Remove 1 screw holding heater bracket A on convection inside cover A.
14. Remove 2 screws holding convection heater on convection inside cover A.



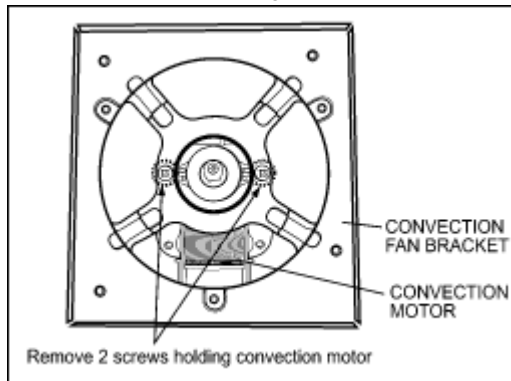
#### To replace convection motor

15. Remove 1 nut holding convection fan, then remove convection fan.
16. Remove 3 screws holding convection fan bracket on convection inside cover A.

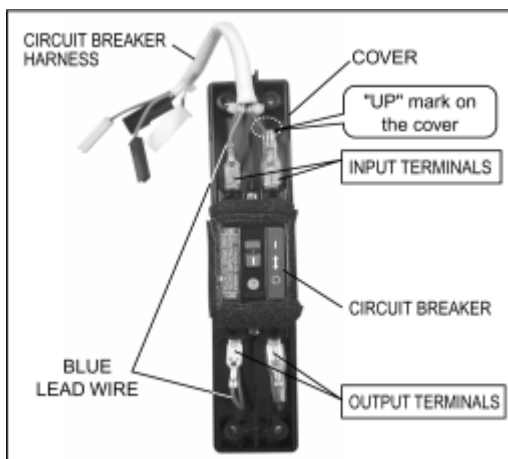




17. Remove 2 screws holding convection motor on convection fan bracket.



## 4.13 Circuit breaker



To install the circuit breaker on the cover

### NOTE:

1. Ensure the circuit breaker is in right direction as shown in above illustration (Do not install upside down).
2. Before tighten 2 screws, draw the circuit breaker harness(U) in and out slightly to confirm if the lead wire is damaged.(If the lead wire is pressed, the insulation of wire might be damaged and will cause electric shock.)
3. Make sure that the same side input and output lead wires are same colour while connecting the terminals (the left side lead wires are blue). Do not mix up.



# 5 COMPONENT TEST PROCEDURE

## CAUTION NEW. H.V.

1. High voltage is present at the high voltage terminal 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 oven from its power source and discharge the high voltage capacitors.

## 5.1 Primary latch switch (door switch and power relay B) interlocks

1. Unplug lead connectors to Power Relay B and verify open circuit of the power relay B 1-2 terminals.
2. Unplug lead connectors to Primary Latch Switch and Door 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)
Door Switch	0Ω (Close)	∞ Ω(Open)
Power Relay B	∞ Ω (Close)	∞ Ω(Open)

## 5.2 Short switch & monitor

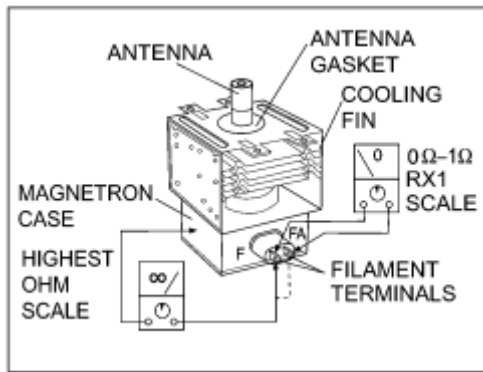
1. Unplug lead wires from Inverter Power Supply (U) primary terminals.
2. Connect test probes of ohm meter to the disconnected leads that were connected to Inverter Power Supply (U).
3. Test the continuity of short switch with door opened and closed positions using lowest scale of the ohm meter.  
Normal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

Door Opened	Door Closed
0Ω	∞ Ω

## 5.3 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.

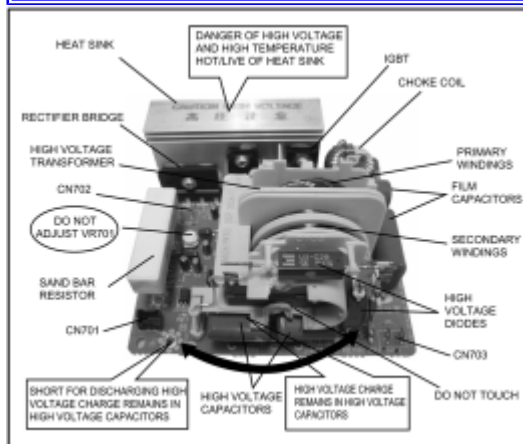


## 5.4 Membrane key board (Membrane switch assembly)

Check continuity between switch terminals, by tapping an appropriate pad on the key board. The contacts assignment of the respective pads on the key board is as shown in digital programmer circuit.

## 5.5 Inverter power supply (U)

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



**DANGER HIGH VOLTAGE**

Test if failure codes of H95, H97 or H98 appear by doing the following procedure. It is recommended to use an AC line input current Ampere meter for testing.

### Test1

1. Program DPC.
  1. Press **Timer/Clock** pad twice.
  2. Press **Start** pad once.
  3. Press **Micro Power** pad once.
2. Place 1 litre of water load into oven cavity.
3. Unplug 2 pin H.V. lead wire connector CN703 from magnetron tube.
4. Program oven at High power for 1 minute and press start.
  1. After approximately 23 seconds, oven stops.
  2. During oven operation, input current is approximately 0.5 to 1A. If both a and b are OK, proceed to test 2.

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

### Test2

Continued from Test 1

1. Unplug 3 pin connector CN701. CN703 remains unplugged.
2. Program oven at High power for 1 minute and press start.
  1. After approximately 3 seconds, oven stops.
  2. During oven operation, input current is approximately 0.4A.

	INPUT AMPERE	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.

## 5.6 Temperature thermistor

These sensor monitors the heat produced by the heater circuit and maintains the magnetron temperature which user had selected. Normal room temperature 10°C to 30°C, the reading across the temperature thermistor should be as follows.

TEMP	MAGNETRON THERMISTOR	STEAM HEATER THERMISTOR	OVEN THERMISTOR
100°C	30-60KΩ	10-20KΩ	10-20KΩ
25°C	700K-1.5MΩ	100K-300KΩ	100K-300KΩ

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

## 5.7 IR Sensor

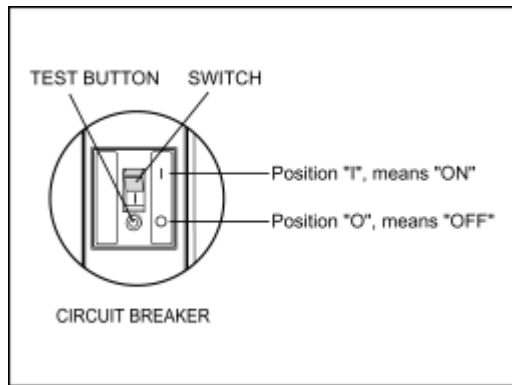
To test if IR sensor is ok by doing the following procedures.

### Test

1. Program DPC.
  1. Press **Timer/Clock** pad twice.
  2. Press **Start** pad once.
  3. Press **Micro Power** pad once.
2. Open the door, then keep pressing **Start** pad for more than 2 seconds until buzzer beeps.
3. Remain door opening and press **Start** pad twice, then "°C" will be shown on the display.
4. Close the door.
5. Press **Start** pad, IR sensor will swing. After 4 seconds, it will stop and show max and minimum temperature readings of 8 eyes IR sensor on display.
6. If the reading is within the limited range of oven temperature, and all above is ok, you may decide IR sensor functions properly.
7. Press **Stop/Reset** pad to finish the test.

## 5.8 Circuit breaker

1. Turn the switch of circuit breaker to the "I" position and then plug in the oven.
2. Press the "TEST" button on circuit breaker, if the switch jump back to "O" position, you may decide the circuit breaker functions properly.



# 6 MEASUREMENTS AND ADJUSTMENTS

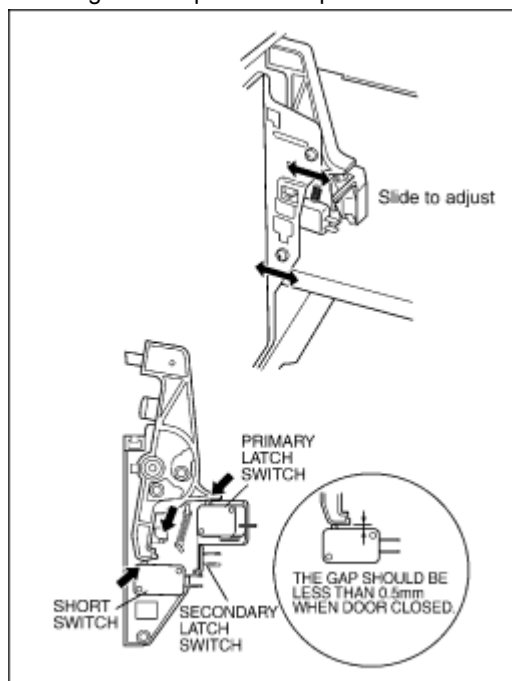
## 6.1 Adjustment of Primary latch switch, Secondary latch switch and Short switch.

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

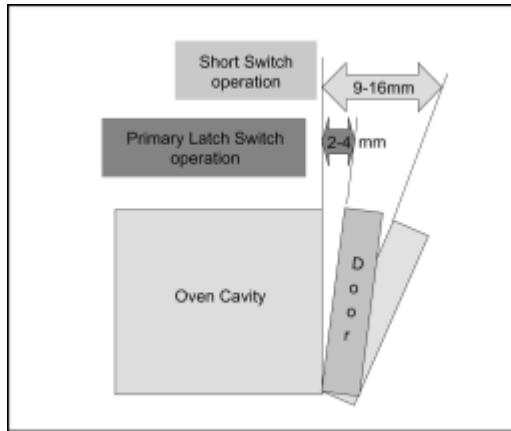
**NOTE:**

**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.



4. The Primary latch switch must be ON when the space between upper portion of door A and cavity front plate is 2~4mm, if the door gap is greater than 4mm, the Primary latch switch must be OFF.



If alignment is poor, oven may not operate after convection/grill use.

## 6.2 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 litre 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 litre 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
1000W	Min.8.5°C

# 7 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 handles very large current and high voltage. Operating a misaligned inverter circuit is dangerous.
2. Ensure proper grounding before checking for trouble.
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. To do 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 yourself to ground while working on this panel to discharge any static charge in your body.
7. 220/240V 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.

## **Self diagnostic display**

Oven has self diagnostic function but it will not be activated in normal operation mode.

To show self diagnostic result, please take the following steps.

1. Firstly, you must program the DPC into TEST MODE (Plug-in oven → press **Timer/Clock** pad twice → press **Start** pad once → press **Micro Power** pad once.)
2. Keep pressing **Timer/Clock** pad for more than 2 seconds until buzzer beeps.
3. Press **Start** pad twice, oven will show error code.

### **NOTE:**

1. If any error was observed, it will be kept in memory up to 3 errors in the past. If there are more than 4 cases, the memory will renew the latest 3 errors codes.
2. Press **Start** pad again, one more older error code will be displayed.
3. If the oven is ok, it will show "000" and blinking.
4. Error cod list

H\*\* Hardware problem, oven itself has problem.

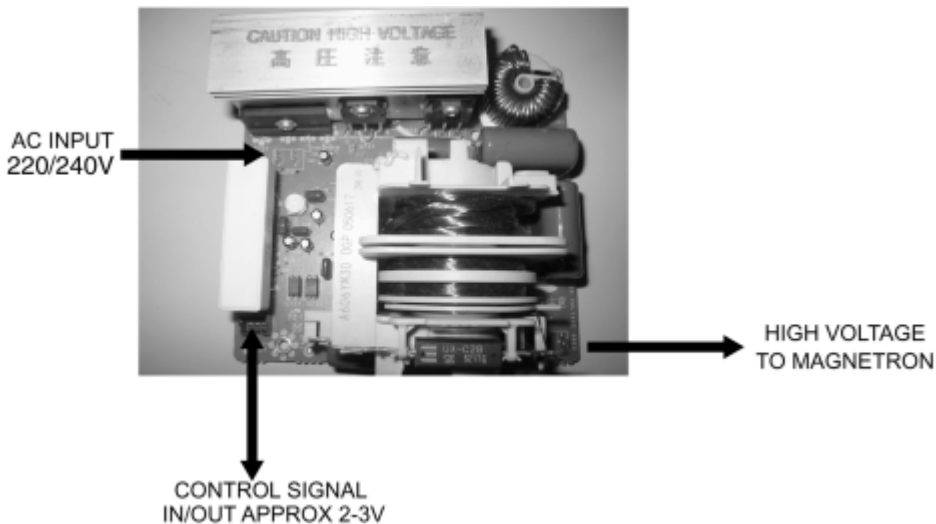
U\*\* Usage problem such as run out of water and oven itself works well.

Error code	Cause for error
H99	Inverter on/off control error
H98	Magnetron no oscillation error
H97	Inverter input error
H96	Inverter custom IC error
H95	Inverter input failure
H90	Power down controlled by Inverter thermistor
H68	IR sensor failure
H61	IR thermistor open/short
H60	IR sensor error
H39	Steam heater thermistor failure
H32	Magnetron thermistor failure
H30	Oven thermistor failure
H02	Memory IC error (It is able to show up both in test mode and cooking mode)
H00	RAM failure (It is able to show up both in test mode and cooking mode)

H20	Steam heater open error
	Usage problem
U14	No water during steam cooking (It is able to show up both in test mode and cooking mode)
U40	No load operation, controlled by magnetron thermistor
U65	Power down controlled by Inverter thermistor
HOT	Oven is hot (It is able to show up both in test mode and cooking mode)

## 7.1 (Troubleshooting) Oven stops operation during cooking

	SYMPTOM	CAUSE	CORRECTIONS
1.	<b>Oven stops in 3 seconds</b> after pressing start pad.	No input AC is supplied to H.V.Inverter (U) CN702 terminals	1. Latch Switch 2. Power relay RY1 3. Loose lead wire connector CN701, CN702
	<b>Oven stops in 23 seconds</b> 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
	<b>Oven stops in 1 minute</b> after pressing start pad. (Convection/Grill convection cooking)	Oven thermistor circuit is not functions.	1. Oven thermistor 2. Loose wiring
	<b>Oven stops in 30 seconds</b> after pressing start pad. (Steam cooking)	Steam heater thermistor circuit is not functions.	1. Steam heater thermistor 2. Loose wiring 3. bad conductivity between thermistor and steam heater
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



## 7.2 (Troubleshooting) Other problems

	SYMPTOM	CAUSE	CORRECTIONS
1.	Oven is dead. Fuse is OK. No display and no operation at all.	1. Defective circuit breaker 2. The switch of circuit breaker is in "O" position 3. Open or loose lead wire harness 4. Open thermal cutout / thermistor 5. Open low voltage transformer 6. Defective DPC	Turn the switch of circuit breaker to "I" position. Check fan motor if thermal cutout is defective.
2.	No display and no operation	1. Shorted lead wire harness	Check adjustment of primary,

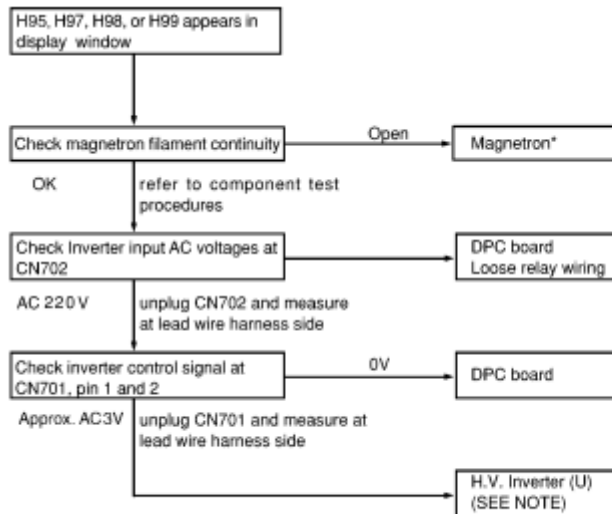


	at all. Fuse is blown.	2. Defective primary latch switch (NOTE 1)	secondary latch switch and short switch including door.
		3. Defective short switch (NOTE 1)	
		4. Defective Inverter Power Supply (U)	
		NOTE 1: All of these switches must be replaced at the same time. Check continuity of power relay B (RY1)'s contacts (between 1 and 2) and if it has continuity, replace power relay B (RY1) also.	
3.	Oven does not accept key input(Program)	1. Key input is not in proper sequence	Refer to operation procedure.
		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 DPC troubleshooting.
4.	Fan motor turns on when oven is plugged in with door closed.	1. Misadjustment or loose wiring of secondary latch switch	Adjust door and latch switches.
		2. Defective secondary latch switch	
5.	Timer starts count down but no microwave oscillation. (No heat while oven lamp and fan motor turn on)	1. Off-alignment of latch switches 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.	Adjust door and latch switches.
		3. Defective high voltage component H.V. Inverter Power Supply (u) Magnetron	Check high voltage component according to component test procedure and replace if it is defective.
		4. Open or loose wiring of power relay B (RY1)	
		5. Defective primary latch switch	
		6. Defective DPC or power relay B (RY1)	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	Consult electrician
		2. Open or loose wiring of magnetron filament circuit.(Intermittent oscillation)	
		3. Aging change of magnetron	
8.	Fan motor turns on and turntable rotates when door is opened.	1. Shorted primary latch switch	
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.	Heater does not turn on.	1. Open or loose wiring of heater	
		2. Defective heater	
		3. Defective power relay	
		4. Defective DPC	
12.	Oven stops operation during cooking.	1. Open or loose wiring of primary and secondary latch switch	Adjust door and latch switches.
		2. Operation of thermal cutout	

## 7.3 Troubleshooting of inverter circuit (U) and magnetron NEW H.V.

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 key is pressed and there is no microwave oscillation.



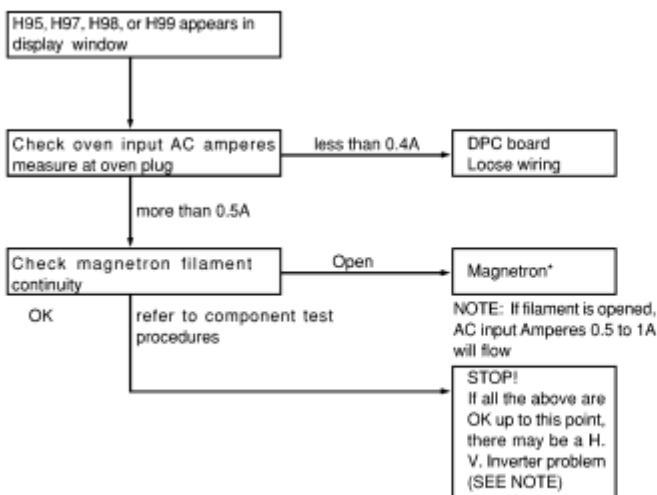
**NOTE:** After check, unplug unit to reset to normal operation mode.

**NOTE:** 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 handles 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.

#### Alternate way to troubleshoot oven with AC Ampere meter used

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



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

**NOTE:** 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 handles 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.

## 7.4 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.
			Normal	→Step3
No key input	3	IC10 pin5 voltage	Abnormal	IC10
			Normal=5V	IC1, CX320, Display
	1	Membrane switch continuity	Abnormal	Membrane switch
No beep sound	1	IC1 pin 8 voltage	Normal	IC1
			Abnormal	IC1
			Normal=5V	BZ210, Q210
Power relay A(RY2) does not turn on even	1	IC1 pin 22 voltage	Abnormal	IC1

though the program had been set and the start pad is tapped		while operation		
			Normal=5V	→Step2
	2	IC220 pin13 voltage	Abnormal	IC220
No microwave oscillation at any power			Normal = 0.7V	RY2
	1	IC1 pin 24 voltages while operation at high power	Abnormal	IC1
			Normal=5V	→Step2
	2	IC220 pin11	Abnormal	IC220
			Normal = 0.7V	→Step3
	3	Short circuit between collector and emits of Q227	Still not turn on	RY1
Dark or unclear display			RY1 turns on	Q227, Q224,Q225,Q226
	1	Replace display and check operation	Normal	Display
Missing or lighting of unnecessary segment			Abnormal	IC1
	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=220~240V	→Step2
	2	Unplug CN701 (3 pin) connector and measure pin3 voltage	Abnormal=0V	D.P.C.
			Approx. AC 3V	Magnetron

## 7.5 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:

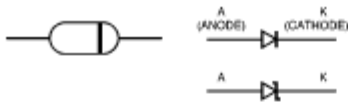
**Do not replace both Inverter board and Magnetron simultaneously and automatically without going through this procedure.**

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 <b>H.V.Inverter</b> (F606YM300GP)
Shut off in 3 seconds after "Start"		2. D702 is OK	Replace <b>magnetron</b>
	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.

## 7.6 How to check the semiconductors using an

## OHM meter

### Diode



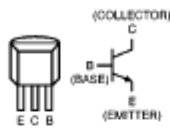
	FORWARD	REVERSE
A-K	SMALL	∞

### Transistor

#### NPN Transistor

2SC.....

2SD.....

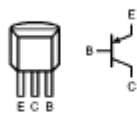


	FORWARD	REVERSE
B-E	SMALL	∞
B-C	SMALL	∞
C-E	∞	∞

#### PNP Transistor

2SA.....

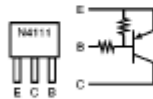
2SB.....



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

### Digital Transistor

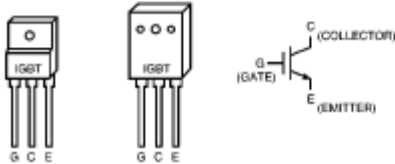
#### PNP Transistor



	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

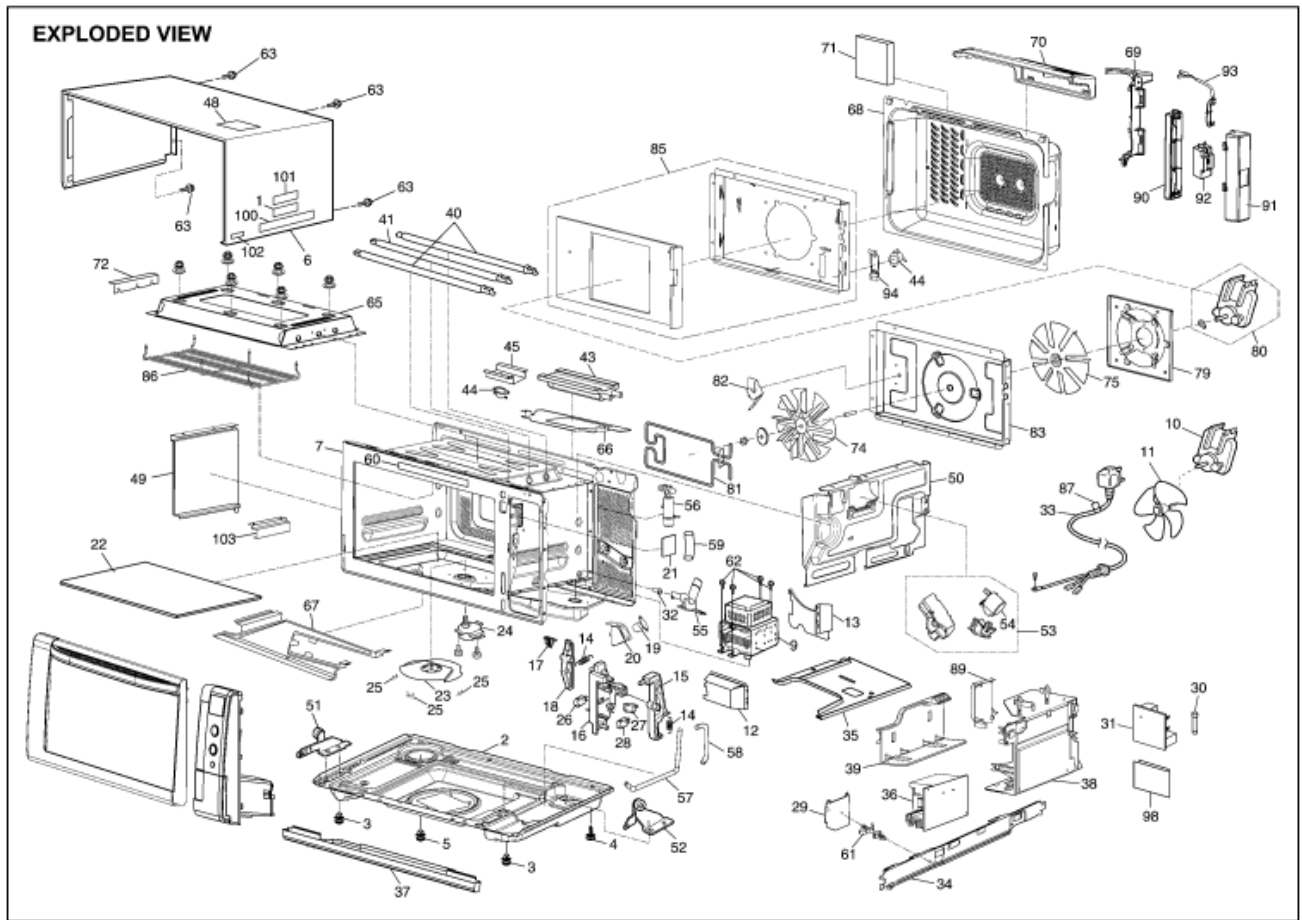
(INSULATED GATE BIPOLAR TRANSISTOR)



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

## 7.7 H.V. Inverter main parts list

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
Q701		A691EM300GP	IGBT	1	
Q702			IGBT	1	
C701		ECWF5184N300	FILM CAPACITOR	1	
C702		ECQE2505T869	FILM CAPACITOR	1	
C703		ECWF2395N632	FILM CAPACITOR	1	
DB701		B0FBBS000001	RECTIFIER BRIDGE	1	
L701		F5020M300GP	CHOKE COIL	1	
R702		D0CM352JA002	SAND BAR RESISTOR	1	
T701		A609AM300GP	TRANSFORMER	1	(INCLUDING D701, D702, C706, C707)
D701, D702		B0FBAZ000001	DIODE	2	
C706		ECWH30562U03	FILM CAPACITOR	1	
C707		ECWH30432U04	FILM CAPACITOR	1	




# 8 EXPLODED VIEW AND PARTS LIST

## 8.1 EXPLODED VIEW



## 8.2 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
<u>1</u>	F00066V00HP	CAUTION LABEL	1	EXCEPT ZPE
<u>1</u>	F00066W10ZP	CAUTION LABEL	1	ZPE
<u>2</u>	F10016Y40XPG	BASE	1	
<u>3</u>	F10087J60XP	RUBBER FOOT	2	
<u>4</u>	F10084T00AP	RUBBER FOOT	1	
<u>5</u>	F1008-1F90	RUBBER FOOT	1	
<u>6</u>	F110D6Y40SXP	CABINET BODY	1	EXCEPT HPE & QPQ
<u>6</u>	F110D6Y40SHP	CABINET BODY	1	HPE
<u>6</u>	F110D6Y40SBP	CABINET BODY	1	QPQ
<u>7</u>	 F200A6Y40HP	OVEN	1	
<u>9</u>	 2M261-M32JY	MAGNETRON	1	
<u>10</u>	F400A7J70MP	FAN MOTOR	1	
<u>11</u>	F40085G10XN	FAN BLADE	1	
<u>12</u>	F40257J70XPG	AIR GUIDE A	1	
<u>13</u>	F40267J70XPG	AIR GUIDE B	1	
<u>14</u>	F30977J70XP	SPRING	2	
<u>15</u>	F31027J70XP	LATCH SWITCH LEVER	1	
<u>16</u>	 F31037J70XP	DOOR HOOK	1	
<u>17</u>	F31057J70XP	LATCH BRACKET	1	
<u>18</u>	F32497J70XP	LATCH SWITCH LEVER	1	
<u>19</u>	F612E6Y40BP	INCANDESCENT LAMP(U)	1	
<u>20</u>	F60746Y40XPG	INCANDESCENT LAMP BRACKET	1	
<u>21</u>	F64377J70XP	GLASS	1	
<u>22</u>	F010T6Y40HP	CERAMIC PLATE (U)	1	HPE,YPQ,YTE,MPQ
<u>22</u>	F010T6Y40BP	CERAMIC PLATE (U)	1	KTE,PTE,QPQ
<u>22</u>	F010T6Y40ZP	CERAMIC PLATE (U)	1	ZPE
<u>23</u>	F202K6Y40XPG	ANTENNA STIRRER (U)	1	
<u>24</u>	F61447J70XP	STIR MOTOR	1	
<u>25</u>	F20197J70XP	ANTENNA BRACKET	3	

<u>26</u>		F61425U30XN	MICRO SWITCH	1	(V-15G-3C25) (PRIMARY LATCH SWITCH)
<u>27</u>		A61425180AP	MICRO SWITCH	1	(D3V-16G-3C25) (SECONDARY LATCH SWITCH)
<u>28</u>		A61785180AP	MICRO SWITCH	1	(D3V-1G-2C25) (SHORT SWITCH)
<u>29</u>		F603Y6Y40XP	D.P.CIRCUIT (DU)	1	
<u>30</u>		F62306V60BP	FUSE	1	10A/250V
<u>31</u>		F692Y6Y40XP	NOISE FILTER(U)	1	HPE,YPQ,YTE,MPQ,KTE,PTE
<u>31</u>		F692Y6Y40ZP	NOISE FILTER(U)	1	QPQ,ZPE
<u>32</u>		F45006Y40XP	JACKET	1	
<u>33</u>		F900C6Y40YK	AC CORD W/PLUG	1	HPE,YTE,MPQ,KTE
<u>33</u>		F900C6Y40YP	AC CORD W/PLUG	1	YPQ
<u>33</u>		F900C6Y40PT	AC CORD W/PLUG	1	PTE
<u>33</u>		F900C7J70ZP	AC CORD W/PLUG	1	ZPE
<u>33</u>		F900C6Y40QP	AC CORD W/PLUG	1	QPQ
<u>34</u>		F20347J70XPG	REINFORCE BRACKET A	1	
<u>35</u>		F2036-1K00	REINFORCE BRACKET B	1	
<u>36</u>		F606YM300BP	H.V.INVERTER (U)	1	QPQ
<u>36</u>		F606YM300GP	H.V.INVERTER (U)	1	EXCEPT QPQ
<u>37</u>		F80236Y40BP	DECORATING PLATE (COLLECTOR PAN)	1	
<u>38</u>		F6585-1K00	INVERTER BRACKET A	1	
<u>39</u>		F67637J70XP	INVERTER BRACKET B	1	
<u>40</u>		F630G6Y40XP	HEATER	2	HPE,YTE,KTE,PTE,ZPE
<u>40</u>		F630G6Y40MP	HEATER	2	YPQ,MPQ,QPQ
<u>41</u>		F630F6Y40HP	HEATER	1	HPE,YTE,KTE,PTE,ZPE
<u>41</u>		F630F6Y40MP	HEATER	1	YPQ,MPQ,QPQ
<u>43</u>		F611E6Y40HP	HEATER (DU)	1	HPE,YTE,KTE,PTE,ZPE
<u>43</u>		F611E6Y40MP	HEATER (DU)	1	YPQ,MPQ,QPQ
<u>44</u>		F61457J70XP	THERMAL CUTOUT	2	
<u>45</u>		F66266Y40XPG	THERMAL CUTOUT BRACKET	1	
<u>48</u>		F01506W50XP	NO TOUCHING LABEL	1	EXCPT HPE
<u>48</u>		F01508G60HP	NO TOUCHING LABEL	1	HPE
<u>49</u>		F22377J70XPG	LEFT HEATER PANEL	1	
<u>50</u>		F22367J70XPG	RIGHT HEATER PANEL	1	
<u>51</u>		F300B7J70XP	LEFT HINGE (U)	1	
<u>52</u>		F300U7J70XP	RIGHT HINGE (U)	1	
<u>53</u>		F601L7J70XP	IR SENSOR (U)	1	
<u>54</u>		A6760-1E20	SWING MOTOR	1	
<u>55</u>		F44966Y40XP	NOZZLE A	1	
<u>56</u>		F45137J70XP	TIE-IN C	1	
<u>57</u>		F92017J70XP	COPPER PIPE	1	
<u>58</u>		F46507J70XP	TUBE C	1	
<u>59</u>		F92047J70XP	TUBE D	1	
<u>60</u>		F03346Y40HP	MENU LABEL	1	HPE,YPQ,YTE,MPQ
<u>60</u>		F03346Y40KT	MENU LABEL	1	KTE,PTE
<u>60</u>		F03346Y40ZP	MENU LABEL	1	ZPE
<u>60</u>		F03346Y40QP	MENU LABEL	1	QPQ
<u>61</u>		F90717J70XP	SUPPORTER	1	
<u>62</u>		XTWFA4+12T	SCREW	4	FOR MAGNETRON
<u>63</u>		XTWFA4+12D	SCREW	4	FOR CABINET BODY
<u>65</u>		F202Q6Y40BP	UPPER HEATER PANEL	1	
<u>66</u>		F15676Y40XP	DRIP PLATE	1	
<u>67</u>		F22776Y40XP	LOWER HEATER PANEL	1	
<u>68</u>		F10596Y40BP	BACK COVER	1	
<u>69</u>		F10586Y40BP	SIDE COVER	1	
<u>70</u>		F10576Y40XP	BACK COVER C	1	
<u>71</u>		F40306Y40BP	EXHAUST GUIDE D	1	

<u>72</u>	F41706Y40BP	HEATER MOUNTING PLATE	1	
<u>74</u>	F22394V00BP	CONVECTION FAN BLADE	1	
<u>75</u>	F41594V00BP	COOLING FAN BLADE	1	
<u>79</u>	F41806Y40BP	CONVECTION FAN BRACKET	1	
<u>80</u>	F490S6Y40XP	CONVECTION FAN MOTOR	1	
<u>81</u>	F631D6Y40XP	CONVECTION HEATER	1	HPE,YTE,KTE,PTE,ZPE
<u>81</u>	F631D6Y40BP	CONVECTION HEATER	1	YPQ,MPQ,QPQ
<u>82</u>	F64174V00BP	HEATER BRACKET A	1	
<u>83</u>	F66796Y40BP	CONVECTION INSIDE COVER A	1	
<u>85</u>	F607J6Y40BP	CONVECTION ASSEMBLY (BU)	1	(INCLUDING IN CONVECTION OUTSIDE COVER B & ADIABATIC MATERIAL)
<u>86</u>	F67356Y40XP	HEATER PROTECTOR	1	
<u>87</u>	F02395E20KN	CORD CAUTION LABEL	1	KTE,PTE
<u>89</u>	F40276Y40BP	INVERTER AIR GUIDE	1	
<u>90</u>	F50586Y40XP	BRACKET	1	
<u>91</u>	F50596Y40XP	COVER	1	
<u>92</u>	F60586Y40XP	CIRCUIT BREAKER	1	
<u>93</u>	F03586Y40XP	CIRCUIT BREAKER HARNESS	1	
<u>94</u>	F66286Y40BP	THERMAL CUTOFF BRACKET	1	
<u>98</u>	F15607J70ZP	ALUMINUM PLATE	1	QPQ,ZPE
<u>100</u>	F01576Y40HP	NAME PLATE	1	HPE
<u>100</u>	F01576Y40YP	NAME PLATE	1	YPQ
<u>100</u>	F01576Y40YT	NAME PLATE	1	YTE
<u>100</u>	F01576Y40MP	NAME PLATE	1	MPQ
<u>100</u>	F01576Y40KT	NAME PLATE	1	KTE
<u>100</u>	F01576Y40PT	NAME PLATE	1	PTE
<u>100</u>	F01576Y40ZP	NAME PLATE	1	ZPE
<u>101</u>	F00066W10MP	CAUTION LABEL	1	YPQ
<u>101</u>	F00068H00YT	CAUTION LABEL	1	YTE
<u>102</u>	F02846Y40YP	NO. LABEL	1	YPQ
<u>103</u>	F11656Y40KT	REINFORCE BRACKET E	1	

## 8.3 WATER TANK ASSEMBLY



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
<u>T1</u>	F060Q6Y40XP	WATER TANK (U)	1	(INCLUDING TANK COVER & SEAL)
<u>T2</u>	F061A6Y40XP	WATER TANK	1	
<u>T3</u>	F06116Y40XP	TANK COVER	1	
<u>T4</u>	F44247J70XP	SEAL	1	

## 8.4 ESCUTCHEON BASE ASSEMBLY

### 8.4.1 NN-CS596A HPE/YPQ/MPQ/YTE/KTE/PTE



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
<u>E1</u>	F603L6Y40HP	D.P.CIRCUIT (AU)	1	HPE
<u>E1</u>	F603L6Y40YP	D.P.CIRCUIT (AU)	1	YPQ



E1	F603L6Y40YT	D.P.CIRCUIT (AU)	1	YTE
E1	F603L6Y40MP	D.P.CIRCUIT (AU)	1	MPQ
E1	F603L6Y40PT	D.P.CIRCUIT (AU)	1	KTE,PTE
E2	F605S6Y40XP	D.P.CIRCUIT (HU)	1	
E3	F630Y6Y40SHP	MEMBRANE SWITCH(U)	1	HPE,YPQ,YTE,MPQ
E3	F630Y6Y40SKT	MEMBRANE SWITCH(U)	1	KTE,PTE
E4	F800A6Y40SHP	ESCUTCHEON BASE (U)	1	HPE,YPQ,YTE,MPQ (INCLUDING MEMBRANE SWITCH(U))
E4	F800A6Y40SKT	ESCUTCHEON BASE (U)	1	KTE,PTE (INCLUDING MEMBRANE SWITCH(U))
E5	F800B6Y40SXP	ESCUTCHEON BASE (BU)	1	
E6	F803G8J00SXP	POP-UP DIAL (U)	2	HPE,YPQ,YTE,MPQ,KTE,PTE
E7	F80186Y40XP	BRACKET	1	HPE,YPQ,YTE,MPQ,KTE,PTE
E8	F81246Y40XP	BREAKWATER	1	HPE,YPQ,YTE,MPQ,KTE,PTE
E9	F80876Y40XP	EARTH LEAD	1	HPE,YPQ,YTE,MPQ,KTE,PTE
E10	F400L6Y40XP	PUMP-LED(U)	1	(INCLUDING PUMP & LED PCB)
E11	F83876Y40XP	BUTTON	1	HPE,YPQ,YTE,MPQ,KTE,PTE
E12	F06397J70XP	PUMP BRACKET	1	
E13	F66166Y40BP	FLAT CABLE	1	(WIDE ONE)
E14	F66166Y40XP	FLAT CABLE	1	(NARROW ONE)
E15	F44266Y40BP	SEAL B	1	
E16	F46487J70XP	TUBE A	1	
E17	F46497J70XP	TUBE B	1	
E18	F45126Y40BP	TIE-IN B	1	

## 8.5 ESCUTCHEON BASE ASSEMBLY

### 8.5.1 NN-CS596S QPQ/ZPE



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
E21	F603L6Y40ZP	D.P.CIRCUIT (AU)	1	ZPE
E21	F603L6Y40QP	D.P.CIRCUIT (AU)	1	QPQ
E22	F605S6Y40XP	D.P.CIRCUIT (HU)	1	
E23	F630Y6Y40SQP	MEMBRANE SWITCH(U)	1	QPQ
E23	F630Y6Y40SZP	MEMBRANE SWITCH(U)	1	ZPE
E24	F800A6Y40SQP	ESCUTCHEON BASE (U)	1	QPQ (INCLUDING MEMBRANE SWITCH(U))
E24	F800A6Y40SZP	ESCUTCHEON BASE (U)	1	ZPE (INCLUDING MEMBRANE SWITCH(U))
E25	F800B6Y40SBP	ESCUTCHEON BASE (BU)	1	QPQ,ZPE
E26	F803G6Y40SBP	POP-UP DIAL (U)	2	QPQ,ZPE
E30	F400L6Y40XP	PUMP-LED(U)	1	(INCLUDING PUMP & LED PCB)
E31	F83876Y40QP	BUTTON	1	QPQ
E31	F83876Y40BP	BUTTON	1	ZPE
E32	F06397J70XP	PUMP BRACKET	1	
E33	F66166Y40BP	FLAT CABLE	1	(WIDE ONE)
E34	F66166Y40XP	FLAT CABLE	1	(NARROW ONE)
E35	F44266Y40BP	SEAL B	1	
E36	F46487J70XP	TUBE A	1	
E37	F46497J70XP	TUBE B	1	
E38	F45126Y40BP	TIE-IN B	1	
E39	F80876Y40BP	GROUNDING PANEL	1	QPQ,ZPE
E40	F01576Y40QP	NAME PLATE	1	QPQ

## 8.6 DOOR ASSEMBLY



Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
<u>D1</u>		F390L6Y40SXP	DOOR(U)	1	HPE,YPQ,YTE,MPQ,KTE,PTE (INCLUDING DOOR C & SEAL)
D1		F390L6Y40SEP	DOOR(U)	1	QPQ,ZPE (INCLUDING DOOR C & SEAL)
<u>D2</u>		F30856Y40XP	DOOR C	1	
D3		A3334-1K00	SEAL	1	
D4		F30546Y40BP	DOOR ARM (LEFT)	1	
D5		F30446Y40BP	DOOR ARM (RIGHT)	1	
<u>D6</u>		F32316Y40XP	DOOR KEY SPRING A	1	
<u>D7</u>		F32307J70XP	DOOR KEY SPRING B	1	
<u>D8</u>		F302A6Y40SXP	DOOR B (U)	1	HPE,YPQ,YTE,MPQ,KTE,PTE
D8		F302A6Y40SEP	DOOR B (U)	1	QPQ,ZPE
<u>D9</u>		F01726V00JP	CAUTION LABEL B	1	QPQ

## 8.7 WIRING MATERIALS



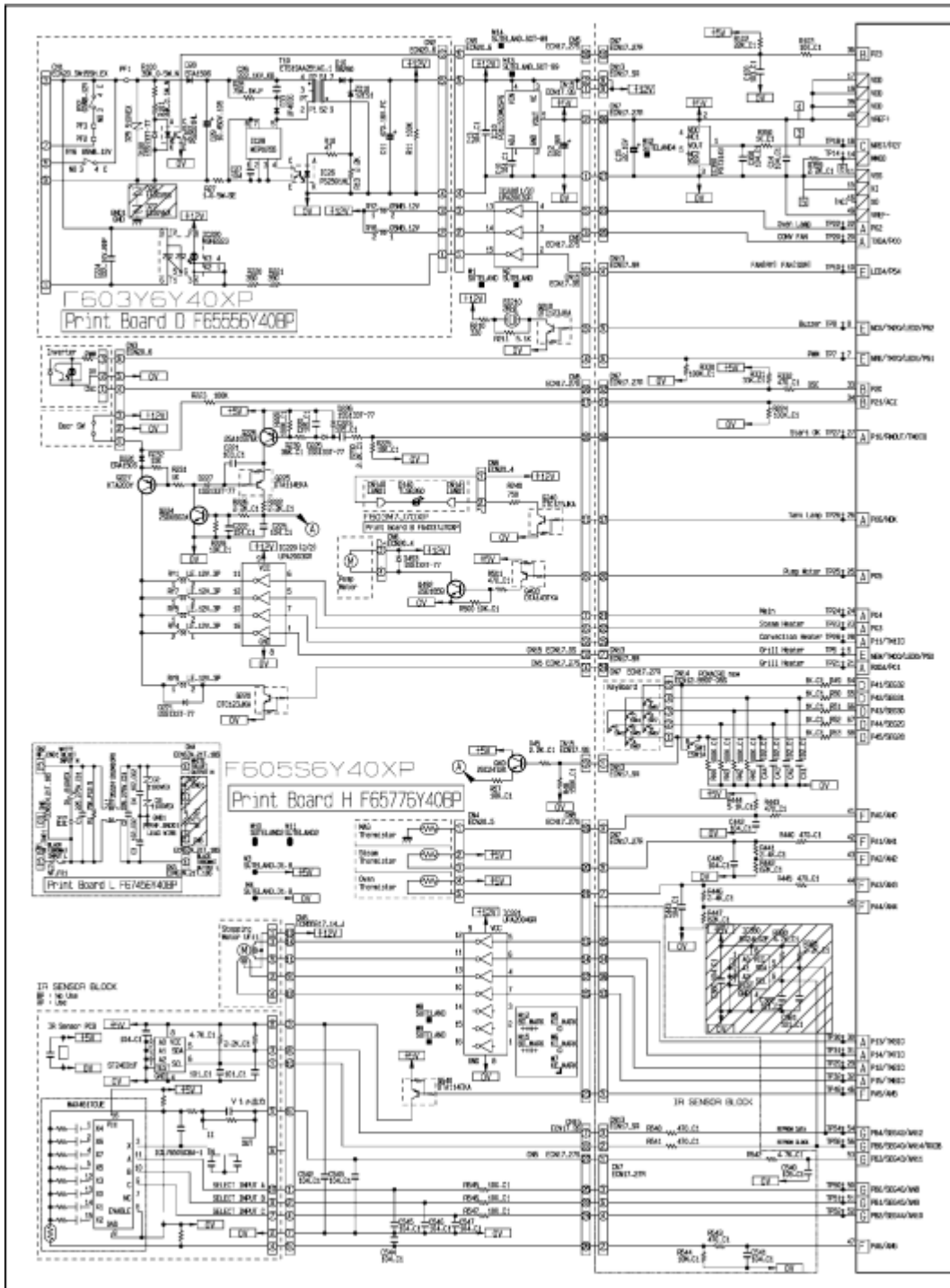
Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
<u>W1</u>	F030A6Y40XP	LEAD WIRE HARNESS	1	
<u>W2</u>	F030E7J70XP	H.V.LEAD WIRE	1	

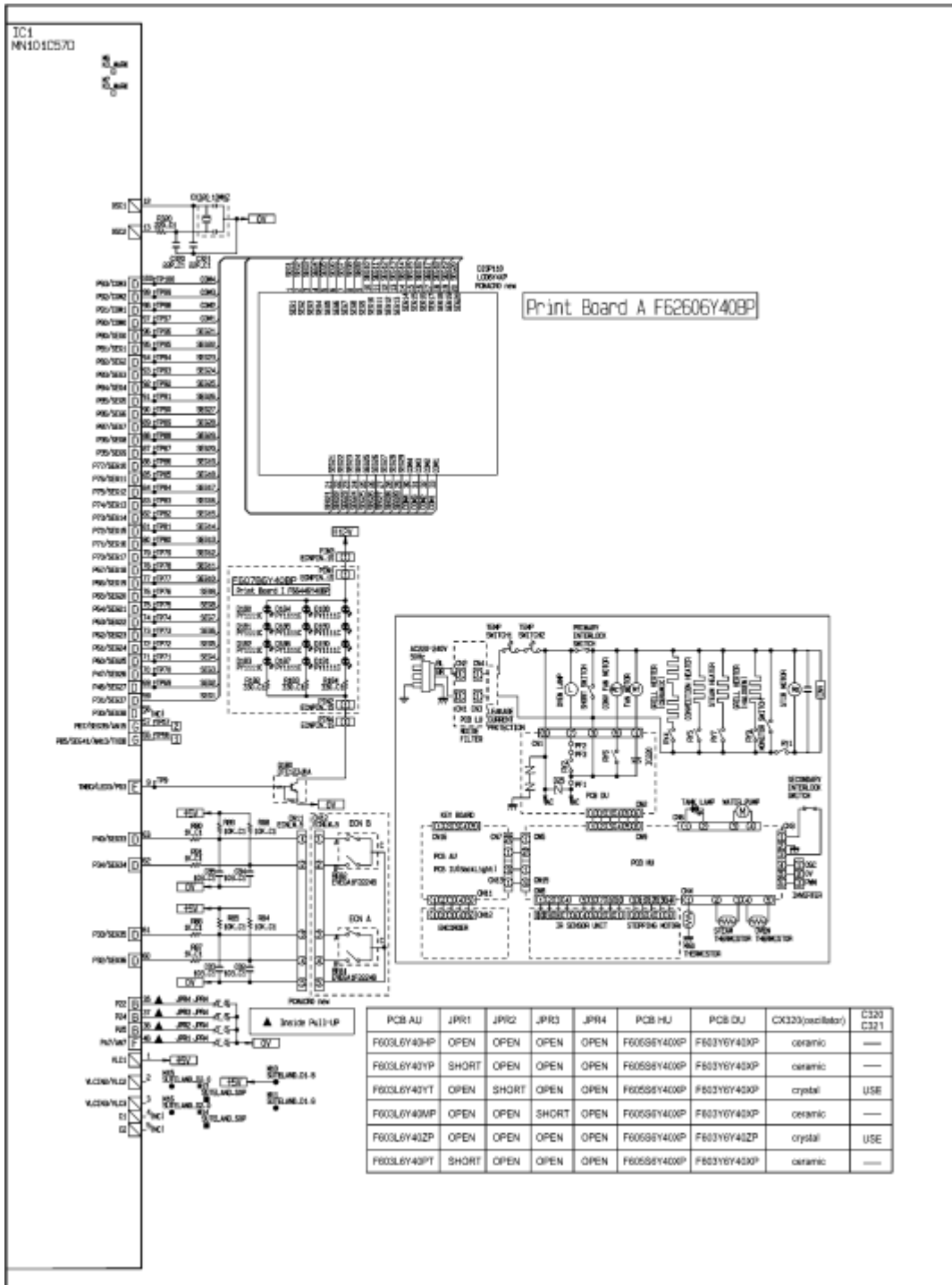
## 8.8 PACKING AND ACCESSORIES



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
<u>P1</u>	F00036Y40HP	INSTRUCTION MANUAL	1	HPE,YPQ,YTE,MPQ
P1	F00036Y40KT	INSTRUCTION MANUAL	1	KTE,PTE
P1	F00036Y40ZP	INSTRUCTION MANUAL	1	ZPE
P1	F00036Y40QP	INSTRUCTION MANUAL	1	QPQ
<u>P2</u>	F01026Y40KT	PACKING CASE,PAPER	1	HPE,YPQ,YTE,MPQ,KTE,PTE
P2	F01026Y40ZP	PACKING CASE,PAPER	1	ZPE
P2	F01026Y40QP	PACKING CASE,PAPER	1	QPQ
<u>P3</u>	F01046Y40XP	UPPER FILLER	1	HPE,YPQ,YTE,MPQ,KTE,PTE
P3	F01046Y40BP	UPPER FILLER	1	QPQ,ZPE
<u>P4</u>	F01056Y40XP	LOWER FILLER	1	HPE,YPQ,YTE,MPQ,KTE,PTE
P4	F01056Y40BP	LOWER FILLER	1	QPQ,ZPE
<u>P5</u>	F01066Y40XP	P.E BAG	1	
<u>P6</u>	F01078100XN	DOOR SHEET	1	
<u>P7</u>	F06217J70XP	QUADRATE COOKING TRAY	1	
<u>P8</u>	F01126Y40XP	FOAM	1	
<u>P9</u>	F01136Y40XP	FOAM	1	
<u>P10</u>	F06027J70XP	OVEN RACK	1	
<u>P11</u>	F60037J70XP	CERAMIC COVER	1	
<u>P12</u>	F01126Y40BP	FOAM	1	
<u>P13</u>	F06037J70XP	CRISPY PAN	1	
<u>P14</u>	F000B6Y40HP	COOKING GUIDE	1	HPE,YPQ,YTE,MPQ
P14	F000B6Y40KT	COOKING GUIDE	1	KTE,PTE
P14	F000B6Y40ZP	COOKING GUIDE	1	ZPE

P15	F01926Y40XP	SHEET	1	
P17	F01096Y40XP	SHEET	1	
P18	F01896Y40XP	PROTECT CORNER	2	
P19	F02246Y40KT	NOTICE	1	EXCEPT QPQ
P19	F02246Y40BP	NOTICE	1	QPQ
P23	F0731-1450	MITTEN	1	
P26	F01567J70HP	NOTICE	1	HPE,YPQ,YTE,MPQ
P27	F04456Y40MP	OVERLAY	1	YPQ,MPQ
P28	F04456Y40YP	OVERLAY	1	YPQ,MPQ
P29	F04456Y40KT	OVERLAY	1	KTE,PTE
P30	F04456Y40PT	OVERLAY	1	KTE,PTE





# 9 DIGITAL PROGRAMMER CIRCUIT

## 9.1 SCHEMATIC DIAGRAM



## 9.2 PARTS LIST

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
BZ210	L0DDEA000014	BUZZER	1	2.0KHz
C11	AECEWG1C471B	AL CHEM CAPACITOR	1	470μF/16V
C12,C15	AECETS1C220B	AL CHEM CAPACITOR	2	22μF/16V
C29	AECETK2W101B	AL CHEM CAPACITOR	1	10μF/450V
C27	AESCT08F104M	AL CHEM CAPACITOR	1	0.1μF/25V
C224	AECT81F102K	CERAMIC CAPACITOR	1	1000PF/1000V
C26	ECKN3A222KBP	CERAMIC CAPACITOR	1	2200PF/1000V
CN1	K1KA05A00308	CONNECTOR	1	5 pin
CN2	K1KA06A00246	CONNECTOR	1	6 pin
CN3	K1KA06A00246	CONNECTOR	1	6 pin
CN4	K1KA05A00236	CONNECTOR	1	5 Pin
CN5	K1MN27A00012	CONNECTOR	1	
CN6	K1KA04A00327	CONNECTOR	1	4 pin
CN7	K1MN27B00032	CONNECTOR	1	27 pin
CN8	K1KA14A00201	CONNECTOR	1	14 pin
CN9	F03536Y40XP	CONNECTOR	1	6 Pin
CN11,CN12	F03536Y40XP	LEAD WIRE	2	5 pin
CN13	K1MN09B00054	LEAD WIRE	1	13 pin
CN14	K1MN05AA0019	LEAD WIRE	1	5 pin
CN15	K1MN09A00001	LEAD WIRE	1	
PIN1,PIN2	K4CE01000003	PIN	2	
CX320	H0D100500017	CRYSTAL RESONATOR	1	8.00MHz (YTE,QPQ,ZPE)
CX320	EFOEC1005T4	CERAMIC RESONATOR	1	8.00MHz (HPE,YPQ,MPQ,KTE,PTE)
D180-D191	B3ACB0000065	CHIP LED	12	
D220	B0EAKT000025	DIODE	1	
D221,D225-D227,D493	MA2C19600E	DIODE	5	
D10	AESB280TLRC	DIODE	1	
D25	D4EAY511A036	VARITOR	1	510V
D28	B0EAKT000025	DIODE	1	
D33	AEUF4006TLRC	DIODE	1	
D100	B0AACK000004	DIODE	1	
DISP1	L5AAAFE00013	LCD	1	HPE,YPQ,YTE,MPQ,KTE,PTE
DISP1	L5AAAFE00014	LCD	1	QPQ,ZPE
DISPL1 HOLD	F66176Y40XP	LCD HOLDER	1	HPE,YPQ,YTE,MPQ,KTE,PTE
DISPL1 HOLD	F66176Y40BP	LCD HOLDER	1	QPQ,ZPE
	E80936Y40BP	DIFFUSION SHEET	1	

IC1	MN101C57DDE	L.S.I.	1	HPE,YPQ,YTE,MPQ
IC1	MN101C57DDJ	L.S.I.	1	QPQ
IC1	MN101C57DDK	L.S.I.	1	KTE,PTE,ZPE
IC10	C0DBAHD00013	IC	1	
IC220,IC221	B1HBGFF00007	IC	2	
IC350	C0EBH0000264	IC	1	
IC26,IC100	B3PAA0000387	IC	2	
IC28	MIP0255SPSCF	IC	1	
IC220	B3PAC0000060	IC (SSR)	2	
Q492	B1BAAJ000003	TRANSISTOR	1	
Q227	B1ACGF000004	AUDION	1	
R10	D0AE470JA155	CARBON FILM RESISTOR	1	47Ω,1/4W,5%
R210,R220,R221	D0AE391JA155	CARBON FILM RESISTOR	3	390Ω,1/4W,5%
R240	D0AE751JA155	CARBON FILM RESISTOR	1	750Ω,1/4W,5%
R231	D0AE102JA155	CARBON FILM RESISTOR	1	1KΩ,1/4W,5%
R13	D0AE222JA155	CARBON FILM RESISTOR	1	2.2K,1/4W,5%
R211	D0AE512JA155	CARBON FILM RESISTOR	1	5.1K,1/4W,5%
R232	D0AE103JA155	CARBON FILM RESISTOR	1	10K,1/4W,5%
R100,R101	AERT15X393JT	CARBON FILM RESISTOR	2	39K,1/2W,5%
R28	AERY16753KcE	RESISTOR	1	75K,1/2W,5%
R11,R223	D0AE104JA155	CARBON FILM RESISTOR	2	100K,1/4W,5%
R27	AERY15J1RQbB	RESISTOR	1	1Ω,1/2W,5%
RY1,RY4,RY5,RY7,RY9	K6B1AGA00212	POWER RELAY	5	
RY2,RY6	K6B1AGA00180	POWER RELAY	2	
T10	ETS19AA2B1AC	SWITCHING POWER SUPPLY	1	
ZD10	B0BA01100053	ZENER DIODE	1	
SW1	EVQ11L05R	SWITCH	1	
RE81,RE82	EVEJ1HF2224B	REVOLVING ENCODER	2	

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