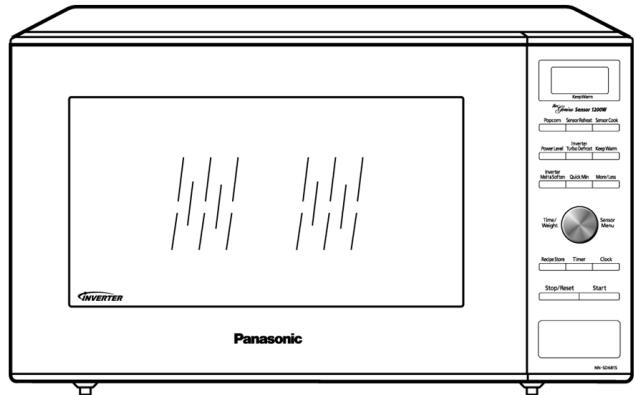


# Service Manual

Microwave Oven



**NN-SD681S  
NN-SN671S  
NN-SN661S  
NN-SA661S  
NN-SA651S  
NN-SN651B  
NN-SN651W  
NN-SA631B  
NN-SA631W**

APH (USA)

## Specifications:

Model: Specifications:	NN-SD681S	NN-SN671S	NN-SN661S	NN-SA661S	NN-SA651S	NN-SN651B NN-SN651W	NN-SA631B NN-SA631W
Power Source:	120V AC Single Phase, 60Hz						
Power Consumption:	1480W	1480W	1480W	1480W	1480W	1480W	1480W
Output:	1200W	1200W	1200W	1200W	1200W	1200W	1200W
Microwave Frequency:	2450MHz						
Timer:	30 min. / Stage (HIGH Power) ~ 3 Stage Maximum 90 min. 00 sec / Stage (Other Power Levels) ~ 3 Stage Maximum.....(SD681S) 99 min. 99 sec / Stage (Other Power Levels) ~ 3 Stage Maximum.....(EXCEPT SD681S)						
Outside Dimensions:	20 11/16 "(W) x 12 1/4 "(H) x 16 5/16 "(D) 525mm(W) x 310mm(H) x 414mm(D)						
Oven Cavity Dimensions:	13 15/16 "(W) x 9 15/16 "(H) x 14 3/8 "(D) 355mm(W) x 251mm(H) x 365mm(D)						
Oven Cavity Dimensions:	1.2 cu. ft.						
Weight:	Approx. 26.5 lbs./12 kg.....(SD681S) Approx. 25.5 lbs./11.5 kg.....(EXCEPT SD681S)						
PbF	This product with PbF						
Specifications subject to change without notice.							

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(Shanghai) Co., Ltd. 2011.

## Your safety and the safety of others are very important.

We have provided important safety messages in this manual and on your appliance. Always read and obey all safety messages.



This is the safety alert symbol. It is used to alert you to potential hazards that can kill or hurt you and others.  
The safety messages will follow the safety alert symbol and either the word "DANGER", "WARNING" or "CAUTION".  
These words mean:



**DANGER** You can be killed or seriously injured if you don't immediately follow instructions.



**WARNING** You can be killed or seriously injured if you don't follow instructions.



**CAUTION** You can be exposed to a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

The safety messages will tell you what the potential hazard is, tell you how to reduce the chance of injury, and tell you what can happen if the instructions are not followed.

## ⚠ WARNING

1. This product should be serviced only by trained, qualified personnel.
  2. Though this product has been manufactured in compliance with:  
"Federal Performance Standard 21 CFR Subchapter J"(D.H.H.S): U.S.A. models  
or "Radiation Emitting Devices Act"(Health and Welfare Canada): Canadian models  
it is very important all repairs should be made in accordance with procedures described in this manual to avoid being exposed to excessive microwave radiation.
  3. Check for radiation leakage before and after every servicing according to the "procedure for measuring radiation leakage."
  4. If the unit cannot be repaired on site, advise the customer not to use until unit is repaired.
  5. Any serviceman who learns of any accident pertaining to microwave radiation leakage including the oven operating with open door should immediately notify the appropriate address listed below and Center for Devices and Radiological Health, DHHS.
- |                     |   |                         |   |
|---------------------|---|-------------------------|---|
| IN U.S.A.<br>(PSTC) | Panasonic Service and Technology Company<br>50 Meadowland Parkway,<br>Secaucus, New Jersey 07094<br>Attention: Technical Service Division.<br>(201)348-7000 | IN PUERTO RICO<br>(PPR) | Panasonic Puerto Rico, Inc.<br>San Gabriel Industrial Park<br>65th Infantry Ave. Km.9.5<br>Carolina, Puerto Rico 00985<br>(787)750-4300 |
|                     |   | IN CANADA<br>(PCI)      | Panasonic Canada Inc.<br>5770 Ambler Drive, Mississauga,<br>Ontario, L4W2T3<br>(905)624-5010  |
6. 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 should be replaced only with the manufacturer's specified parts to prevent microwave leakage, shock, fire, or other hazards. Do not modify the orginal design.

## PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

- (A) Do not operate or allow the oven to be operated with the door open.
- (B) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:
  - (1) Interlock operation
  - (2) Proper door closing
  - (3) Seal and sealing surfaces (arching, wear, and other damage)
  - (4) Damage to or loosening of hinges and latches.
  - (5) Evidence of dropping or abuse
- (C) Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, waveguide or transmission line, and cavity for proper alignment, integrity and connections.
- (D) Any defective or misadjusted components in the interlock, monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.
- (E) A microwave leakage check to verify compliance with the Federal Performance Standard should be performed on each oven prior to release to the owner.

## ⚠ 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  $600^{\circ}\text{C}$ ). Use eyeware protection.

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

**⚠ WARNING**

This Inverter board looks like a regular PCB. However, this PCB drives the magnetron tube with extremely high voltage and high current. Take cautionary measures when disassembling and troubleshooting the Inverter circuit. 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.

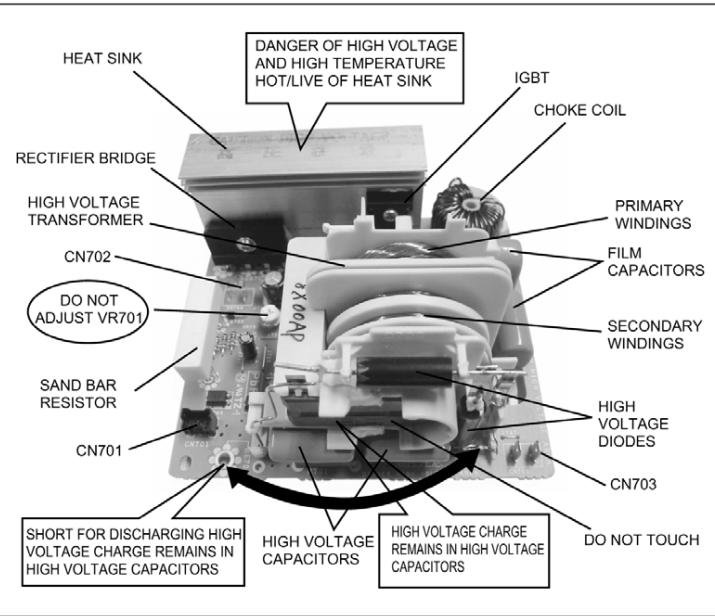
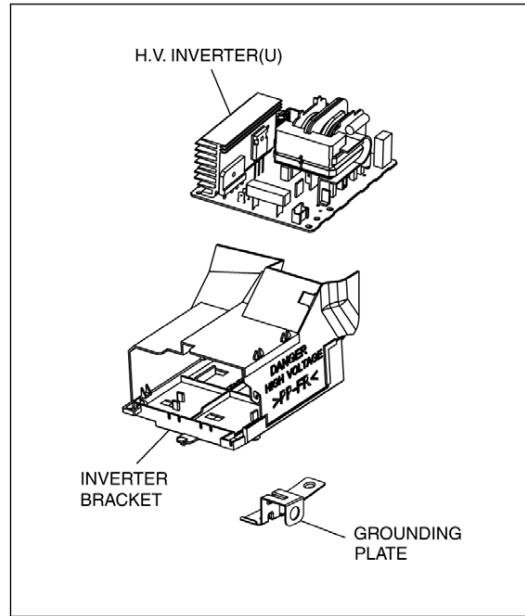
2. Aluminum heat sink that is energized with very high voltage and high heat energy.
3. Very high voltage which may remain in circuitry even when oven is off. High voltage charge may remain in the capacitors on the board.

**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.
- \* 5. For USA only:

Do not try to repair Inverter PCB because it is very dangerous to repair. Replace as a complete High Voltage Inverter Circuit unit and return fully re-packed in original shipping box and shipping materials.

**INVERTER POWER SUPPLY**

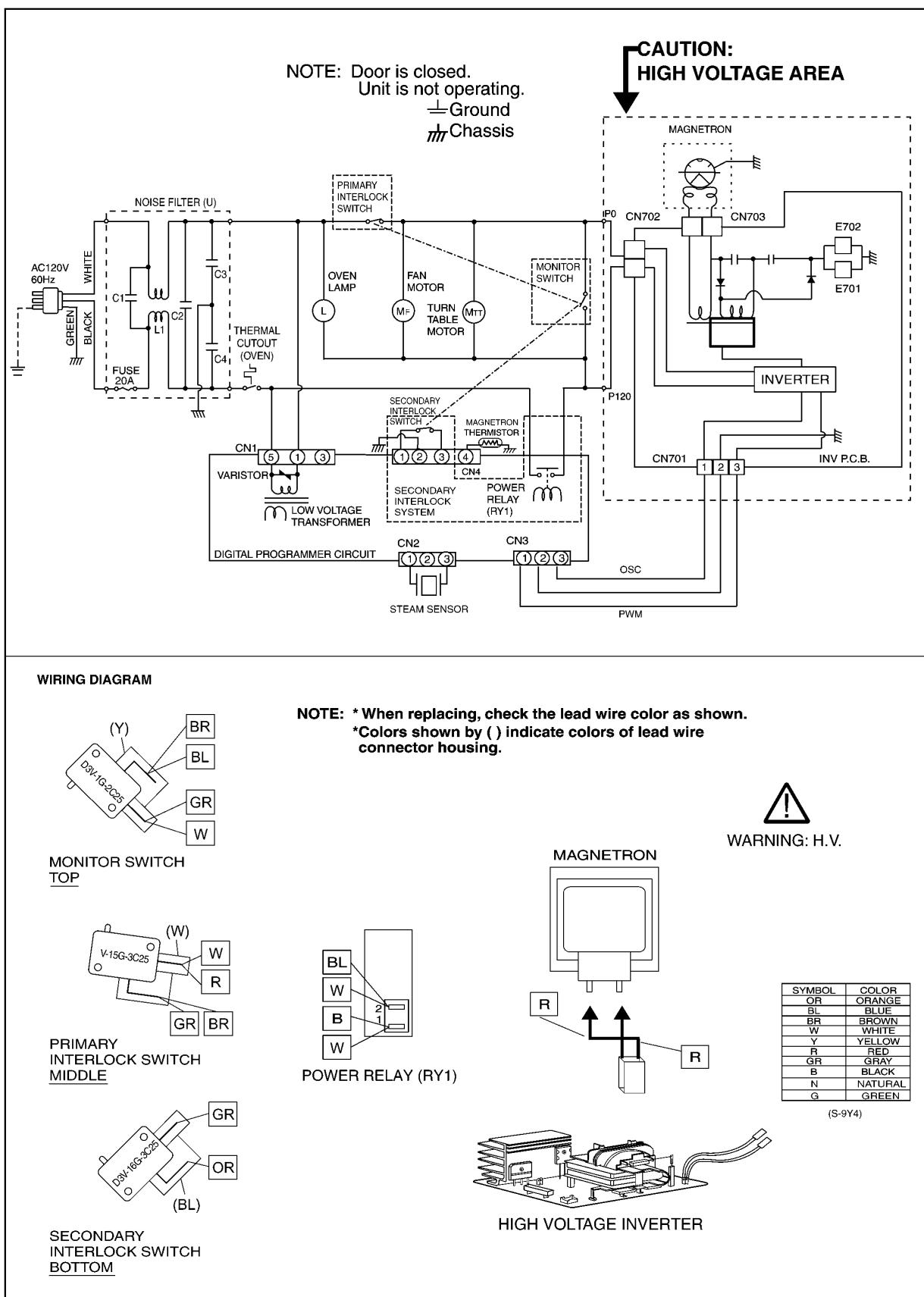


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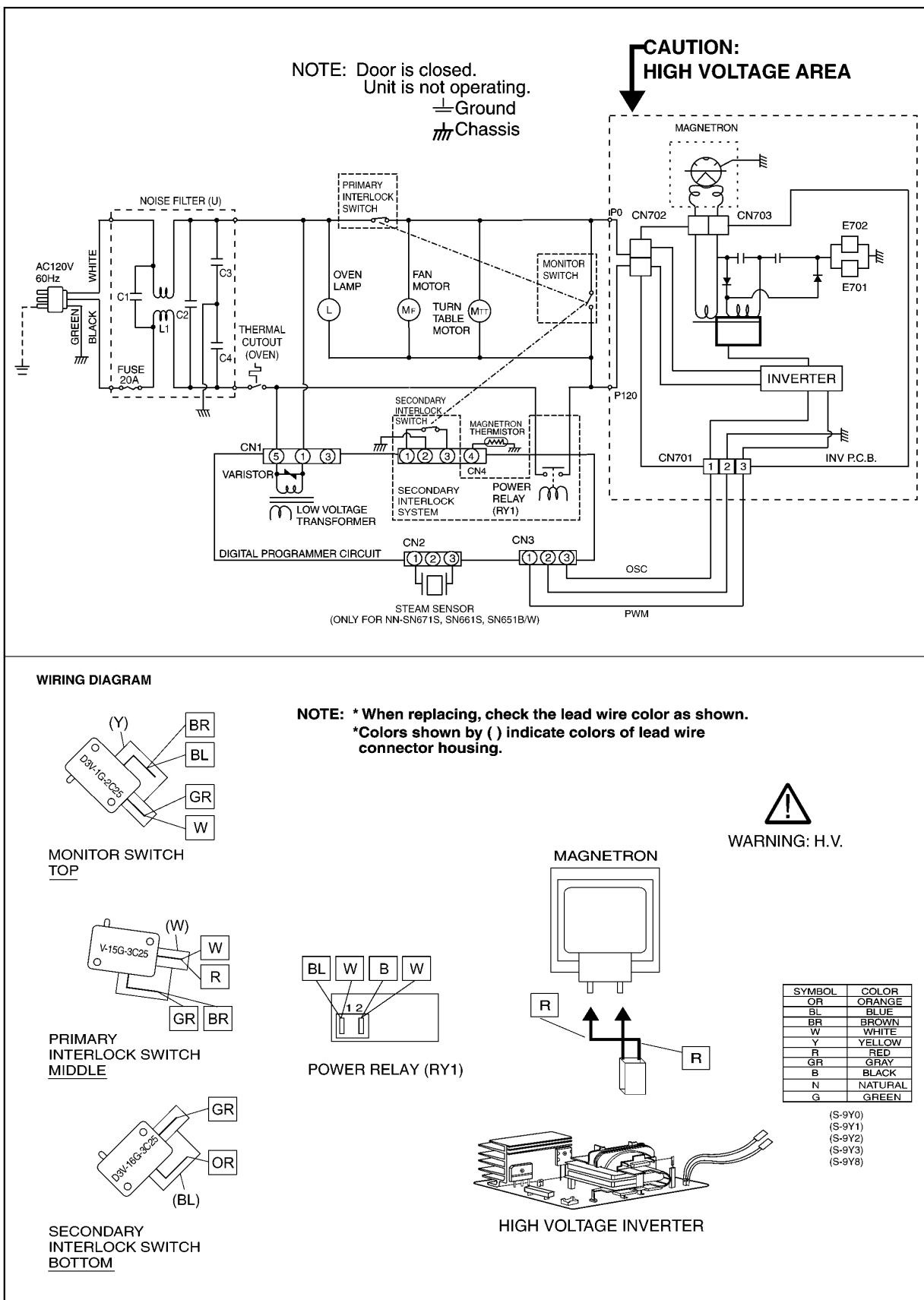
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# 1 SCHEMATIC DIAGRAM

## 1.1. NN-SD681S



## 1.2. EXCEPT NN-SD681S



## 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 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	P10	100%	22
	P9	90%	22
	P8	80%	22
MEDIUM-HIGH	P7	70%	22
MEDIUM	P6	60%	22
	P5	50%	22
	P4	40%	22
MEDIUM-LOW	P3	30%	22
	P2	20%	15
	P1	10%	8
			14

### 2.2. Inverter power supply circuit

The Inverter Power Supply circuit powered from the line voltage, 120V 60Hz 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 120V 60Hz 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. Inverter defrost

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.

Inverter Turbo Defrost	
SELECTED WEIGHT	COOKING TIME
1.0 LB	4 min.00 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. Sensor cooking (Only for sensor models)

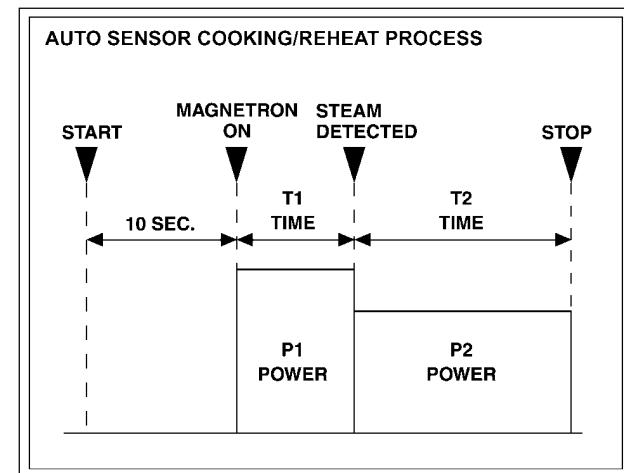
Auto sensor cooking without setting a power level or selecting a time. All that is necessary is to select an Auto Sensor Program before starting to cook.

**Understanding Auto Sensor Cooking**

As the food cooks, a certain amount of steam is produced. If the food is covered, this steam builds up and eventually escapes from the container. In Auto Sensor Cooking, a carefully designed instrument, called the steam sensor element, senses this escape of steam. Then, based upon the Auto Sensor Program selected, the unit will automatically determine the correct power level and the proper length of time it will take to cook the food.

**NOTE:**

Auto Sensor Cooking is successful with the foods and recipes found in the Auto Sensor Cooking Guide. Because of the vast differences in food composition, items not mentioned in the Cooking Guide should be prepared in the microwave oven using power select and time features. Please consult Variable Power Microwave Cookbook for procedures.



### Explanation of the Auto Sensor Cooking process

1. During the first 10 second period there is no microwave activity. When calculating the T2 time by using the formula below make sure this 10 seconds is subtracted from the T1 time. In other words, T1 time starts at the end of the 10 second period.
2. **T1 time** The total amount of time it takes the microwave oven to switch to T2 time after the 10second period.
3. **T2 time** When the steam escapes from the cooking container placed in the oven, the steam sensor detects it and the microprocessor calculates the balance of cooking time. This T2 time is then shown in the display and begins counting down.

#### Balance of cooking time (T2 time)

The balance of cooking time which is called T2 time, can be calculated by the following formula.

$$\text{T2 time (in sec.)} = \text{T1 time} \times \text{K factor} - 150$$

#### NOTE:

Remember, the T1 time starts after the 10 second period. The coefficient K is programmed into the microprocessor memory and they are listed in the following tables along with the P1 and P2 powers.

#### NOTE:

When "More" or "Less" pad is selected, the K factor varies resulting in T2 time to be increased or decreased.

### Example of calculating the T2 time

Example 1: If the T1 time is measured to be 2 minutes and 40 seconds after the 10 second period.

$$\text{T2} = \text{T1} \times \text{K} - 150 \text{ sec.}$$

$$= 2 \text{ min. and } 40 \text{ sec.} \times 1.1 - 150 \text{ sec.}$$

$$= 160\text{sec.} \times 1.1 - 150 \text{ sec.}$$

$$= 26 \text{ sec.}$$

Category	P1 Power	P2 Power	K Factor Standard
Oatmeal	MEDIUM-HIGH	MEDIUM-HIGH	0.4

## 2.5. Sensor reheat (Only for sensor models)

Auto Sensor Reheat is a quick and easy way to reheat refrigerated and room temperature foods.

Simply press the reheat pad. There is no need to select power level and cooking time.

#### NOTE:

The Auto Sensor Reheat process is similar as Auto Sensor Cooking process.

#### Balance of cooking time (T2 time)

The balance of cooking time which is called T2 time, can be calculated by the following formula.

$$\text{T2 time (in sec.)} = \text{T1 time} \times \text{K factor} - 150$$

#### NOTE:

Remember, the T1 time starts after the 10 second period. The coefficient K is programmed into the microprocessor memory and they are listed in the following tables along with the P1 and P2 powers.

#### NOTE:

When "More" or "Less" pad is selected, the K factor varies resulting in T2 time to be increased or decreased.

### Example of calculating the T2 time

Example 1: If the T1 time is measured to be 2 minutes and 40 seconds after the 10 second period.

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$$= 2 \text{ min. and } 40 \text{ sec.} \times 1.1 - 150 \text{ sec.}$$

$$= 160\text{sec.} \times 1.1 - 150 \text{ sec.}$$

$$= 26 \text{ sec.}$$

Category	P1 Power	P2 Power	K Factor Standard
Sensor Reheat	MEDIUM-HIGH	MEDIUM-HIGH	1.1

## 2.6. Steam sensor and digital programmer circuit (Only for sensor models)

In order to determine if the steam sensor function of the digital programmer circuit is working, do the following test.

1. Place a water load (150 cc) in the oven.
2. Tap Sensor Reheat pad.
3. Tap Start pad.
4. Steam Sensor detects steam about 1.5 to 4 minutes after the Start pad is tapped.
5. T1 time cooking automatically switches to remaining time for cooking (T2).
6. The remaining cooking time (T2) appears in display window. If the following cooking time appears, Steam Sensor function is normal.

T1 TIME	T2 TIME (Remaining cooking time)
50 Sec. ~ 12 Min.	0 Sec. ~ 10 Min.42 Sec.

## 2.7. 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.

### 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 and rings 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.

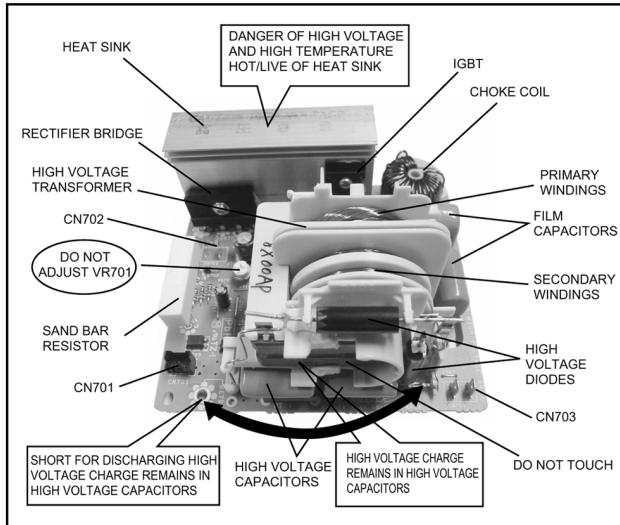
#### 3.2. Inverter warnings

##### **⚠ WARNING HIGH VOLTAGE AND HIGHTEMPERATURE (HOT/LIVE) OF THE INVERTERPOWER 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.

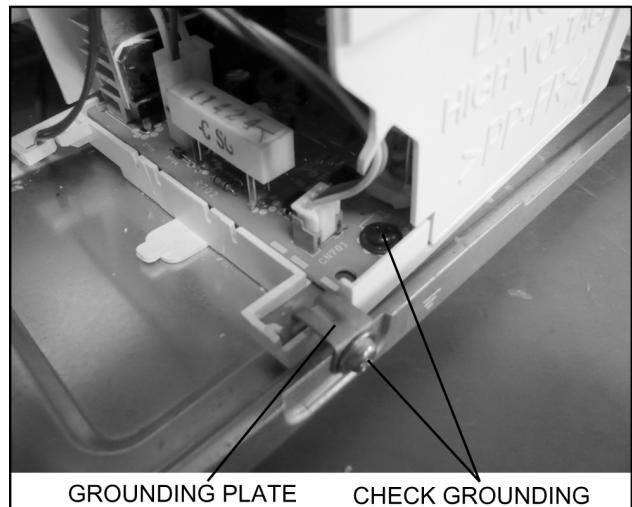
The aluminum heat sink may be HOT due to heat energy, therefore, extreme care should be taken during servicing.



##### 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 plate 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 plate.

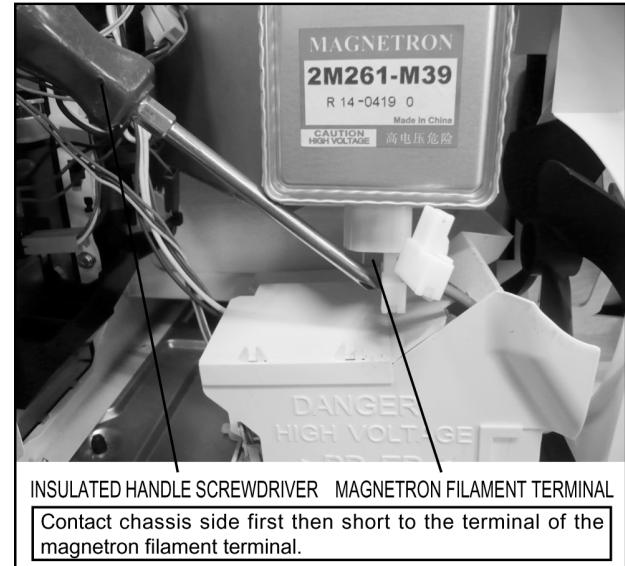


##### Grounding of the inverter circuit board

##### **⚠ WARNING DISCHARGE THE HIGH VOLATGE CAPACITORS**

For about 30 seconds after the oven is turned off, an electric charge remains in the high voltage capacitors of the Inverter Power Supply circuit board.

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



**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. Part replacement.**

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

**3.4. When the 20A fuse is blown due to the malfunction of the monitor switch:****⚠ WARNING**

When the 20A 120V fuse is blown due to the malfunction of the monitor switch, replace all of the components (primary interlock switch, monitor 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.

**3.5. 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.

**3.6. Verification after repair**

1. After repair or replacement of parts, make sure that the screws of the oven, etc. are neither loosen or 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. (Refer to procedure for measuring 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**

1. 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.

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

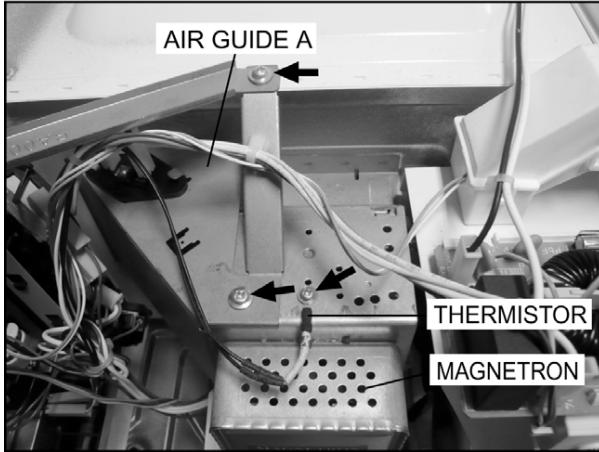
**3.7. Sharp edges****⚠ CAUTION**

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.

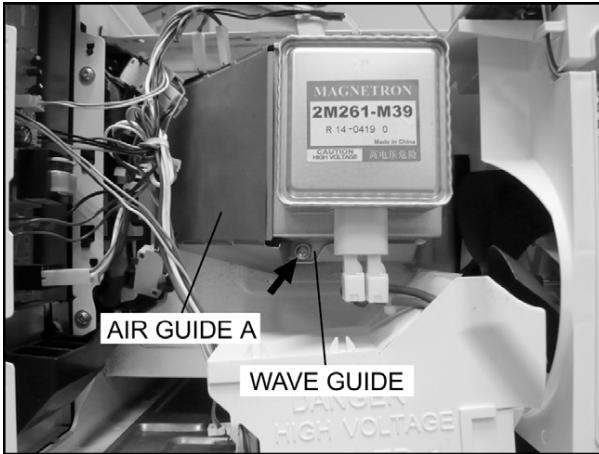
## 4 DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

### 4.1. Magnetron

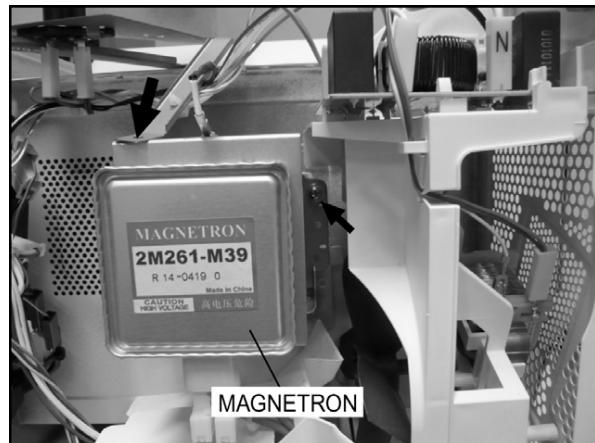
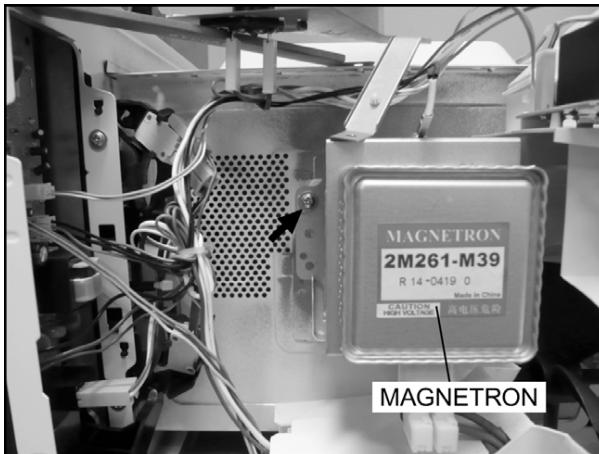
1. Discharge the high voltage capacitor.
2. Remove 1 screw holding air guide A on the magnetron.
3. Remove 1 screw holding air guide A on cavity top plate.
4. Remove 1 screws holding thermistor on the magnetron.



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



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.

### 4.2. Digital programmer circuit (D.P.C)

**⚠ CAUTION:**

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

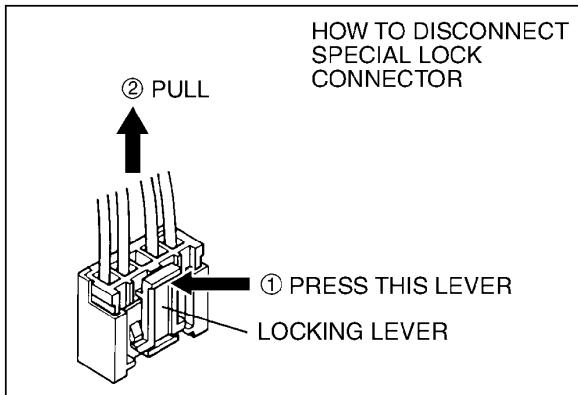
1. Disconnect connector CN701 on H.V. Inverter board.
2. Remove 1 screw holding escutcheon base and slide the escutcheon base upward slightly.
3. Remove all screws holding D.P.C. board on escutcheon base.
4. Separate D.P.C board from tabs on the escutcheon base and remove D.P.C board.

**To replace membrane key board**

5. Use tools such as knife etc. to lift the edge of escutcheon sheet and peel off escutcheon sheet & key board membrane 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 the new key board membrane, make sure that the surface of escutcheon base is clean to prevent a malfunction or shorted contacts.



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

**⚠ CAUTION:**

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

1. 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.

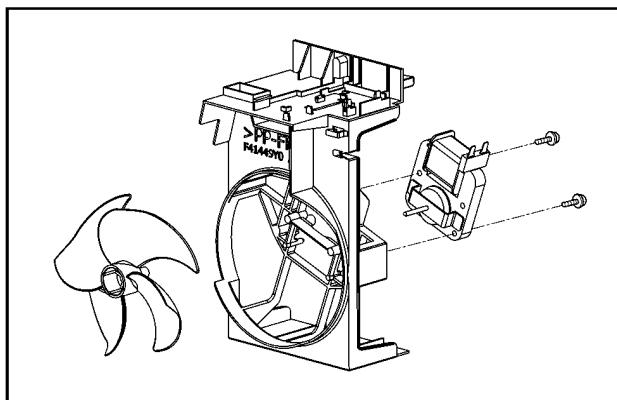
**⚠ CAUTION:**

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.

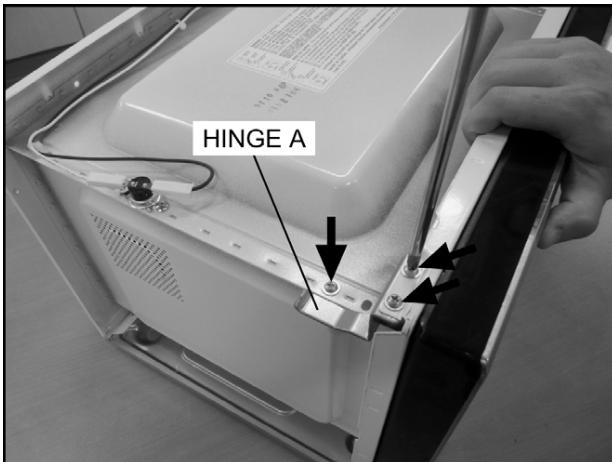
#### 4.4. Fan motor

1. Disconnect 2 lead wires from fan motor terminals.
2. Remove 2 screws at location on oven attaching orifice assembly.
3. Remove orifice assembly from oven assembly.
4. Remove fan blade from the fan motor shaft by pulling it straight out.
5. Remove 2 screws holding fan motor to orifice.



#### 4.5. Door assembly

1. Support the door, remove 3 screws holding hinge A.



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

**NOTE:**

Support the door before opening.



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

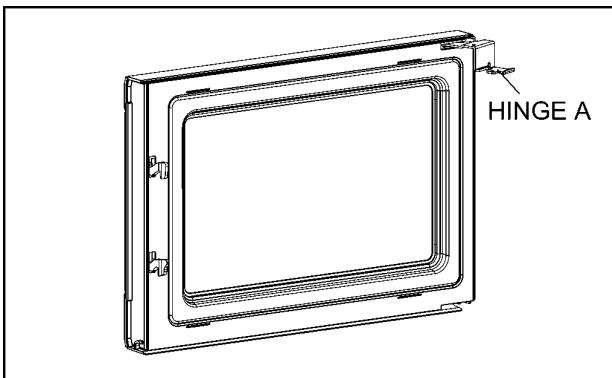
6. Replace other components.

**To re-install components:**

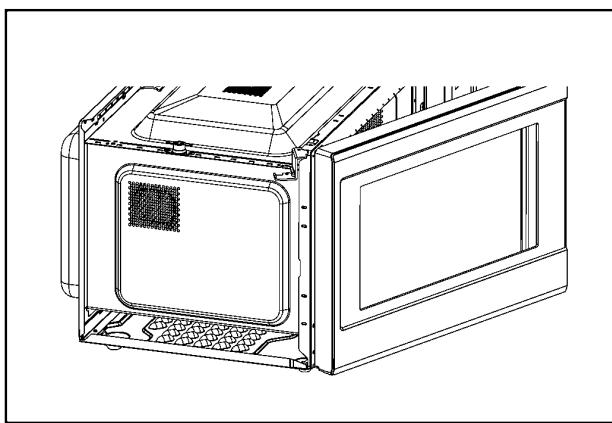
**NOTE:**

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

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



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



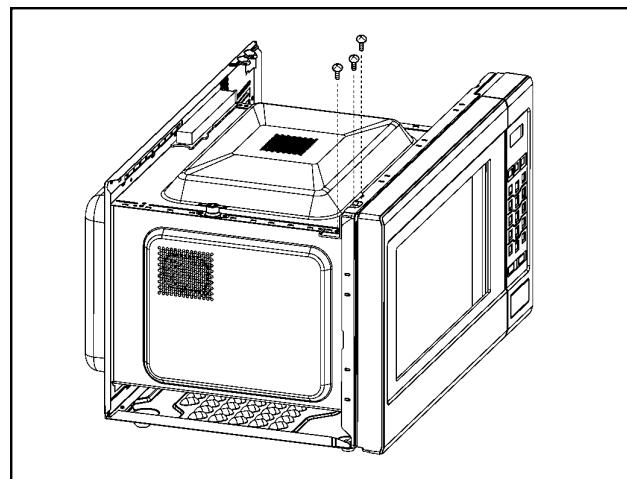
**NOTE:**

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

**NOTE:**

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

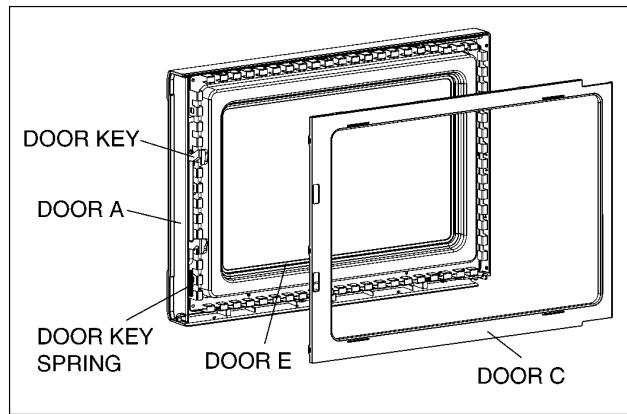
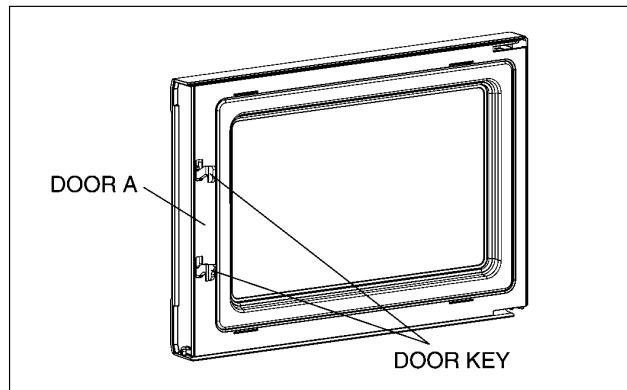
9. Tighten 2 mounting screws.



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

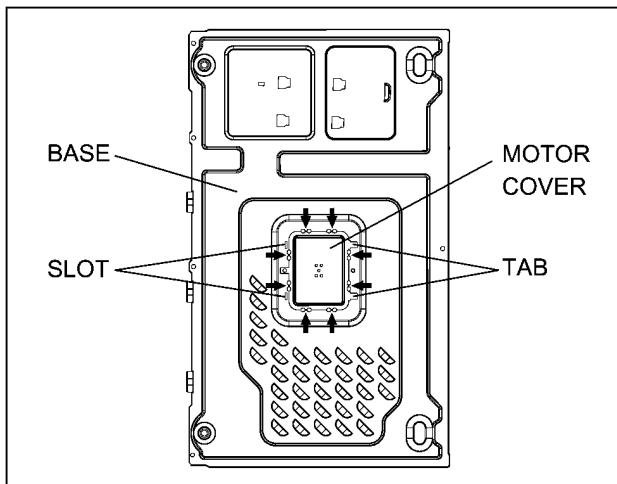
**NOTE:**

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



## 4.6. Turntable motor

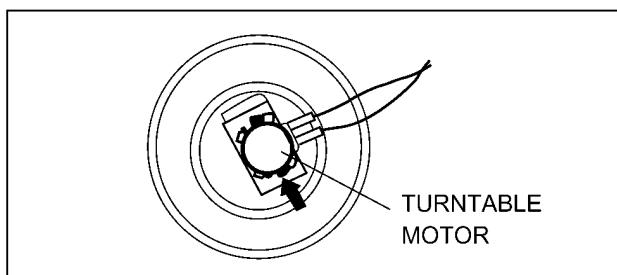
1. Remove the motor cover by breaking off at the 8 spots indicated by arrows with a cutter or the like.



**⚠ 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 connected to the turntable motor.
3. Remove the turntable motor by removing screw.

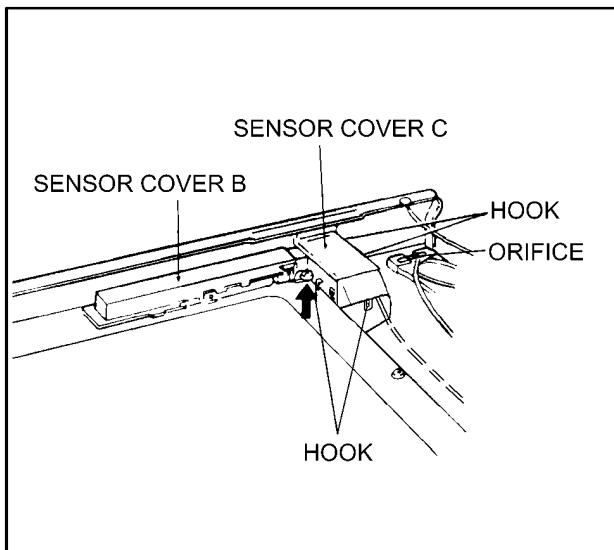


**⚠ NOTE:**

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 in the 2 provided slots, then screw the single tab to the base using a 4mm x 6mm screw.

## 4.7. Steam sensor (Only for sensor models)

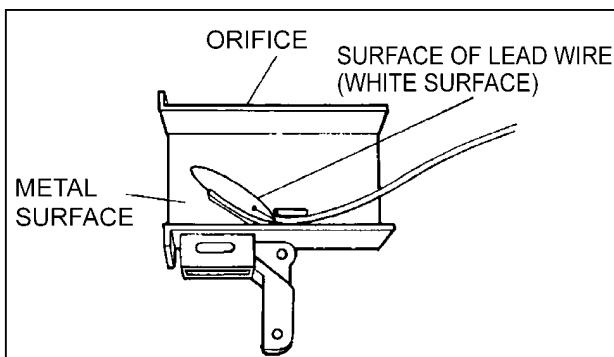
1. Disconnect connector CN2 from digital programmer circuit board.
2. Disengage catch hooks on sensor cover C from orifice.



3. Remove steam sensor from orifice.

**⚠ NOTE:**

When installing the steam sensor, make sure that the direction of steam sensor is as shown in figure.

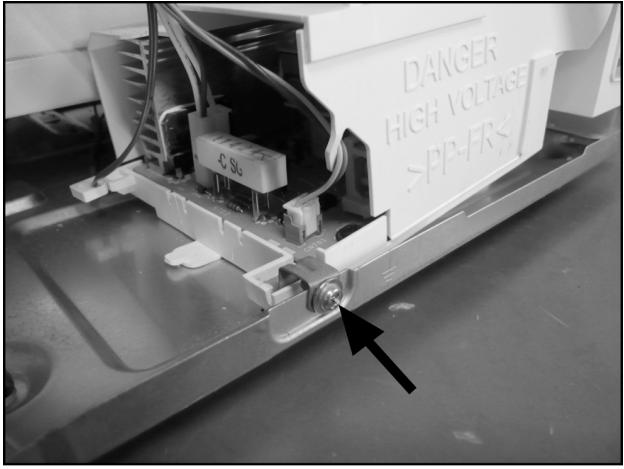


## 4.8. Inverter power supply

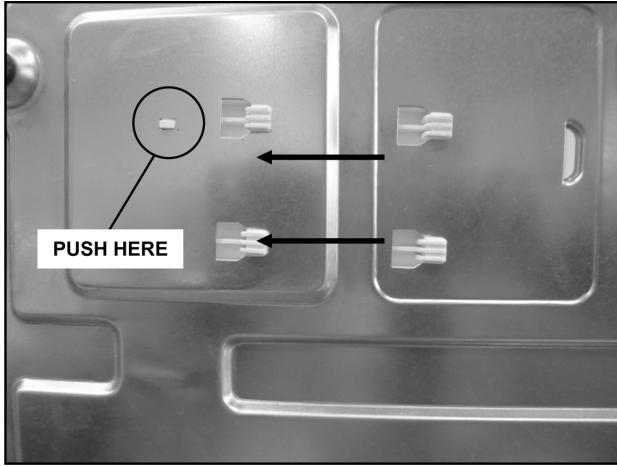
### CAUTIONS

1. Always leave the grounding plate in place.
2. Always securely tighten the ground screw through the bottom of the chassis (base).
3. Securely connect 3 lead wire connectors.
4. Make sure the heat sink has enough space (gap) from the oven. Take special care not to dress any lead wire over the aluminum heat sink because it is hot.

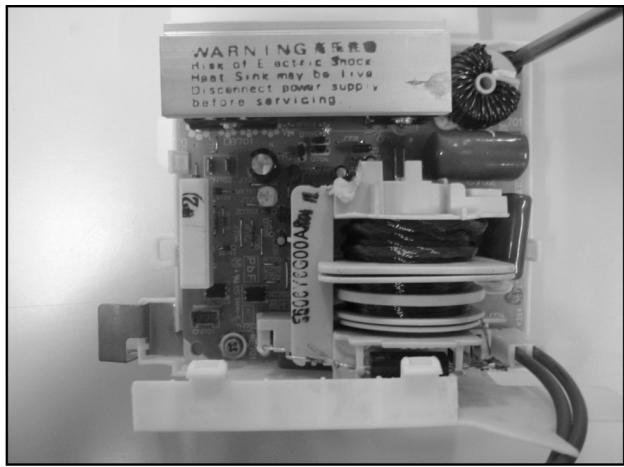
1. Discharge high voltage charge.
2. Remove the H.V.lead wire from magnetron terminals.
3. Disconnect 2 connectors from CN701 & CN702 on H.V.Inverter(U).
4. Remove 1 screw holding grounding plate to the base.



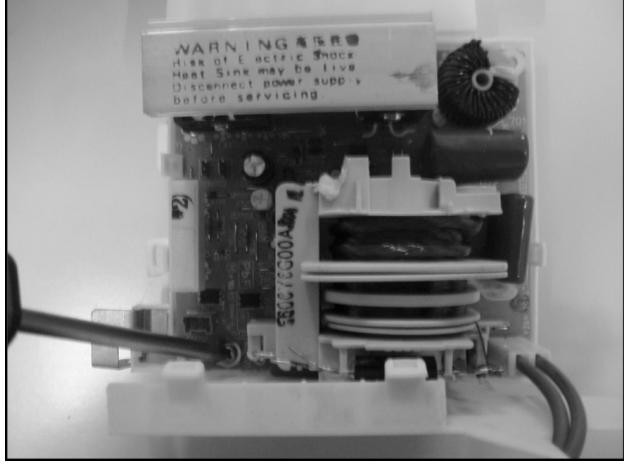
5. Press 1 encircled locking tab and then slide 4 locking tabs of Inverter bracket at the bottom of the base in direction of arrows.



6. Remove 1 screw holding H.V.Inverter to Inverter bracket.



7. Remove 1 screw holding grounding plate to H.V. Inverter.



8. Separate H.V. Inverter from Inverter bracket by freeing 3 catch hooks on the Inverter bracket.

## 5 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 (see page 9).

### 5.1. Primary, Secondary Interlock Switch & 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 Interlock Switch and Secondary Interlock 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 Interlock Switch	0Ω (Close)	∞Ω(Open)
Secondary Interlock Switch	0Ω (Close)	∞Ω(Open)
Power Relay RY1	∞Ω (Open)	∞Ω(Open)

### 5.2. Monitor Switch

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 Monitor Switch with door opened and closed positions using lowest scale of the ohm meter.

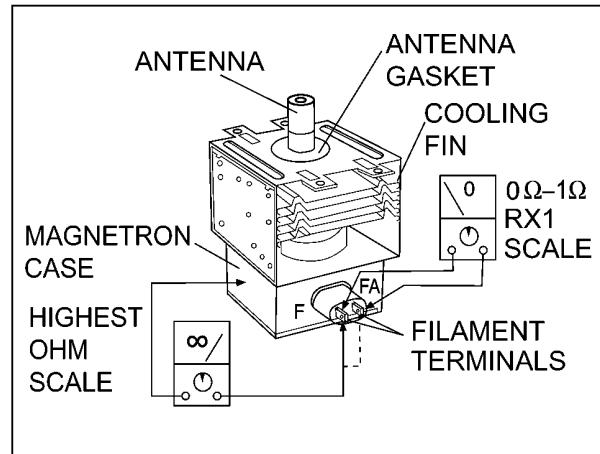
Normal continuity readings should be as follows.

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

### 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.

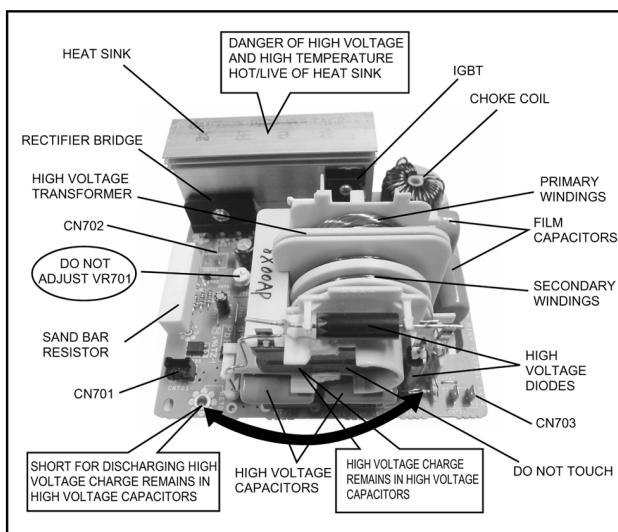


### 5.4. key board membrane (Membrane switch assembly)

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.



### 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.

#### For SD681S model

- a. Press **Clock** button once.
- b. Press **Timer** button once.
- c. Press **Start** button once.
- d. Press **Power Level** button once.

#### For except SD681S models

- a. Press **Timer/Clock** pad twice.
- b. Press **Start** pad once.
- c. Press **Power Level** 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.

#### For SD681S model

- a. Press **Clock** button once.
- b. Press **Timer** button once.
- c. Press **Start** button once.
- d. Press **Power Level** button once.

#### For except SD681S models

- a. Press **Timer/Clock** pad twice.
- b. Press **Start** pad once.
- c. Press **Power Level** 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	$\approx 0.4A$	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.

## 6 MEASUREMENTS AND ADJUSTMENTS

### ⚠ WARNING

- \* For continued protection against radiation hazard, replace only with identical replacement parts (For touch models part No. J61415G10XN, Type No. V-15G-3C25 for primary interlock switch; Part No. J61414T00AP, Type No. D3V-16G-3C25 for secondary interlock switch and Part No. J61784T00AP, Type No. D3V-1G-2C25 for monitor switch.)
- \* When the 20 Amp. fuse is blown due to the operation of the monitor switch, you must replace power relay RY1 (part No. AEBGJQC25F18, Type No.G5G-1A18VDC), the primary interlock switch and the monitor switch. Then follow the installation procedures below.
- \* Interlock switch replacement: In replacing faulty switches, be sure mounting tabs are not bent, broken or otherwise deficient in their ability to hold the switches.
- \* Refer to schematic diagram to ensure proper connection.

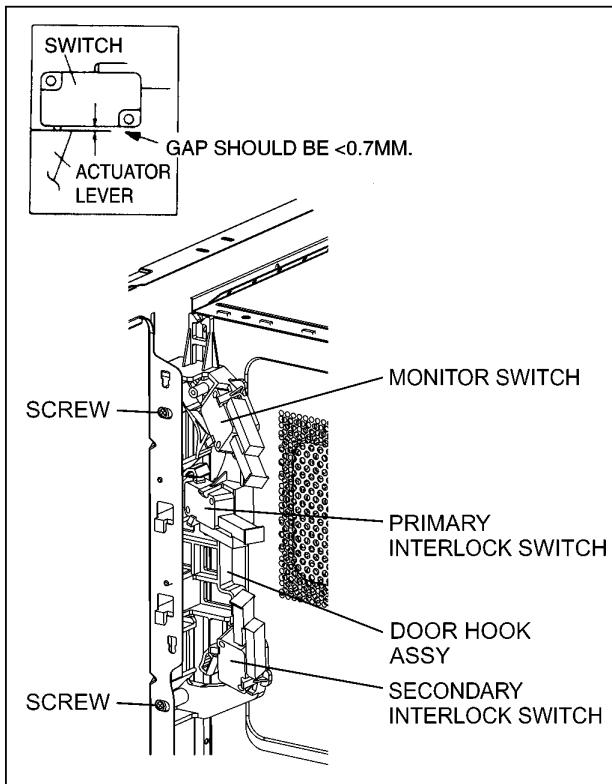
### 6.1. Adjustment of primary interlock switch, secondary interlock switch and monitor switch.

1. Mount the Primary Interlock Switch, the Secondary Interlock Switch and the Monitor Switch to the door hook assembly as shown in illustration.

#### NOTE:

No specific individual adjustments during installation of the Primary Interlock Switch, Secondary Interlock Switch or Monitor 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 monitor switch and check the continuity of the monitor circuit and all interlock switches again by following the component test procedures.



### 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 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
1200W	Min. 18.5°F(10.3°C)

## 7 PROCEDURE FOR MEASURING MICROWAVE ENERGY LEAKAGE

### **⚠ WARNING**

Check for radiation leakage after every servicing. Should the leakage be more than 2 mW/cm<sup>2</sup> (1mW/cm<sup>2</sup> for Canada) inform PSTC, PPR, or PCI immediately. After repairing or replacing any radiation safety device, keep a written record for future reference, as required by D.H.S. and Health and Welfare Canada regulation. This requirement must be strictly observed. In addition, the leakage reading must be recorded on the service repair ticket while in the customer's home.

#### NOTE:

The U.S. Government standard is 5 mW/cm<sup>2</sup> while in the customer's home. 2mW/cm<sup>2</sup> stated here is our own voluntary standard. (1mW/cm<sup>2</sup> for Canada)

### 7.1. Equipment

- Electromagnetic radiation monitor
- Glass thermometer 212°F or 100°C
- 600cc glass beaker

### 7.2. Procedure for measuring radiation leakage

#### Note before measuring:

- Do not exceed meter full scale deflection. Leakage monitor should initially be set to the highest scale.
  - To prevent false readings, the test probe should be held by the grip portion of the handle only and moved along the shaded area in Figure no faster than 1 inch/sec (2.5cm/sec).
  - Leakage with the outer panel removed: less than 5mW/cm<sup>2</sup>.
  - Leakage for a fully assembled oven with door normally closed: less than 2mW/cm<sup>2</sup> (1mW/cm<sup>2</sup> for Canada).
  - Leakage for a fully assembled oven [Before the latch switch (primary) is interrupted] while pulling the door: less than 2mW/cm<sup>2</sup>.
1. Pour 275 ± 15cc (9ozs<sup>s</sup>± 1/2oz) of 20°C ± 5°C (68° ± 9°F) water in a beaker which is graduated to 600cc, and place in the center of the oven.
  2. Set the radiation monitor to 2450MHz and use it following the manufacturer's recommended test procedure to assure correct results.
  3. When measuring the leakage, always use the 2 inch (5cm) spacer supplied with the probe.
  4. Tap the [Start] pad or set the timer and with the magnetron oscillating, measure the leakage by holding the probe perpendicular to the surface being measured.

### 7.2.1. Measurement with the outer panel removed.

Whenever you replace the magnetron, measure for radiation leakage before the outer panel is installed and after all necessary components are replaced or adjusted. Special care should be taken in measuring around the magnetron.

### **⚠ WARNING**

Do not touch any high voltage parts.  
Doing so can lead to personal injury or death.

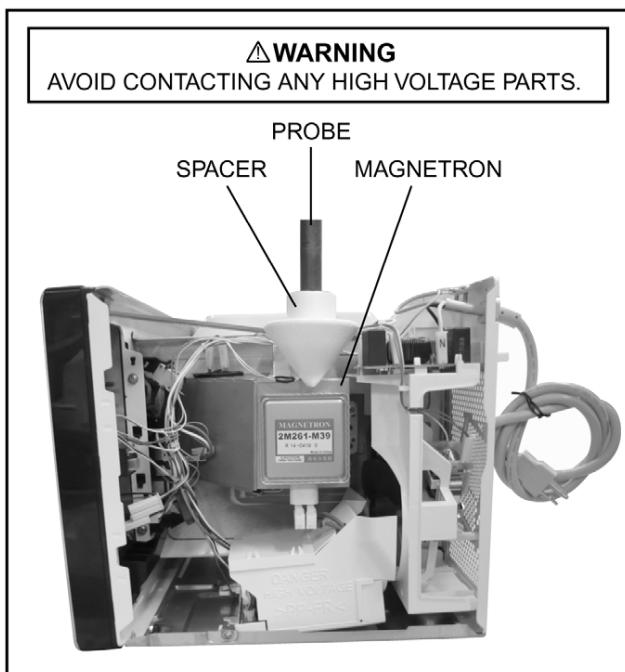
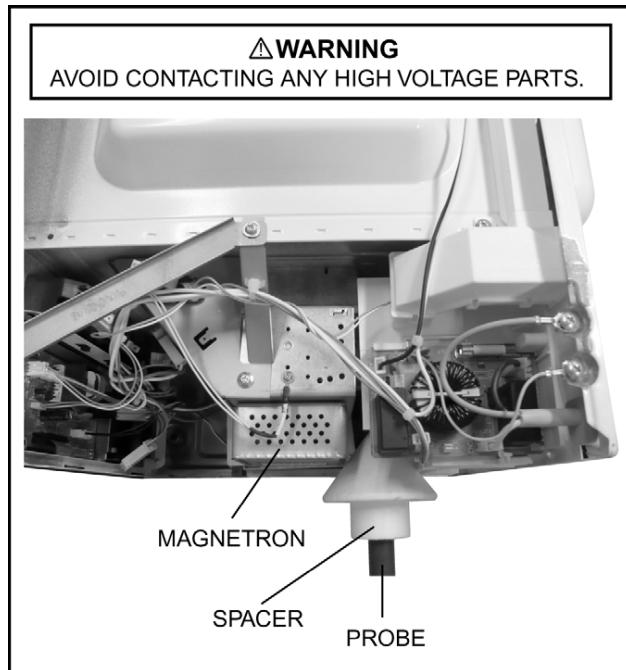
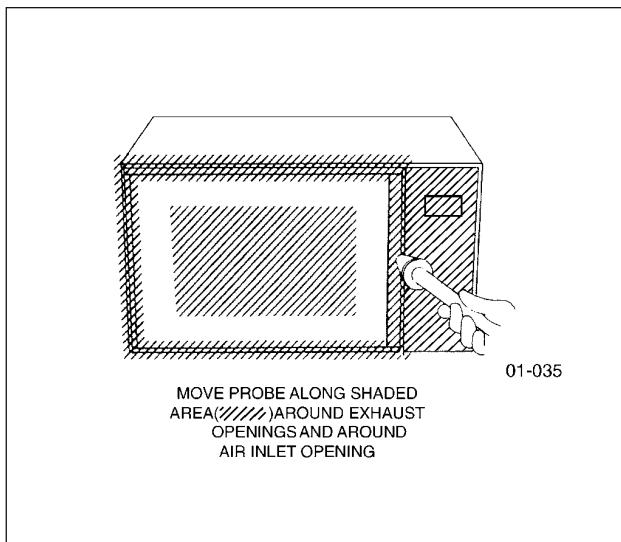
### 7.2.2. Measurements with a fully assembled oven.

After all components, including outer panel are fully assembled, measure for radiation leakage around the door periphery, the door viewing window, the exhaust opening, control panel and air inlet openings.

### 7.3. Record keeping and notification after measurement

- After any adjustment or repair to a microwave oven, a leakage reading must be taken. Record this leakage reading on the repair ticket even if it is zero. A copy of this repair ticket and the microwave leakage reading should be kept by repair facility.
- Should the radiation leakage be more than 2 mW/cm<sup>2</sup> (1mW/cm<sup>2</sup> for Canada) after determining that all parts are in good condition, functioning properly, and genuine replacement parts as listed in this manual have been used, immediately notify PSTC, PPR or PCI.

**7.4. At least once a year, have the radiation monitor checked for calibration by its manufacturer.**



## 8 TROUBLESHOOTING GUIDE

### DANGER: HIGH VOLTAGES

1. **DO NOT RE-ADJUST PRESET CONTROL** on the H.V.Inverter (U). It is very dangerous to repair or adjust without proper test equipment because this circuit generates very large current and high voltage. Operating a misaligned inverter circuit is dangerous.
2. Ensure proper grounding before troubleshooting.
3. Be careful of the high voltage circuitry, taking necessary precautions when troubleshooting.
4. Discharge high voltage remaining in the H.V.Inverter (U).
5. When checking the continuity of the switches or the H.V.Inverter, disconnect one lead wire from these parts and then check continuity with the AC plug removed. Doing otherwise may result in a false reading or damage to your meter. When disconnecting a plastic connector from a terminal, you must hold the plastic connector instead of the lead wire and then disconnect it, otherwise lead wire may be damaged or the connector cannot be removed.
6. Do not touch any parts of the circuitry on the digital programmer circuit, since static electric discharge may damage this control panel. Always touch ground while working on this panel to discharge any static charge in your body.
7. 120V 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.

### H97 & H98 error code display

If 3 times H97 or 2 times H98 exist, microwave oven can not be used any more, even if the defective parts already be replaced & un-plug and plug-in again.

#### How to reset for the service:

Please take the following steps

1. Plug-in oven.
2. Press **[Stop/Reset]** pad (button) once.
3. Open the door.
4. Keep pressing **[Start]** pad (button) for more than 2 seconds until buzzer beeps.
5. Press **[Stop/Reset]** pad (button) three times.
6. Press **[Start]** pad (button) once.
7. While finish resetting, one beeps, and show "end".
8. Press **[Stop/Reset]** to return to initial stage.

### Magnetron usage time display

Oven has magnetron usage time display function but it will not be activated in normal operation mode.

To show magnetron usage time result, please take the following steps:

1. Firstly, you must program the DPC into TEST MODE.

#### For NN-SD681S model

Plug-in oven → press **[Timer/Clock]** button twice → press **[Start]** button once → press **[Power Level]** button once.

#### For except NN-SD681S model

Plug-in oven → press **[Clock]** pad once → press **[Timer]** pad once → press **[Start]** pad once → press **[Power Level]** pad once.

2. **For NN-SD681S model**

Keep pressing **[Timer/Clock]** button for more than 2 seconds until buzzer beeps.

#### For except NN-SD681S model

Keep pressing **[Clock]** pad for more than 2 seconds until buzzer beeps.

3. Press **[Start]** pad (button) once, oven will show the total usage time of magnetron.

(note1:the magnetron usage time is kept in L.S.I. memory.)

(note2:Magnetron usage time display is in hours.)

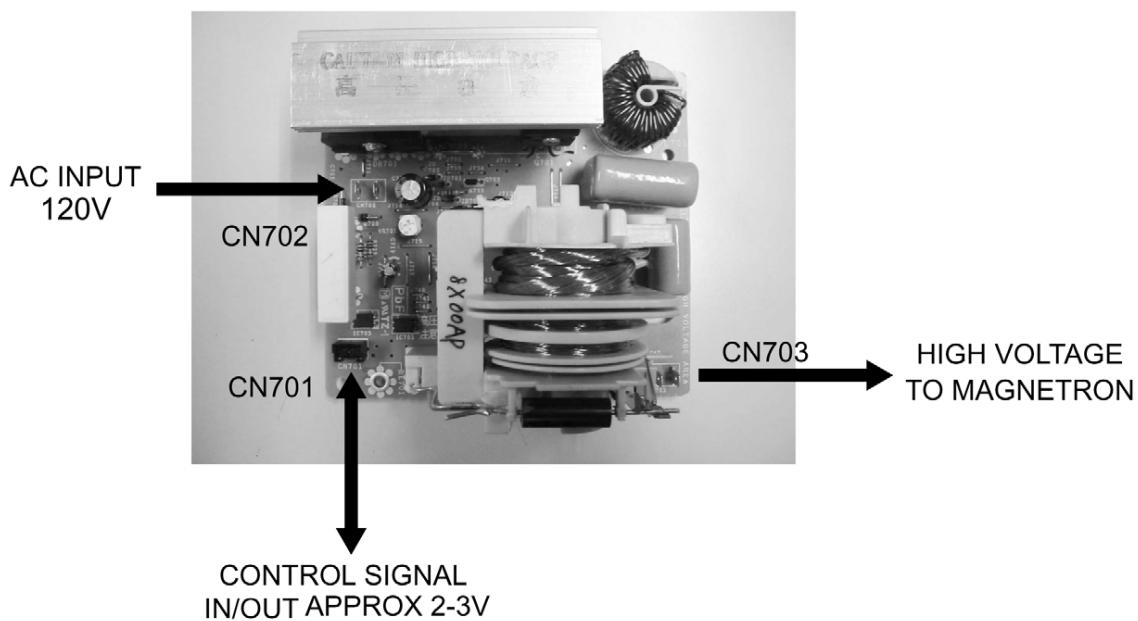
#### NOTE:

To delete the recorder of L.S.I. memory.

- a. Press **[Start]** pad (button) for more than 2 seconds until buzzer beeps.
- b. While finish deleting, one beeps and show "end".
- c. Press **[Stop/Reset]** to return to initial stage.

## 8.1. (Troubleshooting) Oven stops operation during cooking

SYMPTOM	CAUSE	CORRECTIONS
1.	Oven stops in 3 seconds after pressing [Start] pad	No 120V AC is supplied to H.V.Inverter (U) CN702 terminals 1. Interlock 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 3. H.V. Inverter (U)
	Oven stops in 10 seconds after pressing [Start] pad (Auto sensor cooking)	Steam sensor circuit is not functioning 1. Steam sensor 2. DPC 3. Open or loose wiring of sensor terminal from connector CN2 on DPC
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 Interlock Switches 2. Loose wiring connectors

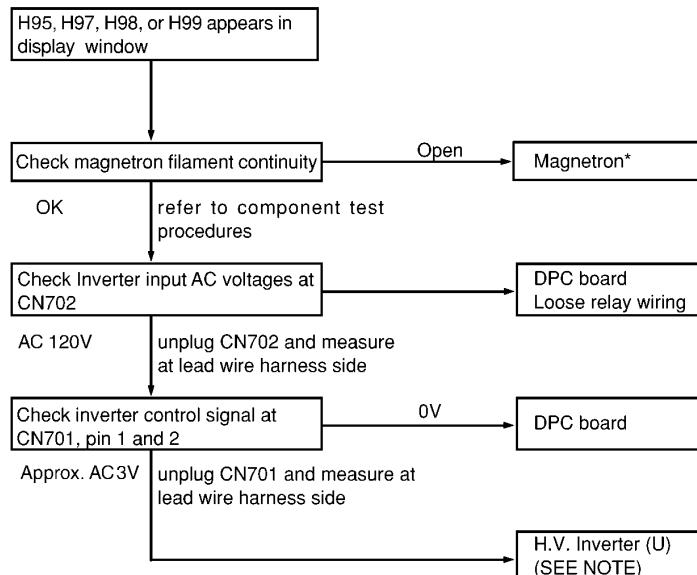


## 8.2. (Troubleshooting) Other problems

	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 interlock switch (NOTE 1) 3. Defective monitor switch (NOTE 1) 4. Defective Inverter Power Supply (U)	Check adjustment of primary, secondary interlock switch and monitor switch including door.
		NOTE 1: All of these switches must be replaced at the same time. Check continuity of power relay RY1 contacts (between 1 and 2) and if it has continuity, replace power relay RY1 also.	
3.	Oven does not accept key input (Program)	1. Key input is not in proper sequence 2. Defective DPC or defective membrane switch	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 interlock switch 2. Defective secondary interlock switch 3. Door switch CN4	Adjust door and interlock 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 interlock 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 interlock switch 6. Defective DPC or power relay RY1	Adjust door and interlock 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 interlock switch 2. Off-alignment of secondary interlock switch 3. Defective secondary interlock 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 interlock switch 2. Operation of thermal cutout	Adjust door and interlock switches.

### 8.3. 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, **For except NN-SD681S models:** press [Clock] pad once → press [Timer] pad once → press [Start] pad once → press [Power Level] pad once, **For NN-SD681S model:** press [Timer/Clock] button twice → press [Start] button once → press [Power Level] button 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.



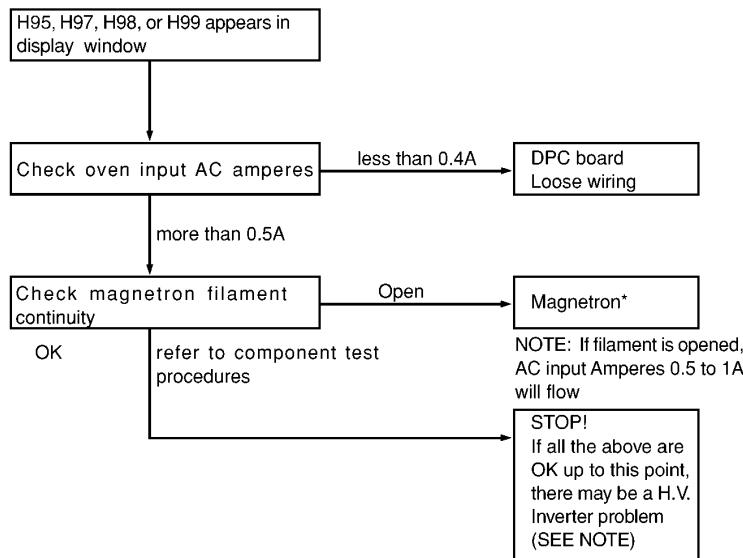
**WARNING:** DO NOT try to repair this Inverter Power Supply (U) and also DO NOT RE-ADJUST PRESET CONTROL on the board. It is very dangerous to repair or adjust without proper test equipment because this circuit generates very high voltage and very large current. Off alignment of inverter board operation 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:** After check, unplug unit to reset to normal operation mode.

## 8.4. Trouble related to Digital Programmer Circuit

### 8.4.1. NN-SD681S

SYMPTOM	STEP	CHECK	RESULT	CAUSE/CORRECTIONS
No display when oven is first plugged in	1	Fuse pattern of D.P.C.	Normal Open	→Step2 Replace D.P.C. or Fuse Pattern
	2	Low voltage transforment (L.V.T.) secondary voltage	Abnormal 0V Normal	L.V.T. →Step3
	3		Abnormal Normal=5V	Q10, ZD10 IC1, Display
No key input	1	Touch switch continuity	Abnormal Normal	Touch switch IC1
No beep sound	1		Abnormal Normal=5V	IC1 BZ210, Q210
No microwave oscillation at any power	1	IC1 pin 27 voltages while operation at high power	Abnormal Normal=5V	IC1 →Step2
	2		Abnormal Normal≈0.7V	Q220 and/or Q221, Q222, Q225 →Step3
	3	Collector of Q220 voltage	Still not turn on RY1 turns on	RY1 Q220 and/or Q221, Q222, Q225
Dark or unclear display	1	Replace display and check operation	Normal Abnormal	Display IC1
Missing or lighting of unnecessary segment	1	Replace IC1 and check operation	Normal Abnormal	IC1 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 Normal=120V	1. Latch Switch 2. D.P.C. /Power Relay →Step2
	2		Abnormal=0V Approx. AC 3V	D.P.C. Magnetron

#### 8.4.2. EXCEPT NN-SD681S

SYMPTOM	STEP	CHECK	RESULT	CAUSE/CORRECTIONS
No display when oven is first plugged in	1	Fuse pattern of D.P.C.	Normal	→Step2
			Open	Replace D.P.C. or Fuse Pattern
	2	Low voltage transforment (L.V.T.) secondary voltage	Abnormal 0V Normal	L.V.T. →Step3
No key input	3	IC1 pin 13 voltage	Abnormal Normal=5V	Q10, ZD10 IC1, Display
	1	Membrane switch continuity	Abnormal Normal	Membrane switch IC1
No beep sound	1	IC1 pin 61 voltage	Abnormal Normal=5V	IC1 BZ210, Q210
	1	IC1 pin 27 voltages while operation at high power	Abnormal Normal=5V	IC1 →Step2
No microwave oscillation at any power	2	Collector of Q220 voltage	Abnormal Normal≈0.7V	Q220 and/or Q221, Q222, Q225 →Step3
	3	Short circuit between collector of Q220 and emitter of Q225	Still not turn on RY1 turns on	RY1 Q220 and/or Q221, Q222, Q225
	1	Replace display and check operation	Normal Abnormal	Display IC1
Missing or lighting of unnecessary segment	1	Replace IC1 and check operation	Normal Abnormal	IC1 Display
	1	Unplug CN702 (2 pin) connector and measure voltage between terminals	Abnormal=0V Normal=120V	1. Latch Switch 2. D.P.C. /Power Relay →Step2
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	2	Unplug CN701 (3 pin) connector and measure pin1 voltage of D. P. C. CN3	Abnormal=0V Approx. AC 3V	D.P.C. Magnetron

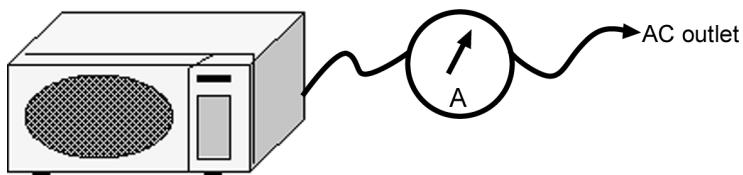
## 8.5. SIMPLE WAY OF H.V. INVERTER/MAGNETRON TROUBLESHOOTING

### 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.**

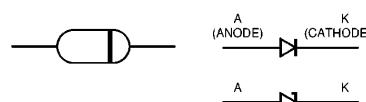
Power will:	Ammeter reading is:	To do:	Remedy:
Shut off in 23 seconds after "Start".	1. Between 0.5A and 1.0A.	Check and repair open magnetron circuit	Open magnetron wiring between Inverter and magnetron terminal.
	2. Between 1.0A and 2.0A.	Check continuity of D702 in Inverter PCB.	
		↓	
	1. D702 shorted 2. D702 is OK	Replace H.V.Inverter(F606Y8X00AP) Replace magnetron	
Shut off in 3 seconds after "Start"	1. Less than 0.5A	Check open circuit: Latch Switch, DPC, Power Relay and CN701	Replace defective component(s), or correct switch, cables and connectors.

## 8.6. H.V.INVERTER BOARD MAIN PARTS LIST (F606Y8X00AP)

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
DB701	B0FBBQ000007	BRIDGE DIODE	1	20A, 600V
L701	F5020W100AP	CHOKE COIL	1	
Q701	B1JAGV000015	TRANSISTOR SI	1	1000V
T701	△ A609A8X00AP	H.V. TRANSFORMER	1	
C701	F0C2H284A012	CAPACITOR	1	0.28μF/500VDC
C702	F0C2E455A246	CAPACITOR	1	4.5μF/250VDC

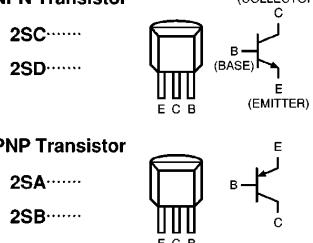
## 8.7. How to check the semiconductors using an OHM meter

### Diode



### Transistor

#### NPN Transistor

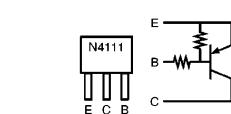


#### PNP Transistor



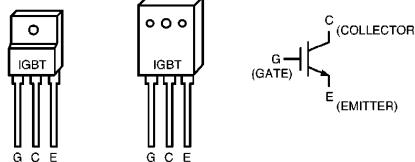
### Digital Transistor

#### PNP Transistor



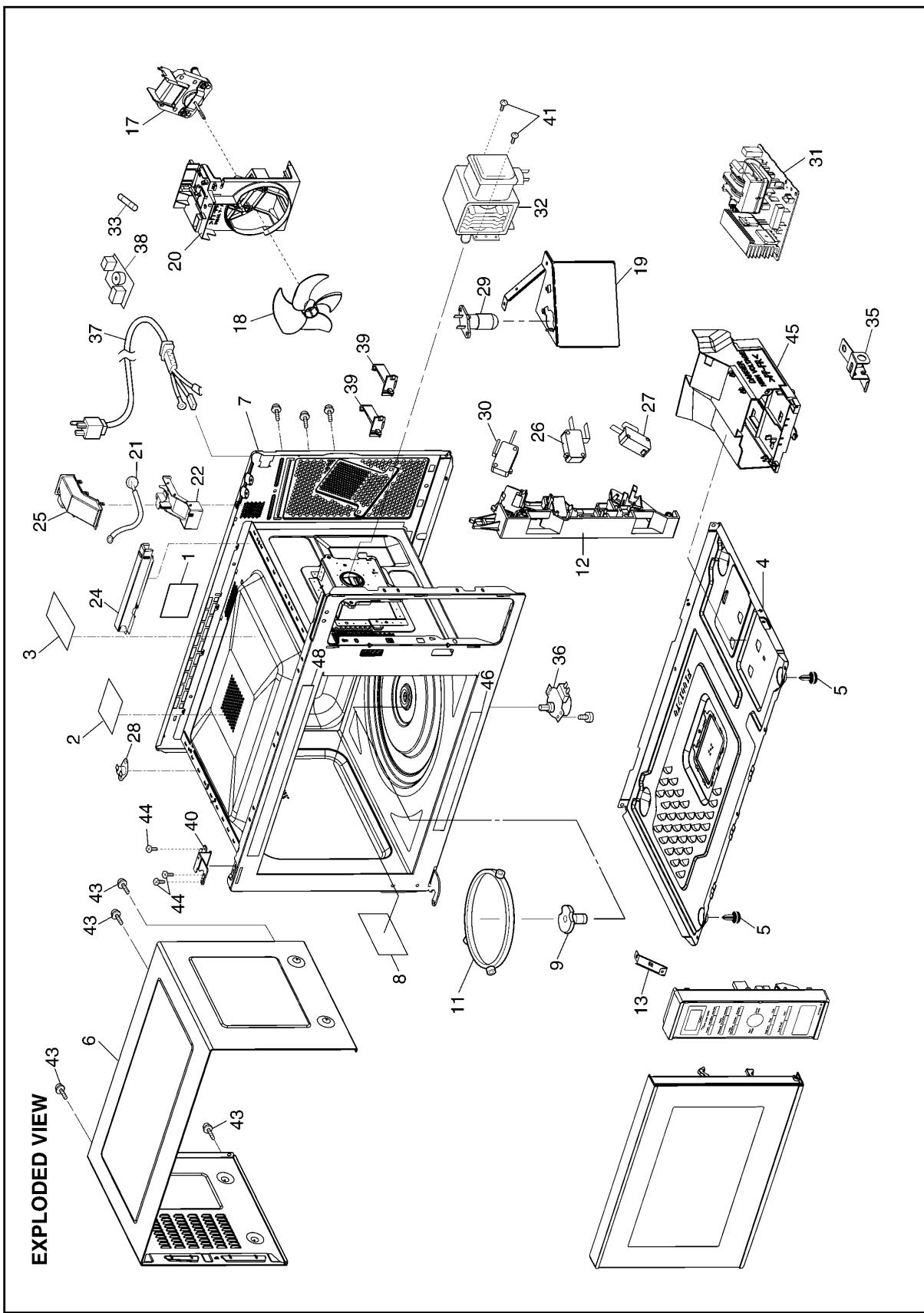
### IGBT

#### (INSULATED GATE BIPOLAR TRANSISTOR)



## 9 EXPLODED VIEW AND PARTS LIST

## **9.1. EXPLODED VIEW**



## 9.2. 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:

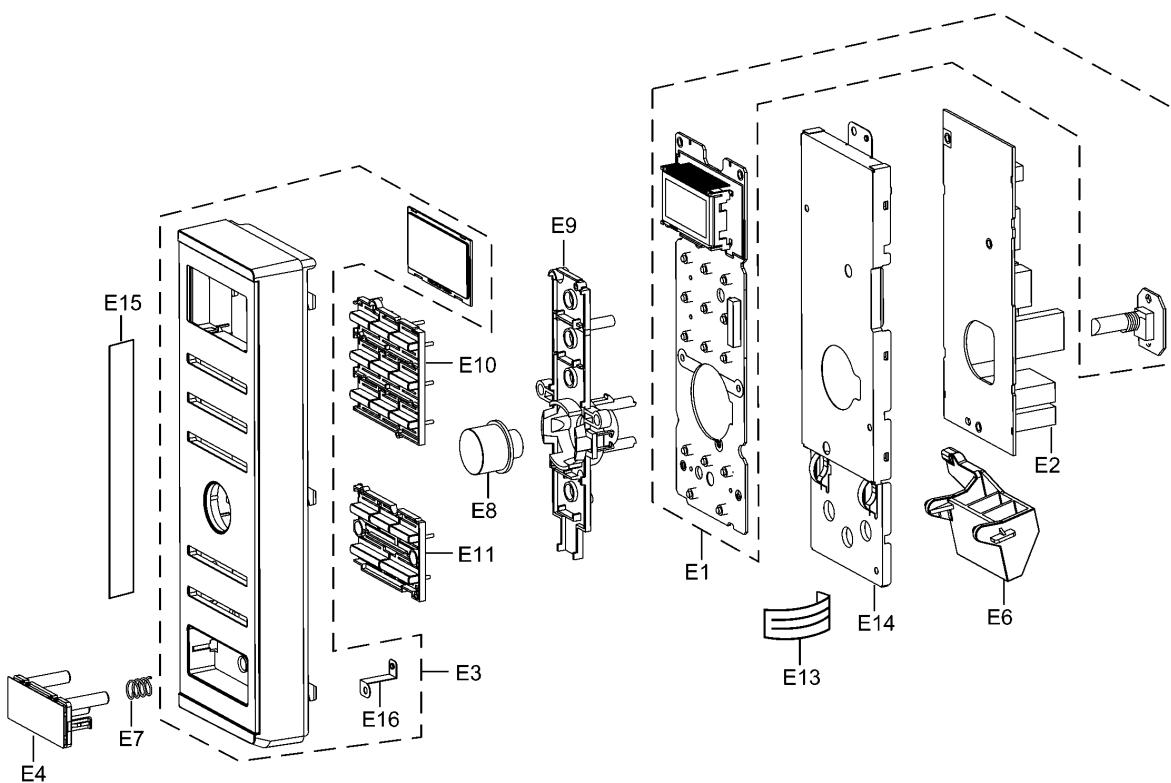
Components identified by  mark have special characteristics important for safety.

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

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
1	F00064W70AP	CAUTION LABEL	1	SD681S,SN671S,SN661S,SA661S,SA651S
1	F00069660AP	CAUTION LABEL	1	SN651B,SN651W,SA631B,SA631W
2	F21559Y10QP	OVEN STICKY PAPER	1	
3	F00339Y00AP	FUSE LABEL	1	
4	F10019Y00AP	BASE	1	
5	F10089W40HPS	RUBBER FOOT	2	
6	F10099Y00SAP	CABINET BODY (U)	1	SD681S,SN671S,SN661S,,SA661S,SA651S
6	F10099Y00BAP	CABINET BODY (U)	1	SN651B,SA631B
6	F10099Y00HAP	CABINET BODY (U)	1	SN651W,SA631W
7	 F200A9Y00HAP	OVEN (U)	1	SD681S,SN671S,SN661S,SN651B,SN651W
7	 F200A9Y10HAP	OVEN (U)	1	SA661S,SA651S,SA631B,SA631W
8	F20559Y00AP	COVER	1	
9	F21319Y00AP	PULLY SHAFT	1	
11	F290D6W50XP	ROLLER RING (U)	1	
12	 F30209Y00AP	DOOR HOOK	1	
13	F11619Y00AP	REINFORCEMENT BRACKET	1	
17	F400A9Y10AP	FAN MOTOR	1	AC120V, SINGLE PHASE, 60Hz
18	F40089Y00AP	FAN BLADE	1	
19	F40259Y00AP	AIR GUIDE A	1	
20	F41449Y00AP	ORIFICE	1	
21	J607S4T00AP	STEAM SENSOR	1	SD681S,SN671S,SN661S,SN651B,SN651W
22	F64499Y00AP	SENSOR COVER A	1	SD681S,SN671S,SN661S,SN651B,SN651W
24	F64508660AP	SENSOR COVER B	1	SD681S,SN671S,SN661S,SN651B,SN651W
25	F65439Y00AP	SENSOR COVER C	1	SD681S,SN671S,SN661S,SN651B,SN651W
26	 F61425U30XN	MICRO SWITCH	1	(PRIMARY INTERLOCK SWITCH)
27	 F61415U30XN	MICRO SWITCH	1	(SECONDARY INTERLOCK SWITCH)
28	 F61456N60AP	THERMAL CUTOUT	1	
29	F612E9Y00AP	INCANDESCENT LAMP (U)	1	
30	 F61785U30XN	MICRO SWITCH	1	(MONITOR SWITCH)
31	 F606Y8X00AP	H.V. INVERTER (U)	1	
32	 2M261-M39R	MAGNETRON	1	
33	 F62308F00AP	FUSE	1	
35	F66629Y00AP	GROUNDING PLATE	1	
36	F63265G60AP	TURNTABLE MOTOR	1	
37	 F900C9Y00AP	AC CORD W/PLUG	1	SD681S,SN671S,SN661S,SA661S,SA651S
37	 F900C4T00AP	AC CORD W/PLUG	1	SN651B,SN651W,SA631B,SA631W
38	F607X9S00CP	NOISE FILTER	1	
39	F11409W00XP	STOPPER	2	
40	F30069Y00AP	HINGE A	1	
41	XTWFA4+12T	SCREW	2	FOR MAGNETRON
43	XTTBFE4T10AO	SCREW	4	FOR CABINET BODY
44	XTWFA4+12LR	SCREW	3	FOR HINGE A
45	F65859Y00AP	INVERTER BRACKET	1	
46	F03349Y40AP	MENU LABEL	1	SD681S
46	F03349Y00AP	MENU LABEL	1	SN671S,SN661S,SN651B,SN651W
46	F03349Y10AP	MENU LABEL	1	SA661S,SA651S,SA631B,SA631W
48	F00067C50AP	CAUTION LABEL	1	

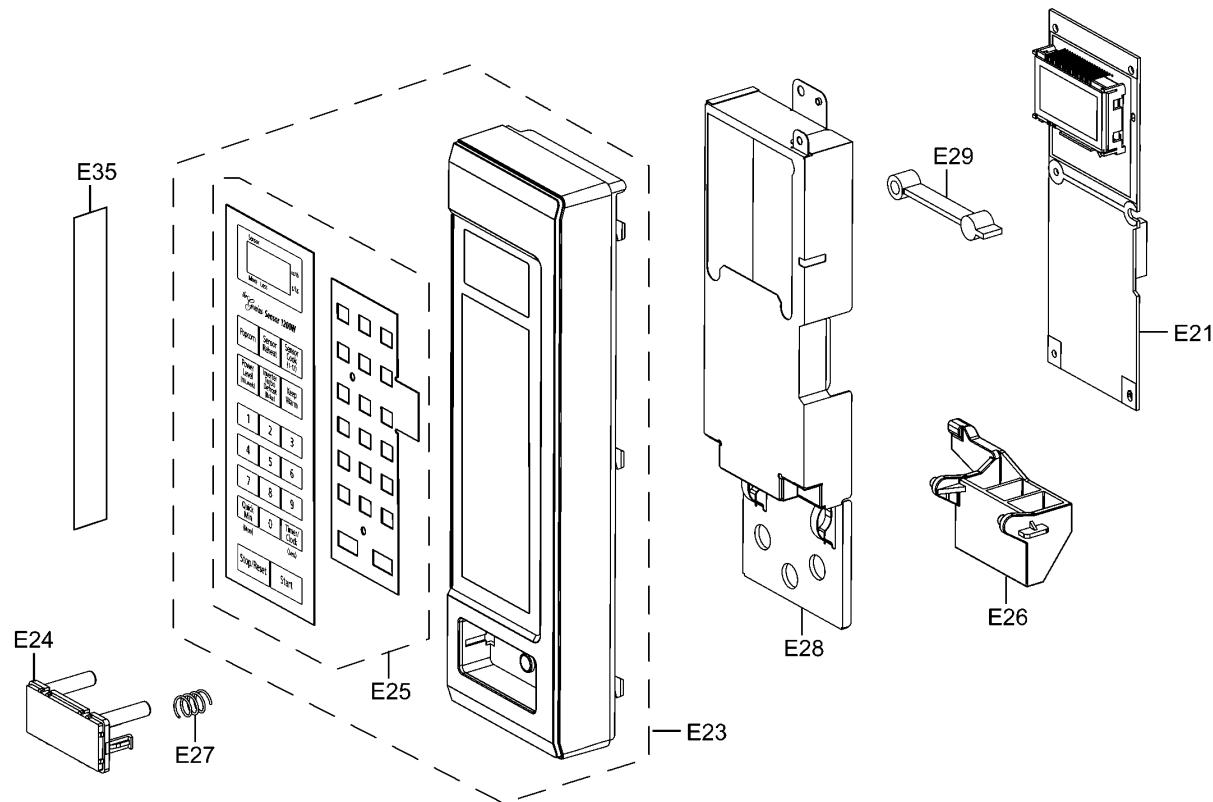
## 9.3. ESCUTCHEON BASE ASSEMBLY

### 9.3.1. NN-SD681S



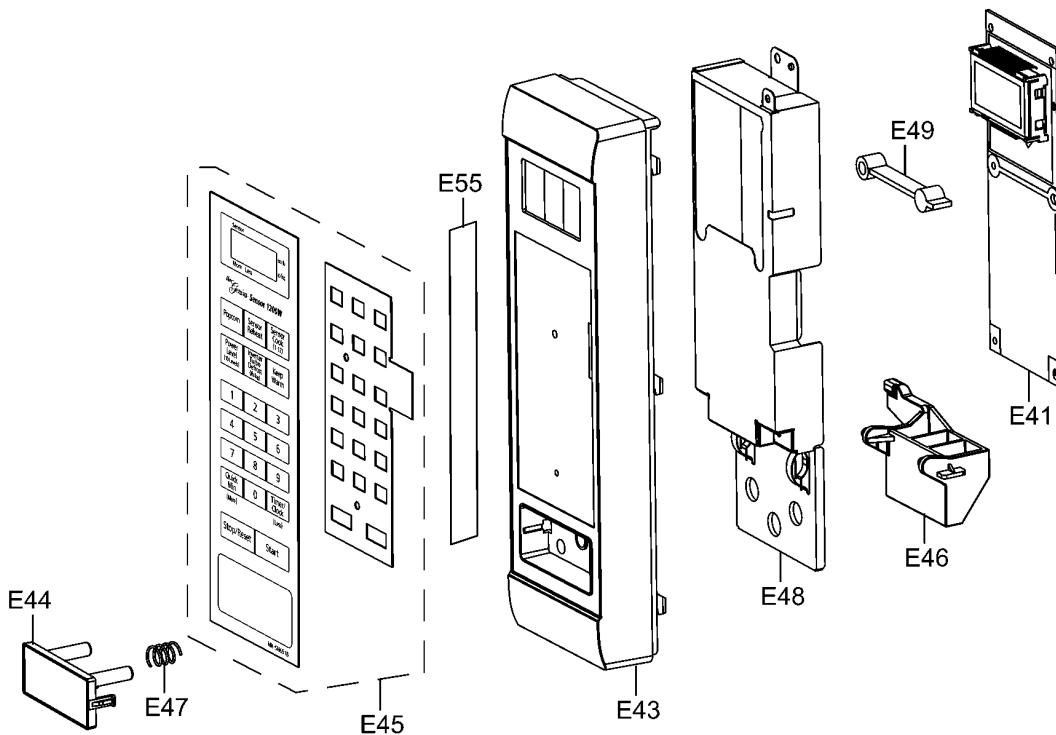
Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
E1	F603L9Y40AP	D.P. CIRCUIT (AU)	1	SD681S
E2	F603Y9Y40AP	D.P. CIRCUIT (DU)	1	SD681S
E3	F800L9Y40SAP	ESCUTCHEON BASE (U)	1	SD681S
E4	F891P9Y40SAP	DOOR OPENING BUTTON (U)	1	SD681S
E5				
E6	F82569Y00AP	DOOR OPENING LEVER	1	
E7	F80375K00AP	COOK BUTTON SPRING	1	
E8	F803G9M60SBP	POP-OUT DIAL (U)	1	SD681S
E9	F80189Y40AP	DIAL SUPPORT	1	SD681S
E10	F82989Y40SAP	BUTTON	1	SD681S
E11	F82989Y90SAP	BUTTON B	1	SD681S
E13	F66167D00AP	FLAT CABLE	1	SD681S
E14	F81279Y40AP	BACK PANEL	1	SD681S
E15	F00079Y40SAP	NAME PLATE	1	SD681S
E16	F33169Y40AP	GROUNDING METAL	1	SD681S

### 9.3.2. NN-SN671S, SN661S, SA661S, SA651S



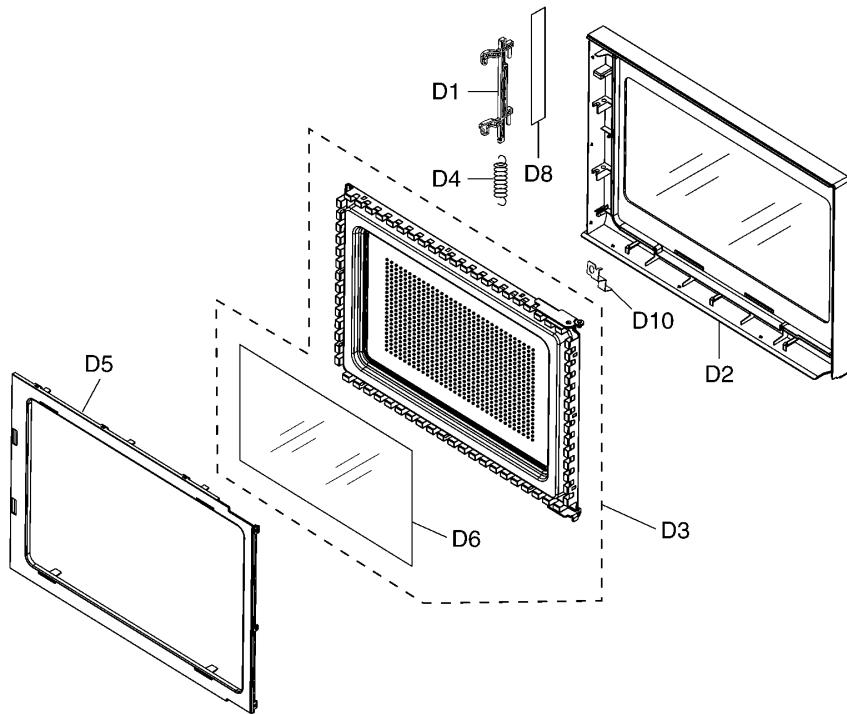
Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
E21	F603L9Y00AP	D.P.CIRCUIT (AU)	1	SN671S, SN661S
E21	F603L9Y10AP	D.P.CIRCUIT (AU)	1	SA661S, SA651S
E23	F800L9Y80SAP	ESCUTCHEON BASE (U)	1	SN671S
E23	F800L9Y30SAP	ESCUTCHEON BASE (U)	1	SN661S
E23	F800L9Y20SAP	ESCUTCHEON BASE (U)	1	SA661S
E23	F800LBD20SAP	ESCUTCHEON BASE (U)	1	SA651S
E24	F891P9Y20SAP	DOOR OPENING BUTTON (U)	1	SN671S, SN661S, SA661S, SA651S
E25	F630Y9Y80SAP	MEMBRANE SWITCH(U)	1	SN671S
E25	F630Y9Y30BAP	MEMBRANE SWITCH(U)	1	SN661S
E25	F630Y9Y20BAP	MEMBRANE SWITCH(U)	1	SA661S
E25	F630YBD20BAP	MEMBRANE SWITCH(U)	1	SA651S
E26	F82569Y00AP	DOOR OPENING LEVER	1	
E27	F80375K00AP	COOK BUTTON SPRING	1	
E28	F81279Y20AP	BACK PANEL	1	SN671S, SN661S, SA661S, SA651S
E29	F66139Y20AP	BACKSTOP	1	SN671S, SN661S, SA661S, SA651S
E35	F00079Y80SAP	NAME PLATE	1	SN671S
E35	F00079Y30SAP	NAME PLATE	1	SN661S
E35	F00079Y20SAP	NAME PLATE	1	SA661S
E35	F0007BD20SAP	NAME PLATE	1	SA651S

### 9.3.3. NN-SN651B, SN651W, SA631B, SA631W



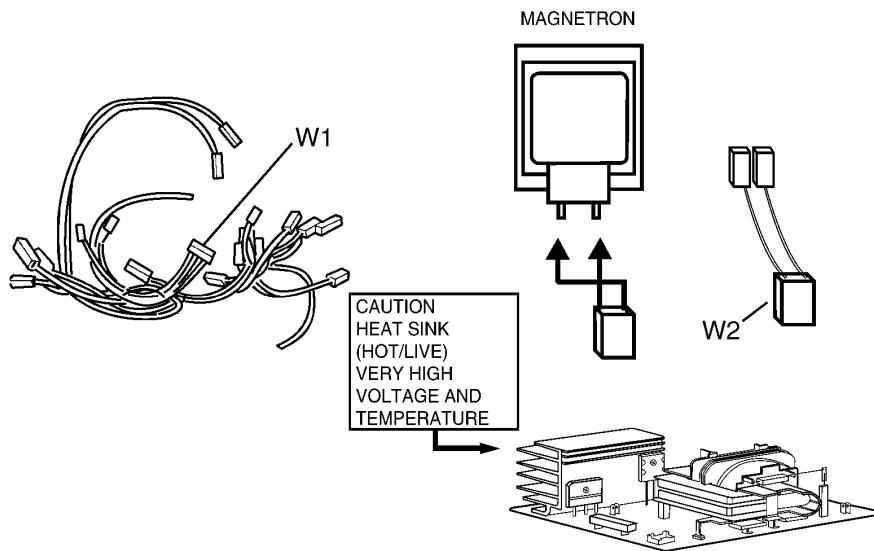
Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
E41	F603L9Y00AP	D.P.CIRCUIT(AU)	1	SN651B, SN651W
E41	F603L9Y10AP	D.P.CIRCUIT(AU)	1	SA631B, SA631W
E43	F80349Y10BAP	ESCUTCHEON BASE	1	SN651B, SA631B
E43	F80349Y10HAP	ESCUTCHEON BASE	1	SN651W, SA631W
E44	F80729Y00BAP	DOOR OPENING BUTTON	1	SN651B, SA631B
E44	F80729Y00HAP	DOOR OPENING BUTTON	1	SN651W, SA631W
E45	F630Y9Y00BAP	MEMBRANE SWITCH(U)	1	SN651B
E45	F630Y9Y00HAP	MEMBRANE SWITCH(U)	1	SN651W
E45	F630Y9Y10BAP	MEMBRANE SWITCH(U)	1	SA631B
E45	F630Y9Y10HAP	MEMBRANE SWITCH(U)	1	SA631W
E46	F82569Y00AP	DOOR OPENING LEVER	1	
E47	F80375K00AP	COOK BUTTON SPRING	1	
E48	F81279Y00AP	BACK PANEL	1	SN651B, SN651W, SA631B, SA631W
E49	F66139Y20AP	BACKSTOP	1	SN651B, SN651W, SA631B, SA631W
E55	F00079Y00BAP	NAME PLATE	1	SN651B
E55	F00079Y00HAP	NAME PLATE	1	SN651W
E55	F00079Y10BAP	NAME PLATE	1	SA631B
E55	F00079Y10HAP	NAME PLATE	1	SA631W

## 9.4. DOOR ASSEMBLY



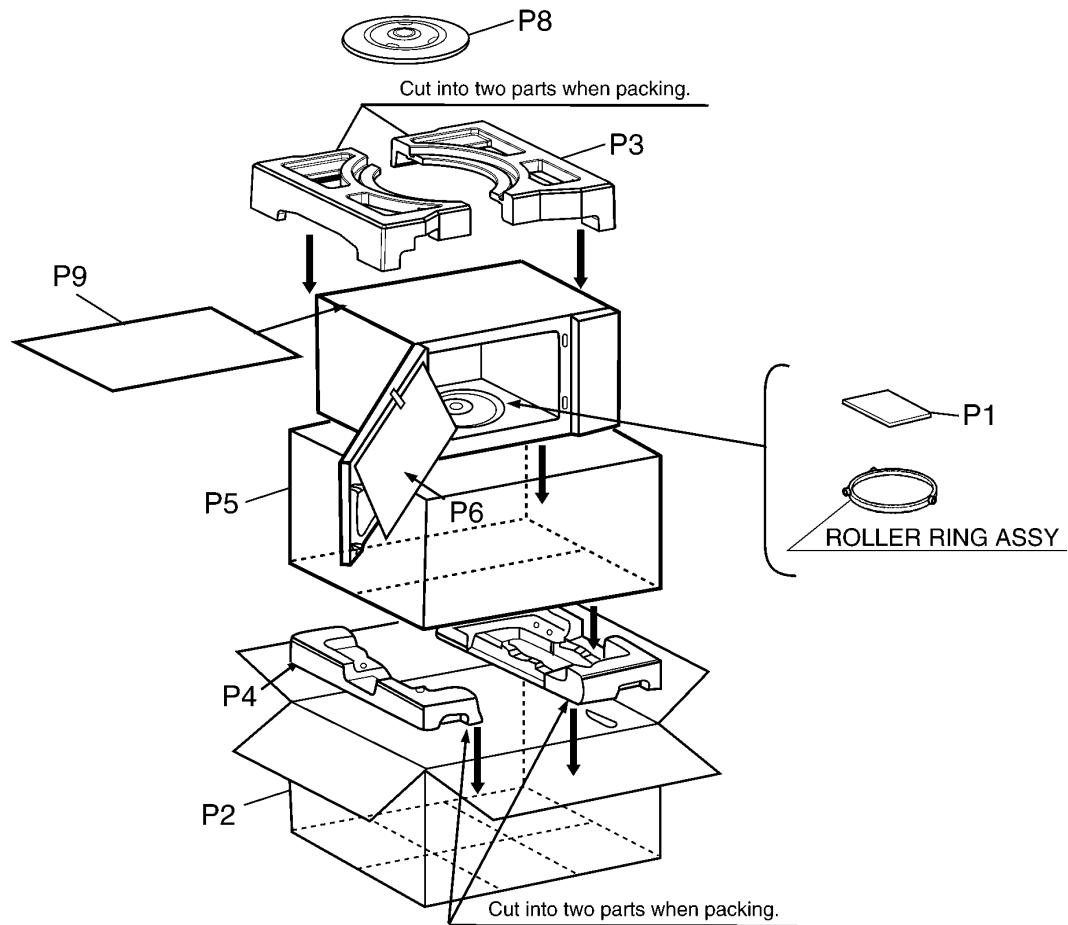
Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
D1		F30189Y00AP	DOOR KEY A	1	
D2	⚠	F302A9Y40SAP	DOOR A (U)	1	SD681S
D2	⚠	F302A9Y30SAP	DOOR A (U)	1	SN671S
D2	⚠	F302A9Y20SAP	DOOR A (U)	1	SN661S, SA661S, SA651S
D2	⚠	F302A9Y10BAP	DOOR A (U)	1	SN651B, SA631B
D2	⚠	F302A9Y10HCP	DOOR A (U)	1	SN651W
D2	⚠	F302A9Y10HAP	DOOR A (U)	1	SA631W
D3	⚠	F302K9Y00AP	DOOR E (U)	1	
D4		F30215G10XN	DOOR KEY SPRING	1	
D5	⚠	F30859Y00AP	DOOR C	1	
D6	⚠	F31459Y00AP	DOOR SCREEN A	1	
D8		F02459660AP	DHHS LABEL	1	
D10		F66629Y40AP	GROUNDING METAL	1	SD681S

## 9.5. WIRING MATERIALS



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
W1	F030A9Y00AP	LEAD WIRE HARNESS	1	(INCLUDING MAGNETRON THERMISTOR)
W2	F030E9Y00AP	H.V. LEAD WIRE	1	

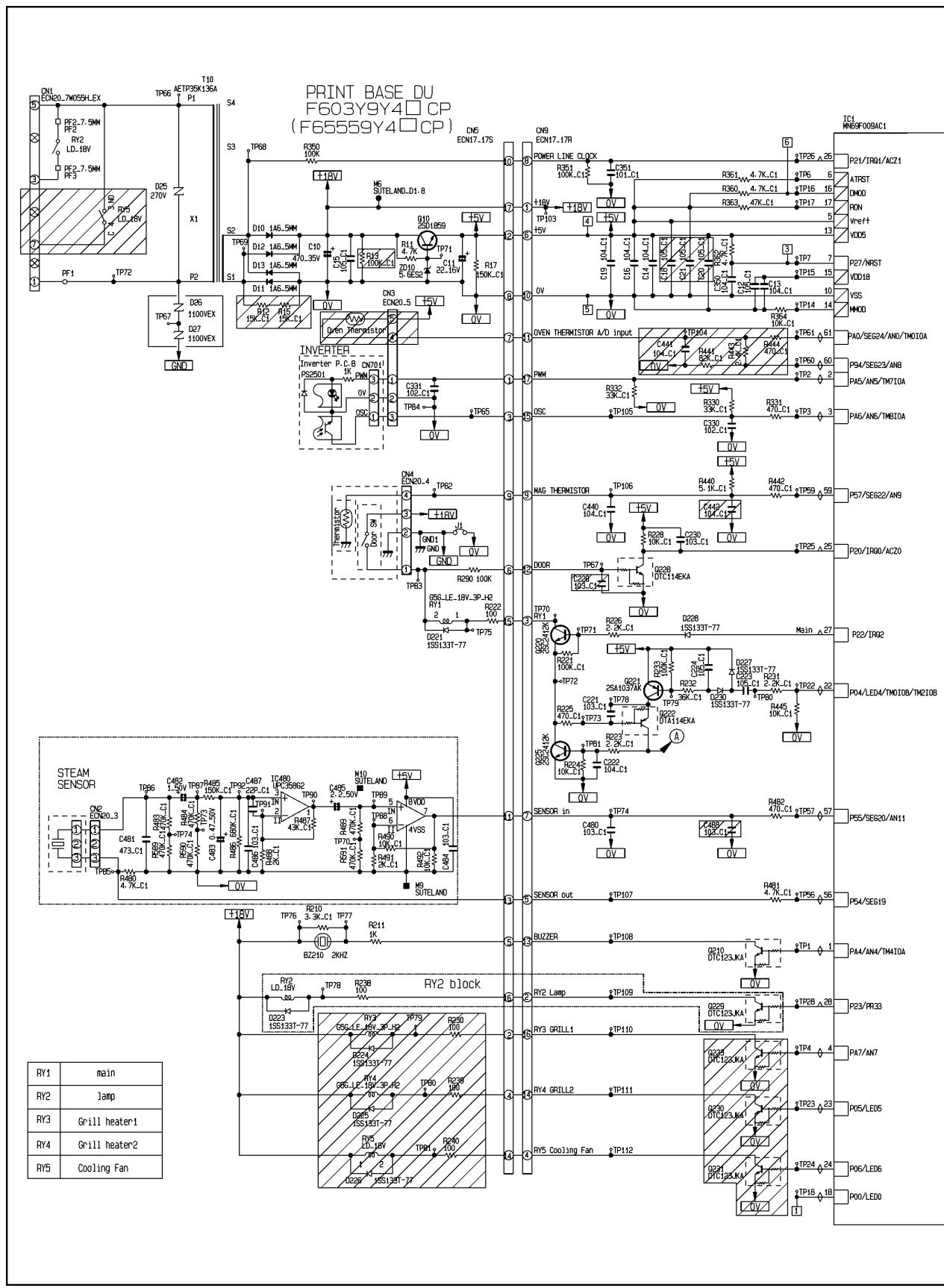
## 9.6. PACKING AND ACCESSORIES

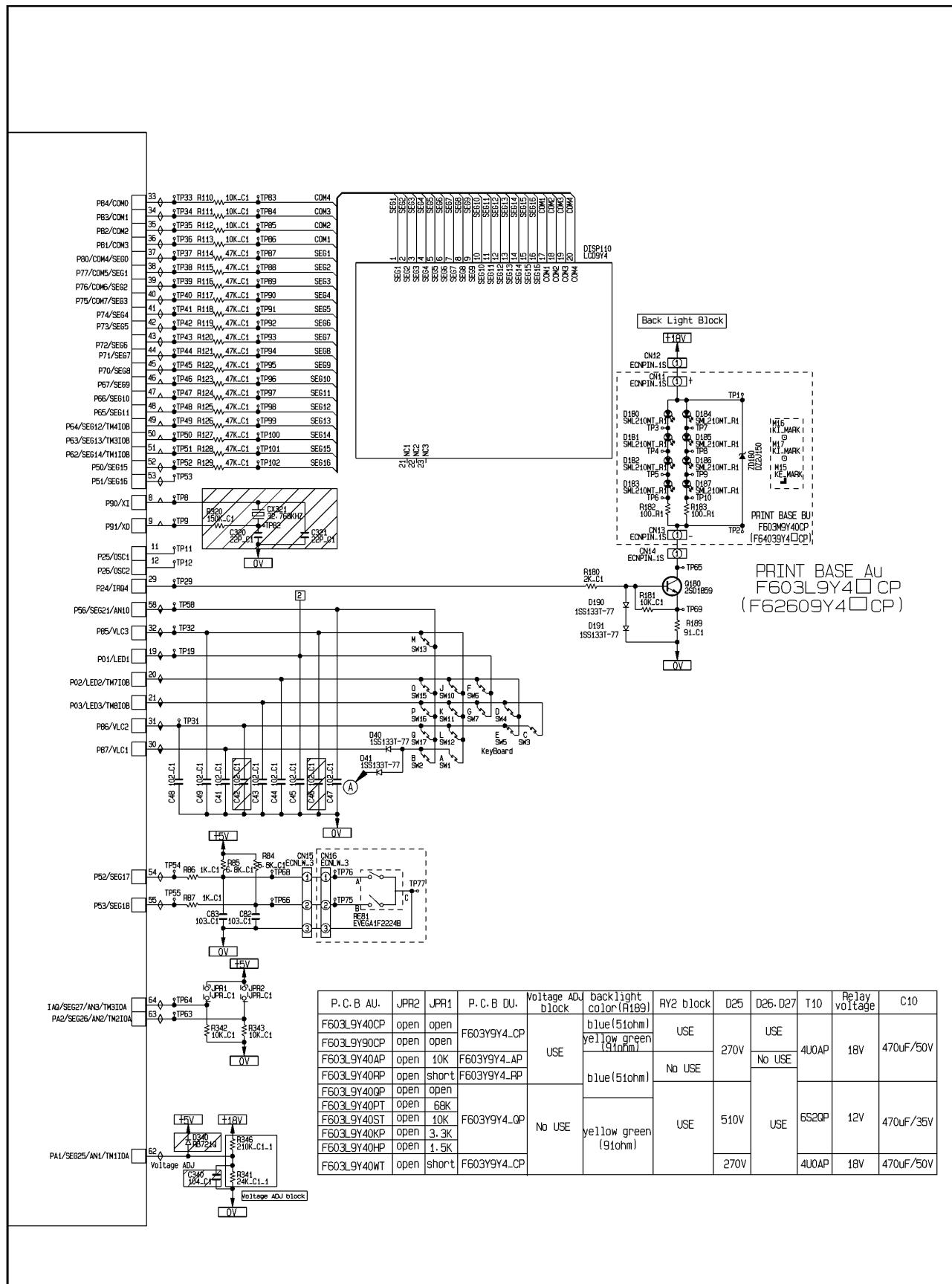


Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
P1		F00039Y40AP	INSTRUCTION MANUAL	1	SD681S
P1		F00039Y00AP	INSTRUCTION MANUAL	1	SN671S, SN661S, SN651B, SN651W
P1		F00039Y10AP	INSTRUCTION MANUAL	1	SA661S, SA651S, SA631B, SA631W
P2		F01029Y40SAP	PACKING CASE, PAPER	1	SD681S
P2		F01029Y80SAP	PACKING CASE, PAPER	1	SN671S
P2		F01029Y30SAP	PACKING CASE, PAPER	1	SN661S
P2		F01029Y20SAP	PACKING CASE, PAPER	1	SA661S
P2		F0102BD20SAP	PACKING CASE, PAPER	1	SA651S
P2		F01029Y00BAP	PACKING CASE, PAPER	1	SN651B
P2		F01029Y00HAP	PACKING CASE, PAPER	1	SN651W
P2		F01029Y10BAP	PACKING CASE, PAPER	1	SA631B
P2		F01029Y10HAP	PACKING CASE, PAPER	1	SA631W
P3		F01049Y00AP	UPPER FILLER	1	
P4		F01059Y00AP	LOWER FILLER	1	
P5		F01068100XN	P.E.BAG	1	
P6		F01078J00XN	DOOR SHEET	1	
P8		F06015Q00AP	COOKING TRAY	1	
P9		F01924T00AP	SHEET	1	

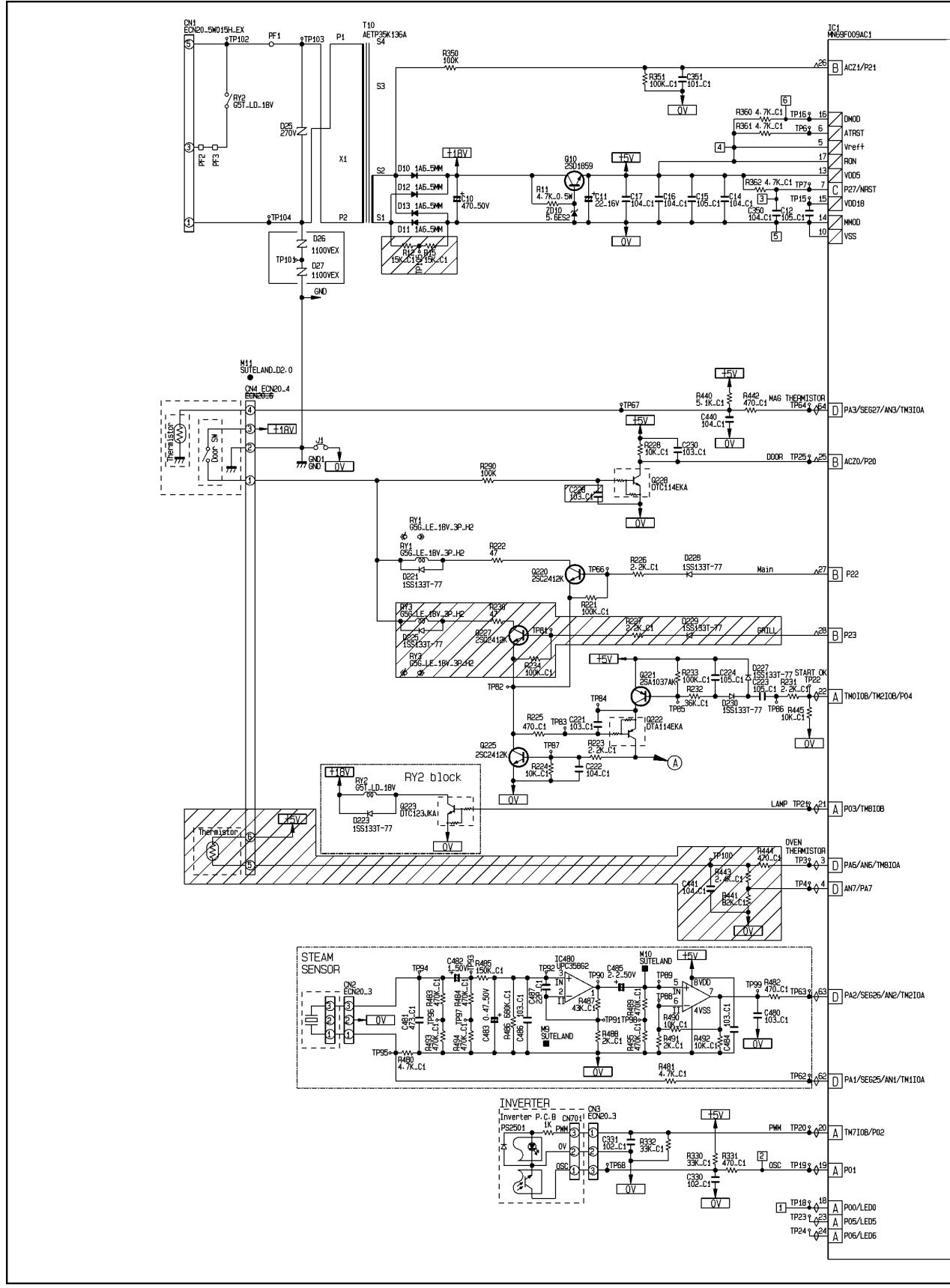
# 10 DIGITAL PROGRAMMER CIRCUIT

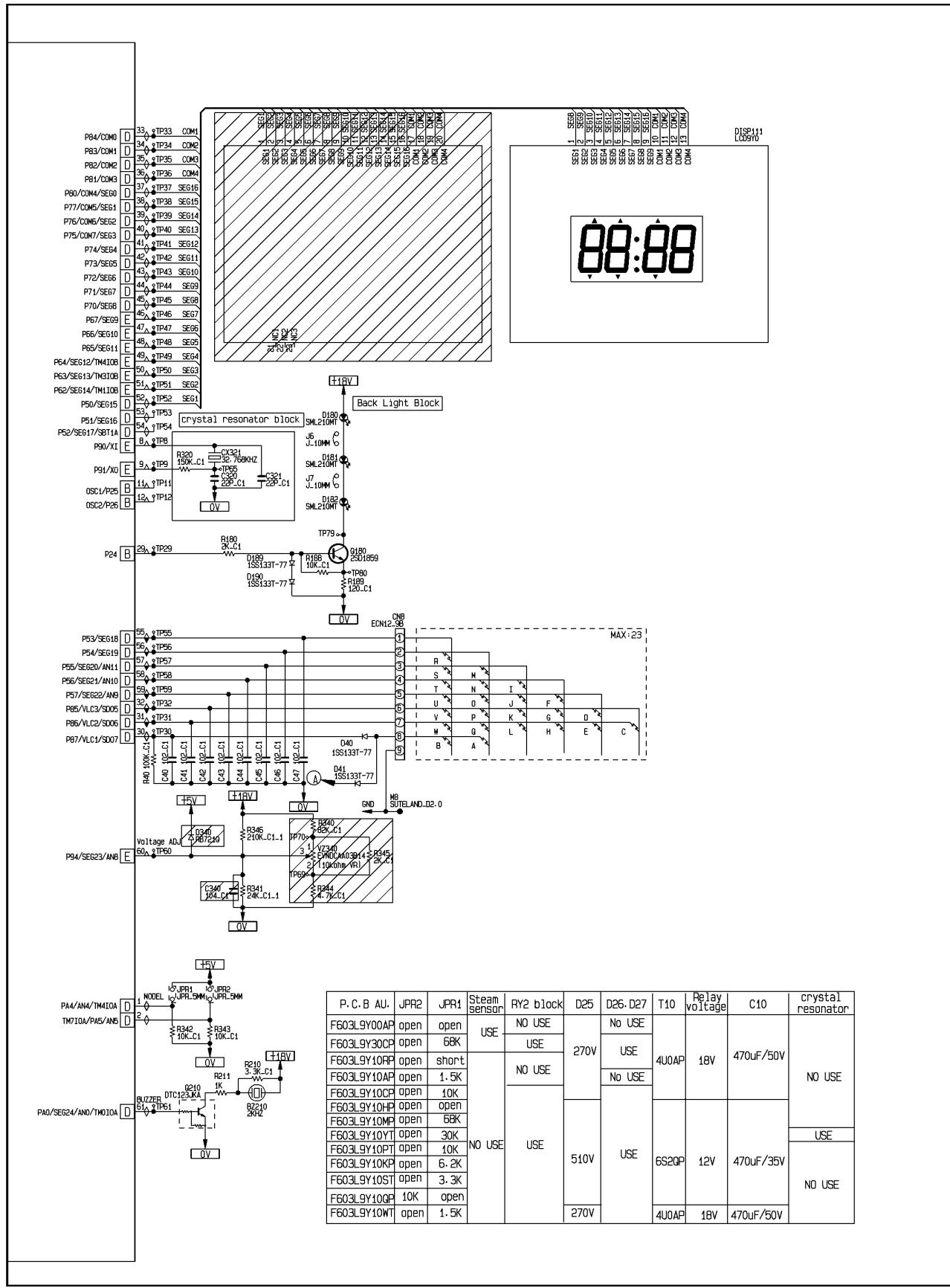
## 10.1. SCHEMATIC DIAGRAM (NN-SD681S)





## **10.2. SCHEMATIC DIAGRAM (EXCEPT NN-SD681S)**





P.C.B AU.	JPR2	JPR1	Steam sensor	RY2 block	D25	D26-D27	T10	Relay voltage	C10	Crystal resonator
F603L9Y00AP	open	open		NO USE			No USE			
F603L9Y30CP	open	68K		USE			4U0AP	18V	470uF/50V	
F603L9Y10AP	open	short		NO USE						
F603L9Y10AP	open	1-5K								
F603L9Y10CP	open	10K								
F603L9Y10HP	open	68K								
F603L9Y10TP	open	30K								
F603L9Y10PT	open	10K								
F603L9Y10KP	open	6.2K								
F603L9Y10ST	open	3-3K								
F603L9Y100P	10K	open								
F603L9Y10WT	open	1.5K								

## 10.3. PARTS LIST

### 10.3.1. NN-SD681S

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
BZ210	L0DDEA000014	BUZZER	1	2.0KHz
C10	F2A1H471B575	AL CHEM CAPACITOR	1	470µF/50V
C11	F2A1C220B624	AL CHEM CAPACITOR	1	22µF/16V
C482	F2A1H1ROB574	AL CHEM CAPACITOR	1	1µF/50V
C483	F2A1HR47B574	AL CHEM CAPACITOR	1	0.47µF/50V
C485	F2A1H2R2B574	AL CHEM CAPACITOR	1	2.2µF/50V
DISP110	L5AYAYY00101	LCD	1	
DISP HOLDER	F66175W00AP	LCD HOLDER	1	
	F67525E40XN	DIFFUSION SHEET	1	
D40,D41,D190,D191,D221,D227, D228,D230	B0AACK000004	DIODE	8	
D10-D13	B0EAKT000025	DIODE	4	
IC1	MN69F009AD1	L.S.I.	1	
IC480	COABBA000230	IC	1	
Q10,Q180	B1BAAJ000003	TRANSISTOR	2	
D25	D4EAY271A036	ZENER RESISTOR	1	270V
RY1	AEBGJQC25F18	POWER RELAY	1	
T10	G4C2AAD00006	LOW VOLTAGE TRANSFORMER	1	120V
SW1-SW7,SW10-SW13,SW15-SW17	EVQ11L05R	SWITCH	14	
RE81	EVEJ1HF2224B	REVOLVING ENCODER	1	
ZD10	B0BA5R600016	ZENER DIODE	1	
ZD180	DZ2J15000L	ZENER DIODE	1	

### 10.3.2. NN-SN671S, SN661S, SN651B/W

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
BZ210	L0DDEA000014	BUZZER	1	2.0KHz
C10	F2A1H471B575	AL CHEM CAPACITOR	1	470µF/50V
C11	F2A1C220B624	AL CHEM CAPACITOR	1	22µF/16V
C482	F2A1H1ROB574	AL CHEM CAPACITOR	1	1µF/50V
C483	F2A1HR47B574	AL CHEM CAPACITOR	1	0.47µF/50V
C485	F2A1H2R2B574	AL CHEM CAPACITOR	1	2.2µF/50V
DISP110	L5AYAYY00096	LCD	1	
DISP HOLDER	F66179Y20AP	LCD HOLDER	1	
	F67525E20XN	DIFFUSION SHEET	1	
D40,D41,D189,D190,D221,D227, D228,D230	B0AACK000004	DIODE	8	
D10-D13	B0EAKT000025	DIODE	4	
IC1	MN69F009AC1	L.S.I.	1	
IC480	COABBA000230	IC	1	
Q10,Q180	B1BAAJ000003	TRANSISTOR	2	
D25	D4EAY271A036	ZENER RESISTOR	1	270V
RY1	AEBGJQC25F18	POWER RELAY	1	
T10	G4C2AAD00006	LOW VOLTAGE TRANSFORMER	1	120V
ZD10	B0BA5R600016	ZENER DIODE	1	

### 10.3.3. NN-SA661S, SA651S, SA631B/W

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
BZ210	L0DDEA000014	BUZZER	1	2.0KHz
C10	F2A1H471B575	AL CHEM CAPACITOR	1	470µF/50V
C11	F2A1C220B624	AL CHEM CAPACITOR	1	22µF/16V
DISP110	L5AYAYY00096	LCD	1	
DISP HOLDER	F66179Y20AP	LCD HOLDER	1	
	F67525E20XN	DIFFUSION SHEET	1	
D40, D41, D189, D190, D221, D227, D228, D230	B0AACK000004	DIODE	8	
D10-D13	B0EAKT000025	DIODE	4	
IC1	MN69F009AC1	L.S.I.	1	
Q10, Q180	B1BAAJ000003	TRANSISTOR	2	
D25	D4EAY271A036	ZENER RESISTOR	1	270V
RY1	AEBGJQC25F18	POWER RELAY	1	
T10	G4C2AAD00006	LOW VOLTAGE TRANSFORMER	1	120V
ZD10	B0BA5R600016	ZENER DIODE	1	

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 S-9Y0, S-9Y1  
 S-9Y2, S-9Y3  
 S-9Y4, S-9Y8  
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