Service Manual Microwave Oven



# NN-C781JF



# Specifications:

Specifications:	Models:	NN-C781JF
Power Source:		240V AC Single Phase, 50Hz For KNQ Models
		230V-240V AC Single Phase, 50Hz . For MNQ, YNQ Models
		220V AC Single Phase, 50Hz For HNE, TNE, YKE, KKE, ZPE Models
		220V AC Single Phase, 50/60Hz For SNM Models
		120V AC Single Phase, 60Hz For WNT Models
Power Requirement:	Microwave	1260W
	Heater	1550W
Output:	Microwave (ICE 705)	1000W
	Heater	1515W
Microwave Frequency:		2450MHz
Timer:		30min (HIGH) / 99min. 59sec
Outside Dimensions:		400mm (W) x 520mm (D) x 312mm (H)
Oven Cavity Dimensions:		373mm (W) x 373mm (D) x 206mm (H)
Weight:		15.5kg
Output		t power: IEC705-88 Test Procedure
Specificatio		tions subject to change without notice.



© 2001 Shanghai Matsushita Microwave Oven Co.,Ltd All rights reserved. Unauthorized copying and distribution is a violation of law.

## A 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  $\triangle$  on the replacement parts list. It is essential that these critical parts should be replaced only with the manufacture's specified parts to prevent microwave leakage, shock, fire, or other hazards. Do not modify the orginal design.

This service manual covers products for following markets.

When troubleshooting or replacing parts, please refer to the country/area identifications shown below for your applicable product specification.

HNE	For Hong Kong	KKE	For UAE, Egypt, Iran
YNQ	For Singapore	KNQ	For Kuwait, Doha, Quatar
MNQ	For Malaysia		Oman, Bahrain, Pakistan
TNE	For Thailand, Indonesia	SNM	For Saudi Arabia
YKE	For Others	ZPE	For CIS Countries
WNT	For Tai Wan		

# 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 (arcing, 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.

(Page)

## CONTENTS

## (Page)

FEATURE CHART 4	DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE
CONTROL PANEL 4	COMPONENT TEST PROCEDURE
OPERATION AND DIGITAL PROGRAMMER	MEASUREMENTS AND ADJUSTMENTS
CIRCUIT TEST PROCEDURE	PROCEDURE FOR MEASURING MICROWAVE ENERGY LEAKAGE 21
SCHEMATIC DIAGRAMS	TROUBLESHOOTING GUIDE
DESCRIPTION OF OPERATING SEQUENCE	EXPLODED VIEW AND PARTS LIST
CAUTIONS TO BE OBSERVED WHEN TROUBLESHOOTING 11	SCHEMATIC DIAGRAM &
	PARTS LIST OF DIGITAL PROGRAMMER CIRCUIT

## 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.			
IT HAS: 1.	Very high voltage and high current of	circuits.	
	it functions the same as the high volta	ge transformer and high voltage capacitor in ordinary microwave ovens.	
2.	Aluminum heat sink is energized wi	th very high voltages and high heat energy.	
3.	Very high voltage may remain in circuitry even when oven is off. High voltage may remain in the capacitors		
	on the board.		
DO NOT:	Do not touch sizewith hosewas it has	way bet (bigh veltage) size with a France when replacing based extreme	
* I.	care should be taken to avoid possi	ble electric shock hazards. High voltage may remain in circuit.	
* 2.	Do not touch aluminum heat sink bed	cause it is very hot in high voltage and also very hot in high heat energy.	
* 3.	Do not try to adjust or tamper with <b>p</b>	preset volume on the Inverter board because it is very dangerous to	
	adjust without proper test equipment	nt.	
* 4.	Do not test oven while Inverter grou	nding plate or screws are loose. It is very dangerous to operate H.V.	
+ 5	Inverter Circuit (U) with loose moun	ting screws or if improperly grounded.	
^ J.	Do not try to repair Inverter PCB be	cause it is very dangerous to repair it. Replace as whole High Voltage	
	Inverter Circuit unit and return fully	re-packed with original shipping box and shipping materials.	
		INVERTER POWER SUPPLY	
[			
e	ę	HEAT SINK HIGH VOLTAGE	
<b>O</b>		HEAT SINK HIGH VOLTAGE (RECTIFIER BRIDGE) TRANSFORMER	
		HEAT SINK HIGH VOLTAGE (RECTIFIER BRIDGE) TRANSFORMER	
		HEAT SINK HIGH VOLTAGE (RECTIFIER BRIDGE) TRANSFORMER CHOKE COIL	
		HEAT SINK (RECTIFIER BRIDGE) CHOKE COIL CURRENT	
		HEAT SINK (RECTIFIER BRIDGE) TRANSFORMER CHOKE COIL CURRENT TRANSFORMER SAND BAR	
	GROUND	HEAT SINK HIGH VOLTAGE (RECTIFIER BRIDGE) TRANSFORMER CHOKE COIL CURRENT TRANSFORMER SAND BAR RESISTOR PRIMARY WINDINGS	
	GROUND	HEAT SINK (RECTIFIER BRIDGE) CHOKE COIL CURRENT TRANSFORMER SAND BAR RESISTOR PRIMARY WINDINGS SECONDARY	
	GROUND METAL	HEAT SINK (RECTIFIER BRIDGE) CHOKE COIL CURRENT TRANSFORMER SAND BAR RESISTOR PCB	
	GROUND	HEAT SINK (RECTIFIER BRIDGE) CHOKE COIL CURRENT TRANSFORMER SAND BAR RESISTOR PRIMARY WINDINGS SECONDARY WINDINGS HIGH VOLTAGE DIODES	
	GROUND	HEAT SINK (RECTIFIER BRIDGE) CHOKE COIL UURRENT TRANSFORMER SAND BAR RESISTOR PCB CHOKE COIL UHRENT TRANSFORMER AND BAR RESISTOR PCB CHOKE COIL UHRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL UHRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL UHRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL UHRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL UHRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL UHRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL CURRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL CURRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL CURRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL CURRENT CHOKE COIL CURRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL CURRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL CURRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL CURRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL CURRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL CURRENT CHOKE COIL CURRENT CHOKE COIL CURRENT CHOKE COIL CURRENT CHOKE COIL CURRENT CHOKE COIL CURRENT CHOKE COIL CURRENT CHOKE COIL CURRENT CHOKE COIL CURRENT CHOKE COIL CHOKE COIL CURRENT CHOKE COIL CURRENT CHOKE COIL CHOKE CHOKE COIL CHOKE CHOKE C	
	GROUND METAL	HEAT SINK (RECTIFIER BRIDGE) CHOKE COL URRENT TRANSFORMER SAND BAR RESISTOR PCB CHOKE COL URRENT TRANSFORMER SAND BAR DO NOT TOUCH	
	GROUND METAL METAL FELEASE TAB TO MAKE FLAT	HEAT SINK (RECTIFIER BRIDGE) CHOKE COIL UHRENT SAND BAR RESISTOR PCB CHOKE COIL UHRENT TRANSFORMER AND BAR RESISTOR CHOKE COIL DO NOT TOUCH	
	RELEASE TAB	HEAT SINK (RECTIFIER BRIDGE) CHOKE COLL URRENT TRANSFORMER SAND BAR RESISTOR PCB CHOKE COLL URRENT TRANSFORMER SAND BAR RESISTOR CHOKE COLL URRENT TRANSFORMER SAND BAR RESISTOR CHOKE COLL URRENT TRANSFORMER SAND BAR RESISTOR CHOKE COLL URRENT TRANSFORMER SAND BAR RESISTOR CHOKE COLL URRENT TRANSFORMER SAND BAR RESISTOR CHOKE COLL CHORE CHORE COLL CHORE CHORE	
	RELEASE TAB TO MAKE FLAT	HEAT SINK (RECTIFIER BRIDGE) CHOKE COIL URRENT RESISTOR RESISTOR CHOKE COIL URRENT TRANSFORMER RESISTOR CHOKE COIL URRENT TRANSFORMER CHOKE COIL DI CHOKE COIL CHORE CHOKE COIL DI CHOKE COIL CHORE CHORE CH	
	RELEASE TAB TO MAKE FLAT	HEAT SINK (RECTIFIER BRIDGE) HIGH VOLTAGE TRANSFORMER CURRENT TRANSFORMER SAND BAR RESISTOR PC CURRENT TRANSFORMER DO NOT TOUCH TRANSFORMER SAND BAR RESISTOR DO NOT TOUCH	
	RELEASE TAB TO MAKE FLAT	HEAT SINK (RECTIFIER BRIDGE) TRANSFORMER CHOKE COLL CURRENT TRANSFORMER AND BAR RESISTOR PCB DO NOT TOUCH	
	RELEASE TAB TO MAKE FLAT	HEAT SINK (RECTIFIER BRIDGE) CHOKE COL UURRENT SAND BAR RESISTOR PCB CHOKE COL UURLENT TRANSFORMER NAISSON RESISTOR CHOKE COL UURLENT TRANSFORMER DO NOT TOUCH CHOKE COL UURLENT TRANSFORMER DO NOT TOUCH CHOKE COL UURLENT DO NOT TOUCH	
	RELEASE TAB TO MAKE FLAT	HEAT SINK (RECTIFIER BRIDGE) CHOKE COL URRENT TRANSFORMER SAND BAR RESISTOR PC CHOKE COL URRENT TRANSFORMER SAND BAR RESISTOR DO NOT TOUCH CHOKE COL URRENT TRANSFORMER SAND BAR RESISTOR DO NOT TOUCH CHOKE COL URRENT TRANSFORMER SAND BAR NEIN CAPACITORS VIRISTOR PIMARY WINDINGS SECONDARY WINDINGS DO NOT TOUCH	

# FEATURE CHART

FEATURE	NN-C781JF
Three Stage Cooking	0
Grill	0
Convection Bake	0
Combination	0
Turbo Defrost	0
Sensor Reheat	0
One Touch Cook (weight)	0
Sensor Cook	0
Child Safety Lock	0
Delay Start	0
Timer/Stand	0
Digital Clock	0



process. Another tap cancels all your instructions and time of day or colon appears on the display window.

# **CONTROL PANEL**

NN-C781JF

Pull Door Handle:

Pull to open the door. Opening the door during cooking will stop the cooking process without cancelling the program. Cooking resumes as soon as the door is closed and Start Pad is pressed. The oven lights will turn on and stay on whenever the door is opened. It is quiet safe to open the door at any time during a cooking program and there is no risk of microwave exposure. **Beep Sound:** 

When a pad is pressed correctly, a beep will be heard. If a pad is pressed and no beep is heard, the unit has not accepted the instruction. The oven will beep twice between programmed stages. At the end of any complete program, the oven will beep five times.

# **OPERATION AND DIGITAL PROGRAMMER CIRCUIT TEST PROCEDURE**



Power connected, then scroll display "88.88". Press **Start** pad once for Chinese only. Press twice for both Chinese and English sisplay. Press 3 times for English only. Press 4 times for BAHASA only.

## 1. To Set Clock

OPERATION	SCROLL DISPLAY
1. Plug the power supply cord into wall outlet.	88.88
2. Press <b>Start</b> pad twice to select English.	ENGLISH
3. Press Clock pad.	*
4. Enter time of day (TOD) by press- ing appropriate 10 1 10 1 pads.	11 3 25
5. Press <b>Clock</b> pad. TOD has now been resistered into the digital programmer circuit and will count up by minutes.	11:25

## 2. Time Cooking for Two Stage

OPERATION	SCROLL DISPLAY
1. Place a water load in the oven.	
<ol> <li>Press Micro Power pad once to set High power. (1st stage)</li> </ol>	HIGH
3. Set for 5 seconds by pressing 101 101 pads.	5 s
4. Press Micro Power pad 4 times to set Medium power. (2nd stage)	MEDIUM
5. Set for 1 minute by pressing 101101]pads.	<b>1 00</b> min s
6. Press <b>Start</b> pad.	¢ 5 <sub>s</sub>

OPERATION	SCROLL DISPLAY
7. When 1st stage cooking time has elapsed. Oven beeps twice and automatically switches to 2nd stage cooking.	∅ <b>1 00</b> min s
8. When 2nd stage cooking time has elapsed, oven beeps 5 times and shuts off.	Time of day or colon if set appears in the display.

## 3. Grill

OPERATION	SCROLL DISPLAY
1. Press <b>Grill</b> pad.	GRILL 1
2. Set for 30 minutes by pressing 1011101 pads.	<b>30 00</b> min s
3. Press <b>Start</b> Pad.	∅ <b>30 00</b> min s
4. When cooking time has elapsed. Oven beeps 5 times and shuts off.	Time of day or colon if set appears in the display.

### 4. Combination

OPERATION	SCROLL DISPLAY
1. Press <b>Combination</b> pad.	COMB 1
2. Set for 2 hours by pressing 1011101 pad.	2H 00s
3. Press <b>Start</b> pad.	Ø <b>2H 00</b> s
4. When cooking time has elapsed. Oven beeps 5 times and shuts off.	Time of day or colon if set appears in the display.

## 5. Turbo Defrost

OPERATION	SCROLL DISPLAY
1. Set the weight for 1 kg by press- ing <b>1.0 kg</b> pads.	1.0 KG
2. Press <b>Start</b> pad.	Ø <b>14 36</b> min s
3. When cooking time has elapsed. Oven beeps 5 times and shuts off.	Time of day or colon if set appears in the display.

## 6. One Touch Cooking

OPERATION	SCROLL DISPLAY
1. Set the weight for 500g by pressing <b>Roast Beef</b> pad.	500 G
2. Press Start pad.	∅ <b>14 00</b> min s
3. When cooking time has elapsed. Oven beeps 5 times and shuts off.	

## 7. Convection Bake

OPERATION	SCROLL DISPLAY	
1. Press Conv. Bake pads twice.		
	160°C	
2. Press <b>Start</b> pad.		
	Ø <b>P</b>	
3. When cooking time has elapsed. Oven beeps 5 times and shuts off.		

## 8. To Set Child Safety Lock

OPERATION	SCROLL DISPLAY
1. Press <b>Start</b> pad 3 times continuously. "LOCK" appears in the display	LOCK

## 9. To Reset Child Lock

OPERATION	SCROLL DISPLAY	
1. Press <b>Stop/Reset</b> ) pad 3 times continuously.	Time of day or colon if set appears in the display.	

## 10. Demonstration Mode

The domonstration mode designed for retail store display. It is not designed for home use. Cooking will not operate during demonstration mode.

To set demonstration mode.

OPERATION	SCROLL DISPLAY
1. Press Clock pad 3 times	
continuously.	
Note: To cancel demonstration	DEMO MODE
mode, press Clock pad 3	
times continuously.	

## 11. Sensor Cooking

Note: Make sure that the control panel is installed before Sensor Cooking tast since Auto Sensor function does not operate properly without the outer panel.

OPERATION	SCROLL DISPLAY
<ol> <li>Pour 150±15cc (4.5±<sup>1</sup>/<sub>2</sub> ozs) of room temperature water in a oven glassware or ceramic utensil.</li> <li>Place the oven glassware or ceramic utensil in the center of the oven.</li> </ol>	
2. Tap Sensor Reheat pad.	
3. Tap <b>Start</b> pad.	Ø
<ol> <li>The steam sensor detects steam about 1.5 to 4 minutes after the Start Pad is tapped.</li> <li>Sensor Brown Cooking (T1) automatically switches to time cooking (T2)</li> </ol>	Ø 18 s
"AUTO" disappeares with beep sounds and the remainder of cooking time appears in display window. NOTE: Cooking time will vary depending on the water temperature, the shape of beaker or the power source voltage.	Ø 48 s
5. When the balance of cooking time has elapsed, oven stops and beeps five times.	

## SCHEMATIC DIAGRAM

### NN-C781JF (EXCEPT ZPE & WNT)



## SCHEMATIC DIAGRAM

NN-C781JF (ZPE, WNT)



# **DESCRIPTION OF OPERATING SEQUENCE**

### 1. Variable power cooking control

HIGH-VOLTAGE INVERTER POWER SUPPLY (U) controls output power by the signal from Digital Programmer Circuit (DPC). Power relay 1 stays on but the inverter drive signal to control it's output power.

### NOTE 1: 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.

NOTE 2: If microwave cooking is over 3 minutes, fan motor rotates for 1 minute after cooking to cool oven and electric components.

## 2. Inverter Power Supply Circuit NEW H.V.

This Inverter Power Supply Circuit supplies 4,000V DC to the magnetron tube from the line voltage, 220-240V 50Hz / 120V 60Hz AC input. functions as the H.V. transformer, the H.V.capacitor and H.V.Diode.

- (A) The AC input voLtage 220-240V 50Hz / 120V 60Hz is rectified to DC voltage immediately.
- (B) DC voltage will be supplied to the switching devices called IGBT. These devices will be switched ON-OFF by the 20 to 40 kHz PWM. (pulse width modulation) signal from the microcomputer in the DPC.
- (C) This drives the High voltage transformer to increase up to 2,000V AC and approximately 3V AC by means of transformer.
- (D) Then the half-wave doubler voltage rectifier circuit, consisting of the HV diodes and Capacitors, generates the necessary 4,000V DC needed for the magnetron.
- (E) Output power of the magnetron tube is always monitored by the signal output from the current transformer built into the inverter ciruit.
- (F) Then this signal will be fed back to the microcomputer in the DPC to determine operating conditions and output necessary to control PWM signal to the inverter Power Supply to control output power.

## 3. Turbo Defrost Control

When this Auto Control feature is selected and the Start Pad is tapped:

- (A) The digital programer 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.
- (B) When cooking time the display window has elapsed, the oven tums off automatically by a control signal from the digital programmer circuit.

## 4. Convection Cooking Control

The digital programmer circuit controls the ON-OFF time of the heater in order to control oven cavity temperature.

- (A) After the start pad is tapped with the desired Bake/Broil program set, an 12V DC singal comes out of the digital programmer circuit and is applied to coil of power relay (RY4).
- (B) When the contacts of power relay 4 close, power source voltage is applied to the heater and the heater turns on.
- (C) When the oven temperature reaches the set temperature, the digital programmer circuit senses the temperature through oven temp sensor and stops supplying and 12V DC signal to the coil of power relay 4 and the heater turns off.
- (D) After the heater turns off, the oven temperature will continue increasing a while and then decrease as shown in Figure. When the oven temperature drops below the set temperature, the digital programmer circuit senses the signal and starts supplying an 12C DC signal to the coil of power relay again.

## Variable Power Cooking

POWER SETTING	OUTPUT POWER(%) APPROX.	RY-1	INVERTER CONTROL SIGNAL
HIGH	100%	stay ON	stay ON
MEDIUM-HIGH	70%	stay ON	stay ON
MEDIUM	55%	stay ON	stay ON
MEDIUM-LOW	30%	15s ON / 7s OFF	ON / OFF
LOW	10%	8s ON / 14s OFF	ON / OFF
DEFROST	30%	16s ON / 6s OFF	ON / OFF

### **Turbo Defrost**

WEIGHT SELECTED	COOKING TIME
1.0KG	14min. 36 sec.

## **Convection Cooking**



## 5. Combination Cooking

Combination cooking is accomplished by microwave and convection cooking being done alternately during one combination cooking cycle. One combination cooking cycle is 22 seconds.

- (A) During combination cooking, the digital programmer circuit controls ON-OFF time of both power relay 1 and 4 as shown in Figure.
- (B) When the power relay 1 (RY1) is turned on, heater turns off and after the power relay 1 turns off, power relay 4 turns on.
- NOTE 1: Note that the heater may not be on during a heater on period if the preprogrammed oven temperature has been reached. This is due to the fact that the oven is keeping the preprogrammed oven temperature constant, so of course the heater will only be on when it is needed and off when it is not needed.
- NOTE 2: As for temperatures of combination cooking for convection, the temperatures by each program are preprogrammed in the microprocessor as shown in Figure.

OVEN TEMP	START SELECTED OVEN TEMP
HEATER (RY4)	85 14S OFF ON
CONVECTION FAN MOTOR (RY5)	ON
MICROWAVE (RY1)	AS 14S ON OFF
FAN MOTOR (RY3)	

## **EX COMEINATION 1**

Combination	Microwave (RY 1)	
No.	ON (SEC)	OFF (SEC)
1	8	14
2	5	17
3	12	10

# CAUTIONS TO BE OBSERVED WHEN TROUBLESHOOTING

Unlike many other appliances, the microwave oven is high-voltage, high current equipment. Though it is free from danger in ordinary use, extreme care should be taken during repair.

### CAUTION

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

### 1. Check the grounding

Do not operate on a 2-wire extension cord. The microwave oven is designed to be used when grounded. When it is inoperative, make

sure it is grounded properly before beginning repair work.

## 2. Inverter Warnings NEW H.V.

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

This High Voltage Inverter Power Supply circuit supplies very high voltage and very high current for the magnetron tube. Though it is free from danger in ordinary use, extreme care should be taken during repair. As you can see, it looks like a TV flyback transformer, however the current is extremely large and so danger exists because of its high current and high voltages.

The aluminum heat sink is also energized with high voltage (HOT), so do not touch when AC input terminal is connected to the power line because one of the IGBT switching power devices (Collector) is directly connected to the Aluminum heat sink.

The Aluminum heat sink may be HOT from heat energy; therefore, extreme care should be taken during servicing and replacing.

## WARNING OF INVERTER POWER SUPPLY (U) GROUNDING

Check the High Voltage Inverter Power Supply circuit grounding. This High Voltage Inverter Power Supply circuit board must have a proper chassis ground by the grounding bracket to the chassis ground; otherwise, this H.V. Inverter circuit board will expose very high voltage and cause extreme DANGER! Be sure to have proper grounding by the grounding plate and screws.

## WARNING OF DISCHARGING HIGH VOLTAGE CAPACITORS

Warning about the electric charge in 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 make sure to touch chassis ground side first then short to the output terminals.

## 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 oven energized.

DO NOT measure the voltage in the high voltage circuit including filament voltage of magnetron.

### WARNING

Never touch any circuit wiring with your hand nor with an insulated tool during operation.

3. When parts must be replaced, remove the power plug from the outlet.

# 4. When the 10 Amp fuse is blown due to the operation of short switch:

### WARNING

When the 18 Amp. fuse if blown due to the operation of short switch, you must replace Primary latch switch and short switch. Also replace power relay B (RY1) when the continuity check reads shorted contacts (1-2).

- (A) This is mandatory. Refer to "Measurements and Adjustments" for these switches.
- (B) When replacing the fuse, confirm that it has the appropriate rating for these models.
- (C) When replacing faulty switches, be sure mounting tabs are not bent, broken or otherwise deficient in their ability to hold the switches.
- 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 other holes or gaps, because such objects may work as an antenna and cause microwave leakage.



Touch chassis side first then short to the high voltage diode terminal.



### 6.Confirm after repair

(A) After repair or replacement of parts, make sure that the screws of the oven, etc. are neither loose nor missing.

Microwaves might leak if screws are not properly tightened.

- (B) Make sure that all electrical connections are tight before inserting the plug into the wall outlet.
- (C) Check for microwave energy leakage. (Refer to procedure for measuring microwave energy leakage.)

## CAUTION

## **MICROWAVE RADIATION**

DO NOT BECOME EXPOSED TO RADIATION FROM THE MICROWAVE GENERATOR OR OTHER PARTS CONDUCTING MICROWAVE ENERGY.

# IMPORTANT NOTICE NEW H.V.

- 1. The following components have potentials above 250V while the appliance is operating..
  - \* 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 on these portions.
- When the appliance is operated with the door hinges or magnetron fixed incorrectly, the microwave leakage can reach more than 5mW/cm<sup>2</sup>. After repair or exchange, it is very important to check if magnetron and the door hinges are correctly fixed.

# DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

### 1. Magnetron

- 1. Discharge the high voltage capacitors.
- 2. Remove A screw holding magnetron on bracket.
- 3. Remove 2 high voltage lead wires.
- 4. Remove circulation fan motor bracket and belt. (2 screws)
- 5. Remove air guide. (2 screws)
- 6. Remove 4 screws holding 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.

### NOTE

Magnetron used for this model is unique type for inverter power supply system. Make sure to use the one as listed in the part list.

NOTE: Magnetron used for this modes is unique type for inverter power supply system. Make sure to use the one as listed in the part list.



- NOTE: Be sure to ground any static electric charge built up on your body, before handling the DPC.
- 1. Disconnect all connectors from D.P.C.
- 2. Remove 2 screws holding escutcheon base and slide the escutcheon base upward slightly with door closed.
- Release CN5 connector's lock of DPC by pushing both levers to inside and pull them upward, and remove flat cable of membrane key board.
- 4. Remove 3 screws holding DPC.

### To replace membrane key board

- 5. Remove escutcheon bracket from escutcheon base by freeing 5 catch hooks on the escutcheon base.
- 6. On some models, the key board is not replaced with individual parts. Instead, the entire escutcheon base assembly must bu replaced. Refer to parts list.



0



### 3. Inverter Power Supply (U)

- 1. Discharge high voltage capacitors.
- 2. Remove 2 screws holding magnetron bracket. (Remove grounding wire)
- 3. Remove 3 screws holding inverter and fan motor assembly.
- 4. Unplug 3 connectors of inverter PCB.
- 5. Remove 2 screws holding inverter PCB on to bracket.
- NOTE: Do not pull by lead wires but make sure to pull housing unless PCB or lead wire may break.









### 4. Door assembly

1. Remove door spring right side.

NOTE: Please hold door unless door become fall down.

- 2. Remove door arm lever by pushing tab and turn clock wise.
- 3. Remove door spring left.
- 4. Insert flat blade screw driver to release hinge pin from left hinge.
- 5. Slide out left hinge pin to release the door.
- 6. Slide out door arms from the oven to disconnect door assembly.
- 7. Remove door arms from the door assembly.
  - To remove door C
- Release catch hooks from hinge pin side.
   To remove door E
- Remove screws holding door E to door A assembly. After replacement of the defective component parts of the door, reassemble it and follow the instructions below for proper installation and adjustment so as to prevent an excessive microwave leakage. Adjustment of the door assembly.
- When mounting the door to the oven, be sure to adjust, the door parallel to the oven face plate by moving hinges back or front.
- NOTE: Upper portion of door A should farmly touch to oven face plate without pushing.











### 5. Turntable motor

- 1. Breaking off at 5 spots indicated by allow with a cutter or like.
- 2. Remove 2 screws holding motor cover.
- 3. Disconnect 2 lead wires from turntable motor.
- 4. Remove 2 screws holding turntable motor.
- NOTE: Make sure to remove sharp barrs at 5 spots to avoid possible injury.



### 6. Heater

- 1. Remove belt.
- 2. Remove 2 lead wires from heater.
- 3. Remove 2 screws holding heater and oven temperature sensor.
- 4. Turn right to release hooks to remove heater assembly.
- 5. Remove a screw to release heater.



- 1. Remove 1 screw holding steam sensor unit.
- 2. Disconnect CN2 connector from digital programmer circuit board.
- 3. Remove exhaust guide from steam sensor unit.
- 4. Remove catch hooks on sensor mounting plate and air guide.
- 5. Remove steam sensor from sensor mounting plate.
- NOTE: When installing the steam sensor, make sure that the direction of steam sensor is as shown in figure.









## **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.
- Before touching any oven components, or wiring, always unplug the oven from its power source and discharge the high voltage capacitors.

# 1. Primary Latch Switch, Secondary (Secondary Latch Switch and Power Relay B) Interlocks.

- (A) Unplug the lead connectors to Power Relay B and verify continuity of the power relay B 1-2 terminals.
- (B) Unplug lead connectors to Primary Latch Switch and Secondary Latch Switch.
- (C) 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	0 Ω (close)	$\infty \Omega$ (open)
Secondary Latch Switch	0 Ω (close)	$\infty \Omega$ (open)
Power Relay B	$\infty \Omega$ (open)	$\infty \Omega$ (open)

### 2. Short Switch & Monitor

- (A) Unplug lead wires from Inverter Power Supply (U) primary terminals.
- (B) Connect test probes of ohm meter to the disconnected leads which were connected to Inverter Power Supply (U).
- (C) 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
0.0	∞ Ω

#### 3. Magnetron

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

- (A) Isolate magnetron from the circuit by disconnecting the leads.
- (B) A continuity check across magnetron filament terminals should indicate one ohm or less.
- (C) A continuity check between each filament terminal and magnetron case should read open.



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.  Inverter Power Supply (U) DO NOT try to REPAIR this H.V. Inverter power supply (U).Replace as whole H.V. Inverter(U) Unit.



- DO NOT TOUCH

Test 1

- A. Place 1 liter of water load into oven cavity.
- B. Unplug 2 pin H.V. lead wire connector CN703 from magnetron tube.
- C. 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 approx. at 0.5 to 1.0A. If both 1 and 2 are OK, please proceed to test 2.

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

Test 2.

- Continued from Test 1
- A. Unplug 3 pin connector, CN701 & CN703 remains unplug.
- B. Set oven at High power for 1 minute and start.
- 1. After approximately 3 seconds, oven stops.
- 2. During oven operation, input current is approximately less than 0.4A.

	INPUT AMPERE	SYMPTOM
Unplug CN701	< 0.4A	Oven stops in 3 seconds after started.

If both 1 and 2 are OK, the Inverter Power Supply (U) can be determined OK.

### 6. Sensor Cooking

Auto sensor cooking is a revolutionary way to cook by microwave 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**

- During the first 10 second period there is no microwave activity, and when calculating the T2 time by using the formula below make sure this 10 second is subtracted from the T1 time. In other words T1 time starts at the end of the 10 second period.
- T1 time... The total amount of time it takes the microwave oven to switch to T2 time after the 10 second 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.

T2 time (in sec.)=T1 time X K factor

- NOTE: Remember, the T1 time starts after the 10 second period. The coefficient K is programmed Into the mlcroprocessor 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, and the Auto program selected is Frozen Vegetable:

T2 = T1 X K

=2 min. and 40 sec. X 0.1

- =160 sec. X 0.1
- =16 sec.

### 7. Sensor Reheat

Auto Sensor Reheat is a quick and easy way to reheat refrigerator 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 same as Auto Sensor Cooking process.



Sensor Cooking

Category	P1	P2	K Factor
	Power	Power	Standard
Frozen Vegetables	M.HIGH	LOW	0.1

#### Sensor Reheat

Category	P1	P2	K Factor	
	Power	Power	Standard	
Sensor Recheat	HIGH	M.HIGH	0.2	

8. Steam Sensor and Digital Programmer Circuit

In order to determine if the steam sensor function of the digital programmer circuit is in working order or not, 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 cooking (T2).
- 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)	
1 Min. 30 Sec.~4 Min.	18 Sec.~48 Sec.	

### 9. Oven temp sensor thermistor

This sensor monitors the heat produced by the heater circuit and maintains the oven temperature the user had selected. Normal room  $10^{\circ}$ C to  $30^{\circ}$ C. The reading across the oven sensor thermistor should be within 100K ohm to 300K ohm when reading in an area with the  $50^{\circ}$ F to  $90^{\circ}$ F room temperature range. If the resistance reading is out of the range stated here, the sensor is detective and must be replaced.

NOTE 1: When measuring resistance disconnect the 3-pin connector (CN6) from the DPC otherwise a false reading may be indicated.

NOTE 2: If checking an oven sensor thermistor just after the microwave oven has been operating, the sensor of course won't be room temperature. In this case the sensor must be removed and allowed to cool down to the 10°C to 30°C range.

# **MEASUREMENTS AND ADJUSTMENTS**

### WARNING

- \* For continued protection against radiation hazard, replace only with identical replacement parts(For touch models Part No. ANE6142-1450,Type No. V-16G-3C26-M for Primary latch switch; Part No. A61425180AP, Type No. L-3C2-2 for Secondary latch switch; Part No. A61785180AP, Type No. L-2C2-2 for short switch and Part. No. AEG5J1EG12B/AEG5J1EG18B, Type No. G5J-1-TP for power relay B(RY1))
- \* When the 10 Amp. fuse is blown due to the operation of the short switch, you must replace power relay B. Primary latch switch and the short 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.
- 1. Adjustment of Primary latch switch, Secondary latch switch and Short switch.
- (A) When mounting Primary latch switch, Secondary latch switch and short switch to door hook assembly, mount the Primary latch switch, the Secondary latch switch and the short switch to the door hook assembly as shown in table.
- NOTE: No specific adjustment during installation of Primary latch switch, Secondary latch switch and short switch to the door hook is necessary.
- (B) When mounting the door hook assembly to the oven assembly, adjust the door hook assembly by moving it in the direction of arrow 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.
- (C) Reconnect the short switch and check the continuity of the monitor circuit and all latch switches again by following the components test procedures.

### 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.
- (A) Fill the beaker with exactly one liter of tap water. Stir the water using the thermometer and record the beaker's temperature. (recorded as T1).
- (B) Place the beaker on the center of glass cook plate. Set the oven for High power and heat it for exactly one minute.
- (C) When one minute is elapsed, open the door and take out beaker.
- (D) Stir the water again and read the temperature of the beaker. (recorded as T2).
- (E) The normal temperature rise at High power position for each model is as shown in table.



TABLE (1L-1min. test)

RATED OUTPUT	TEMPERATURE RISE	
1000W (IEC705-88)	Min. 15.4°F (8.6°C)	

# 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>. After repairing or replacing any radiation safety device, keep a written record for future reference, the leakage reading must be recorded on the service repair ticket while in the customer's home.

### 1. Equipment

\*Electromagnatic radiation monitor \*Glass thermometer 212°F or 100°C \*600cc glass beaker

### 2. Procedure for measuring radiation leakage

Note before measuring.

- (1) Do not exceed meter full scale deflection. Leakage monitor should initially be set to the highest scale.
- (2) 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).
- (3) Leakage with the outer panel removed ...... less than 5mW/cm<sup>2</sup> .
- (4) Leakage for a fully assembled oven with door normally closed ...... less than 2mW/cm² (1mW/cm² for Canada).
- (5) Leakage for a fully assembled oven [Before the latch switch (primary) is interrupted] while pulling the door ...... less than 2mW/cm<sup>2</sup>.
- (A) Pour 275  $\pm$  15cc (9ozs"  $\pm$  1/2oz) of 20"  $\pm$  5"C (68"  $\pm$  9"F) water in a beaker which is graduated to 600cc, and place in the center of the oven.
- (B) Set the radiation monitor to 2450MHz and use it following the manufacturer's recommended test procedure to assure correct results.
- (C) When measuring the leakage, always use the 2 inch (5cm) spacer supplied with the probe.
- (D) 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.
- (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 measur ing around the magnetron.

## WARNING

Avoid contacting any high voltage parts.

### (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 and air inlet openings.

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.

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

WARNING

AVOID CONTACTING ANY HIGH VOLTAGE PARTS.





MOVE PROBE ALONG SHADED AREA(/////)AROUND EXHAUST OPENINGS(as shown)AND AROUND AIR INLET OPENING

# DANGER HIGH VOLTAGES A

- 1. DO NOT RE-ADJUST PRESET VOLUME on the H.V.Inverter (U). It is very dangerous to repair or adjust without sufficient test equipment because this circuit handles very large current with high voltage. Off alignment of inverter board operation will be 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 remains 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 open 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. 120V/220V/230V/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.

## (Trouble 1) Oven stops operation during cooking

	SYMPTOM	CAUSE	CORRECTIONS
1.	Oven stops in 3 seconds after pressing start pad	No 120/220/230/240V AC is supplied to H.V.Inverter (U) CN702 terminals	<ol> <li>Latch Switch</li> <li>Power relay RY-1</li> <li>Loose lead wire connector CN701, CN702</li> </ol>
	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
	Oven stops in 10 seconds after pressing start pad (Auto sensor cooking)	Steam sensor circuit is not functions	1. Steam sensor 2.DPC 3. Loose wiring connector CN2
	Oven stops in 60 seconds after pressing start pad	Oven temperature sensor circuit is not functions	1. Oven temp. sensor 2. Loose wiring CN5
2.	No display and no operation at all. Fuse is blown.	Most probably loose connection of connectors or door latch mechanizm is not adjusted properly	<ol> <li>Allign door, Door Latch Switches</li> <li>Loose wiring connectors</li> </ol>



## (Trouble 2) Other troubles

	SYMPTOM	CAUSE	CORRECTIONS
1.	Oven is dead. Fuse is OK. No display and no operation at all.	<ol> <li>Open or loose lead wire harness</li> <li>Open thermal cutout (Cavity)</li> <li>Defective DPC</li> </ol>	Check fan motor when thermal cutout is defec- tive.
2.	No display and no operation at all. Fuse is blown.	<ol> <li>Shorted lead wire harness</li> <li>Defective primary latch switdh (NOTE 1)</li> <li>Defective short switch (NOTE 1)</li> <li>Defective Inverter Power Supply (U) Refer to component test procedure</li> </ol>	Check adjustment of primary, secondary latch switch and short switch including door. Refer to inverter PCB Troubleshooting
		NOTE 1: All of these switches must be replaced at the Check continuity of power relay (RY1)'s control replace power relay B (RY-1) also.	he same time. ntacts (between 1 and 2) and if it has continuity,
3.	Oven does not accept key input(Program)	<ol> <li>Key input is not insequence</li> <li>Open or loose connection of membrane key pad to DPC (Flat cable)</li> <li>Shorted or open membrane key board</li> <li>Defective DPC</li> </ol>	Refer to operation procedure. Refer to DPC troubleshooting.
4.	Oven lamp and fan motor turn on when oven is plugged in with door closed.	<ol> <li>Misadjustment or loose wiring of secondary latch switch</li> <li>Defective secondary latch switch</li> </ol>	Adjust door and latch switches.
5.	Timer starts count down but no microwave oscil- lation. (No heat while oven lamp and fan motor turn on)	<ol> <li>Off-alignment of latch switches</li> <li>Open or loose connection of high voltage circuit especially magnetron filament circuit</li> <li>NOTE: Large contact resistance will bring lower magnetron filament voltage and cause magnetron to lower output and/or be in- termittent.</li> <li>Defective high voltage component HV Inverter Power Supply (u) Magnetron</li> <li>Open or loose wiring of power relay B (RY-1)</li> <li>Defective primary latch switch</li> <li>Defective DPC or power relay B (RY-1)</li> </ol>	Adjust door and latch switches. Check high voltage component according to component test procedure and replace if it is defective. Refer to DPC troubleshooting.
6.	Oven can program but timer does not start count- down.	<ol> <li>Open or loose wiring of secondary latch switch</li> <li>Off-alignment of secondary latch switch</li> <li>Defective secondary latch switch</li> </ol>	Adjust door and latch switches.
7.	Microwave output is low. Oven takes longer time to cook food.	<ol> <li>Decrease in power source voltage</li> <li>Open or loose wiring of magnetron filament circuit.(Intermittent oscillation)</li> <li>Aging change of magnetron</li> </ol>	Consult electrician
8.	Turntable motor turns on when door is opened.	1. Shorted primary latch switch	
9.	Loud buzzing noise can be heard.	1. Loose fan and fan motor	
10.	Turntable motor does not rotate.	<ol> <li>Open or loose wiring of turntable motor</li> <li>Defective turntable motor</li> </ol>	
11.	Heater does not turn on.	<ol> <li>Defective heater</li> <li>Defective power relay 4 (RY4)</li> <li>Defective DPC</li> </ol>	

## (Trouble 3) Trouble related Digital programmer circuit

SYMPTOM	STEP	CHECK	RESULT	CAUSE/CORRECTIONS
No display when oven is first plugged in	1	Fuse resistor R28 1Ω	Normal	STEP 2
			Open	Shorted circuit of IC-10
	2	Q10 emitter	Abnormal	Q10
		(Output terminal)	Normal = 5V	→ IC-1, CX320, DISPLAY
No key input	1	Membrane switch continuity	Abnormal	Membrane switch
			Normal	IC-1
No beep sound	1	IC-1 pin 8 voltage	Abnormal	IC-1
			Normal	BZ, IC-220
Power relay A (RY-2) does not turn on even	1	IC-1 pin 41 voltage while operation	Abnormal	IC-1
though the program has been set and the			Normal = 5V	→ Step 2
start pad is tapped	2	Short circuit between pin 8 and pin	Still not turn on	RY-2
		12 of IC-220	Ry-2 turns on	IC-220
No microwave oscillation at any power	1	IC-1 pin 9 voltages while operation at	Abnormal	IC-1
setting		high power	Normal	→ Step 2
			5 = 5v	
	2	Q220 transistor	Abnormal	Q220
			Normal	IC-220, RY-1
Dark or unclear display	1	Replace display and check operation	Normal	DISPLAY
			Abnormal	IC-1
Missing or lighting of unnecessary segment	1	Replace IC-1 and check operation	Normal	IC-1
			Abnormal	DISPLAY

## (Trouble 4) Inverter circuit

Inverter PCB Repair Procedures

## Warning for High Voltages!

- 1. Unplug oven when removing outer cabinet.
- 2. never touch inverter PCB with oven plugged in inverter PCB handling over 7,000V and it is very danger!
- 3. Heat sink is also energized with High Voltages!
- 4. Discharge high voltage before touching circuitry.
- 5. When testing inverter PCB, completely install it into oven, put outer cabinet and make ground.

# 1. Discharge high voltage before touching Inverter PCB.

- 1. Unplug oven and leave it for more than 30 seconds before removing outer cabinet.
- Use insulated lead wire to short across D701 Anode to D702 Cathode or short across magnetron filament terminals to the chassis ground. Please refer to service manual for detail of the specified model.

# 2. Remove inverter PCB from oven before troubleshooting.

Refer tp related service manual for inverter PCB removal.

- 1. Visual check:
  - a. PCB board: Any crack on board, burnt printed copper foil pattern? Any cockroach, bugs excrements, any mark of wet?
  - B. Components: Any damaged components? Any burnt, broken or missing?

### How to discharge high voltage capacitors



### How to check semi conductor IGBT



### 3. Check component by circuit tester.

### Make sure remove inverter PCB when continuity check Do not test component when inverter PCB is installed

- How to check power transistors (Q701, Q702). To measure, suck a solder from its legs completely unless faulse reading may observe and mislead a troubleshooting. Measure across pins between E-C, E-G, C-G, E-black lead, C-red lead of tester should be infinite and may have some reading in reverse, it is normal. Refer to attached table for normal reading.
- 2. DB701 Diode Bridge.
- C704, C705 High voltage Capacitors. D702 and C705, D701 and C704 are parallel connected therefore, remove component to measure when diode is shorted.
- 4. D701, D702 High voltage Diodes.



	FORWARD	REVERSE
E-C	Some $\Omega$	~
E-G	∞	~
C-G	∞	~

		FORWARD	REVERSE
****	~ - +	Some $\Omega$	∞
	~	Some $\Omega$	∞
	~ - ~	8	∞
<u> </u>	+	Some $\Omega$	~

BETWEEN TERMINALS	FORWARD	REVERSE
	<ul> <li>infinite Circuit tester employed lower voltage battery         Several k ohm to several hundred k ohm will be observed Circuit tester should omclewed more than 9V     </li> </ul>	∞ infinite it does not matter by internal battery voltage
''	battery	

# 4. How to replace power transistors Q701, Q702 and Bridge Diode DB701.

- 1. To remove Q701, Q702 and DB701 unsolder their legs first, next remove a screw that holding the heatsink onto the PCB then dtach the heatsink as shown below. Sevice Hints: For easy solder removal, use one soldering iron to heat a solder and use solder sucker iron to suck solder.
- 2. Make sure to replace both Q701 and Q702 at a time with the same maker.
- 3. Make sure to apply heat conduction grease between transistor and heat sink.
- 4. NO DUST SHOULD CAUGHT between heat sink and power transistor unless if causes looseness of heat conduction and insufficient cooling to blow components.

### 5. Screw must be tighten securely.

6. Install the heatsink onto the PCB by a screw and make sure to apply extra solder between legs and PCB pattern so that it's able to flow 15A or more main current.



### Apply silicone grease



7. Apply extra solder onto Q701 and Q702 legs and printed foil pattern to be able to hold main large current of more than 15A.

For easy removal of solder, apply some solder first than suck it all.

#### Apply extra solder





or



#### How to test oven



# 8. How to test repaired Inverter PCB. Warning:

- 1. Do not test Inverter PCB with using any extention cable Open gounding of inverter PCB is so DANGER.
- 2. Make sure to check no Bridge solder nor cold solder joint.
- 1. Install Inverter PCB into oven with screws securely, plug in CN701, CN702 and CN703.
- 2. Insert AC plug through the Amper meter with specified voltage. NOTE: Current will be changed by the input AC voltage.
- 3. Operate the oven at High power setting for 1 minutes.
- Read input current which should be within oven specification.
   NOTE: Input current will be decreased after a certain cooking period.
- 5. Adjustment is not necessary when replacing transistors, You may adjust the preset volume control VR701 to meet the specified input current when Transformer is replaced.



Preset Volume control

```
NOTE: WHEN TRANSFORMERS OR IC WAS REPLACED
MAKE SURE ADJUST VOLUME FOR PROPER
INPUT AMPARES.
```

## HOW TO CHECK THE SEMICONDUCTORS USING AN OHM METER FORWARD

A-K



А		К
 (ANODE)	-b	(CATHODE)

Κ А Þ

Transistor **NPN Transistor** 

2SC .....

(COLLECTOR) B (BASE) E (EMITTER) В ΕĊ

**PNP Transistor** 

2SA ..... 2SB.....

2SD.....



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

SMALL

REVERSE

 $\infty$ 

	FORWARD	REVERSE
B-E	SMALL	∞
C-B	SMALL	∞
C-E	∞	8

Digital	Transistor
PNP	Transistor



	FORWARD	REVERSE
E-B	10kΩ ~ 30kΩ	10kΩ ~ 30kΩ
C-B	50kΩ ~ 90kΩ	8
C-E	$40 \mathrm{k}\Omega \sim 80 \mathrm{k}\Omega$	∞

## IGBT

(INSULATED GATE BIPOLAR TRANSISTOR)

000

IGBT

G С E





	FORWARD	REVERSE
E-C	SMALL	80
E-G	~	∞
C-G	∞	œ

# **INVERTER BOARD PARTS LIST (A606Y4V00GP)**

Ref.No.		Part No.	Part name & Description	Pcs/ Set	Remarks
C701		ECWF5104N300	CAPACITOR	1	0.1µF, 500VDC
C702		ECQE2405T847	POLYESTER CAPACITOR	1	4μF, 250VDC
C703		ECWF5454N300	FILM CAPACITOR	1	0.45μF, 500VDC
C704,C705		ECWH30822JUA	FILM CAPACITOR	2	8200PF, 3KVDC
CN701		AEEMXH00703WG	CONNECTOR	1	
CT701		A66904T00AP	TRANSFORMER	1	
D701,D702	$\triangle$	A6202-4N10T	DIODE SI	2	0.3A
D703		AEDNERA3806	DIODE SI	1	0.5A
D704,D705		AEDNERA1506	DIODE SI	2	1A
D706		MA196-(TA5)	DIODE SI	1	MA196, 0.1A
DB701		AESTRBV6206	DIODE SI	1	15A, 600V
		XTW3+12B	SCREW	2	3*12 (FOR Q701)
H.S.		A66914T00AP	HEAT SINK	1	
IC702,IC703		AEICP25011HL	IC	2	PS2501-1, HL 4P
IC801		AN9DB07SB	IC	1	
L701		A50204T00AP	COIL	1	
Q701		A691E4V10GP	TRANSISTOR SI	1	AESCGT60M303
Q702		A691E4V10GP	TRANSISTOR SI	1	AESPGT30J322
C806		A691E4V10GP	CAPACITOR	1	56PF TRANSISTOR (Q701,Q702) KIT
		XTN3+12B	SCREW	1	3*12 (FOR Q702)
Q703,Q704		2SC3311AQSTA	TRANSISTOR SI	2	2SC3311AQRS
Q705		2SA1309AQSTA	TRANSISTOR SI	1	2SA1309AQRS
R715		AERGS215J452	RESISTOR	1	4.5KΩ, 15W
VR701		AEVTZ6TLT102	VARIABLE RESISTOR	1	1ΚΩ, 308
ZD701,ZD703,ZD704,ZD705		AEDZ10ES2T1	ZENNER DIODE SI	4	RD10ES2T1
ZD702		AESZ12JS2T1	ZENNER DIODE SI	1	RD12JS2
T701		A609A4V00GP	TRANSFORMER	1	

# **EXPLODED VIEW AND PARTS LIST**



# 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:
  - 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.

## NOTE "A" parts are supplied by MOD (Japan)

"F" parts are supplied by SIMMC (China)

Ref.No.		Part No.	Part name & Description	Pcs/ Set	Remarks
1		F01504Y00XN	NO TOUCHING LABEL	1	
2		F00068100HN	CAUTION LABEL	1	HNE,MNQ,YNQ,YKE,TNE,KKE,KNQ,SNM
2		F00063310WN	CAUTION LABEL	1	WNT
2		F00065E90ZP	CAUTION LABEL	1	ZPE
3		F01575G00NHN	NAME PLATE	1	HNE
3		F01575G00NMN	NAME PLATE	1	MNQ
3		F01575G00NYN	NAME PLATE	1	YNQ
3		F01575G00NYK	NAME PLATE	1	YKE
3		F01575G00NTN	NAME PLATE	1	TNE
3		F01575G00NKK	NAME PLATE	1	KKE
3		F01575G00NKN	NAME PLATE	1	KNQ
3		F01575G00NSN	NAME PLATE	1	SNM
3		E01575G00NZP	NAME PLATE	1	ZPF
3		F05245G00NWN	NAME PLATE	1	WNT
4		F10014X80XN	BASE	1	
5		F1008-3W0		1	
5		1 1000-3 110	INOBBEITT COT		
6				1	
7		F11404 I60XN	STOPPER	2	
0		E11614X80MN		1	
0		E20045C00XN		1	
9		F200A3G00AN		1	
10		F2011-1640	COVER	I	
		A040450700D			
11		A21315870GP	PULLY SHAFT	1	
12		F2177-F80	WASHER	1	
13		J290D4X70MN	ROLLER RING (U)	1	
14		F3097-1660	SPRING	2	
15		J3102-1830	LATCH SWITCH LEVER	1	
16	$\triangle$	J3103-1830	DOOR HOOK	1	
17		F3105-1830	LATCH BRACKET	1	
18		J3249-1830	LATCH SWITCH LEVER	1	
19		F400A5E60XN	FAN MOTOR	1	EXCEPT WNT
19		F400A5G00WN	FAN MOTOR	1	WNT
20		F40084T00AP	FAN BLADE	1	
21		F40254X80MN	AIR GUIDE A	1	
22		F40264X80MN	AIR GUIDE B	1	
23		F40315G00XN	AIR GUIDE C	1	
24		F630G4X80HN	HEATER (AU)	1	HNE,YKE,TNE,KKE,SNM,ZPE (220V, 1515W)
24		F630G4X80MN	HEATER (AU)	1	MNQ,YNQ,KNQ (240V, 1515W)
24		F630G4X80WN	HEATER (AU)	1	WNT (110V, 1420W)
25		A607S-1450	SENSOR	1	
26		F64174X80MN	HEATER MOUNTING PLATE	3	
27	$\triangle$	A606Y4V00GP	H.V.INVERTER (U)	1	EXCEPT WNT
27	$\triangle$	A606Y4T00AP	H.V.INVERTER (U)	1	WNT
28	$\triangle$	J6142-1450	MICRO SWITCH	1	(V-16G-3C26-M) (PRIMARY LATCH SWITCH)
29		A61425180AP	MICRO SWITCH	1	(L-3C2-2) (SECONDARY LATCH SWITCH)
30	$\triangle$	F61453230XN	THERMAL CUTOUT	2	180 + 10°C
31	$\wedge$	A61785180AP		1	(L-2C2-2) (SHORT SWITCH)
32	$\wedge$	A62304210BP	FUSE	1	
C			100		

Ref.No.		Part No.	Part name & Description	Pcs/ Set	Remarks
32		B62308250AP	FUSE	1	18A, 125V (WNT)
33		F63264760JP	TURNTABLE MOTOR	1	EXCEPT WNT
33		F63264080AP	TURNTABLE MOTOR	1	WNT
34		F64504J00XN	SENSOR COVER B	1	
35		F65434X80MN	SENSOR COVER C	1	
36		F65854Y60XN	INVERTER BRACKET	1	
37		F67634X80MN	INVETTER BRACKET B	1	
38		F66624X80MN	GROUNDING PLATE	1	
40		A62314000AP	FUSE HOLDER	1	EXCEPT ZPE & WNT
42		F900C5E60YK	AC CORD W/PLUG	1	HNE,MNQ,YNQ,YKE,KKE,KNQ
42		F900C5E60TN	AC CORD W/PLUG	1	TNE
42		F900C5G00WN	AC CORD W/PLUG	1	LNK
42		F900C5G00SN	AC CORD W/PLUG	1	SNM
42		F900C5G00ZP	AC CORD W/PLUG	1	ZPE
43		XTWAFE4+10RU	SCREW	4	FOR MAGNETRON
44		XTTFNE4+6BN	SCREW	1	FOR COVER
46		XTWANE4+12LR	SCREW	4	FOR LEFT HINGE 2, RIGHT HINGE 2
47		2M261-M32F	MAGNETRON	1	EXCEPT ZPE & WNT
47	$\overline{\wedge}$	2M261-M32G	MAGNETRON	1	ZPE.WNT
48		F80234.100XN	ESCUTCHEON SASH	1	,
49	$\wedge$	F300B-1640	LEFT HINGE	1	
50	$\overline{\wedge}$	F300U-1640	BIGHT HINGE	1	
				· ·	
51		XNG4EVS	NUT	2	
52		XWS4VI	SPRING WASHER	2	
53		F40244X80MN		1	
54		F41074X80MN		1	
55		F48804X80MN		1	
		1400047001011		1	
56		E22364X80MN	RIGHT HEATER PANEL	1	
57				1	
58		F22305850AP		1	
50		E4122595050AD		1	
60		F41575850AP		1	
00		141373030AI			
61					
62		F41505050AF		1	
62		141033030AF			
63		A41043030AF		- 1	
64		A42243110BF			
60		A40604X60IVIN	BELIA		
22					
60					
66		F41795G005N			
67					
67		F40085020AQ			
68		F41805G00XN		1	
69		F00304060BP			
/0		A0132403UAP	JUCKEI		
71		E001100000			
70				 	
72					
73		E02205E00//N		1	
/4					
/5		J692Y4100QP		1	
76		F67974X00CP	P.C.B. HOLDER	1	ZPE,WNT
77		F612E5A00AP	INCANDESCENT LAMP (U)	1	WNT
78		F63174X80WN	LAMP SHADE	1	WNT
79		F00065540MN	CAUTION LABEL	1	YNQ

# DOOR ASSEMBLY



Ref.No.		Part No.	Part name & Description	Pcs/ Set	Remarks
D1	$\triangle$	F302K4J00XN	DOOR E (U)	1	
D3		F3044-1640	RIGHT DOOR ARM	1	
D4		F30854J00XN	DOOR C	1	
D5		F3252-1450	DOOR ARM SPACER	1	
D6		XTN3+7Q	SCREW	8	
D7		F3054-1640	LEFT DOOR ARM	1	
D8		F3230-1600	DOOR KEY SPRING B	1	
D9		F30015G00NXN	DOOR A (U)	1	

# WIRING MATERIAL



Ref.No.	Part No.	Part name & Description	Pcs/ Set	Remarks
W1	F030A5G00XN	LEAD WIRE HARNESS	1	EXCEPT ZPE & WNT
W1	F030A5G00ZP	LEAD WIRE HARNESS	1	ZPE,WNT
W2	F030E4X80MN	H.V. LEAD WIRE	1	
W4	AECQJ5335KRP	CAPACITOR	1	

# **ESCUTCHEON BASE ASSEMBLY**



Ref.No.	Part No.	Part name & Description	Pcs/ Set	Remarks
E1	F603L5G00HN	D.P.CIRCUIT	1	HNE
E1	F603L5G00MN	D.P.CIRCUIT	1	MNQ
E1	F603L5G00YN	D.P.CIRCUIT	1	YNQ
E1	F603L5G00TN	D.P.CIRCUIT	1	YKE,TNE
E1	F603L5G00WN	D.P.CIRCUIT	1	WNT
E1	F603L5G00SN	D.P.CIRCUIT	1	KKE,SNM
E1	F603L5G00KN	D.P.CIRCUIT	1	KNQ
E1	F603L5G00ZP	D.P.CIRCUIT	1	ZPE
E2	F630Y5G00NHN	MEMBRANE SWITCH	1	HNE,MNQ,YNQ,YKE,TNE
E2	F630Y5G00NWN	MEMBRANE SWITCH	1	WNT
E2	F630Y5G00NKN	MEMBRANE SWITCH	1	KKE,KNQ,SNM
E2	F630Y5G00NZP	MEMBRANE SWITCH	1	ZPE
E3	F80344X80NMN	ESCUTCHEON BASE	1	
E4	F81274J00XN	BACK PANEL	1	
E5	F80025G00XN	ESCUTCHEON B	1	
E6	F82844J00XN	CUSHION RUBBER	1	
E7	F02459660AP	DHHS LABEL	1	WNT

# **PACKING AND ACCESORIES**



Ref.No.	Part No.	Part name & Description	Pcs/ Set	Remarks
P1	F00035G00HN	INSTRUCTION MAUNAL	1	HNE,MNQ,YNQ,YKE,TNE
P1	F00035G00WN	INSTRUCTION MAUNAL	1	WNT
P1	F00035G00KN	INSTRUCTION MAUNAL	1	KKE,KNQ,SNM
P1	F00035G00ZP	INSTRUCTION MAUNAL	1	ZPE
P4	F00324040XN	EARTH CAUTION LABEL	1	TNE,WNT
P5	F01025G00NHN	PACKING CASE, PAPER	1	HNE,MNQ,YNQ,YKE,TNE
P5	F01025G00NWN	PACKING CASE, PAPER	1	WNT
P5	F01025G00NKK	PACKING CASE, PAPER	1	KKE,SNM
P5	F01025G00NKN	PACKING CASE, PAPER	1	KNQ
P5	F01025G00NZP	PACKING CASE, PAPER	1	ZPE
P6	F01044J00XN	UPPER FILLER	1	
P7	F01054J00XN	LOWER FILLER	1	
P8	F01064W00AP	P.E. BAG	1	
P9	F01078100XN	DOOR SHEET	1	
P10	F01084J00XN	TRAY PACKING	1	
P12	F04455E60NMN	MENU LABEL	1	MNQ,YNQ,YKE
P12	F04455E60NTN	MENU LABEL	1	TNE
P13	A06014J00XN	COOKING TRAY	1	
P14	F06024X80MN	OVEN RACK	1	
P15	F91644000XN	EARTH LEAD	1	TNE,WNT
P16	F01134J00XN	TRAY STYROL	1	
P17	F01174J00KN	TRAY STYROL B	1	KKE,KNQ,SNM
P18	F01925E60XN	SHEET	1	
P19	F01264J00XN	REINFORCE MATERIAL	1	KKE,KNQ,SNM
P20	F01115E90ZP	GLABEL	1	ZPE

## **DIGITAL PROGRAMMER CIRCUIT**

## SCHEMATIC DIAGRAM





# DIGITAL PROGRAMMER CIRCUIT

## PARTS LIST

Ref.No.	Part No.	Part name & Description	Pcs/Set	Remarks
BZ210	AEFB22EP20TL	BUZZER	1	2.0KHz
C10	AECETM1C471A	AL CHEM CAPACITOR	1	470μF/16V
C11	AECESS1C220A	AL CHEM CAPACITOR	1	22µF/16V
C25	AECEUT2W100F	AL CHEM CAPACITOR	1	10μF/450V/105 <sup></sup> C (EXC EPT WNT)
C25	ECEUT2D470F	AL CHEM CAPACITOR	1	47μF/200V/105°C (WNT)
C481	AECESS1H010A	AL CHEM CAPACITOR	1	1μF/50V
C482	AECESS1HR47A		1	0.47μF/50V
C483	AECESS1H2R2A		1	2.2µF/50V
C40-C48	AECU85C102KK		9	1000PF/50V
	AECU85F103ZK		4	0.01µF/50V
C12,C14,C220,C484			4	0.1µF/23V
C480				0.047µF/50V
C320,C321	AECUTC220J50			22FF/30V (TNE,ZFE)
CN2			1	3 PIN
CN2		CONNECTOR	1	3 PIN
CN4		CONNECTOR	1	4 PIN
CN5		CONNECTOR	1	
CN6	AEEMME00703B	CONNECTOR	1	3PIN
CX320	AFYXAT49-8MA	CBYSTAL RESONATOR	1	8 00MHz (YKE TNE ZPE)
CX320	AEEOS800MG06		1	8.00MHz (EXCEPT YKE, TNE & ZPE)
D28 D220	AEDNEBA1502	DIODE	2	
D40 D41 D222 D223 D224	AESS133T-77	DIODE	5	
D25	AE87511NS10D	VARISBOR	1	EXCEPT WNT
D25	AERZ271NS10D	VARISHOR	1	WNT
D26 D27	AFBZB00NS10D	VARISBOR	2	
D180 D181 D182	AESOTI GE260	CHIP   ED	3	
DISP1 HOLD	A611A4J00XN		1	
DISP 110	AFDDTM4X80XN	DISPLAY	1	EXCEPT KKE KNO SNM & ZPE
DISP 110	AEDDTM4X70QP	DISPLAY	1	KKE.KNQ.SNM.ZPE
IC1	MN101C54CDE2	L.S.I.	1	
IC25	AEICP25011HL	IC	1	
IC220	AEICU2004GR2	IC	1	
IC480	AEICUPC358G2	IC	1	
IC10	ETXMJ197X1BG	SWITCHING POWER SUPPLY	1	
Q10	2SD1859TV2Q	TRANSISTOR	1	
Q182	AESC43ZKE	CHIP DIGI-TRANSFORMER	1	
Q220	AESAKTA200Y	TRANSISTOR	1	
Q221	AESA14EKE	CHIP DIGI-TRANSFORMER	1	
Q440	AESC43XKE	CHIP DIGI-TRANSFORMER	1	
R40-R48	AERJ3GSYJ102	CHIP RESISTOR	9	1K, 1/16W, 5%
R27,R220,R340,R490,R491	AERJ3GSYJ103	CHIP RESISTOR	5	10K, 1/16W, 5%
R223	AERJ3GSYJ104	CHIP RESISTOR	1	100K, 1/16W, 5%
R488	AERJ3GSYJ105	CHIP RESISTOR	1	1MΩ, 1/16W, 5%
R484	AERJ3GSYJ154	CHIP RESISTOR	1	150K, 1/16W, 5%
R211	AERJ3GSYJ182	CHIP RESISTOR	1	1.8K, 1/16W, 5%
R486,R489	AERJ3GSYJ202	CHIP RESISTOR	2	2K, 1/16W, 5%
R320	AERJ3GSYJ221	CHIP RESISTOR	1	220Ω, 1/16W, 5% (YKE,TNE,ZPE)
R440	AERJ3GSYJ222	CHIP RESISTOR	2	2.2K, 1/16W, 5%
R330	AERJ3GSYJ333	CHIP RESISTOR	1	33K, 1/16W, 5%
R210	AERJ3GSYJ391	CHIP RESISTOR	1	390Ω, 1/16W, 5%
R487	AERJ3GSYJ433	CHIP RESISTOR	1	43K, 1/16W, 5%
R331	AERJ3GSYJ471	CHIP RESISTOR	1	470Ω, 1/16W, 5%
R480,R481	AERJ3GSYJ472	CHIP RESISTOR	2	4.7K, 1/16W, 5%
R485	AERJ3GSYJ684	CHIP RESISTOR	1	680K, 1/16W, 5%
R441	AERJ3GSYJ823	CHIP RESISTOR	1	82K, 1/16W, 5%
R222	RD16S1104J		1	100K, 1/4W, 5%
R482, R483	RD16S1105J		2	1M <u>12</u> , 1/4W, 5%
R182	HD1651361J			36052, 1/4W, 5%
R221	HD1651392J		1	3.9K, 1/4W, 5%
K20,K26	ERDS1FJ3931		2	39N, 1/2W, 5%
			1	02US2, 1/4VV, 5%
				152, 1/200, 3%
	AEGGOGIAIZ		2	
7D10				
D29	AESTS1WBA60B	BRIDGE DIODE	1	600V