Service Manual Microwave Oven



# NN-S215WF NN-S215MF NN-S235WF NN-S235MF NN-S235BF

QPQ(Australia & New Zealand) HPE(Hong Kong) YPQ(Singapore) MPQ(Malaysia) TPE(Thailand, Indonesia) LPK(Philippines) YTE(Others) KTE(UAE) PTE( Iran) KPQ(Kuwait, Doha, Qatar, Oman, Bahrain, Pakistan) STM(Saudi Arabia) ZPE(CIS Countries)

## Specification

Model	S215WF/MF	S235WF/MF/BF
Power Source:	230VAC Single Phase, 50Hz Fo 240VAC Single Phase, 50Hz Fo 220VAC Single Phase, 50Hz Fo	or QPQ Models or KPQ, MPQ, YPQ Models or KTE, ZPE, HPE,TPE,YTE, PTE Models
	220VAC Single Phase, 50Hz/60Hz Fo	or STM Models or LPK Models
Power Requirement:	1200W(Except STM) 1100W(STM 50Hz) 1500W(STM 60Hz)	1200W(Except STM) 1100W(STM 50Hz) 1500W(STM 60Hz)
Output:	800W	800W
Microwave Frequency:	2450MHz	
Timer:	30min. 29min.90sec	
Outside Dimensions:	364mm(D) x 482mm(W) x 284mm(H)	
Oven Cavity Dimensions:	330mm(D) x 325mm(W) x 218mm(H)	
Weight:	11.0kg	
PbF	This product with PbF	
Specifications subject to change without notice.		



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

#### WARNING

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

This service manual covers products for following markets.

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

QPQ For Australia & New Zealand
HPEFor Hongkong
TPEFor Thalland, Indonesia
YPQFor Singapore
MPQFor Malaysia
LPKFor Phillipines
YTE For Others
ZPE For CIS Countries
KTEFor UAE
PTEFor Iran
KPQFor Kuwait, Doha, Qatar
Oman, Bahrain, Pakistan
STM For Saudi Arabia

#### CAUTION

About lead free solder (PbF)

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

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

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# **1 FEATURE CHART**

MODE	NN-S215WF/MF	NN-S235WF/MF/BF
FEATURE		
Three Stage Cooking	—	0
Turbo Defrost	—	0
Auto Cook	-	0
Power Level Select	-	0
Variable Power Control	_	0
Child Safety Lock	0	

# 2 CONTROL PANEL



#### 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. The oven light will turn on and stay on whenever the door is opened. It is quite safe to open the door at any time during a cooking program and there is no risk of microwave exposure.

## 3 OPERATION AND DIGITAL PROGRAMMER CIRCUIT TEST PROCEDURE

#### 3.1. Time Cooking for Two Stage

OPERATION	SCROLL DISPLAY
1. Plug the power supply cord into wall outlet.	High Med Low 88:88 kg B Defrost Serv.
2. Place a water load in the oven.	High Med Low Kg 88:88 g Defrost Serv.
3. Press Micro Power Pad once to set high power. (1st stage)	High Med Low Kg kg Defrost Serv.
4. Set for 10 Seconds.	High Med Low -: 0 g Defrost Serv.
5. Press Micro Power Pad 5 times to set low power. (2nd stage)	High Med Low kg kg Defrost Sarv.
6. Set for 1 minute.	High Med Low High Cow R Defrost Sarx.
7. Press <b>Start</b> Pad.	High Med Low Kg g High Cov Low Kg g Defrost Serv.
7. When 1st stage cooking time has elapsed. Oven beeps twice and automatically switches to 2nd stage cooking.	High Med Low I - O O R Defrost Serv.
<ol> <li>When 2nd stage cooking time has elapsed, oven beeps 5 times and shuts off.</li> </ol>	High Med Low kg g Defrost Serv.

## 3.2. Turbo Defrost

OPERATION	SCROLL DISPLAY
1. Press <b>Turbo Defrost1.0 kg</b> Pad to set the weight for 1.0kg.	High Med Low High Med Low Kg g Defrost Serv.
2. Press <b>Start</b> pad.	High Med Low <b>9</b> * <b>36</b> <i>B</i> <i>Defrost</i> Serv.

OPERATION	SCROLL DISPLAY
3. Press <b>Stop/Reset</b> Pad twice, Oven shuts off.	High Med Low kg B Defrost Serv.

## 3.3. Auto Cook

OPERATION	SCROLL DISPLAY
1. Press <b>Vegetables</b> pad thrice to set the weight for 300g.	High Med Low BOO_kg Defrost Serv.
2. Press <b>Start</b> pad.	High Med Low High Med Low High Serv. High Med Low Kg g Betrost Serv.
<ol> <li>When cooking time has elapsed, Oven beeps 5 times and shuts off.</li> </ol>	High Med Low kg g Defrost Serv.

## 3.4. Auto Reheat

OPERATION	SCROLL DISPLAY
1. Press <b>Auto Reheat</b> pad twice for 2 serving.	High Med Low RB Defrost Serv.
2. Press <b>Start</b> pad.	High Med Low B * I D g Defrost Serv.
3. When cooking time has elapsed, Oven beeps 5 times and shuts off.	High Med Low kg g Defrost Serv.

## 3.5. To Set Child Satety Lock

OPERATION	SCROLL DISPLAY
1. Press <b>Start</b> pad 3 times continuously. "Child" appears in the display.	High Med Low Low B h i d g Defrost Serv.

## 3.6. To Reset Child Lock

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

# **4 SCHEMATIC DIAGRAM**

## 4.1. NN-S215 (QPQ, ZPE)



## 4.2. NN-S215 (EXCEPT QPQ & ZPE)



#### 4.3. NN-S235



## **5 DESCRIPTION OF OPERATING SEQUENCE**

# 5.1. Variable power cooking control (NN-S235)

The coil of power relay B (RY1) is energized intermittently by the digital programmer circuit, when the oven is set at any power selection except for High power position. The digital programmer circuit controls the ON-OFF time of power relay B contacts in order to vary the output power of the microwave oven from "Low" to "High" power. One complete ON and OFF cycle of power relay B is 22 seconds. The relation between indications on the control panel and the output of the microwave oven is as shown in table.

#### 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.

	OUTPUT	ON-OFF TIME OF	
POWERSETTING	POWER(%)	POWER RE	LAY B (RY1)
	APPROX.	ON(SEC)	OFF(SEC)
HIGH	100%	22	0
MEDIUM-HIGH	70%	17	5
MEDIUM	50%	13	9
MEDIUM-LOW	30%	8	14
LOW	15%	5	17
DEFROST	30%	8	14

# 5.2. Variable power cooking control (NN-S215)

The vari-power controller controls the ON-OFF time of the varipower switch to vary the output power of the microwave oven from "Low" to "High". The vari-power controller is a part of the timer assembly. The timer assembly consists of timer motor, timer switch, vari-power switch and the combination of gears, cam and actuater level.

One complete cycle of the vari-power controller is 30 senconds, in which the vari-power switch is turned "ON" or "OFF" by the cam rotation in the  $30 \pm 2$  second period.

By controlling the timing of the vari-power switch "ON" period, the 220 or 240V AC supplied to the high voltage transformer is interrupted intermittently so that the average output power of the microwave oven is varied.

Table shows the timing chart of vari-power switch operation in response to the power setting on the control panel.

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					
	OUTPUT	ON-OFF TIME OF			
POWER SETTING	POWER(%)	POWER RELAY B (RY1)			
	APPROX.	ON(SEC)	OFF(SEC)		
HIGH	100%	30	0		
MEDIUM-HIGH	70%	23.2	6.8		
MEDIUM	55%	16.5	13.5		
MEDIUM-LOW	30%	9.8	20.2		
LOW	15%	5	25		
DEFROST	30%	9.8	20.2		

#### 5.3. Turbo Defrost, Auto Reheat, Auto Cook control (NN-S235)

When those 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 or weight by categories.

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

Turbo Defrost					
WEIGHT SELECTED	COOKING TIME				
1.0KG	9 min.36 sec.				
Auto Reheat					
WEIGHT SELECTED COOKING TIME					
2 SERV 3 min.10 sec.					
Auto Cook					

Auto Cook					
CATEGORY WEIGHT SELECTED COOKING TIME					
Vegetable	100g	1 min.50 sec.			

## 6 CAUTIONS TO BE OBSERVED WHEN TROUBLESHOOTING

Unlike many other appliances, the microwave oven is highvoltage, 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.

## 6.1. Check the grounding

Do not operate on a 2-wire extension cord. The microwave oven is designed to be grounded when used. It is imperative, therefore, to make sure it is grounded properly before beginning repair work.

# 6.2. Warning about the electric charge in the high voltage capacitor

For about 30 seconds after the oven is turned off, an electric charge remains in the high voltage capacitor. When replacing or checking parts, remove the power plug from the outlet and short the terminal of the high voltage capacitor (terminal of lead wire from diode) to chassis ground with an insulated handle screwdriver to discharge.

#### WARNING

There is high-voltage present, with high-current capabilities in the circuits of the high voltage winding and filament winding of the high voltage transformer. 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.



- 6.3. When parts must be replaced, remove the power plug from the outlet.
- 6.4. When the 8 Amp fuse is blown due to the operation of short switch:

#### WARNING

When the 8 Amp fuse is blown due to operation of the interlock monitor switch, you must replace all of the components (Primary latch switch, Door switch, Short switch and Power relay B (RY1)).

- 1. This is mandatory. Refer to "Adjustments and Measurement" for these switches.
- 2. When replacing the fuse, confirm that it has the appropriate rating for these models.
- 3. When replacing faulty switches, be sure mounting tabs are not bent, broken or otherwise deficient in their ability to hold the switches.

# 6.5. 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.

#### 6.6. Confirm after repair

- 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.
- 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 evergy leakage.)

#### CAUTION MICROWAVE RADIATION

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
- \* High voltage diode
- \* High voltage capacitor
- Pay special attention to these areas.

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

## 7 DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

#### 7.1. Magnetron

- 1. Discharge the high voltage capacitor.
- 2. Remove 1 screw holding air guide A & reinforce bracket.
- 3. Disconnect 2 high voltage lead wires from magnetron filament terminals.
- 4. Remove 4 screws holding the magnetron.

#### NOTE:

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

#### CAUTION

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

#### CAUTION

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



# 7.2. Digital Programmer Circuit (DPC) and membrane key board.

#### NOTE:

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

- 1. Release 1 flat cable from D.P.C board holding on the oven cavity.
- 2. Remove 1 screw holding escutcheon base and slide the escutcheon base upward slightly.
- 3. Remove 1 screws holding D.P.C board.
- 4. Separate D.P.C board from tabs on the escutcheon base and remove D.P.C board.
- 5. Remove rubber connector.
- 6. Separate display from tabs on the escutcheon base and remove display.

#### To replace membrane key board

7. Push the upper part of key board (display window portion) from back of escutcheon base, and peel off escutcheon sheet & membrane key board completely from escutcheon base.

#### NOTE:

1. The membrane key board is attached to the escutcheon base with double faced adhesive tape. Therefore, applying hot air such as using a hair dryer is recommended for smoother removal.

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

3. Alignment position of membrane key board is as follows;

Membrane key board: Right and upper edges Escutcheon sheet: Right and upper edges



### 7.3. Low voltage transformer and/or power relays (RY1, RY2)

#### 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 D.P.C. board on the oven cavity.
- 3. Using solder wick or a desoldering tool and 30W soldering iron, carefully remove all solder from the terminal pins of the low voltage transformer and/or power relays.

#### NOTE:

## Do not use a soldering iron or desoldering tool of more than 30 watts on DPC contacts.

4. With all the terminal pins cleaned and separated from DPC contacts, remove the defective transformer/power relays. Replace components, making sure all terminal pins are inserted completely. Resolder all terminal contacts carefully.



#### 7.4. Timer

- 1. Disconnect all lead wires from timer.
- 2. Remove 1 screw holding escutcheon base and slide the escutcheon base upward slightly.
- 3. Remove 3 screws to detach timer from escutcheon base.
- 4. Remove 2 knobs from timer shaft.



#### 7.5. Fan motor

- 1. Disconnect 2 lead wires from fan motor terminals.
- 2. Remove 1 screw holding diode (U) on side of the oven.
- 3. Disconnent 2 H.V. lead wires which linking to H.V. transformer from H.V. capacitor terminals.
- 4. Remove 3 screws holding orifice assy and detach the orifice assy from oven assy.
- 5. Remove fan blade from the motor shaft by pulling it straight out.
- 6. Remove 2 screws holding fan motor on orifice assy and detach the fan motor from orifice assy.



### 7.6. Door assembly

- 1. Remove door C from door E by carefully pulling outward starting from upper right hand corner using a flat blade screwdriver.
- 2. Separate door E from tabs on door A and remove door A.
- 3. Remove door screen B from door A.
- 4. Remove handle spring which hitching door handle, seperate door handle from door A by pulling outward door handle slightly, moving it towards the side of door A and out.
- 5. Open Door E at the opening angle of approximately 10°(Note: The door cannot be removed if the opening angle is greater than 10°).
- 6. Remove the door E from its hinges by pushing the door E's bottom upward and out.
- 7. Remove door key and door key spring from door E.
- 8. Replace other components.

#### NOTE:

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

#### NOTE:

After replacement of the defective component parts of the door, reassemble, and perform microwave leakage test.







#### 7.7. Turntable motor

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

#### NOTE:

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

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

#### NOTE:

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



# 8 COMPONENT TEST PROCEDURE

#### CAUTION

 High voltage is present at the high voltage terminal of the high voltage transformer during any cook cycle.
 It is neither necessary nor advisable to attempt measurement of the

 a is neutrer 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 capacitor.

#### 8.1. Primary Latch Switch, (Door Switch and Power Relay B) Interlocks.

- 1. Unplug the lead connectors to Power Relay B and verify continuity of the power relay B 1-2 terminals.
- 2. Unplug lead connectors to primary Latch switch and Door Switch.
- 3. Test the continuity of switches at door opened and closed positions with ohm meter (low scale).

Normal continuity readings should be as follows.

	Door Opened	Door Closed
Primary Latch Switch	$\infty \Omega$ (open)	0 Ω (close)
Door Switch	$\infty \Omega$ (open)	0 Ω (close)
Power Relay B	$\infty \Omega$ (open)	$\infty \Omega$ (open)

## 8.2. Short Switch & Monitor

- 1. Unplug lead wires from H.V.transformer primary terminals.
- 2. Connect test probes of ohm meter to the disconnected leads of the H.V. Transformer.
- 3. Test the continuity of short switch with door opened and closed positions using lowest scale of the ohm meter. Normal continuity readings should be as follows.

Door Opened	Door Closed
0 Ω	$\Omega \propto$

## 8.3. High voltage transformer

- 1. Remove connectors from the transformer terminals and check continuity.
- 2. Normal (cold) resistance readings should be as follows: Secondary winding...... Approx. 80  $\Omega$ ~120  $\Omega$ Filament winding...... Approx. 0  $\Omega$ Primary winding...... Approx. 0  $\Omega$  ~1  $\Omega$



## 8.4. High voltage capacitor

- 1. Check continuity of capacitor with meter on highest OHM scale.
- 2. A normal capacitor will show continuity for a short time, and then indicate  $9M\Omega$  once the capacitor is charged.
- 3. A shorted capacitor will show continuous continuity.
- 4. An open capacitor will show constant  $9 M \Omega.$
- 5. Resistance between each terminal and chassis should be infinite.



#### 8.5. 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.



#### 8.6. Variable power controller

- Isolate variable power switch from the circuit by disconnected 2 leads.
- In order to check if variable power controllor is operating normally, follow the test procedures below.
  - 1. Select any power other than "High" and start the oven.
  - 2. Check continuity between both terminals of the variable power switch.
  - 3. Variable power controller (timer and variable power switch) is working proporty it the ohm meter reads open and  $0\Omega$  within 30 ± 2 seconds interval as shown in table on P.9.



## 8.7. Diode (U)

- 1. Isolate the diode (U) from the circuit by disconnecting the leads.
- 2. With the ohmmeter set on the highest resistance scale, measure the resistance across the diode terminals. Reverse the meter leads and again observe the resistance reading. Meter with 6V, 9V or higher voltage batteries should be used to check the front-to-back resistance of the diode, otherwise an infinite resistance may be read in both directions.

A normal diode's resistance will be infinite in one direction



6 VOLT BATTERY.

FORWARD	REVERSE
SEVERAL HUNDRED KΩ	$\Omega \infty$

3. With the ohmmeter set on the highest resistance scale, measure the resistance across the protector diode terminals. Reverse the meter leads and again observe the resistance reading.

A normal protector diode's resistance will be infinite in both directions. It is faulty if it shows continuity in one or both directions.



#### 8.8. 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.

## 9 MEASUREMENTS AND ADJUSTMENTS

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

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

NOTE:

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

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



# 9.2. 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).
- 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		
800W	Min.12.6°F(7.0°C)		

## **10 TROUBLESHOOTING GUIDE**

CAUTION

1. Check grounding before checking for trouble.

2. Be careful of high voltage circuit.

3. Discharge high voltage capacitor.

4. When checking the continuity of the switches or the high voltage transformer, disconnect one lead wire from these parts and then check continuity with the AC plug removed. To do otherwise may result in a false reading or damage to your meter.

When disconnecting a plastic connector from a terminal, you must hold the plastic connector instead of the lead wire and then disconnect it, otherwise lead wire may be damaged or the connector cannot be removed. 5. 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.

6. 240V AC is present on the digital programmer circuit (Terminals of power relay's and primary circuit of low voltage transformer). When troubleshooting, be cautious of possible electrical shock hazard.

First of all operate the microwave oven following the correct operating procedures in order to find the exact cause of any trouble.

	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     3. Open low voltage transformer     4. Defective DPC	Check fan motor if thermal cutout is defective.
2.	No display and no operation at all. Fuse is blown.	<ol> <li>Shorted lead wire harness</li> <li>Defective primary latch switch (NOTE 1)</li> <li>Defective short switch (NOTE 1)</li> <li>Shorted H.V. capacitor</li> <li>Shorted H.V. transformer (NOTE 2)</li> <li>Shorted diode (U)</li> </ol>	Check adjustment of primary, secondary latch switch and short switch including door.
		NOTE 1: All of these switches must be replaced at the Check continuity of power relay B (RY1)'s of replace power relay B (RY1) also. NOTE 2: When H.V. transformer is replaced, check	ne same time. contacts (between 1 and 2) and if it has continuity diode and magnetron also.
3.	Oven does not accept key input(Program)	<ol> <li>Key input is not proper in-sequence</li> <li>Open or loose connection of membrane key pad to DPC (Flat cable or rubber connector)</li> <li>Shorted or open membrane key board</li> <li>Defective DPC</li> </ol>	Refer to operation procedure. Refer to DPC troubleshooting.
4.	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 cause lower magnetron filament voltage and cause magnetron to lower output and/or be in- termitteet</li> </ol>	Adjust door and latch switches.
		<ol> <li>Defective high voltage component</li> <li>H.V. transformer</li> <li>H.V. capacitor</li> <li>H.V. diode (U)</li> <li>Magnetron</li> <li>Open or loose wiring of power relay B (RY1)</li> <li>Defective primary latch switch</li> </ol>	Check high voltage component according to com- ponent test procedure and replace if it is defec- tive.
6.	Oven can program but timer does not start count- down.	6. Defective DPC or power relay B (HY1)     1. Open or loose wiring of secondary latch switch     2. Off-alignment of secondary latch switch     3. Defective secondary latch switch	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.	Fan motor turns on and turntable rotates when door is opened.	1. Shorted primary latch switch.	

	SYMPTOM	CAUSE	CORRECTIONS	
9.	Oven does not operate and return to plugged in mode as soon as start pad is pressed.	1. Defective DPC	Check the grounding lead wire and D.P.C. board.	
10.	Loud buzzing noise can be heard.	<ol> <li>Loose fan and fan motor</li> <li>Loose screws on H.V. transformer</li> </ol>		
11.	Turntable motor does not rotate.	<ol> <li>Open or loose wiring of turntable motor</li> <li>Defective turntable motor</li> </ol>		
12.	Oven stops operation during cooking.	<ol> <li>Open or loose wiring of primary and secondary latch switch</li> <li>Operation of thermal cutout</li> </ol>	Adjust door and latch switches.	
13.	15A fuse is blown.	<ol> <li>Shorted lead wire harness</li> <li>Defective short switch</li> <li>Defective primary latch switdh</li> <li>Shorted H.V. capacitor</li> <li>Shorted H.V. diode</li> <li>Defective magnetron</li> <li>Shorted H.V. transformer</li> <li>Shorted diode (U)</li> <li>Defective power relays</li> <li>10.Defective DPC</li> </ol>	Check adjustment of latch switches and door Replace H.V. Diode and protector diode (*NOTE) Replace Magnetron and protector diode (*NOTE) Replace H.V. Transformer and protector diode (*NOTE)	
		<ul> <li>NOTE : Be sure to replace protector diode together with those H.V. components.</li> <li>In this case, only D2 of protector diode may be shorted due to faulty</li> <li>H.V. component. Therefore, if protector diode is not replaced together, high voltage transformer will be damaged (over heated).</li> </ul>		

## **10.1.** Trouble related to Digital Programmer Circuit

SYMPTOM	STEP	CHECK	RESULT	CAUSE/CORRECTIONS
No display when oven is first plugged in	1	Fuse pattern of DPC	Normal	→ STEP2
			Open(NOTE)	Shorted circuit of ZNR,
				L.V.T,Oven Lamp etc.
				Replace DPC
	2	Low voltage transformer (LVT) secondary	Abnormal 0V	LVT
		voltage	Normal	→ Step3
	3	IC-1 pin 23 voltage (Emitter of Q10)	Abnormal	ZD10,Q10
			Normal=3.3V	IC1,CX320 Display

NOTE

Procedure of fuse pattern repairing is as follows:

1. When the fuse pattern (PF2) opens.

(1) Remove jumper wire (PF1).

(2) Insert the removed jumper wire (PF1) to "(PF2)" position and solder it. If both "PF1" and "PF2" fuse patterns are open, please replace DPC.

2. When the fuse pattern (PF4) opens.

(1) Remove jumper wire (PF3).

(2) Insert the removed jumper wire (PF3) to "(PF4)" position and solder it. If both "PF3" and "PF4" fuse patterns are open, please replace DPC.

NOTE:\*At the time of these repairs, made visual inspection of the varistor for burning damage and examine the transformer with tester for the presence of layer shortcircuit (check primary coil resistance).

If any abnormal condition is detected, replace the defective parts.

No key input	1	Membrane switch continuity	Abnormal	Membrane switch
			Normal	IC-1
No beep sound	1	IC-1 pin 29 voltage	Abnormal	IC-1
			Normal	BZ210, Q210
Power relay A(RY-2) does not turn on	1	IC-1 pin 1 voltage while operation	Abnormal	IC-1
even though the program had been set			Normal=5V	→ Step 2
and the start pad in tapped	2	Short circuit between collector and Emitter	Still not turn on	RY-2
		of Q225	RY-2 turns on	Q225
No microwave oscillation at any power	1	IC-1 pin 4 voltages while operation at high	Abnormal	IC-1
		power	Normal=5V	→ Step 2
	2	Transistor Q223 & Q224	Abnormal	Q223 and (or) Q224
			Normal	RY-1
Dark or unclear display	1	Replace display and check operation	Normal	DISPLAY
			Abnormal	IC-1
Missing or lighting of unnecessary seg-	1	Replace IC-1 and check operation	Normal	IC-1
ment			Abnormal	DISPLAY

#### 10.2. How To CHECK THE SEMICONDUCTORS USING AN OHM METER



# 11 EXPLODED VIEW AND PARTS LIST

## 11.1. EXPLODED VIEW



#### 11.2. PARTS LIST

#### NOTE:

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

#### NOTE:

- "A" parts are supplied by CSD (Japan)
- "F" parts are supplied by PHAMOS (China)

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks	
1		F01576S10HQP	NAME PLATE	1	S215WF QPQ	
1		F01576S10HHP	NAME PLATE	1	S215WF HPE	
1		F01576S10HTP	NAME PLATE	1	S215WF TPE	
1		F01576S10STP	NAME PLATE	1	S215MF TPE	
1		F01576S10HYT	NAME PLATE	1	S215WF YTE	
1		F01576S10SYT	NAME PLATE	1	S215MF YTE	
1		F01576S10HMP	NAME PLATE	1	S215WF MPO	
1		F01576S10HYO	NAME PLATE	1	S215WF YPO	
1		F01576S10SYP	NAME PLATE	1	S215MF YPO	
1		F01576S10HLP	NAME PLATE	1	S215WF LPK	
1		F01576S10HKT	NAME PLATE	1	S215WF KTE	
1		F01576S10HPT	NAME PLATE	1	S215WF PTE	
1		F01576510HKP	NAME PLATE	1	S215WE KPO	
1		F01576S10HZP	NAME PLATE	1	S215WE ZDE	
1		F01576520HOP	NAME PLATE	1	S235WE OPO	
1		F01576220HUD		1		
1		F01576520HHF	NAME DIATE	1	COSCUE THE	
1		F01576520HIP	NAME PLATE	1	SZSSWE IPE	
1		F015765205TP	NAME PLATE	1	S235MF TPE	
1		F01576520H11	NAME PLATE	1	SZSSWE IIE	
1		F01576520511	NAME PLATE	1	SZSSMF IIE	
1		F01576520HMP	NAME PLATE	1	S235WF MPQ	
1		F01576520HIP	NAME PLATE	1	SZSSWE IPQ	
1		F0157652051P	NAME PLATE	1	S235MF IPQ	
1		F01576S20HLP	NAME PLATE	1	S235WF LPK	
1		F01576520HKT	NAME PLATE	1	S235WF KIE	
1		F01576520HPT	NAME PLATE	1	S235WF PIE	
1		F01576S20HKP	NAME PLATE	1	S235WF KPQ	
		FUIS/6SZUHST		1	S235WF SIM	
1		F01576S20HZP	NAME PLATE	1	S235WF ZPE	
		F01576S20S2P	NAME PLATE	1	S235MF ZPE	
1		F01576520B2P	NAME PLATE	1	SZ35BF ZPE	
2		F10016510XP	BASE			
3		F10004100AP	CARINET RODY (II)	1	C21 EWE C22 EWE	
4		FILODOE/OHAP	CABINET BODY (U)	1	5215WF ,5235WF	
4		FIIODOE/OSAP	CABINET BODI (U)	1	5215MF, 5255MF	
		FILODOE/OBAP	CABINEI BODI (0)	1	C21 EWE (EXCEPT ZDE)	
5		F200A-0510	OVEN (U)	1	SZISWF/MF (EACEPI ZPE)	
5		F200A0SIOAF	OVEN (U)	1	COSCUE/ME (EXCEPT ZDE)	
5		F200A6520AP	OVEN (U)	1	S2SSWF/MF (EACEPI 2PE)	
		F 200A0820AP		<u> </u>	SZJJNE/ME/DF (AFE)	
6		F20556510YP	COVER	1		
7	<u> </u>	F21316F70VD	DIILLY SHAFT	1		
, ,		F2177_F20	WASUFD	1		
<u>ہ</u>		F290D6S10YD	ROLLER RING (II)	⊥ 1		
10		F30206510XP	DOOR HOOK	1		
10		FJUZUUDIUAF	DOOK HOOK	-		
11		F313650002P	HOOK LEVER A	1		
12		F40026910VP	EAN MOTOR	1		
13		F4008-1F60	FAN BLADE	1		
14		F40256S10YD	ATR GUIDE A	1		
15		F41446S10YD	ORIFICE	⊥ 1		
		TITIOPTONE	UNIT TOP	-		
16		F612E5G50YM	INCANDESCENT LAMP (II)	1	EXCEPT HDE	
17	Â	.T61424T00AD	MICRO SWITCH	1	PRIMARY LATCH SWITCH	
17		.T61424T003D	MICRO SWITCH	1	SECONDARY LATCH SWITCH (S215WE/ME)	
18		.T61414T00AP	MICRO SWITCH	1	SECONDARY LATCH SWITCH (S235WE/ME/BE)	
20		F61456S10XP	THERMAL CUTOUT	1	60°C ON,180°C OFF	

Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks	
21	⚠	J61784T00AP	MICRO SWITCH	1	SHORT SWITCH	
22	⚠	2M211A-M1J	MAGNETRON	1	EXCEPT STM	
22	$\triangle$	2M210-M1J	MAGNETRON	1	STM	
23	$\wedge$	F60906N60XP	H.V.CAPACITOR	1	EXCEPT LPK & STM	
23	$\wedge$	F6090-1H70	H.V.CAPACITOR	1	LPK	
23	⚠	F60906S20SN	H.V.CAPACITOR	1	STM	
24		F60376S10XP	CAPACITOR BRACKET	1		
25	$\triangle$	F621B6S10HP	H.V.TRANSFORMER	1	HPE, TPE, YTE, KTE, PTE, ZPE	
25	$\mathbb{A}$	F621B6S10LP	H.V.TRANSFORMER	1	LPK	
25	$\triangle$	F621B6S10MP	H.V.TRANSFORMER	1	QPQ,MPQ,YPQ,KPQ	
25	$\triangle$	F621B6S20ST	H.V.TRANSFORMER	1	STM	
26	$\triangle$	F605V6N60XP	DIODE (U)	1		
27	$\triangle$	ANE6230Z70BP	FUSE	1		
29		F63266S10XP	TURNTABLE MOTOR	1		
30	$\triangle$	F900C6S10QP	AC CORD W/PLUG	1	QPQ	
30	$\triangle$	F900C6S10YT	AC CORD W/PLUG	1	S215*F (HPE,MPQ,YTE,KTE,KPQ)	
30	$\triangle$	F900C6S20YT	AC CORD W/PLUG	1	S235*F (HPE,MPQ,YTE,KTE,KPQ)	
30	$\triangle$	F900C6S10TP	AC CORD W/PLUG	1	S215*F (TPE,PTE)	
30	⚠	F900C6S10ZP	AC CORD W/PLUG	1	ZPE,S235*F (TPE,PTE)	
30	$\triangle$	F900C6S10YP	AC CORD W/PLUG	1	S215*F (YPQ)	
30	⚠	F900C6S20YP	AC CORD W/PLUG	1	S235*F (YPQ)	
30	$\triangle$	F900C6S10LP	AC CORD W/PLUG	1	S215WF (LPK)	
30	$\triangle$	F900C6S20AP	AC CORD W/PLUG	1	S235WF (LPK)	
30	⚠	F900C6S20ST	AC CORD W/PLUG	1	STM	
31	⚠	F61456N00AP	THERMAL CUTOUT	2	-20°C ON ,120°C OFF	
32		F60366S10XP	CAPACITOR INSTALLATION BRACKET	1		
33		F11656S10XP	REINFORCE BRACKET	1		
34		F60706S10XP	INSULATE BRACKET	1		
35		F603Y6S20QP	D.P.CIRCUIT (DU)	1	S235*F (QPQ & ZPE)	
35		F603Y6S20ST	D.P.CIRCUIT (DU)	1	S235WF (STM)	
35		F603Y6S20XP	D.P.CIRCUIT (DU)	1	S235*F (EXCEPT QPQ,STM & ZPE)	
36		F00065540MN	CAUTION LABEL	1	YPQ	
37		F00068100HN	CAUTION LABEL	1	EXCEPT ZPE	
38		F00065E90ZP	CAUTION LABEL	1	ZPE	
41		F02846S10HYP	NO. LABEL	1	S215WF YPQ	
41		F02846S10SYP	NO. LABEL	1	S215MF YPQ	
41		F02846S20HYP	NO. LABEL	1	S235WF YPQ	
41		F02846S20SYP	NO. LABEL	1	S235MF YPQ	
45		XTWFA4+12T	SCREW	4	FOR MAGNETRON	
46		XTWFA4+12D	SCREW	3	FOR CABINET BODY	
47		XTTFA4+6BN	SCREW	2	FOR CABINET BODY SIDE	
49		F02395E20KN	CORD CAUTION LABEL	1	KTE, PTE, KPQ, STM	
51		F60305G60HN	INCANDESCENT LAMP	1	HPE	
52		F61525H00AP	SOCKET	1	HPE	
53		F692Y6S10QP	NOISE FILTER (U)	1	S215WF (QPQ & ZPE)	

#### 11.3. DOOR ASSEMBLY



Ref. No.		Part No.	Part Name & Description	Pcs/Set	Remarks
D1		F30186S10XP	DOOR KEY A	1	
D2	$\mathbb{A}$	F301A6S10HXP	DOOR A (U)	1	S215WF (EXCEPT QPQ & ZPE),S235WF (EXCEPT QPQ)
D2	$\wedge$	F301A6S10HAP	DOOR A (U)	1	S215WF (QPQ,ZPE),S235WF (QPQ)
D2	⚠	F301A6S10SXP	DOOR A (U)	1	S215MF,S235MF
D2	⚠	F301A6S10BAP	DOOR A (U)	1	S235BF
D3	⚠	F302K6S10XP	DOOR E (U)	1	
D4		F30216S10XP	DOOR KEY SPRING	1	
D5	⚠	F30856S10XP	DOOR C	1	
D6	⚠	F31455G10XN	DOOR SCREEN A	1	
D7		F31466S10XP	DOOR SCREEN B	1	
D8		F30126S10KXP	DOOR HANDLE	1	S215WF (EXCEPT QPQ & ZPE),S235WF (EXCEPT QPQ)
D8		F30126S10HXP	DOOR HANDLE	1	S215WF (QPQ,ZPE),S235WF (QPQ)
D9		F30216S10XP	HANDLE SPRING	1	
D10		F01729660JP	CAUTION LABEL B	1	QPQ
D10		F02459660AP	DHHS LABEL	1	LPK

## 11.4. WIRING MATERIALS



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
Wl	F030A-6S10	LEAD WIRE HARNESS	1	S215WF (QPQ,ZPE)
W1	F030A6S10XP	LEAD WIRE HARNESS	1	S215WF/MF (EXCEPT QPQ & ZPE)
W1	F030A6S20XP	LEAD WIRE HARNESS	1	S235WF/MF/BF

## 11.5. PACKING AND ACCESSORIES



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks	
P1	F00036S10QP	INSTRUCTION MANUAL	1	QPQ	
P1	F00036S10HP	INSTRUCTION MANUAL	1	HPE, TPE, YTE, MPQ, YPQ, LPK	
P1	F00036S10KP	INSTRUCTION MANUAL	1	KTE, PTE, KPQ, STM	
P1	F00036S10ZP	INSTRUCTION MANUAL	1	ZPE	
P2	F01026S10HQP	PACKING CASE, PAPER	1	S215WF (QPQ)	
P2	F01026S10HHP	PACKING CASE, PAPER	1	S215WF (HPE, TPE, MPQ, YPQ, LPK)	
P2	F01026S10HYT	PACKING CASE, PAPER	1	S215WF (YTE)	
P2	F01026S10HKT	PACKING CASE, PAPER	1	S215WF (KTE,PTE)	
P2	F01026S10HKP	PACKING CASE, PAPER	1	S215WF (KPQ)	
P2	F01026S10HZP	PACKING CASE, PAPER	1	S215WF (ZPE)	
P2	F01026S10SHP	PACKING CASE, PAPER	1	S215MF (TPE,YPQ)	
P2	F01026S10SYT	PACKING CASE, PAPER	1	S215MF (YTE)	
P2	F01026S20HQP	PACKING CASE, PAPER	1	S235WF (QPQ)	
P2	F01026S20HHP	PACKING CASE, PAPER	1	S235WF (HPE, TPE, MPQ, YPQ, LPK)	
P2	F01026S20HYT	PACKING CASE, PAPER	1	S235WF (YTE)	
P2	F01026S20HKT	PACKING CASE, PAPER	1	S235WF (KTE,PTE)	
P2	F01026S20HKP	PACKING CASE, PAPER	1	S235WF (KPQ,STM)	
P2	F01026S20HZP	PACKING CASE, PAPER	1	S235WF (ZPE)	
P2	F01026S20SHP	PACKING CASE, PAPER	1	S235MF (TPE,YPQ)	
P2	F01026S20SYT	PACKING CASE, PAPER	1	S235MF (YTE)	
P2	F01026S20SZP	PACKING CASE, PAPER	1	S235MF (ZPE)	
P2	F01026S20BZP	PACKING CASE, PAPER	1	S235BF (ZPE)	
P3	F01045G40XN	UPPER FILLER	1		
P4	F01056S10XP	LOWER FILLER	1		
P5	F01066S10XP	P.E BAG	1		
P6	F01075G10XN	DOOR SHEET	1		
P7	A06015G10XN	COOKING TRAY	1		
P8	F01136E70XP	TRAY STYROL	1		
P9	F00065G40AP	CAUTION LABEL	1	QPQ	
P10	F9164-5G10	EARTH LEAD	1	TPE	
P11	F00324040XN	EARTH CAUTION LABEL	1	TPE	
P12	F01924T00AP	SHEET	1	S215MF,S235MF/BF	
P13	F04456S20HTP	OVERLAY	1	S235WF (TPE)	
P13	F04456S20HMP	OVERLAY	1	S235WF (MPQ,YPQ)	
P13	F04456S20HKT	OVERLAY	1	S235WF (KTE, PTE, KPQ, STM)	
P13	F04456S20STP	OVERLAY	1	S235MF (TPE)	
P13	F04456S20SMP	OVERLAY	1	S235MF (YPQ)	

## 11.6. ESCUTCHEON BASE ASSEMBLY



Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
E1	F603L6S20QP	D.P.CIRCUIT (AU)	1	S235WF (QPQ)
El	F603L6S20HP	D.P.CIRCUIT (AU)	1	S235*F (HPE,TPE,YTE)
E1	F603L6S20MP	D.P.CIRCUIT (AU)	1	S235*F (MPQ,YPQ)
E1	F603L6S20LP	D.P.CIRCUIT (AU)	1	S235WF (LPK)
E1	F603L6S20KP	D.P.CIRCUIT (AU)	1	S235WF (KPQ)
El	F603L6S20KT	D.P.CIRCUIT (AU)	1	S235WF (KTE,PTE)
El	F603L6S20ST	D.P.CIRCUIT (AU)	1	S235WF (STM)
El	F603L6S20ZP	D.P.CIRCUIT (AU)	1	S235*F (ZPE)
E2	F630Y6S20HQP	MEMBRANE SWITCH (U)	1	S235WF (QPQ)
E2	F630Y6S20HHP	MEMBRANE SWITCH (U)	1	S235WF (HPE, TPE, YTE, MPQ, YPQ, LPK)
E2	F630Y6S20HKT	MEMBRANE SWITCH (U)	1	S235WF (KTE,PTE,KPQ,STM)
E2	F630Y6S20HZP	MEMBRANE SWITCH (U)	1	S235WF (ZPE)
E2	F630Y6S20SHP	MEMBRANE SWITCH (U)	1	S235MF (TPE,YTE,YPQ)
E2	F630Y6S20SZP	MEMBRANE SWITCH (U)	1	S235MF (ZPE)
E2	F630Y6S20BZP	MEMBRANE SWITCH (U)	1	S235BF (ZPE)
E3	F80346S20SXP	ESCUTCHEON BASE	1	S235WF
E3	F80346S20HXP	ESCUTCHEON BASE	1	S235MF
E3	F80346S20BXP	ESCUTCHEON BASE	1	S235BF
E4	F67006S20XP	RUBBER CONNECTOR	1	S235WF/MF/BF
E5	AEDDHJ6S20XP	DISPLAY	1	S235WF/MF/BF
E7	F80346S10HQP	ESCUTCHEON BASE	1	S215WF (QPQ)
E7	F80346S10HHP	ESCUTCHEON BASE	1	S215WF (HPE, TPE, YTE, MPQ, YPQ, LPK)
E7	F80346S10HKT	ESCUTCHEON BASE	1	S215WF (KTE,PTE,KPQ)
E7	F80346S10HZP	ESCUTCHEON BASE	1	S215WF (ZPE)
E7	F80346S10SHP	ESCUTCHEON BASE	1	S215MF (TPE,YTE,YPQ)
E8	F60016S10XP	TIMER	1	S215WF/MF (EXCEPT LPK)
E8	F60016S10LP	TIMER	1	S215WF (LPK)
E9	F80206S10KXP	TIMER KNOB	1	S215WF/MF
E10	F83926S10KXP	TIMER KNOB	1	S215WF/MF

## 12 DIGITAL PROGRAMMER CIRCUIT (NN-S235WF/MF/BF) 12.1. SCHEMATIC DIAGRAM





#### 12.2. PARTS LIST

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
BZ210	AEFBAT2001WQ	BUZZER	1	2.0KHz
C12	AECETS1V221B	AL CHEM CAPACITOR	1	220µF/35V
C222	AECUU06C101J	CHIP CAPACITOR	1	100PF/50V
C11,C12,C223,C350,C351	AECUT06F104Z	CHIP CAPACITOR	5	0.1µF/25V
C220,C221	AECUN06F105Z	CHIP CAPACITOR	2	1µF/10V
C13	AECETS1C220B	CHIP CAPACITOR	1	22µF/16V
C1	ECQU2A474BP7	CAPACITOR	1	0.1µF/250V
C2,C3	ECTJ10222ME	CAPACITOR	2	0.0022µF/250V
CN1, CN2, CN7, CN8	F62146D00XN	CONNECTOR	4	
CN3	K1KA03AA0115	CONNECTOR	1	
CN4	F03536S20XP	LEAD WIRE HARNESS	1	
CN5	K1MN11A00008	CONNECTOR	1	
CN6	F65906S20XP	FLAT CABLE	1	11 pin
L1	F621A6S20AP	FILTER COIL	1	
CX320	EFOEC8004A4	CERAMIC RESONATOR	1	8.00MHz
D14,D220-D225,D228	AESS133T-77	DIODE	8	
D1	AERZ511KSBN	VARISTOR	1	
D2,D3	AERZ102KSBN	VARISTOR	2	
D11	AESSRCT1A6-E	DIODE	1	
IC1	MN101C78ADF	L.S.I.	1	
IC350	COEBE0000401	CMOS CHIP	1	
Q10	2SD1859TV2Q	TRANSISTOR	1	
Q11,Q220	2SA1037AK	CHIP TRANSISTOR	2	
Q222	AESA14EKE	CHIP DIGI-TRANSISTOR	1	
Q14,Q210,Q225,Q230	AESC23JKE	CHIP DIGI-TRANSISTOR	4	
Q224,Q231	2SC2412KT146	CHIP TRANSISTOR	2	
Q223	B1ACGF000004	AUDION	1	
R350	AERJ06J102R	CHIP RESISTOR	1	1K <b>Ω,</b> 1/10W,5%
R221,R223	AERJ06J104R	CHIP RESISTOR	2	100K <b>Ω,</b> 1/10W,5%
R225,R227	AERJ06J152R	CHIP RESISTOR	2	1.5KΩ,1/10W,5%
R220	AERJ06J222R	CHIP RESISTOR	1	2.2KΩ,1/10W,5%
R13	AERJ06J223R	CHIP RESISTOR	2	22 <b>Ω,</b> 1/10₩,6%
R10,R11	AERJ06J331R	CHIP RESISTOR	2	330 <b>Ω,</b> 1/10W,4%
R40-R46,R340,R341	AERJ06J334R	CHIP RESISTOR	9	330K <b>Ω,</b> 1/10W,6%
R222	AERJ06J363R	CHIP RESISTOR	1	36K <b>Ω,</b> 1/10W,7%
R12,R224,R351	AERJ06J472R	CHIP RESISTOR	3	4.7K <b>Ω,</b> 1/10W,6%
R211	D0AF102JA155	CARBON RESISTOR	1	1K <b>Ω,</b> 1/4W,5%
R15,R223	D0AF103JA155	CARBON RESISTOR	2	10K <b>Ω,</b> 1/4W,5%
R12,R13,R222	D0AF104JA155	CARBON RESISTOR	3	100KΩ,1/4W,5%
R210	D0AF332JA155	CARBON RESISTOR	1	3.3K <b>Ω,</b> 1/4W,5%
R225	D0AF470JA155	CARBON RESISTOR	1	47 <b>Ω,</b> 1/4W,5%
RY1	AEGG5G1A12	POWER RELAY	1	
RY2	AEBLD118	POWER RELAY	1	
T10	AETP284T0AP	LOW VOLTAGE TRANSFORMER	1	
ZD10	BOBA4R400002	ZENER DIODE	1	
ZD11	AESZMTZJ5R6B	ZENER DIODE	1	
F1	A62316010BP	FUSE HOLDER	2	