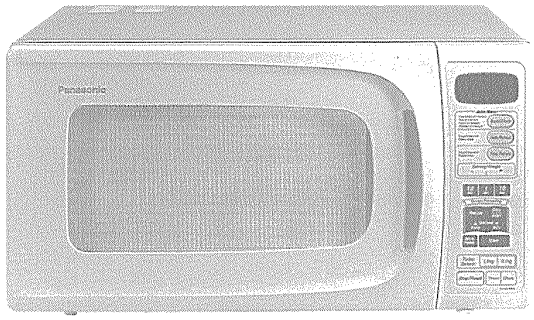
ORDER NO. MMOC9806055C3
E1

Service Manual

Microwave Oven

MODELS	QPQ	JPG	VPE
NN-S648BA	○	–	–
NN-S658WA	○	○	○
NN-S678BA	○	○	–
NN-S688WA	○	–	○
NN-S698WA	○	○	○
NN-S788WA	○	○	○

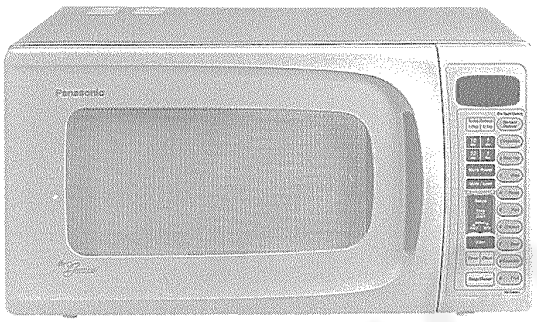


NN-S658WA

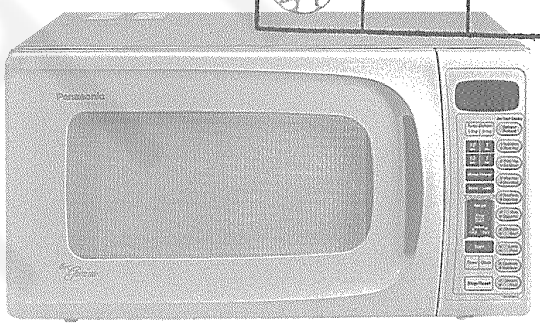
Models sold in these markets:
QPQ - Australia
JPG - New Zealand
VPE - South Africa

'98年 7月 17日 No.

承認	検印	作成
		MMOC



NN-S688WA



NN-S698WA

Specifications:

Models:	NN-S648BA, NN-S658WA, NN-S678BA, NN-S688WA, NN-S698WA MODELS	NN-S788WA MODELS
Power Source:	240 V AC Single Phase, 50 Hz ••••• For QPQ Models 230 V AC Single Phase, 50 Hz ••••• For JPG Models 220 V AC Single Phase, 50 Hz ••••• For VPE Models	
Power Requirements:	1600W (7.0A)•••QPQ/JPG Models	1600W (7.0A)•••QPQ/JPG Models
Power Requirements:	1600W (7.6A)•••VPE Models	1600W (7.6A)•••VPE Models
Output: (IEC705-88)	1000W	1000W
Microwave Frequency:	2,450MHz	2,450MHz
Timer:	99 min. 99 sec. (99 min. 90 sec. for NN-S658WA Models)	99 min. 99 sec.
Oven Cavity Size:	1.3 cu. ft.	1.7 cu. ft.
Outside Dimensions:	$21\frac{7}{8}$" (W) X $16\frac{3}{4}$" (D) X 12" (H) 555mm (W) X 425mm (D) X 306mm (H)	$23\frac{7}{8}$" (W) X $16\frac{3}{4}$" (D) X 14" (H) 595mm (W) X 425mm (D) X 356mm (H)
Inside Dimensions:	$14\frac{15}{16}$" (W) X $13\frac{13}{16}$" (D) X $9\frac{1}{8}$" (H) 380mm (W) X 402mm (D) X 232mm (H)	$17\frac{3}{16}$" (W) X $15\frac{9}{16}$" (D) X $10\frac{11}{16}$" (H) 437mm (W) X 396mm (D) X 272mm (H)
Weight:	38 lbs/17.2 kg	40 lbs/18 kg
Output power: IEC705-88 Test procedure		
Specifications subject to change without notice		

Panasonic®

⚠ 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 can be 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 should be replaced only with the manufacturer's specified parts to prevent microwave leakage, shock, fire, or other hazards. Do not modify the original design.

This service manual covers products for following markets.
When troubleshooting or replacing parts, please refer to the country identifications shown below for your applicable product specification.

QPQ•••••••••••••••••••••For Australia
VPE•••••••••••••••••••••For South Africa
JPG•••••••••••••••••••••For New Zealand

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

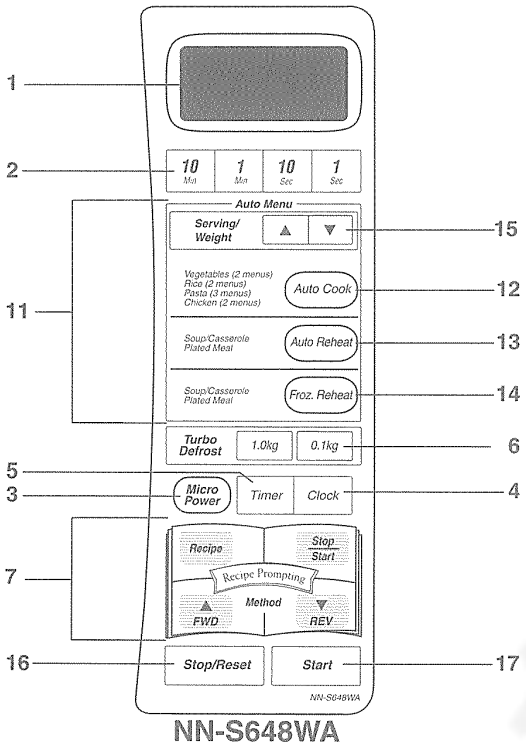
(A) Do not operate or allow the oven to be operated with the door open.
(B) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:
  (1) Interlock operation
  (2) Proper door closing
  (3) Seal and sealing 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.

CONTENTS

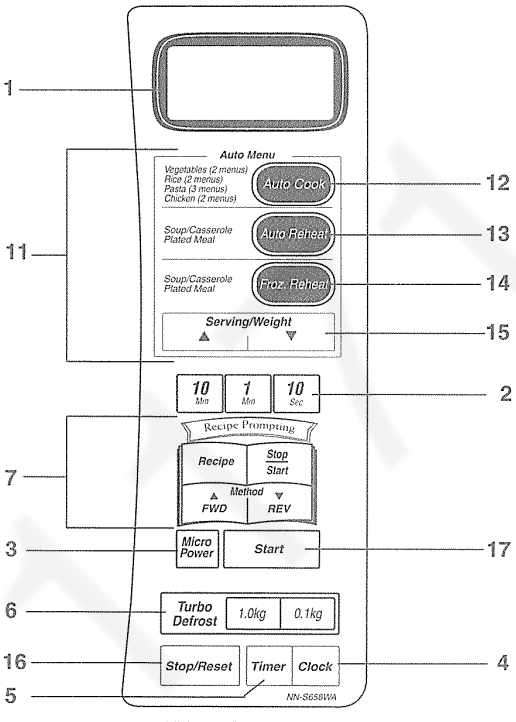
FEATURE CHART

FEATURE \ MODELS	NN-S648BA NN-S658WA	NN-S678BA	NN-S688WA	NN-S698WA	NN-S788WA
Three Stage Cooking	○	○	○	○	○
Turbo Defrost	○	○	○	○	○
Sensor Reheat	–	○	○	○	○
One Touch Cooking (Sensor)	–	○ 8 Menu	○ 9 Menu	○ 18 Menu	○ 16 Menu
Micro Power	○	○	○	○	○
Auto Menu	○	–	–	–	–
Auto Reheat	○	–	–	–	–
Auto Cook	○	–	–	–	–
Frozen Reheat	○	–	–	–	–
More/Less	–	○	○	○	○
Recipe Prompting	○	○	○	○	○
Child Safety Lock	○	○	○	○	○
Operating Guide on the Display	○	○	○	○	○
Delay Start	○	○	○	○	○
Timer/Stand	○	○	○	○	○
Digital Clock	○	○	○	○	○

CONTROL PANELS



NN-S648WA



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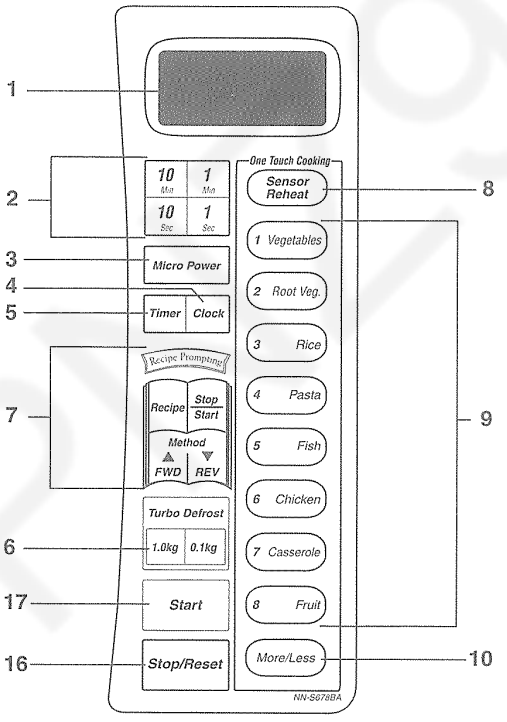
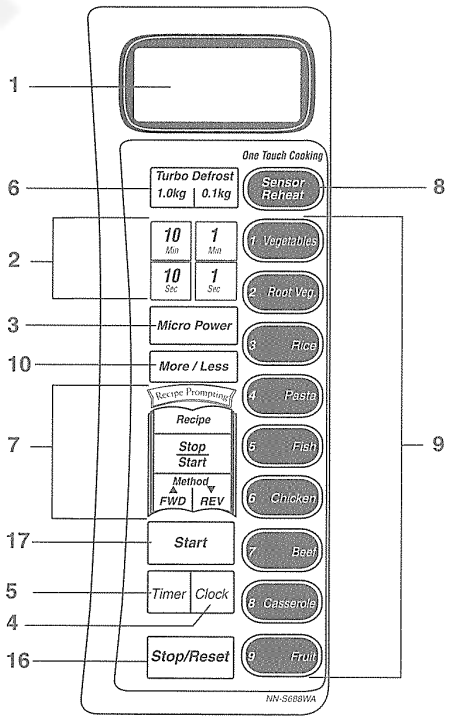
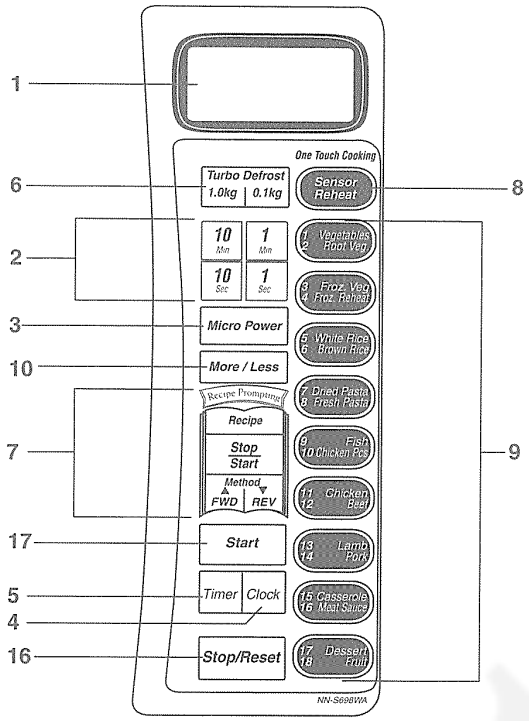


NN-S678BA

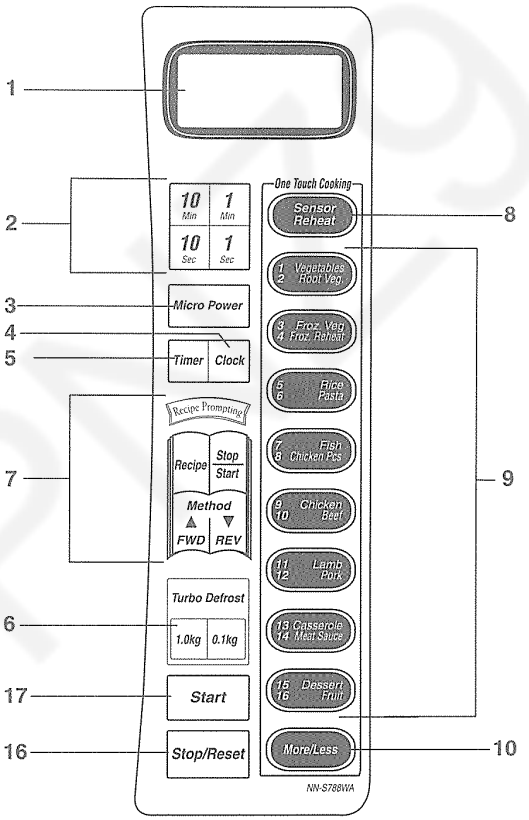


*NN-S688WA

CONTROL PANELS



*NN-S698WA



NN-S788WA

1 Display Window
2 Time Pads
3 Micro Power Pad
4 Clock Pad
5 Timer Pad
6 Turbo Defrost Pads
7 Recipe Prompting Pads
8 Sensor Reheat Pad
9 One Touch Cooking Pads
10 More/Less Pad
11 Auto Menu Pads
12 Auto Cook Pad
13 Auto Reheat Pad
14 Frozen Reheat Pad
15 Serving Weight Pads
16 Stop/Reset Pad

Before cooking: One tap clears your instructions. During cooking: One tap temporarily stops the cooking process. Another tap cancels all your instructions and time of day appears in the display window.

17 Start Pad

One tap allows oven to begin functioning. If door is opened or STOP/RESET Pad is pressed once during oven operation, START Pad must again be pressed to restart oven.

Word Prompters

When pads are pressed, a beep sound is heard and the corresponding letter or word(s) appear and roll across the window. If a pad is pressed and no beep is heard, the unit does not or cannot accept the instruction. As each pad is pressed the corresponding word(s) roll across the window. Words will automatically appear to prompt the user to perform the next step. It is not necessary to wait for the words to appear before pressing pads for the next step. A two beep sound is heard between stages. At the end of any complete program, the oven will beep five times and "ENJOY YOUR MEAL" will appear in the display window.

* Easy operation of this control panel is accomplished by blinking or illuminating next step key highlighting on the LCD keyboard for Recipe Prompting, More/Less, Micro Power, Start and Time Keypads. The control panel is assembled by sticking the LCD keyboard onto the membrane keyboard.

OPERATION AND DIGITAL PROGRAMMER CIRCUIT TEST PROCEDURE

Operation Guide on the display:
To assist you in programming, the next operation will appear on the display. When you get used to operating the oven, you can turn off the operating guide.

To turn off:

Timer → OPERATING GUIDE OFF

Press 3 times

To turn on:

Timer → OPERATING GUIDE ON

Press 3 times

1. To Set Clock

OPERATION	SCROLL DISPLAY
1. Plug the power supply cord into wall outlet.	*WELCOME TO WORD PROMPTING*
2. Press Clock pad.	✳ *——SET TIME*
3. Enter time of day (TOD) by pressing appropriate Time pads. (NN-S658/NN-S688/NN-S698 Time pads blink).	*11✳25* *——PRESS CLOCK*
4. Press Clock pad. TOD has now been registered into the digital programmer circuit and will count up by minutes.	*11:25*
5. Set for 1 minute by pressing 1 Min. Time pad once. (NN-S658/NN-S688/NN-S698 Time pads blink).	*1 00* *MIN SEC* *——PRESS START* *MEDIUM*
6. Press Start pad. (NN-S658/NN-S688/NN-S698 Start pad blinks).	↻ *10* *SEC*
7. When 1st stage cooking time has elapsed, oven beeps twice and automatically switches to 2nd stage cooking.	↻ *1 00* *MIN SEC*
8. When 2nd stage cooking time has elapsed, oven beeps 5 times and shuts off.	*ENJOY YOUR MEAL* *11:25*

2. Time Cooking for Two Stage

OPERATION	SCROLL DISPLAY
1. Place a water load in the oven.	
2. Press Micro Power pad once to set High power. (1st stage) (NN-S658/NN-S688/NN-S698 Micro Power pad blinks).	*HIGH* *——SET TIME*
3. Set for 10 seconds by pressing 10 Sec. Time pad once. (NN-S658/NN-S688/NN-S698 Time pads blink).	*10* *SEC* *——PRESS START* *HIGH*
4. Press Micro Power pad 4 times to set Medium power. (2nd Stage) (NN-S658/NN-S688/NN-S698 Micro Power pad blinks).	*MEDIUM* *——SET TIME*

3. Turbo Defrost

OPERATION	DISPLAY
1. Set the weight for 1 kg by pressing 1.0 kg pad.	*1.0 KG* *——PRESS START*
2. Press Start pad. Turbo Defrost cycle begins as time counts down. (NN-S658/NN-S688/NN-S698 Start pad blinks).	↻ *14 40* *MIN SEC*
3. Press Stop/Reset pad twice. Oven shuts off. (Time of day or colon appears on the display.)	*11:25*

4. Demonstration Mode

The demonstration mode is 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 mode, press [Clock] pad 3 times continuously.	*WELCOME TO WORD PROMPTING* *– – PRESS ANY KEY*

5. To Set Child Safety Lock

OPERATION	SCROLL DISPLAY
1. Press [Start] pad 3 times continuously. "*LOCK" appears on the display.	*LOCK

6. To Reset Child Lock

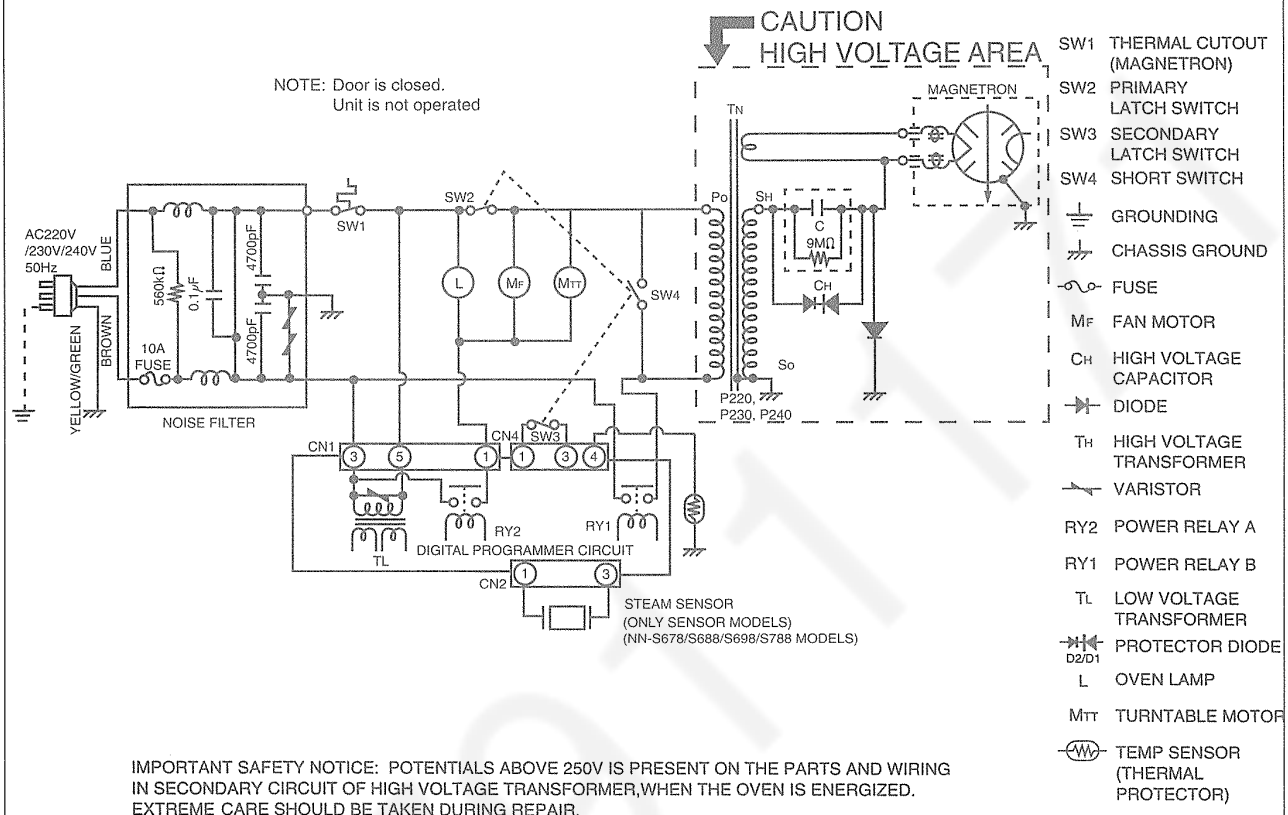
OPERATION	SCROLL DISPLAY
1. Press [Stop/Reset] pad 3 times continuously. Time of day or colon appears on the display	11:25

7. Sensor Cooking (NN-S678/S688/S698/S788 Models)

NOTE: Make sure that the outer panel is installed before Sensor cooking test, since Sensor function does not operate properly without the outer panel.

OPERATION	SCROLL DISPLAY
1. Pour 150 ±15cc (4.5±1/2ozs) of room temperature water in a beaker, place the beaker in the center of the oven.	
2. Press the desired Sensor Cooking Category pad. e.g. Set to Sensor Reheat	*SENSOR REHEAT* *——PRESS START*
3. Press [Start] pad.	AUTO
4. The steam sensor detects steam about 1.5 to 4 minutes after the Start pad is pressed. Sensor cooking (T1) automatically switches to time cooking (T2). "Auto" disappears with beep sounds and the remainder of cooking time appears in the display window. NOTE: Cooking time will vary depending on the water temperature, the shape of the beaker or the power source voltage.	8 SEC 23 SEC
5. When the balance of cooking time has elapsed, oven stops and beeps 5 times.	*ENJOY YOUR MEAL* 11:25

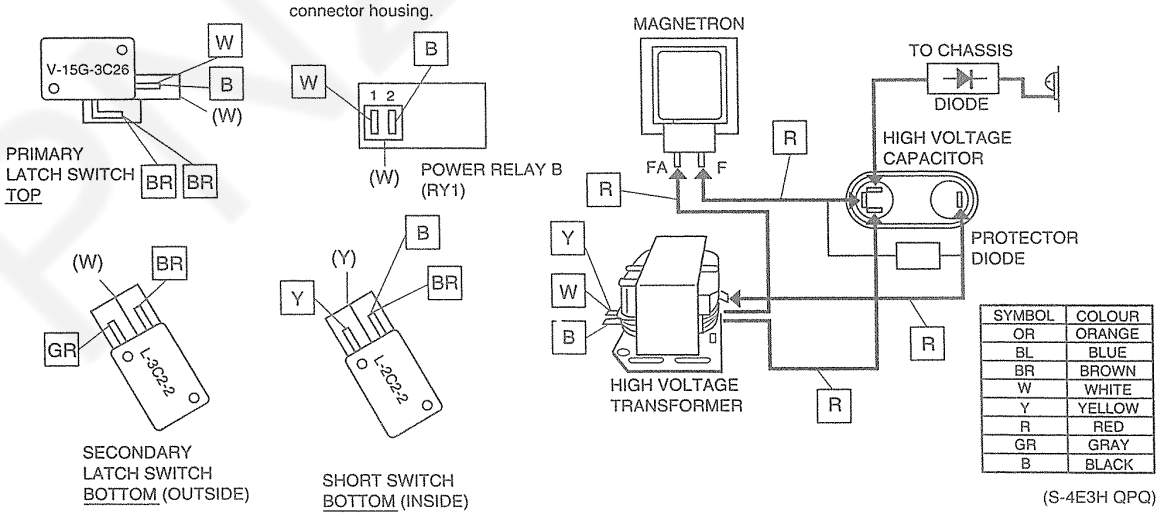
SCHEMATIC DIAGRAM (QPQ/JPG/VPE Models)



IMPORTANT SAFETY NOTICE: POTENTIALS ABOVE 250V IS PRESENT ON THE PARTS AND WIRING IN SECONDARY CIRCUIT OF HIGH VOLTAGE TRANSFORMER,WHEN THE OVEN IS ENERGIZED. EXTREME CARE SHOULD BE TAKEN DURING REPAIR.

WIRING DIAGRAM

NOTE: *When replacing, check the lead wire colour as shown.
*Colours shown by ( ) indicate colours of lead wire connector housing.



SYMBOL	COLOUR
OR	ORANGE
BL	BLUE
BR	BROWN
W	WHITE
Y	YELLOW
R	RED
GR	GRAY
B	BLACK

(S-4E3H QPQ)

M002

DESCRIPTION OF OPERATING SEQUENCE

1. Variable power cooking control

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.

POWER SETTING	OUTPUT POWER (%) APPROX.	ON-OFF TIME OF POWER RELAY B (RY1)	
		ON (SEC)	OFF (SEC)
HIGH	100%	22	0
MEDIUM-HIGH	70%	17	5
MEDIUM	55%	13	9
MEDIUM-LOW	30%	8	14
LOW	10%	5	17
DEFROST	30%	8	14

2. Turbo Defrost, Auto Reheat, Auto Cook controls

When these Auto Control features are selected and the Start Pad is tapped:

(A) The digital programmer circuit determines the power level and cooking time to complete cooking and indicates the operating state in the display window. Table shows the corresponding cooking times for respective serving by categories.

(B) 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 (All Models)

WEIGHT SELECTED	COOKING TIME
1.0 kg	14 min. 40 sec.
2.0 kg	30 min. 20 sec.
3.0 kg	46 min. 00 sec.

Auto Reheat (All NN-S648BA, NN-S658WA Models)

MENU	SELECTED SERVINGS/ WEIGHT		COOKING TIME
SOUP/CASSEROLE	1	250g	2 min. 20 sec.
	2	450g	3 min. 00 sec.
	4	850g	6 min. 00 sec.
PLATED MEAL	1	250g	2 min. 40 sec.
	2	450g	4 min. 20 sec.
	4	850g	6 min. 50 sec.

Auto Cook (All NN-S648BA, NN-S658WA Models)

MENU	SELECTED SERVINGS/ WEIGHT	COOKING TIME
Fresh Vegetables	250g	3 min. 00 sec.
	750g	7 min. 00 sec.
Frozen Vegetables	250g	4 min. 00 sec.
	750g	10 min. 00 sec.
Chicken Pieces	0.5kg	7 min. 30 sec.
	1.0kg	14 min. 00 sec.

Frozen Reheat (All NN-S648BA, NN-S658WA Models)

MENU	SELECTED SERVINGS/ WEIGHT		COOKING TIME
SOUP/CASSEROLE	1	250g	4 min. 00 sec.
	2	450g	7 min. 00 sec.
	4	850g	14 min. 00 sec.
PLATED MEAL	1	250g	5 min. 00 sec.
	2	450g	8 min. 00 sec.
	4	850g	15 min. 00 sec.

3. One Touch Cooking (Auto Sensor Cooking) (All NN-S678BA, NN-S688WA, NN-S698WA, NN-S788WA Models)

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

1) 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 seconds is subtracted from the T1 time. In other words T1 time starts at the end of the 10 second period.
2) T1 time...The total amount of time it takes the microwave oven to switch to T2 time after the 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 microprocessor memory and they are listed in the following tables along with the P1 and P2 powers.

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

Example of calculating the T2 time

Example 1: If the T1 time is measured to be 2 minutes and 40 seconds after the 10 second period, and the Auto program selected is Vegetables:

T2 = T1 X K
= 2 min. and 40 sec. X 0.3
= 160 sec. X 0.3
= 48 sec.

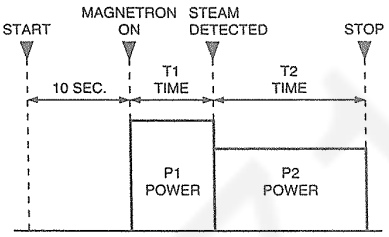
4. Sensor Reheat (All NN-S678BA, NN-S688WA, NN-S698WA, NN-S788WA Models)

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.

AUTO SENSOR COOKING/REHEAT PROCESS



Auto Sensor Cooking (One Touch Cooking Models)

Category	P1 Power	P2 Power	K Factor Standard
Vegetables	HIGH	HIGH	0.3

Sensor Reheat (All Sensor Models)

Category	P1 Power	P2 Power	K Factor Standard
Sensor Reheat	HIGH	M. HIGH	0.1

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. It is imperative, therefore, to make sure it is grounded properly before beginning repair work.

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.

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

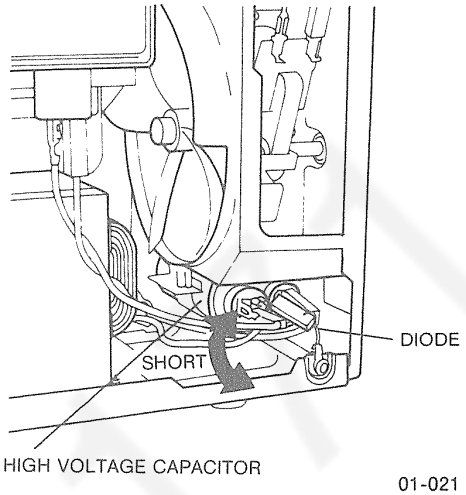
4. **When the 10 Amp fuse is blown due to the operation of short switch:**

WARNING

When the 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.

(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 capacitor 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

1. The following components have potentials above 250V while the appliance is operated.
   - ❊ Magnetron
   - ❊ High voltage transformer
   - ❊ High voltage diode
   - ❊ High voltage capacitor
   - ❊ Protector diode

   Pay special attention on these portions.
2. When the appliance is operated with the door hinges or magnetron fixed incorrectly, the microwave leakage can reach more than 5mW/cm^3. After repair or exchange, it is very important to check if magnetron and the door hinges are correctly fixed.

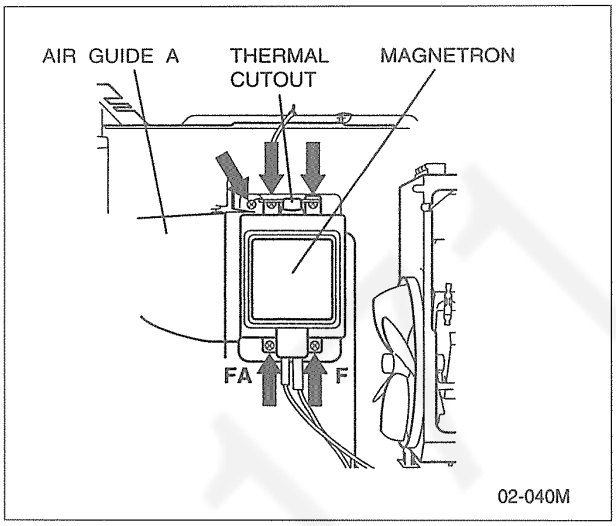
DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

1. Magnetron

(A) Discharge the high voltage capacitor.
(B) Remove 2 screws holding magnetron thermal cutout.
(C) Remove 1 screw holding air guide A.
(D) Disconnect 2 high voltage lead wires from magnetron filament terminals.
(E) Remove 4 screws holding the magnetron.
NOTE: After replacement of the magnetron, tighten mounting screws in an X pattern, 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.

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



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.
(A) Disconnect all connectors from D.P.C.
(B) Remove 1 screw holding escutcheon base and slide the escutcheon base upward slightly.
(C) Release flat cable connector's lock of DPC by pushing both levers to inside and pull them upward, and remove flat cable of membrane key board.
(D) Remove 3 screws holding DPC.

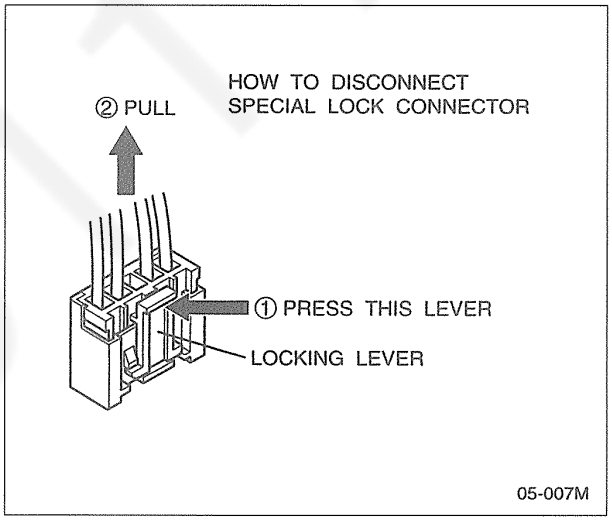
To replace membrane key board (All NN-S658WA, NN-S688WA & NN-S698WA Models)

(E) Remove escutcheon bracket from escutcheon base by freeing 4 catch hooks on the escutcheon base.
(F) On these models, the key board is not replaced with individual parts. Instead, the entire escutcheon base assembly must be replaced. Refer to parts list.

To replace membrane key board (All NN-S648BA, NN-S678BA & NN-S788WA Models)

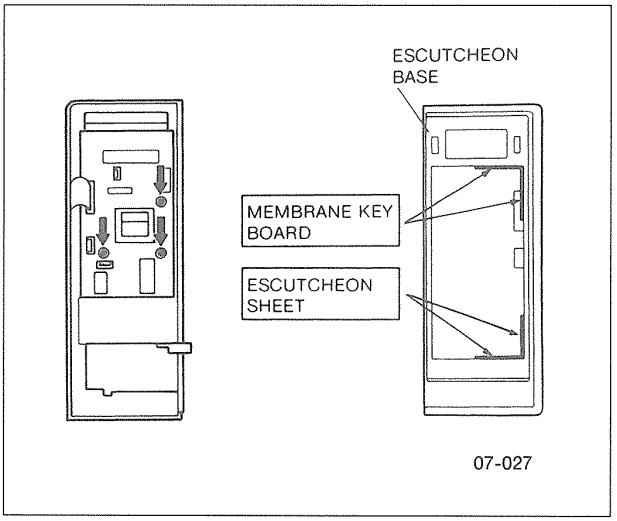
(E) Remove escutcheon bracket from escutcheon base by freeing 4 catch hooks on the escutcheon base.
(F) Push the upper part of key board (display window portion) from back of escutcheon base and peel off escutcheon sheet and membrane key board completely from escutcheon base.

NOTE: 1. The membrane key board is attached to the escutcheon base with double faced adhesive tape. Therefore, applying hot air such as using a hair dryer is recommended for smoother removal.
2. When installing new membrane key board, make sure that the surface of escutcheon base is cleaned sufficiently so that any problems (shorted contacts or uneven surface) can be avoided.
3. Alignment position of membrane key board is as follows (see figure);
Membrane key board: Right and upper edges
Escutcheon sheet: Right and lower edges



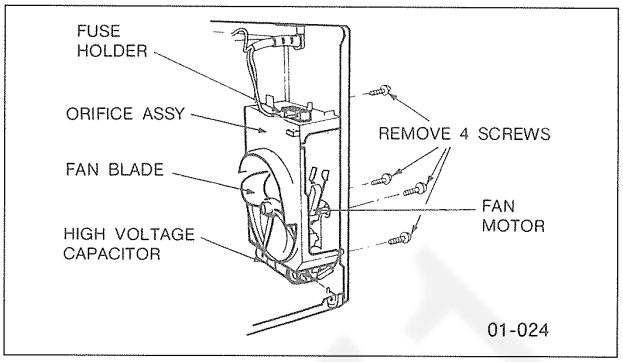
3. Low voltage transformer and/or power relays (RY1, RY2)

NOTE: Be sure to ground any static electric charge built up on your body before handling the DPC.
(A) Using solder wick or a desoldering tool and 30W soldering iron, carefully remove all solder from the terminal pins of the low voltage transformer and/or power relays.
NOTE: Do not use a soldering iron or desoldering tool of more than 30 watts on DPC contacts.
(B) With all the terminal pins cleaned and separated from DPC contacts, remove the defective transformer/power relays and install new transformer/power relays making sure all terminal pins are inserted completely. Resolder all terminal contacts carefully.



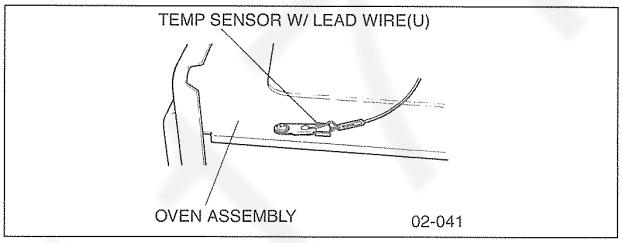
4. Fan motor

(A) Disconnect 2 lead wires from fan motor terminals.
(B) Disconnect 2 lead wires from fuse holder terminals.
(C) Disconnect 4 high voltage lead wires from high voltage capacitor terminals.
(D) Remove 5 screws holding fan motor and orifice assy and detach the orifice assy with fan motor from oven assy.
(E) Remove fan blade from the fan motor shaft by pulling it straight out.
(F) Separate the fan motor from the orifice assy by freeing 2 catch hooks on the orifice assy.



5. Temp sensor (thermal protector)

(A) Unplug socket of temp sensor with lead wire(U).
(B) Remove 1 screw holding the temp sensor with lead wire (U) and replace with new one.

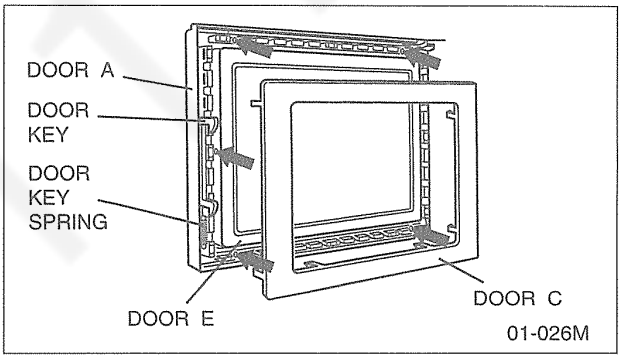


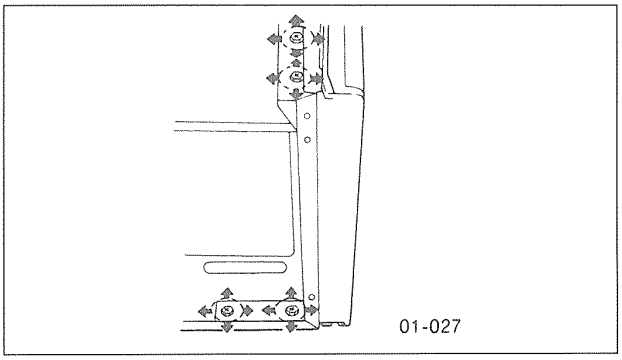
6. Door disassembly

(A) Remove door C from door E by carefully pulling outward starting from upper right hand corner using a flat blade screwdriver.
(B) Remove 5 screws holding door E to door A to separate door E from door A.
(C) Remove door screen B from door A.
(D) Remove door key and door key spring.

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.

(1) When mounting the door to the oven, be sure to adjust the door parallel to the bottom line of the oven face plate by moving the upper hinge and lower hinge in the direction necessary for proper alignment.
(2) Adjust so that the door has no play between the inner door surface and oven front surface. If the door assembly is not mounted properly, microwave power may leak from the clearance between the door and oven.
(3) Perform the microwave leakage test.





7. Turntable motor

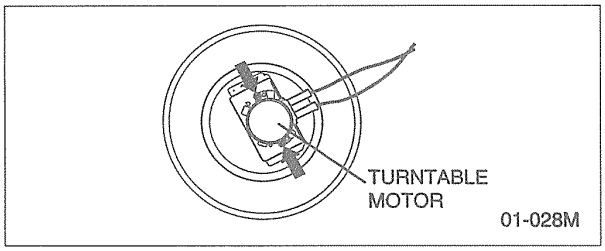
(A) Remove the motor cover by breaking off at the 8 spots indicated by arrows with a cutter or the like. (See Figure)

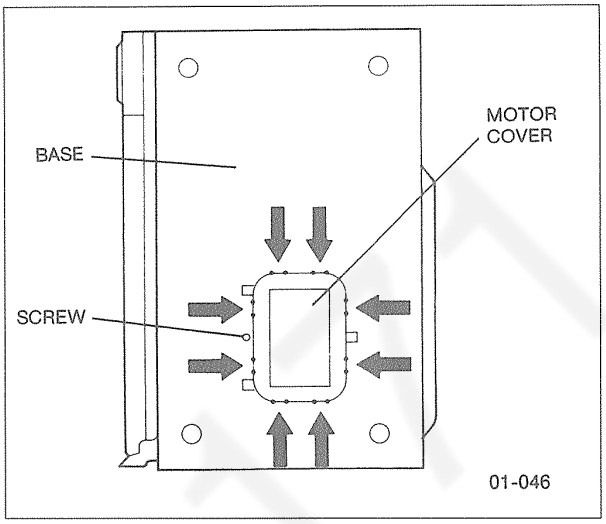
NOTE: After breaking off the motor cover, make sure that cut-off portions are properly trimmed off or bend to inside so that no sharp edge will expose to outside.

(B) Disconnect 2 lead wires connected to the stirrer motor.

(C) Remove the stirrer motor by removing 2 screws.

NOTE: To reinstall the motor cover, use 4X6 screw.





8. Steam Sensor (ALL NN-S678BA, NN-S688WA, NN-S698WA, NN-S788WA Models)

(A) Remove 1 screw holding steam sensor unit.

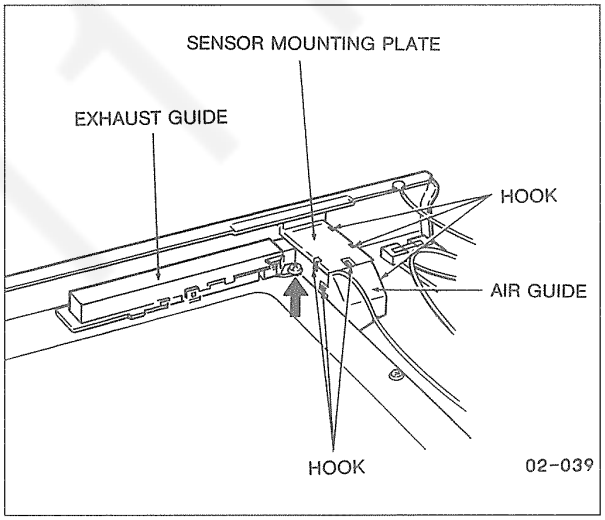
(B) Disconnect CN2 connector from digital programmer circuit board.

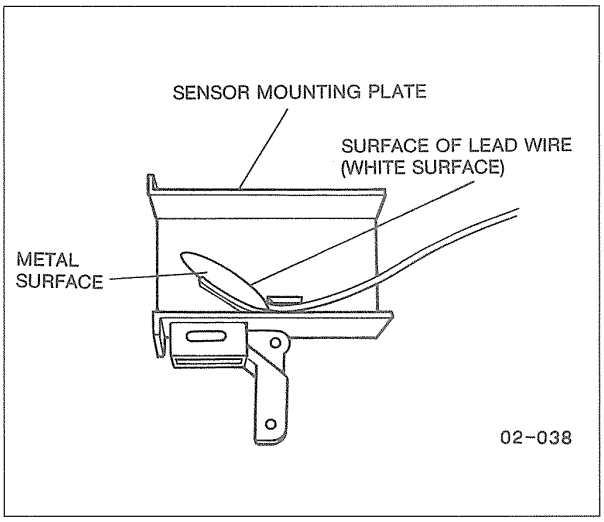
(C) Remove exhaust guide from steam sensor unit.

(D) Remove catch hooks on sensor mounting plate and air guide.

(E) 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

1. High voltage is present at the high voltage terminal of the high voltage transformer during any cook cycle.
2. It is neither necessary nor advisable to attempt measurement of the high voltage.
3. Before touching any oven components, or wiring, always unplug the oven from its power source and discharge the high voltage capacitor.

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 Opened	Door Closed
Primary Latch Switch	∞ Ω (open)	0 Ω (close)
Secondary Latch Switch	∞ Ω (open)	0 Ω (close)
Power Relay B	∞ Ω (open)	∞ Ω (open)

2. Short Switch & Monitor

(A) Unplug lead wires from H.V. transformer primary terminals.
(B) Connect test probes of ohm meter to the disconnected leads which were connected to H.V. Transformer.
(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 Ω	∞ Ω

3. High voltage transformer

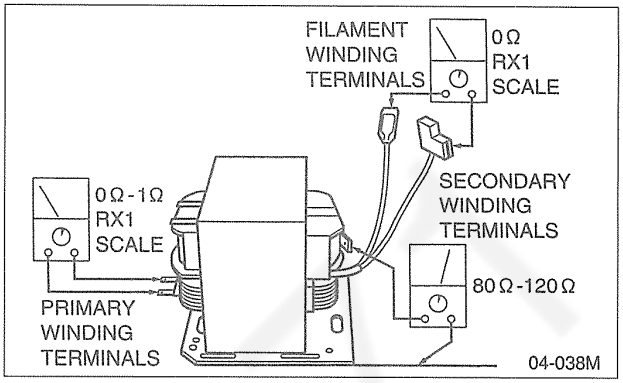
(A) Remove connectors from the transformer terminals and check continuity.
(B) Normal (cold) resistance readings should be as follows:
Secondary winding . . . . . Approx. 80Ω~120Ω
Filament winding . . . . . Approx. 0Ω
Primary winding . . . . . Approx. 0Ω~1Ω

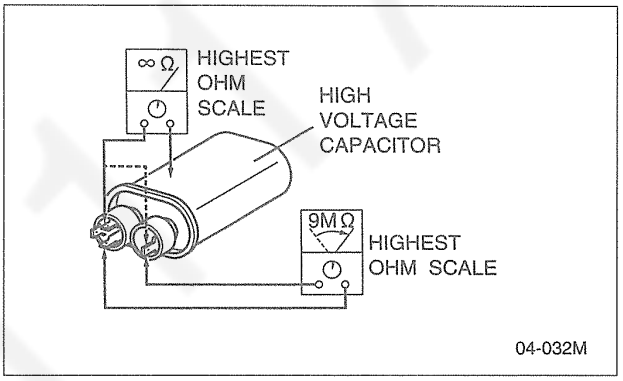
4. High voltage capacitor

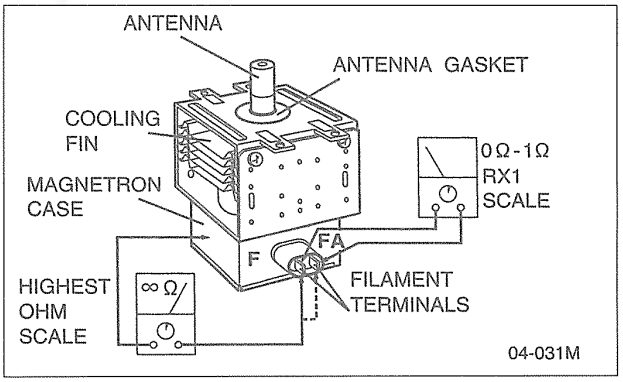
(A) Check continuity of capacitor with meter on highest OHM scale.
(B) A normal capacitor will show continuity for a short time, and then indicate 9MΩ once the capacitor is charged.
(C) A shorted capacitor will show continuous continuity.
(D) An open capacitor will show constant 9MΩ.
(E) Resistance between each terminal and chassis should be infinite.

5. 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.

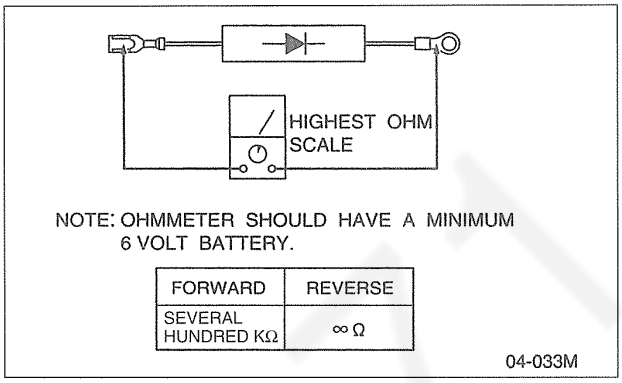






6. Diode

(A) Isolate the diode from the circuit by disconnecting the leads.
(B) 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 and several hundred KΩ in the other direction.

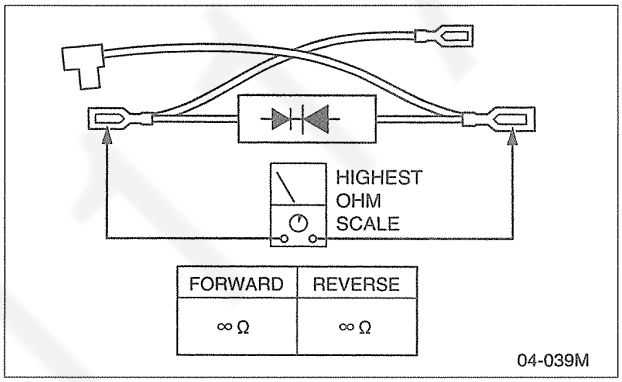


7. Membrane key board (Membrane switch assembly)

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.

8. Protector diode

(A) Isolate the protector diode assembly from the circuit by disconnecting its leads.
(B) 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.



9. Temp sensor (Thermal protector)

A temp sensor is mounted on top of the oven cavity at the left side. Its purpose is to automatically shut off the oven in case the cavity overheats for any reason.
The thermal protector will shut the oven down when the temperature of the cavity reaches 257°F (125°C).
The device is connected to the DPC on touch control models. When the thermal protector exceeds its temperature it will turn off the power to oven cavity and display will go to reset mode.
The cooking program can be reset after cool-down.
THERMISTOR RESISTANCE VALUE
30K-120K at 10°C-30°C (50°F-86°F)

10.Steam Sensor and Digital Programmer Circuit

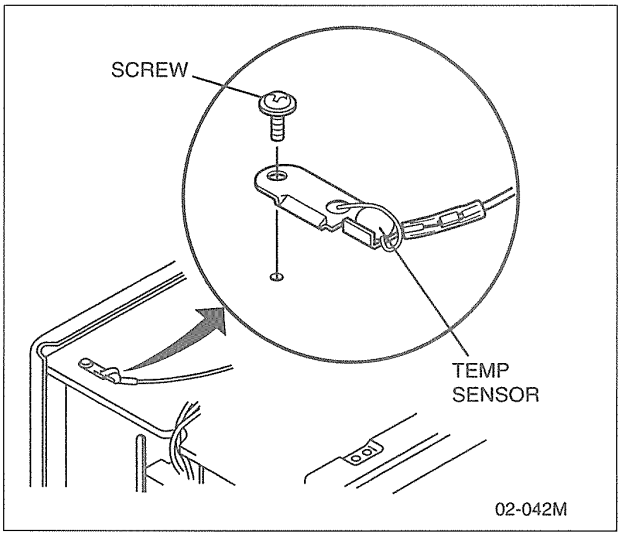
CAUTION

Do not touch any parts of the circuitry on the digital programmer circuit since static electric discharge may damage this control panel.
Always ground yourself while working on this panel to discharge any static charge built up on your body.

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).
6) The remaining cooking time (T2) appears in display window. If the following cooking time appears, Steam Sensor function is normal.

T1 TIME	T2 TIME (Remaining cooking time)
1 Min. 30 Sec.~4 Min.	8 Sec.~23 Sec.



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. Installation 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 the illustration.

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, Primary and Secondary latch switches 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

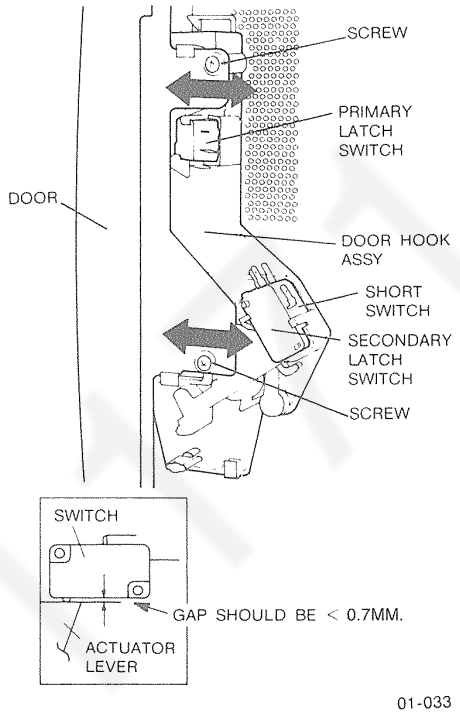
NOTE: **Check the line voltage under load. Low voltage will lower the magnetron output. Take the temperature readings and heating time as accurate as possible.**

(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) Stir the water again and read the temperature of the beaker (recorded as T2).

(D) The normal temperature rise at High power position for each model is as shown in table.



01-033

Please confirm that the gap between the switch housing and switch actuator levers is no more than 0.7 mm when the door is closed.

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. The leakage Should not be more than 2 mW/cm². 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

*Electromagnetic 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 shown in Figure no faster than 1 inch/sec (2.5 cm/sec).

(3) Leakage with the outer panel removed ..... less than 5mW/cm².

(4) Leakage for a fully assembled oven with door normally closed..... less than 2mW/cm².

(5) Leakage for a fully assembled oven [Before the latch switch (primary) is interrupted] while pulling the door..... less than 2mW/cm².

(A) Pour 275 ± 15cc (9ozs ± 1/2oz) of 20 ±5°C (68 ± 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 measuring 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.

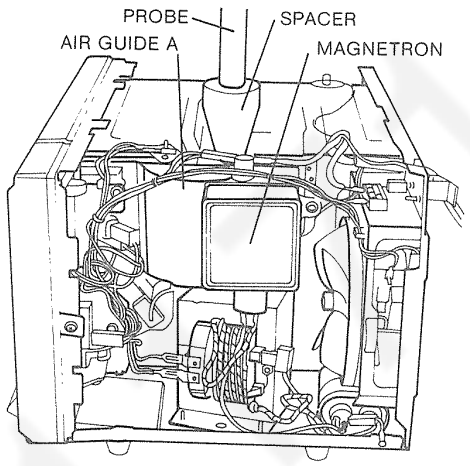
3. Record keeping and notification after measurement

(A) 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.



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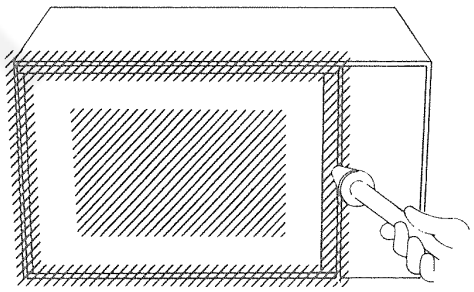


01-035

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

(RPE)

TROUBLESHOOTING GUIDE

CAUTION

1. Ensure proper grounding before checking for trouble.
2. Be careful of the high voltage circuitry, taking necessary precautions when troubleshooting.
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 open or the connector cannot by 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. 220/230/240V 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.

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 does not start cooking

	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 (Magnetron)	Check fan motor when thermal cutout is defective.
		3. Open low voltage transformer 4. Defective DPC	
2.	Oven does not accept key input (Program)	1. Key input is not in-sequence	Refer to operation procedure.
		2. Open or loose connection of membrane key pad to DPC (Flat cable) 3. Shorted or open membrane key board	
		4. Defective DPC	Refer to DPC troubleshooting.
3.	Oven lamp and fan motor turn on when oven is plugged in with door closed.	1. Misalignment or loose wiring of secondary latch switch	Adjust door and latch switches.
		2. Defective secondary latch switch	
4.	Timer starts count down but no microwave oscillation.	1. Off-alignment of latch switches	Adjust door and latch switches.
		2. Defective primary latch switch 3. Open or loose wiring of power relay (RY1) 4. Defective power relay (RY1). 5. Defective DPC. 6. Open or loose connection of high voltage circuit especially magnetron filament circuit NOTE: Large contact resistance will bring lower magnetron filament voltage and causing magnetron to lower output and/or intermittent oscillation.	
		7. Defective high voltage component H.V. Transformer H.V. Capacitor H.V. Diode Magnetron	Check high voltage component according to component test procedure and replace if it is defective.

[TROUBLE 2] Fuse is blown

	SYMPTOM	CAUSE	CORRECTIONS
1.	10A fuse is blown.	1. Shorted lead wire harness	
		2. Defective short switch	Check adjustment of latch switches and door
		3. Defective primary latch switch	
		4. Shorted H.V. Capacitor	
		5. Shorted H.V. Diode	Replace H.V. Diode and protector diode (*NOTE)
		6. Defective magnetron	Replace magnetron and protector diode (*NOTE)
		7. Shorted H.V. Transformer	Replace H.V.Transformer and protector diode (*NOTE)
		8. Shorted Protector diode	
	※NOTE: Be sure to replace protector diode together with those H.V.Components. In this case, only D2 of protector diode may be shorted due to faulty H.V.Component.Therefore, if protector diode is not replaced together, high voltage transformer will bedamaged (over heated).		

[TROUBLE 3] Other troubles

	SYMPTOM	CAUSE	CORRECTIONS
1	Microwave output is low. Oven takes longer time to cook food.	1. Decrease in power source voltage	Consult electrician
		2. Open or loose wiring of magnetron filament circuit. (Intermittent oscillation) 3. Aging change of magnetron	
2.	Fan motor and oven lamp turn on when door is opened.	1. Shorted primary latch switch	
3.	Oven does not operate and return to plugged in mode.	1. Open or loose wiring of temp sensor 2. Defective temp sensor	Check tighten screws on escutcheon base bracket, D.P.C. board and temp sensor.
		3. Defective DPC	Refer to DPC troubleshooting.
4.	Loud buzzing noise can be heard.	1. Loose fan and fan motor 2. Loose screws on H.V. Transformer	
5.	Oven stops operation during cooking	1. Off-alignment of latch switches	Adjust door and latch switches.
		2. Open or loose wiring of primary and secondary latch switch 3. Operation of thermal cutout (Magnetron)	
6.	Turntable motor does not rotate.	1. Open or loose wiring of turntable motor 2. Defective turntable motor	
7.	Oven return to plugged in mode after 10 seconds elapsed in the auto sensor cooking mode.	1. Open or loose wiring of sensor terminals from DPC. 2. Open steam sensor. 3. Defective D.P.C.	Sensor Models

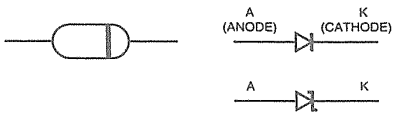
Trouble related to Digital Programmer Circuit

SYMPTOM	STEP	CHECK	RESULT	CAUSE/CORRECTIONS
No display when oven is first plugged in	1	Fuse pattern of DPC	Normal	STEP 2
			Open (NOTE)	Shorted circuit of ZNR, L. V. T., Oven Lamp etc. Replace DPC
	2	Low voltage transformer (LVT) secondary voltage	Abnormal 0V	LVT
			Normal	→ Step 3
	3	IC-1 pin 1 voltage (Emitter of Q1)	Abnormal	ZD1,Q1
			Normal = 5V	→ Step 4
	4	IC-1 pin 27 voltage (14 pin of IC-2)	Abnormal	IC-2
			Normal	→ IC-1, CX1, DISPLAY
NOTE (FOR ALL MODELS) **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 pattern 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 "PF4" and "PF3" fuse pattern are open, please replace DPC.** **NOTE:* At the time of these repairs, make visual inspection of the varistor for burning damage and examine the transformer with tester for the presence of layer short-circuit (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 23 voltage	Abnormal	IC-1
			Normal	BZ, Q6
Power relay A(RY-2) does not turn on even though the program has been set and the start pad is tapped	1	IC-1 pin 8 voltage while operation	Abnormal	IC-1
			Normal=5V	→ Step 2
	2	short circuit between pin 1 and pin 12 of IC-2	Still not turn on	RY-2
			RY-2 turns on	IC-2
No microwave oscillation at any power setting	1	IC-1 pin 5 and pin 15 voltages while operation at high power	Abnormal	IC-1
			Normal 5---5V, 15---5V IC-1	→ Step 2
	2	Q2 transistor	Abnormal	Q2
			Normal	IC-2, 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

TO BE CONTINUED FOR AUTO SENSOR MODELS				
Auto Sensor cooking does not operate normally. (Steam sensor does not detect steam from foods.)	1	Steam sensor terminal voltage by using high impedance tester (20kΩ/V), when breathe on metal surface of sensor	Abnormal = 0V	Steam sensor
			Normal ≧ 10~30mV	IC-1, IC-3

HOW TO CHECK THE SEMICONDUCTORS USING AN OHM METER

Diode



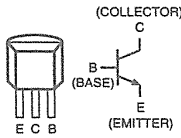
	FORWARD	REVERSE
A-K	SMALL	∞

Transistor

NPN Transistor

2SC·····

2SD·····

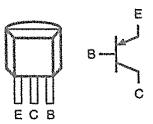


	FORWARD	REVERSE
B-E	SMALL	∞
B-C	SMALL	∞
C-E	∞	∞

PNP Transistor

2SA·····

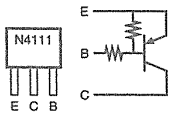
2SB·····



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

Digital Transistor

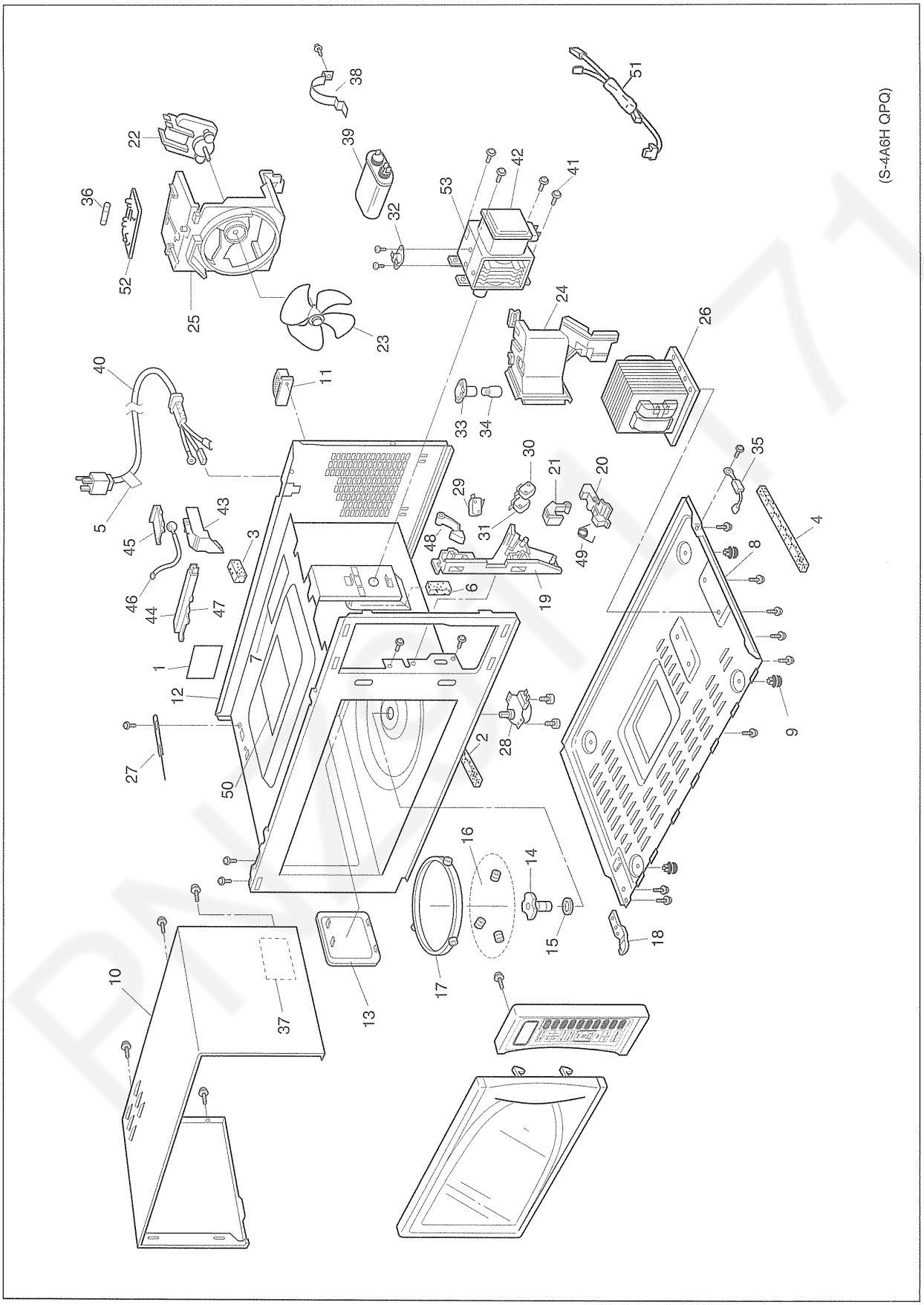
PNP Transistor



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

MEMO

EXPLODED VIEW AND PARTS LIST



PARTS LIST

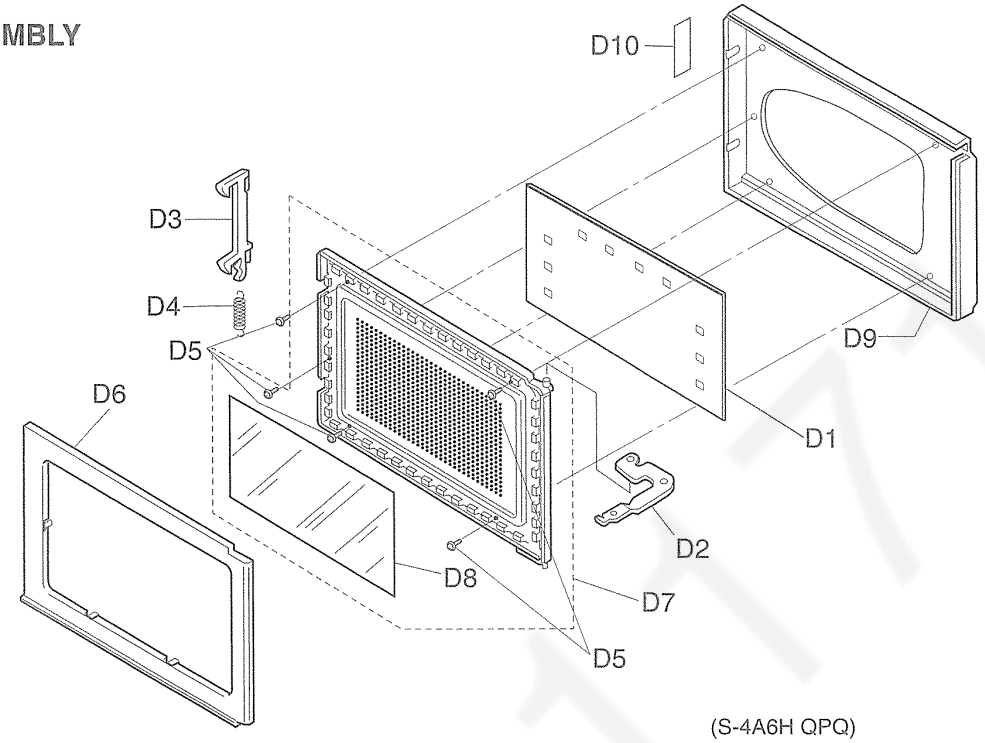
NOTES:
- When ordering replacement part(s), please use part number(s) shown in this parts list. Do not use description of the part.
- Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
- Items marked * supplied by MMOC (MAC). (U.S.A.)
- Items marked # are new Part No's. for Pre I.G. (Initial Guidance) list.
- Model Number suffixes in Remarks column (i.e. QPQ etc.) indicate parts applicable to only specified country models as follows.
  QPQ: For Australia, JPG: For New Zealand, VPE: For South Africa

Ref.No.		Part No.	Part Name & Description	Pcs/Set	Remarks
*1		B00065460JP	WARNING LABEL	1	
*2		AMQ0928000BT	FOG CUSHION	1	
*3		AMQ0908000AE	CUSHION RUBBER A	1	
*4		AMQ0903000AG	CUSHION RUBBER A	1	
*5		B0239L00XN	AC CORD LABEL	1	ALL VPE MODELS
*6		AMQ0908000AE	CUSHION RUBBER A	1	
*7		B60407050AP	OVEN LAMP SHEET	1	NN-S648BAQPQ & NN-S658WAQPQ/JPG/VPE
*8		B10018640AP	BASE	1	ALL 1.3 MODELS
*8		B10018290AP	BASE	1	NN-S788WAQPQ/JPG/VPE
*9		B10088250AP	RUBBER FOOT	4	
*10		B10096250QP	CABINET BODY / 1.3 BLACK	1	NN-S648BAQPQ & NN-S678BAQPQ/JPG
*10		B10096240HQP	CABINET BODY / 1.3 WHITE	1	ALL NN-S658, NN-S688 & NN-S698 MODELS
*10		B10098280HQP	CABINET BODY / 1.7 WHITE	1	NN-S788WAQPQ/JPG/VPE
*11		B11408760AP	STOPPER A	1	
*12	⚠	B200A9340AP	OVEN	1	ALL 1.3 MODELS
*12#	⚠	B200A4A00AP	OVEN	1	NN-S788WAQPQ/JPG/VPE
*13		B20557000AP	CEILING COVER WHITE	1	
*14		B21315540AP	PULLEY SHAFT	1	
*15		B21777050AP	WASHER	1	
*16		B202K9330AP	ROLLER B (U)	1	(NOTE 1)
*17		B290D9330AP	ROLLER RING (U)	1	
*18	⚠	B30077050AP	LOWER HINGE (B)	1	ALL 1.3 MODELS
*18	⚠	B30077600AP	LOWER HINGE (B)	1	NN-S788WAQPQ/JPG/VPE
*19	⚠	B3020-1480	DOOR HOOK A	1	
*20		B3137-1480	HOOK SPACER B	1	
*21		B3138-1480	HOOK SPACER C	1	
*22		2Z-9AUA.S.	FAN MOTOR	1	(24W, AC, SINGLE PHASE)
*23		B40086260AP	FAN BLADE	1	NN-S788WAQPQ/JPG/VPE
*23		B40085950AP	FAN BLADE	1	ALL 1.3 MODELS
*24		B40259390AP	AIR GUIDE A	1	
*25		B41447630AP	ORIFICE / 1.3	1	ALL 1.3 MODELS
*25		B41447600AP	ORIFICE / 1.7	1	NN-S788WAQPQ/JPG/VPE
*26	⚠	B621C9250QP	H.V. TRANSFORMER	1	ALL QPQ & JPG MODELS (1.5KVA)
*26	⚠	B621C9250VP	H.V. TRANSFORMER	1	ALL VPE MODELS (1.5KVA)
*27		B03539560CP	TEMP SENSOR W/ LEAD WIRE (U)	1	
*28		B63264760JP	TURNTABLE MOTOR	1	(3W)
*29	⚠	ANE6142-1450	MICRO SWITCH	1	(V-16G-3C26-M) PRIMARY LATCH SWITCH
*30	⚠	A61425180AP	MICRO SWITCH	1	(L-3C2-2) SECONDARY LATCH SWITCH
*31	⚠	A61785180AP	MICRO SWITCH	1	(L-2C2-2) SHORT SWITCH
*32	⚠	B61456240QP	THERMAL CUTOUT	1	
*33	⚠	B61524740AQ	SOCKET	1	
*34		B60304080BP	INCANDESCENT LAMP	1	
*35	⚠	A62024000AP	DIODE, SI	1	
*36	⚠	B63317550GP	FUSE	1	(10A)
*37		B60704760JP	INSULATION SHEET	1	
*38		B61884060AP	CAPACITOR BRACKET	1	
*39	⚠	E60904080GP	H.V. CAPACITOR	1	(1.14uf. AC2000V)
*40	⚠	B910C4760QP	AC CORD W/PLUG	1	ALL QPQ/JPG MODELS (240V)
40#	⚠	A900C5450VN	AC CORD W/PLUG	1	ALL VPE MODELS (240V)
*41		XTT4+8B	SCREW	4	(4X8) FOR MAGNETRON
*42	⚠	2M210-M1F1	MAGNETRON / 1.0	1	

Ref.No.		Part No.	Part Name & Description	Pcs/Set	Remarks
*43		B64498660AP	SENSOR COVER A	1	ALL NN-S678, NN-S688, NN-S698 & NN-S788 MODELS
*44		B64508660AP	SENSOR COVER B	1	ALL NN-S678, NN-S688 & NN-S698 MODELS
*44		A64505500AP	SENSOR COVER B	1	ALL NN-S788 MODELS
*45		B65438660AP	SENSOR COVER C	1	ALL NN-S678, NN-S688, NN-S698 & NN-S788 MODELS
*46		A607S7050AP	STEAM SENSOR	1	ALL NN-S678, NN-S688, NN-S698 & NN-S788 MODELS
*47		A65435500AP	SENSOR COVER C	1	ALL NN-S788 MODELS
*48		B3136-1480	HOOK SPACER A	1	
*49		J3097-1480	LATCH SPRING	1	
*50		B03478250AP	COVER SHEET	1	
*51		B606V7640QP	PROTECTOR DIODE	1	
*52		B692Y7680VP	NOISE FILTER	1	
*53		B03115460QP	N LABEL	1	
*		B08878640AP	CABINET BODY TOUCH-UP PAINT (BLACK)	1	BOTTLE WITH BRUSH, FOR REPAIR OF PAINTED CABINET BODY
*		B08878640HAP	CABINET BODY TOUCH-UP PAINT (WHITE)		BOTTLE WITH BRUSH, FOR REPAIR OF PAINTED CABINET BODY
*		B0887705AAP	CAVITY SPRAY PAINT	1	SPRAY CAN, FOR REPAIR OF PAINTED OVEN CAVITY
*		B0887700AAP	CAVITY TOUCH-UP PAINT	1	BOTTLE WITH BRUSH, FOR REPAIR OF PAINTED OVEN CAVITY

NOTE 1: When ordering the roller B assy, three rollers will be shipped.
When replacing the roller B, three rollers should be replaced at the same time.
Otherwise the glass cooking tray may not turn smoothly.

DOOR ASSEMBLY

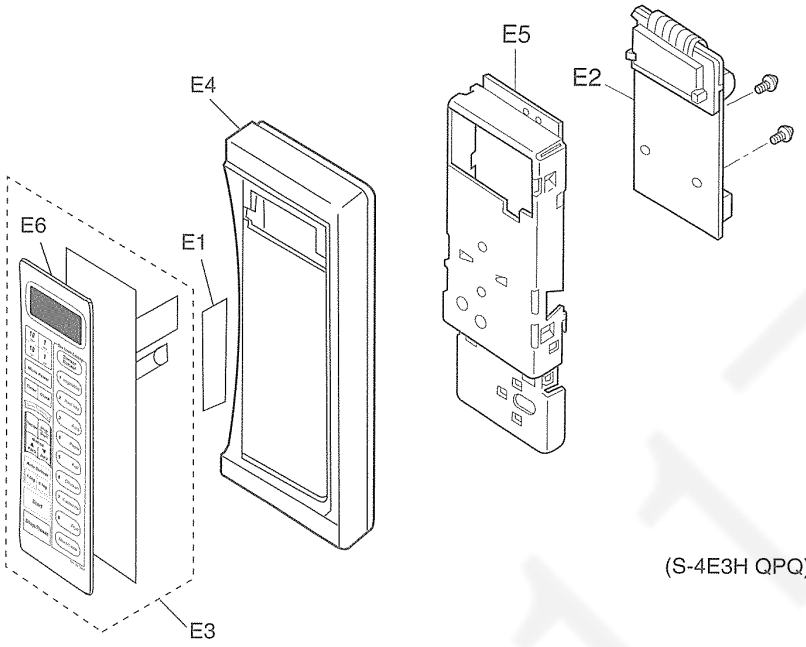


(S-4A6H QPQ)

Ref.No.		Part No.	Part Name & Description	Pcs/Set	Remarks
*D1#	⚠	B31464E50QPH	DOOR SCREEN B / 1.3	1	NN-S678BAQPQ/JPG
*D1#	⚠	B31464D20CPH	DOOR SCREEN B / 1.3	1	NN-S648BAQPQ
*D1#	⚠	B31469330HAP	DOOR SCREEN B / 1.3	1	ALL NN-S658, NN-S688 & NN-S698 MODELS
*D1#	⚠	B31464A00HAP	DOOR SCREEN B / 1.7	1	NN-S788WAQPQ/JPG/VPE
*D2	⚠	B30067050AP	UPPER HINGE (A)	1	ALL 1.3 MODELS
*D2	⚠	B30067600AP	UPPER HINGE (A)	1	NN-S788WAQPQ/JPG/VPE
*D3		B30188350AP	DOOR KEY A	1	
*D4		B30214000AP	DOOR KEY SPRING	1	
*D5		XTW3+6Q	SCREW	5	
*D6	⚠	B30858640AP	DOOR C / 1.3 BLACK	1	NN-S648BAQPQ & NN-S678BAQPQ/JPG
*D6	⚠	B30858640HAP	DOOR C / 1.3 WHITE	1	ALL NN-S658, NN-S688 & NN-S698 MODELS
*D6	⚠	B30858290HAP	DOOR C / 1.7 WHITE	1	NN-S788WAQPQ/JPG/VPE
*D7#	⚠	B302K9390QP	DOOR E (U) / 1.3 BLACK	1	NN-S648BAQPQ & NN-S678BAQPQ/JPG
*D7#	⚠	B302K9390HQP	DOOR E (U) / 1.3 WHITE	1	ALL NN-S658, NN-S688 & NN-S698 MODELS
*D7#	⚠	B302K8290HQP	DOOR E (U) / 1.7 WHITE	1	NN-S788WAQPQ/JPG/VPE
*D8	⚠	B31457050AP	DOOR SCREEN A / 1.3	1	ALL 1.3 MODELS
*D8#	⚠	B31459310AP	DOOR SCREEN A / 1.7	1	NN-S788WAQPQ/JPG/VPE
*D9#	⚠	B301A4E50HQP	DOOR A (U) / 1.3 WHITE	1	ALL NN-S688 & NN-S698 MODELS
*D9#	⚠	B301A4B00AP	DOOR A (U) / 1.3 BLACK	1	NN-S648BAQPQ & NN-S678BAQPQ/JPG
*D9#	⚠	B301A4D20HCP	DOOR A (U) / 1.3 WHITE	1	NN-S658WAQPQ/JPG/VPE
*D9#	⚠	B301A4E30HQP	DOOR A (U) / 1.7 WHITE	1	NN-S788WAQPQ/JPG/VPE
*D10	⚠	B01726210JP	CAUTION LABEL	1	ALL JPG MODELS

NOTE 2: Please order Door A and Caution Label together.

ESCUTCHEON BASE ASSEMBLY (ALL NN-S648, NN-S678 & NN-S788 MODELS)

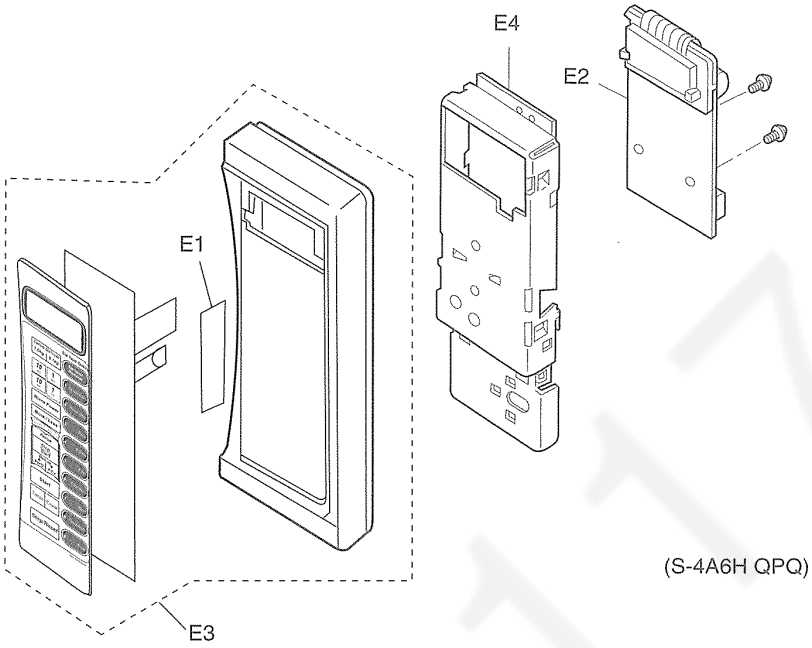


(S-4E3H QPQ)

Ref.No.		Part No.	Part Name & Description	Pcs/Set	Remarks
*E1		B00079330QP	NAME PLATE	1	ALL QPQ MODELS
*E1		B00078940HQP	NAME PLATE	1	ALL JPG/VPE MODELS
*E2#		B603L4E60QP	D. P. CIRCUIT (U)	1	NN-S648BAQPQ RTL (W/ COMPONENTS)
*E2#		B603L4E50QP	D. P. CIRCUIT (U)	1	NN-S678BAQPQ/JPG RTL (W/ COMPONENTS)
*E2#		B603L4E30QP	D. P. CIRCUIT (U)	1	NN-S788WAQPQ/JPG RTL (W/COMPONENTS)
*E2#		B603L4E30VP	D. P. CIRCUIT (U)	1	NN-S788WAVPE RTL (W/COMPONENTS)
*E3#		B630Y4E60QP	MEMBRANE SWITCH (U)	1	NN-S648BAQPQ (W/ESCUTCHEON SHEET)
*E3#		B630Y4E50QP	MEMBRANE SWITCH (U)	1	NN-S678BAQPQ/JPG (W/ESCUTCHEON SHEET)
*E3#		B630Y4E30HQP	MEMBRANE SWITCH (U)	1	NN-S788WAQPQ/JPG/VPE (W/ESCUTCHEON SHEET)
*E4		B80348660AP	ESCUTCHEON BASE	1	NN-S648BAQPQ & NN-S678BAQPQ/JPG (NOTE 3)
*E4		B80348290HAP	ESCUTCHEON BASE	1	NN-S788WAQPQ/JPG/VPE (NOTE 3)
*E5		B81278640AP	BACK PLATE	1	NN-S648BAQPQ & NN-S678BAQPQ/JPG
*E5		B81278290AP	BACK PLATE	1	NN-S788WAQPQ/JPG/VPE
*E6#		B83374E60QP	ESCUTCHEON SHEET	1	NN-S648BAQPQ
*E6#		B83374E50QP	ESCUTCHEON SHEET	1	NN-S678BAQPQ/JPG
*E6#		B83374E30HQP	ESCUTCHEON SHEET	1	NN-S788WAQPQ/JPG/VPE

NOTE 3: Please order Escutcheon Base and Name Plate together.

ESCUTCHEON BASE ASSEMBLY (ALL NN-S658, NN-S688 & NN-S698 MODELS)

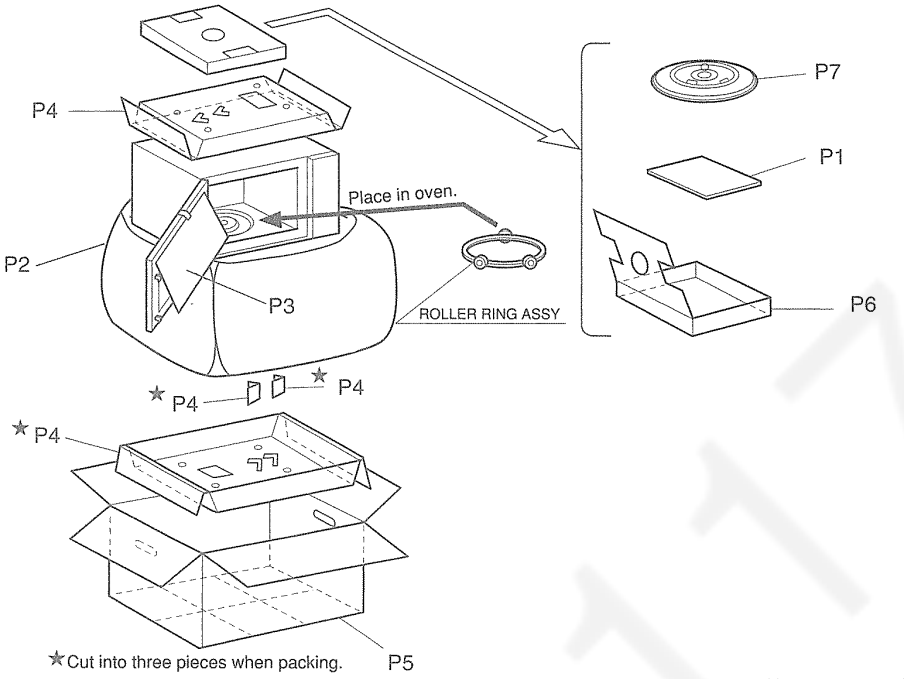


(S-4A6H QPQ)

Ref.No.		Part No.	Part Name & Description	Pcs/Set	Remarks
*E1		B00079330QP	NAME PLATE	1	ALL QPQ MODELS
*E1		B00078940HQP	NAME PLATE	1	ALL JPG/VPE MODELS
*E2#		B603L4A80QP	D. P. CIRCUIT (U)	1	NN-S658WAQPQ/JPG RTL (W/COMPONENTS)
*E2#		B603L4A80VP	D. P. CIRCUIT (U)	1	NN-S658WAVPE RTL (W/COMPONENTS)
*E2#		B603L4A70QP	D. P. CIRCUIT (U)	1	NN-S688WAQPQ/JPG RTL (W/COMPONENTS)
*E2#		B603L4A70VP	D. P. CIRCUIT (U)	1	NN-S688WAVPE RTL (W/COMPONENTS)
*E2#		B603L4A60QP	D. P. CIRCUIT (U)	1	NN-S698WAQPQ/JPG RTL (W/COMPONENTS)
*E2#		B603L4A60VP	D. P. CIRCUIT (U)	1	NN-S698WAVPE RTL (W/ COMPONENTS)
*E3#		B800L4A80HQP	ESCUTCHEON BASE (U)	1	ALL NN-S658 MODELS (W/ESCUTCHEON SHEET) (NOTE 3)
*E3#		B800L4A70HQP	ESCUTCHEON BASE (U)	1	ALL NN-S688 MODELS (W/ESCUTCHEON SHEET) (NOTE3)
*E3#		B800L4A60HQP	ESCUTCHEON BASE (U)	1	ALL NN-S698 MODELS (W/ESCUTCHEON SHEET) (NOTE 3)
*E4		B81278640AP	BACK PLATE	1	

NOTE 3: Please order Escutcheon Base and Name Plate together.

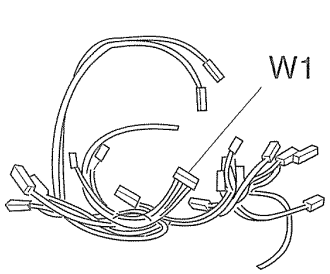
PACKING AND ACCESSORIES

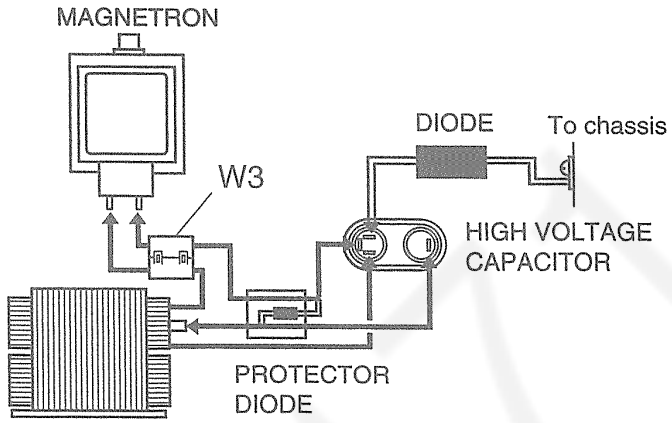


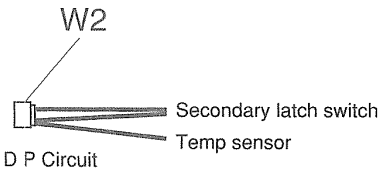
(S-4A6H QPQ)

Ref.No.		Part No.	Part Name & Description	Pcs/Set	Remarks
*P1#		B00034E30QP	INSTRUCTION MANUAL	1	
*P2		B01068290AP	P.E. BAG	1	
*P3		B01075640AP	DOOR SHEET	1	ALL 1.3 MODELS
*P3		B01077000AP	DOOR SHEET	1	NN-S788WAQPQ/JPG/VPE
*P4		B01837050AP	CORRUGATED FILLER / 1.3	2	ALL 1.3 MODELS
*P4		B01837000AP	CORRUGATED FILLER / 1.7	2	NN-S788WAQPQ/JPG/VPE
*P5		B010A9320AP	PACKING CASE / PAPER / 1.3	1	ALL 1.3 MODELS
*P5		B010A7600AP	PACKING CASE / PAPER / 1.7	1	NN-S788WAQPQ/JPG/VPE
*P6#		B02214A00AP	UPPER SUPPORT PACKING / 1.7	1	NN-S788WAQPQ/JPG/VPE
*P6		B02218310AP	UPPER SUPPORT PACKING /1.3	1	ALL 1.3 MODELS
*P7		A06014000AP	COOKING TRAY	1	ALL 1.3 MODELS
*P7#		A06014A00AP	COOKING TRAY	1	NN-S788WAQPQ/JPG/VPE

WIRING MATERIALS







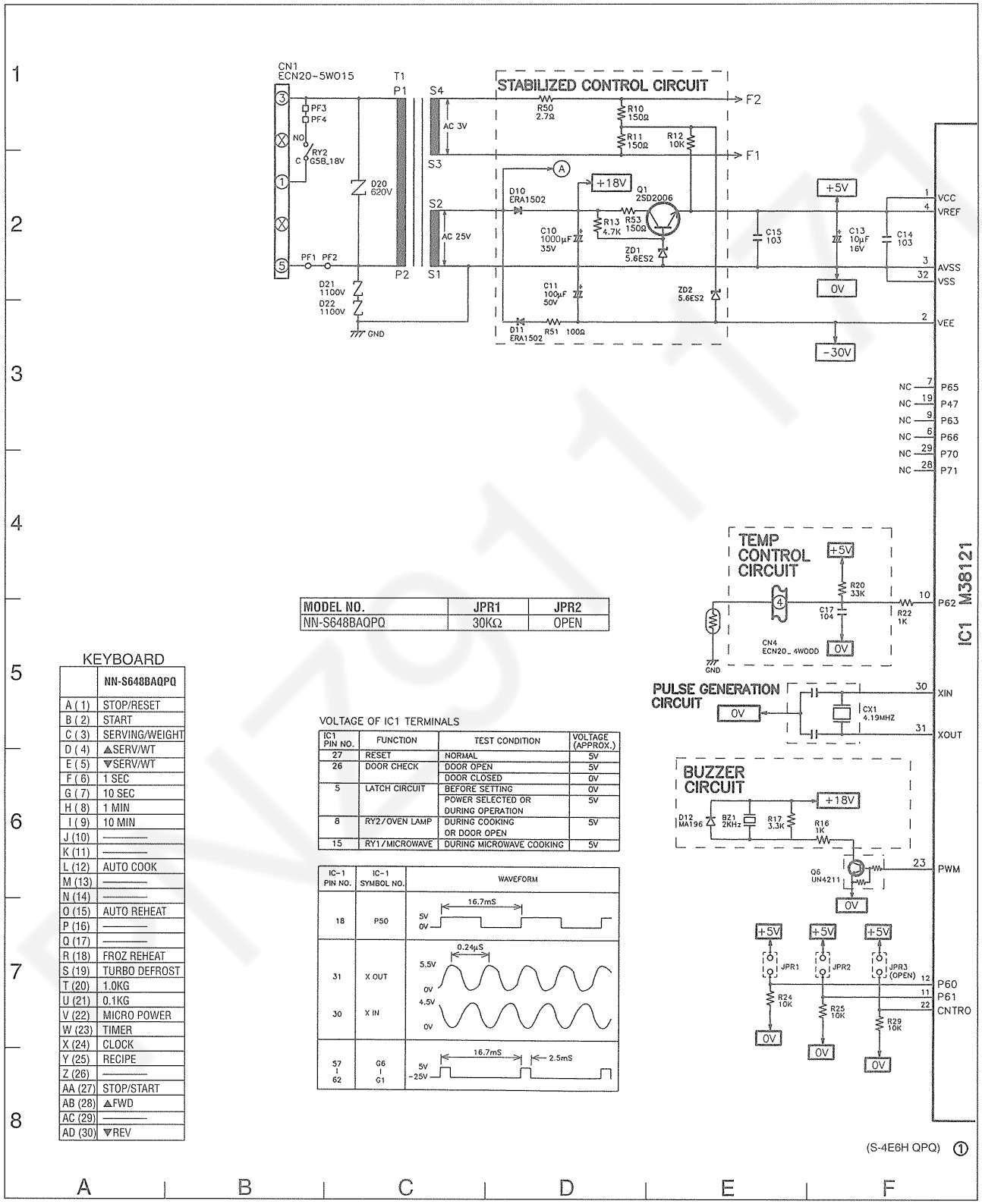
(S-4A6H QPQ)

Ref.No.		Part No.	Part Name & Description	Pcs/Set	Remarks
*W1		B030A8280JP	LEAD WIRE HARNESS	1	
*W2		B03539560CP	LEAD WIRE (U) W/ TEMP SENSOR	1	
*W3		A50966520UP	FERRITE COIL	1	

Ref.No.		Part No.	Part Name & Description	Pcs/Set	Remarks
REF. NO. 52 NOISE FILTER (U)					
L1		A621A7600CP	FILTER COIL	1	
F1		A62316010BP	FUSE HOLDER	2	
C2, 3	⚠	ECKDNS472MEX	CERAMIC CAPACITOR	2	0.0047MF, 250V, ±20%
C1		ECQU2A104MN	POLYESTER CAPACITOR	1	0.1MF, 250V, ±20%
R1		ERD25FJ564S	CARBON FILM RESISTOR	1	560K OHM, 1/4W, ±5%
ZNR2,3		ERZC10DK112W	VARISTOR	2	

DIGITAL PROGRAMMER CIRCUIT (NN-S648BAQPQ)

SCHEMATIC DIAGRAM



MODEL NO.	JPR1	JPR2
NN-S648BAQPQ	30KΩ	OPEN

KEYBOARD

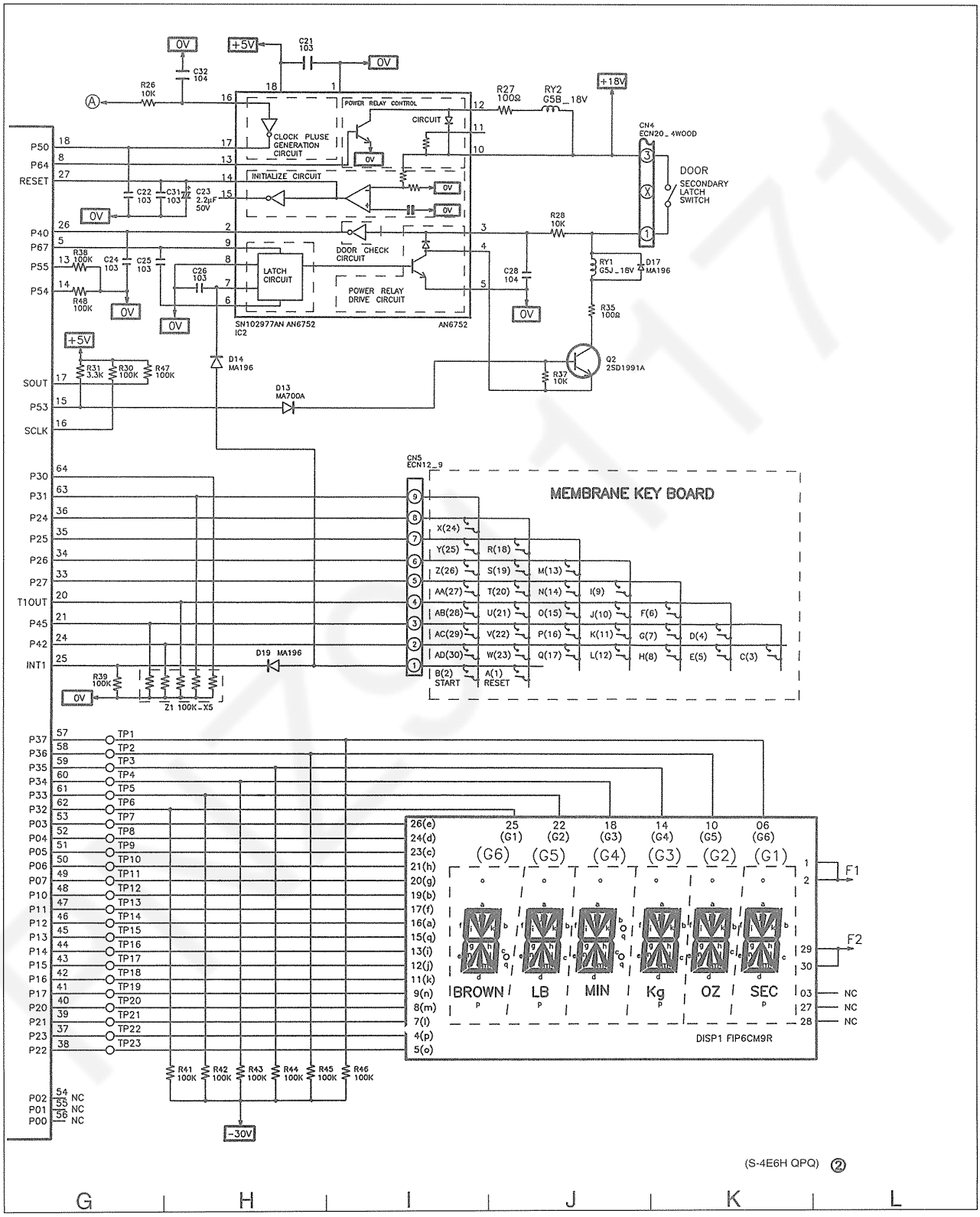
	NN-S648BAQPQ
A (1)	STOP/RESET
B (2)	START
C (3)	SERVING/WEIGHT
D (4)	▲SERV/WT
E (5)	▼SERV/WT
F (6)	1 SEC
G (7)	10 SEC
H (8)	1 MIN
I (9)	10 MIN
J (10)	————
K (11)	————
L (12)	AUTO COOK
M (13)	————
N (14)	————
O (15)	AUTO REHEAT
P (16)	————
Q (17)	————
R (18)	FROZ REHEAT
S (19)	TURBO DEFROST
T (20)	1.0KG
U (21)	0.1KG
V (22)	MICRO POWER
W (23)	TIMER
X (24)	CLOCK
Y (25)	RECIPE
Z (26)	————
AA (27)	STOP/START
AB (28)	▲FWD
AC (29)	————
AD (30)	▼REV

VOLTAGE OF IC1 TERMINALS

IC1 PIN NO.	FUNCTION	TEST CONDITION	VOLTAGE (APPROX.)
27	RESET	NORMAL	5V
26	DOOR CHECK	DOOR OPEN	5V
		DOOR CLOSED	0V
5	LATCH CIRCUIT	BEFORE SETTING	0V
		POWER SELECTED OR DURING OPERATION	5V
8	RY2/OVEN LAMP	DURING COOKING OR DOOR OPEN	5V
15	RY1/MICROWAVE	DURING MICROWAVE COOKING	5V

IC-1 PIN NO.	IC-1 SYMBOL NO.	WAVEFORM
18	P50	16.7mS, 5V, 0V
31	X OUT	0.24μS, 5.5V, 0V
30	X IN	4.5V, 0V
57 I 62	G6 I G1	16.7mS, 2.5mS, 5V, -25V

(S-4E6H QPQ) ①


MEMBRANE KEY BOARD
CN5 ECN12_9
CN4 ECN20_4WOOD
DOOR SECONDARY LATCH SWITCH
POWER RELAY CONTROL CIRCUIT
CLOCK PLUSE GENERATION CIRCUIT
INITIALIZE CIRCUIT
DOOR CHECK CIRCUIT
LATCH CIRCUIT
POWER RELAY DRIVE CIRCUIT
SN102977AN AN6752 IC2
AN6752
RY1 G5J_18V
RY2 G5B_18V
D17 MA196
D14 MA196
D13 MA700A
D19 MA196
Q2 2SD1991A
Z1 100K_X5
DISP1 FIP6CM9R
BROWN
LB
MIN
Kg
OZ
SEC
(G1)
(G2)
(G3)
(G4)
(G5)
(G6)
START
RESET
(S-4E6H QPQ) ②

DIGITAL PROGRAMMER CIRCUIT (NN-S678BAQPQ/JPG & NN-S788WAQPQ/JPG/VPE)

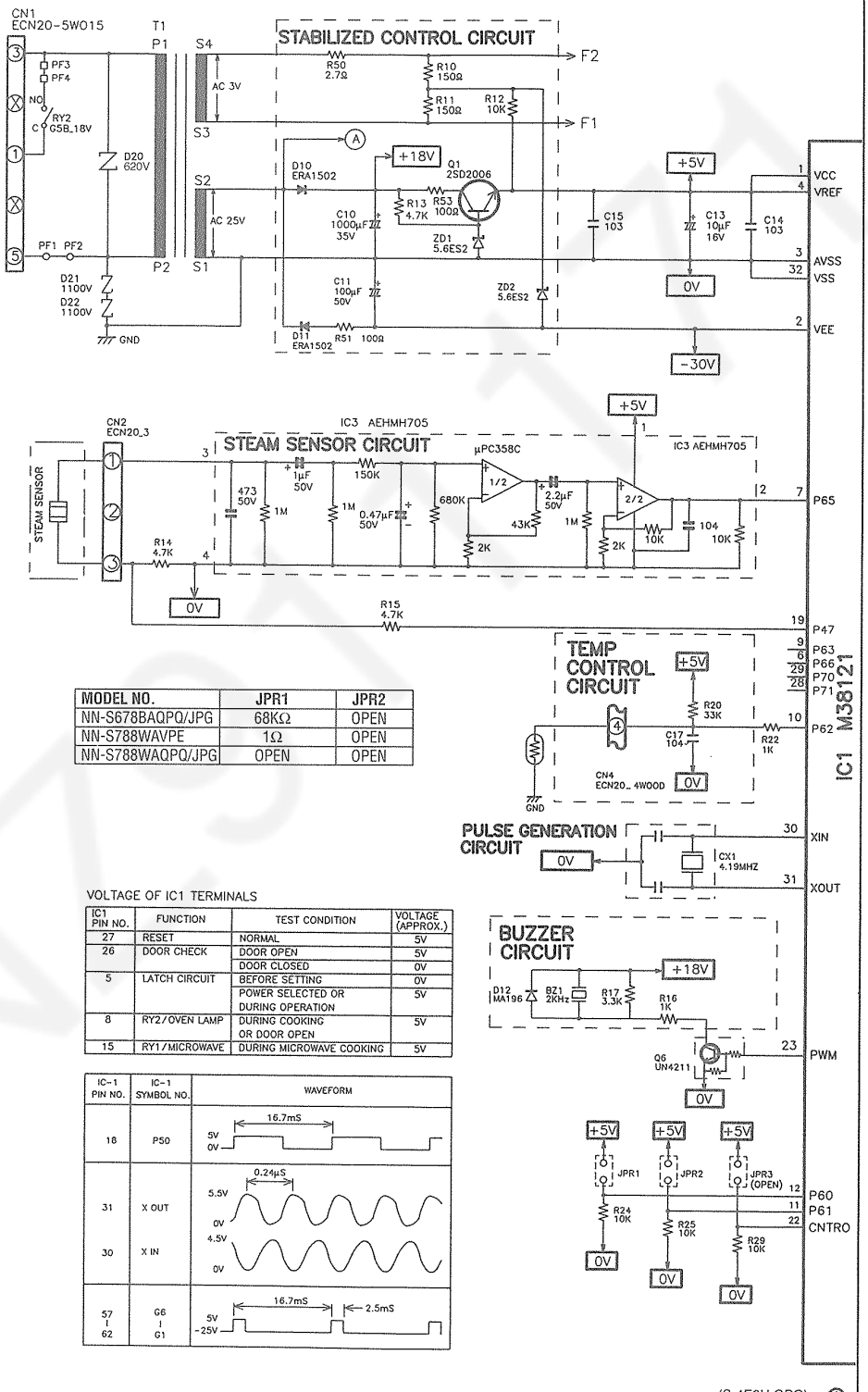
SCHEMATIC DIAGRAM

KEYBOARD

	NN-S678BA (ALL MODELS)
A (1)	START
B (2)	STOP/RESET
C (3)	MICRO POWER
D (4)	TIMER
E (5)	CLOCK
F (6)	1 SEC
G (7)	10 SEC
H (8)	1 MIN
I (9)	10 MIN
J (10)	SENSOR REHEAT
K (11)	AUTO 1-VEGETABLES
L (12)	AUTO 2-ROOT VEG.
M (13)	AUTO 3-RICE
N (14)	AUTO 4-PASTA
O (15)	AUTO 5-FISH
P (16)	AUTO 6-CHICKEN
Q (17)	AUOTO 7-CASSEROLE
R (18)	AUTO 8-FRUIT
S (19)	MORE/LESS
T (20)	————
U (21)	————
V (22)	▲FWD
W (23)	▼REV
X (24)	————
Y (25)	TURBO DEFROST
Z (26)	1.0KG
AA (27)	0.1KG
AB (28)	————
AC (29)	RECIPE
AD (30)	STOP/START

KEYBOARD

	NN-S788WA (ALL MODELS)
A (1)	START
B (2)	STOP/RESET
C (3)	MICRO POWER
D (4)	TIMER
E (5)	CLOCK
F (6)	1 SEC
G (7)	10 SEC
H (8)	1 MIN
I (9)	10 MIN
J (10)	SENSOR REHEAT
K (11)	VEGETABLES/ROOT VEG
L (12)	FROZ VEG./FROZ REHEAT
M (13)	RICE/PASTA
N (14)	FISH/CHICKEN PIECES
O (15)	CHICKEN/BEEF
P (16)	LAMB/PORK
Q (17)	CASSEROLE/MEAT SAUCE
R (18)	DESSERT/FRUIT
S (19)	MORE/LESS
T (20)	————
U (21)	————
V (22)	▲FWD
W (23)	▼REV
X (24)	————
Y (25)	TURBO DEFROST
Z (26)	1.0KG
AA (27)	0.1KG
AB (28)	————
AC (29)	RECIPE
AD (30)	STOP/START



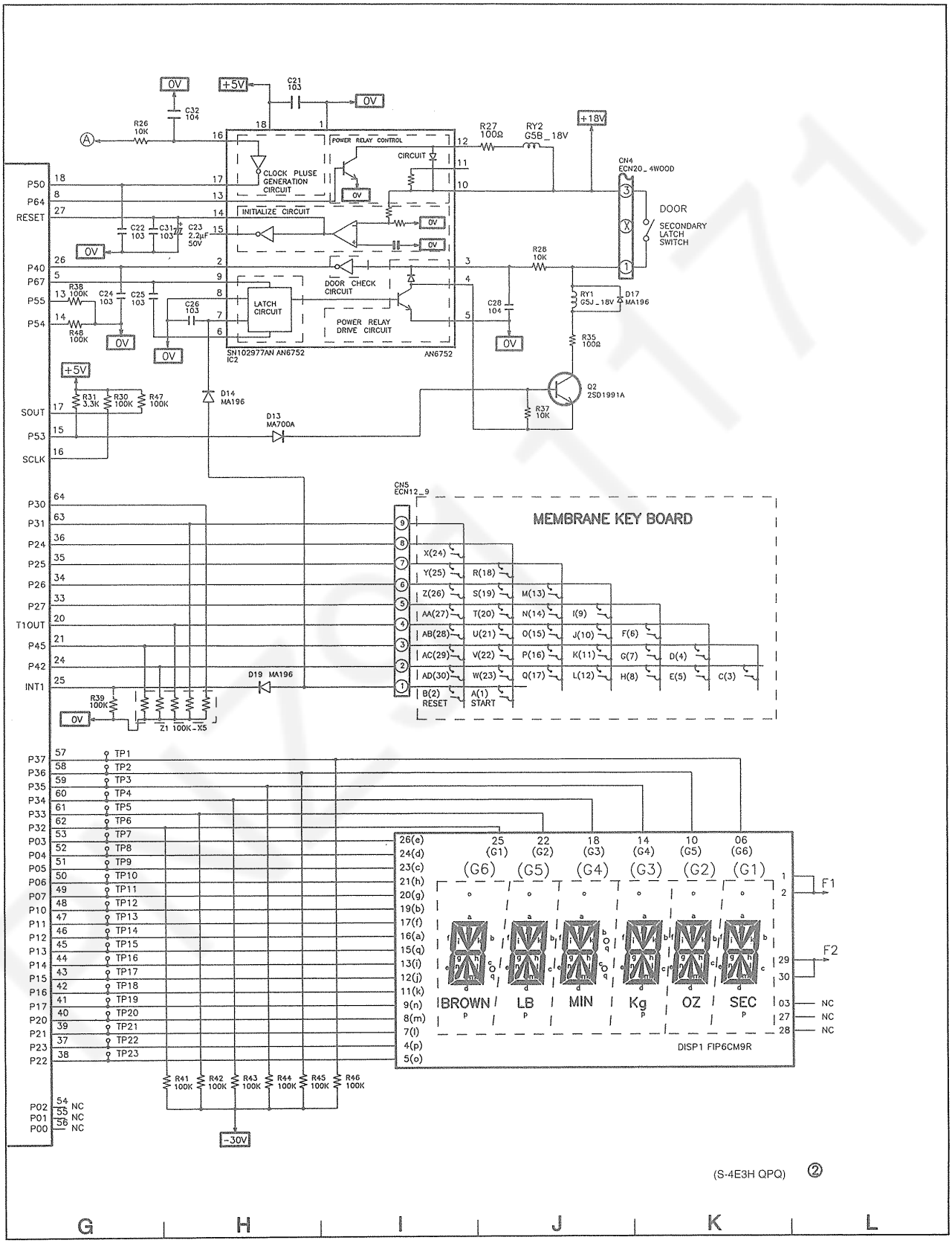
MODEL NO.	JPR1	JPR2
NN-S678BAQPQ/JPG	68KΩ	OPEN
NN-S788WAVPE	1Ω	OPEN
NN-S788WAQPQ/JPG	OPEN	OPEN

VOLTAGE OF IC1 TERMINALS

IC1 PIN NO.	FUNCTION	TEST CONDITION	VOLTAGE (APPROX.)
27	RESET	NORMAL	5V
26	DOOR CHECK	DOOR OPEN	5V
		DOOR CLOSED	0V
5	LATCH CIRCUIT	BEFORE SETTING	0V
		POWER SELECTED OR DURING OPERATION	5V
8	RY2/OVEN LAMP	DURING COOKING OR DOOR OPEN	5V
15	RY1/MICROWAVE	DURING MICROWAVE COOKING	5V

IC-1 PIN NO.	IC-1 SYMBOL NO.	WAVEFORM
18	P50	16.7mS, 5V, 0V
31	X OUT	0.24μS, 5.5V, 0V
30	X IN	4.5V, 0V
57 I 62	G6 I G1	16.7mS, 2.5mS, 5V, -25V

(S-4E3H QPQ) ①


0V
+5V
C21 103
C32 104
R26 10K
POWER RELAY CONTROL
CIRCUIT
CLOCK PLUSE GENERATION CIRCUIT
INITIALIZE CIRCUIT
DOOR CHECK CIRCUIT
LATCH CIRCUIT
POWER RELAY DRIVE CIRCUIT
SN102977AN AN6752
IC2
AN6752
R27 100Ω
RY2 G5B_18V
+18V
CN4 ECN20_4WOOD
DOOR
SECONDARY LATCH SWITCH
C22 103
C31 103
C23 2.2μF 50V
R38 100K
C24 103
C25 103
C26 103
R48 100K
C28 104
RY1 G5J_18V
D17 MA196
R35 100Ω
Q2 2SD1991A
R37 10K
R31 3.3K
R30 100K
R47 100K
D14 MA196
D13 MA700A
D19 MA196
R39 100K
Z1 100K-X5
CN5 ECN12_9
MEMBRANE KEY BOARD
X(24)
Y(25)
Z(26)
AA(27)
AB(28)
AC(29)
AD(30)
B(2) RESET
R(18)
S(19)
T(20)
U(21)
V(22)
W(23)
A(1) START
M(13)
N(14)
O(15)
P(16)
Q(17)
I(9)
J(10)
K(11)
L(12)
F(6)
G(7)
H(8)
D(4)
E(5)
C(3)
P50
P64
RESET
P40
P67
P55
P54
SOUT
P53
SCLK
P30
P31
P24
P25
P26
P27
T1OUT
P45
P42
INT1
P37
P36
P35
P34
P33
P32
P03
P04
P05
P06
P07
P10
P11
P12
P13
P14
P15
P16
P17
P20
P21
P23
P22
P02
P01
P00
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
TP18
TP19
TP20
TP21
TP22
TP23
NC
R41 100K
R42 100K
R43 100K
R44 100K
R45 100K
R46 100K
-30V
(G6)
(G5)
(G4)
(G3)
(G2)
(G1)
BROWN
LB
MIN
Kg
OZ
SEC
F1
F2
DISP1 FIP6CM9R

(S-4E3H QPQ) ②

DIGITAL PROGRAMMER CIRCUIT (NN-S648BAQPQ, NN-S678BAQPQ/JPG & NN-S788WAQPQ/JPG/VPE)

PARTS LIST

Note: Items marked * are supplied by MMOC (MAC) (U.S.A.)
Items marked # are new Part No's for Pre I.G. (Initial Guidance) list.

REF No.	PART NO.	DESCRIPTION	QTY	REMARKS	REF No.	PART NO.	DESCRIPTION	QTY	REMARKS
BZ1	AEFB22EP20TL	BUZZER	1	2.0KHZ	R16,22	ERDS2TJ102T	CARBON FILM RESISTOR	2	1KΩ, 1/4W, ±5%
C10	ECA1HM102E	ELECTROLYTIC CAPACITOR, AL.	1	1000μF/35V/±20%	R17,31	ERDS2TJ332T	CARBON FILM RESISTOR	2	3.3KΩ, 1/4W, ±5%
C11	ECEA1HU101B	ELECTROLYTIC CAPACITOR, AL.	1	100μF/50V/±20%	R20	ERDS2TJ333T	CARBON FILM RESISTOR	1	33KΩ, 1/4W, ±5%
C13	ECEA1CKA100B	ELECTROLYTIC CAPACITOR, AL.	1	10μF/16V/±20%	R51,53	ERDS2TJ101T	CARBON FILM RESISTOR	2	100Ω, 1/4W, ±5%
C14,15,21, 22,24,25,26,31	AECBT50F103Z	CERAMIC CAPACITOR	8	0.01μF/25V/ -20%+80%	R30,38,39, 41,42,43, 44,45,46,47, 48	ERDS2TJ104T	CARBON FILM RESISTOR	11	100KΩ, 1/4W, ±5%
C17,28,32	AECF50F104Z	CERAMIC CAPACITOR	3	0.01μF/50V/ -20%+80%					
C23	ECEA1HKA2R2B	ELECTROLYTIC CAPACITOR, AL.	1	2.2μF/50V/±20%					
CN1	AEEMMF01505W	CONNECTOR	1	5PIN	R50	ERDS2TJ2R2T	CARBON FILM RESISTOR	1	2.7Ω, 1/4W, ±5%
CN2	AEEMMF00703W	CONNECTOR	1	3PIN					
CN4	AEEMMF00D04W	CONNECTOR	1	4PIN					
CN5	AEEM09FDZBTM	CONNECTOR	1		RY1 ⚠	AEG5J1EM18B	POWER RELAY	1	(18V)
					RY2 ⚠	AEBG5B18P-1	POWER RELAY	1	(18V)
CX1#	EFOEC4194T4	CERAMIC RESONATOR	1	4.19MHz	SP1*	B82847010AP	DISPLAY HOLDER	1	FOR DISPLAY
D10,11	AEDNERA1502 or AESS1N4003E	DIODE, SI	2	(0.1A)	T1 ⚠	ETP41KCN81QP	L.V. TRANSFORMER	1	
					Z1	AEXBM5X104JT	COMPOUND-RESISTOR	1	100KΩX5
D12,14,17,19	MA196-(TA5)	DIODE, SI	4	(0.1A)					
D13	MA700-(TA)	DIODE, SI	1	(0.03A)	ZD1,2	AEDZ5R6ES2T1	ZENER DIODE,SI	2	
					D20	ERZV10D621CS	VARISTOR	1	620V
DISP1*	AEFR06SS17	FLUORESCENT TUBE	1						
IC1*#	AEIC38127127	L.S.I.	1		JPR1	ERD25VJ303T	CARBON FILM RESISTOR	1	30KΩ,1/4W, ±5% NN-S648BAQPQ
IC2*	AN6752 (OR) AEIC102977AN	IC	1		JPR1	ERD25VJ1R0T	CARBON FILM RESISTOR	1	1Ω, 1/4W, ±5% NN-S788WAVPE
IC3*	AEHMH705	IC	1						
Q1	2SD2006QRTA	TRANSISTOR, SI, 1.2W	1	(120MHZ)	JPR1	ERD25VJ683T	CARBON FILM RESISTOR	1	68KΩ, 1/4W, ±5% NN-S678BAQPQ/JPG
Q2	2SD1991AQSTA	TRANSISTOR, SI, 400MW	1	(150MHZ)					
Q6	UN4211-(TA)	TRANSISTOR, SI, 300MW	1						
R10,11	ERDS2TJ151T	CARBON FILM RESISTOR	2	150Ω1/4W, ±5%					
R12,24,25, 26,28,29,37	ERDS2TJ103T	CARBON FILM RESISTOR	7	10KΩ, 1/4W, ±5%					
R13	ERDS2TJ472T	CARBON FILM RESISTOR	1	4.7KΩ,1/4W, ±5%, NN-S648BAQPQ					
R13,14,15	ERDS2TJ472T	CARBON FILM RESISTOR	3	4.7KΩ,1/4W, ±5%, ALL NN-S678 & NN-S788 MODELS					

SERVICE FIXTURES AND TOOLS

EXTENSION CABLES

NOTE: To be used when repairing the DPC board assembly directly on the oven for easy access of the board.

DPC COMMON CHECKER AND ITS CABLE

NOTE: To be used only when DPC common checker is available.

REF No.	PART NO.	DESCRIPTION	QTY	REMARKS	REF No.	PART NO.	DESCRIPTION	QTY	REMARKS
	AT40P003	3 pin Extension Cable	1	Cable No. 48		ANE600ZK70AP	DPC. Common Checker	1	
	AT40P004	4 pin Extension Cable	1	Cable No. 47		AT30A7020AP	DPC. Checker Cable	1	NOTE
	AT40P005	5 pin Extension Cable	1	Cable No. 46					
	AT40E006	1 pinX6 Extension Cable	1	Cable No. 9					

DIGITAL PROGRAMMER CIRCUIT (NN-S658WAQPQ/JPG/VPE, NN-S688WAQPQ/VPE & NN-S698WAQPQ/JPG/VPE)

PARTS LIST

Note: Items marked * are supplied by MMOC (MAC). (U.S.A.)
Note: Items marked # are new Part No's. for Pre I.G. (Initial Guidance) list.

REF No.	PART NO.	DESCRIPTION	QTY	REMARKS	REF No.	PART NO.	DESCRIPTION	QTY	REMARKS
BZ1	AEFB22EP20TL	BUZZER	1	2.0KHZ	R14	ERDS2TJ472T	CARBON FILM RESISTOR	1	4.7KΩ, 1/4W, ±5% ALL NN-S658 MODELS
C10	ECA1HM102E	ELECTROLYTIC CAPACITOR, AL.	1	1000μF/35V/±20%					
C11,16	ECA1HM101B	ELECTROLYTIC CAPACITOR, AL.	2	100μF/50V/±20%					
C14	ECA1CM220B	ELECTROLYTIC CAPACITOR, AL.	1	22μF/16V/±20%	R14,15,16	ERDS2TJ472T	CARBON FILM RESISTOR	3	4.7KΩ, 1/4W, ±5% ALL NN-S688 & NN-S698 MODELS
C15,34,36, 39-41	AECBT50F103Z	CERAMIC CAPACITOR	6	0.01μF/25V/ -20%+80%					
C17	ECA1HM220B	ELECTROLYTIC CAPACITOR	1	22μF/50V/±20%	R18	ERDS2TJ333T	CARBON FILM RESISTOR	1	33KΩ, 1/4W, ±5%
C19,29,35, 38,42,43	AECF50F104Z	CERAMIC CAPACITOR	6	0.01μF/50V/ -20%+80%	R20,45	ERDS2TJ102T	CARBON FILM RESISTOR	2	1KΩ, 1/4W, ±5
					R44,58,59,62	ERDS2TJ332T	CARBON FILM RESISTOR	4	3.3KΩ, 1/4W, ±5%
C45-49	AECBE50X682T	CERAMIC CAPACITOR	5	68μF/16V/ -20%+80%	R63,64	ERDS2TJ330T	CARBON FILM RESISTOR	2	33KΩ, 1/4W, ±5%
C28,30-33	ECBT1H101KB5	CERAMIC CAPACITOR	5	0.01μF/50V/ -20%+80%	R74-84,86	ERDS2TJ104T	CARBON FILM RESISTOR	12	100KΩ, 1/4W, ±5%
C37	ECEA1HKA2R2B	ELECTROLYTIC CAPACITOR	1	2.2μF/50V/±20%					
CN1	AEEMMF01505W	CONNECTOR	1	5PIN	RY1 ⚠	AEG5J1EM12B	POWER RELAY	1	(12V)
CN2	AEEMMF00703W	CONNECTOR	1	3PIN, ALL NN-S688 & NN-S698 MODELS	RY2 ⚠	AEBGG5N1A18	POWER RELAY	1	(18V)
					SP1*	B82849410AP	DISPLAY HOLDER	1	FOR DISPLAY
CN3,5	AEEM12FDZBTM	CONNECTOR	2	4PIN RED	T1# ⚠	ETP41KDN813U	TRANSFORMER	1	
CN4	AEEMMF00D04W	CONNECTOR	1	4PIN	ZD1,2	AEDZ5R6ES2T1	ZENER DIODE,SI	2	RD5.6ES-AB2
CN6	AEEMMF00703R	CONNECTOR	1		ZD4,5	AEDZ13ES2T1	ZENER DIODE, SI	2	RD20ES-AB3
CX1#	AEFFT4R19GWT	CERAMIC RESONATOR	1	4.19MHz	D43	ERZV10D621CS	VARISTOR	1	10K, 620V
D10,11,12	AEDNERA1502	DIODE, SI	3	(1.0A)	JPR1	ERD25VJ103T	CARBON FILM RESISTOR	1	NN-S698WAVPE 10KΩ, 1/4W, ±5%
D14-19,22-27 30,33-40,45	MA196-(TA5)	DIODE, SI	22	(0.1A) ALL NN-S658 MODELS	JPR1	ERD25VJ303T	CARBON FILM RESISTOR	1	NN-S658WA QPQ/JPG 30KΩ, 1/4W, ±5%
D14,19-27, 30,33-40,45	MA-196-(TA5)	DIODE, SI	20	(0.1A) ALL NN-S688 & NN-S698 MODELS	JPR1	ERD25VJ163T	CARBON FILM RESISTOR	1	NN-S658WAVPE 16KΩ, 1/4W, ±5%
D29	MA700-(TA)	DIODE, SI	1	(0.03A)	JPR1	ERD25VJ1ROT	CARBON FILM RESISTOR	1	NN-S688WAQPQ 1Ω, 1/4W, ±5%
DISP1*	AEFR6LT147GN	FLUORESCENT TUBE	1						
IC1*#	AEIC38127128	L.S.I.	1		JPR1	ERD25VJ683T	CARBON FILM RESISTOR	1	NN-S688WAVPE 68KΩ, 1/4W, ±5%
IC2*	AN6752	IC	1						
IC4*	MN8591	IC	1						
IC7*	AEHMH705	IC	1	ALL NN-S688 & NN-S698 MODELS					
Q1	2SD2006QRTA	TRANSISTOR, SI, 1.2W	1	(120MHZ)					
Q2	2SC1318QSTA	TRANSISTOR	1						
Q3	UN4219-(TA)	TRANSISTOR	2						
Q4	UN4111-(TA)	TRANSISTOR	1						
Q5#	UN421F-(TA)	TRANSISTOR	1						
Q6	2SD1991AQSTA	TRANSISTOR, SI, 400MW	1	(150 MHZ)					
R10,11	ERDS2TJ151T	CARBON FILM RESISTOR	2	150Ω, 1/4W, ±5%					
R13	ERDS2TJ152T	CARBON FILM RESISTOR	1	1.5KΩ, 1/4W, ±5%					
R12,46-50 53-56,60,61, 65,69,71,87, 88	ERDS2TJ103T	CARBON FILM RESISTOR	17	10KΩ, 1/4W, ±5% ALL NN-S658 MODELS					
R12,50-56, 60,61,65,69, 71,87,88	ERDS2TJ103T	CARBON FILM RESISTOR	15	10KΩ, 1/4W, ±5% ALL NN-S688 & NN-S698 MODELS					

SERVICE FIXTURES AND TOOLS

EXTENSION CABLES

NOTE: To be used when repairing the DPC board assembly directly on the oven for easy access of the board.

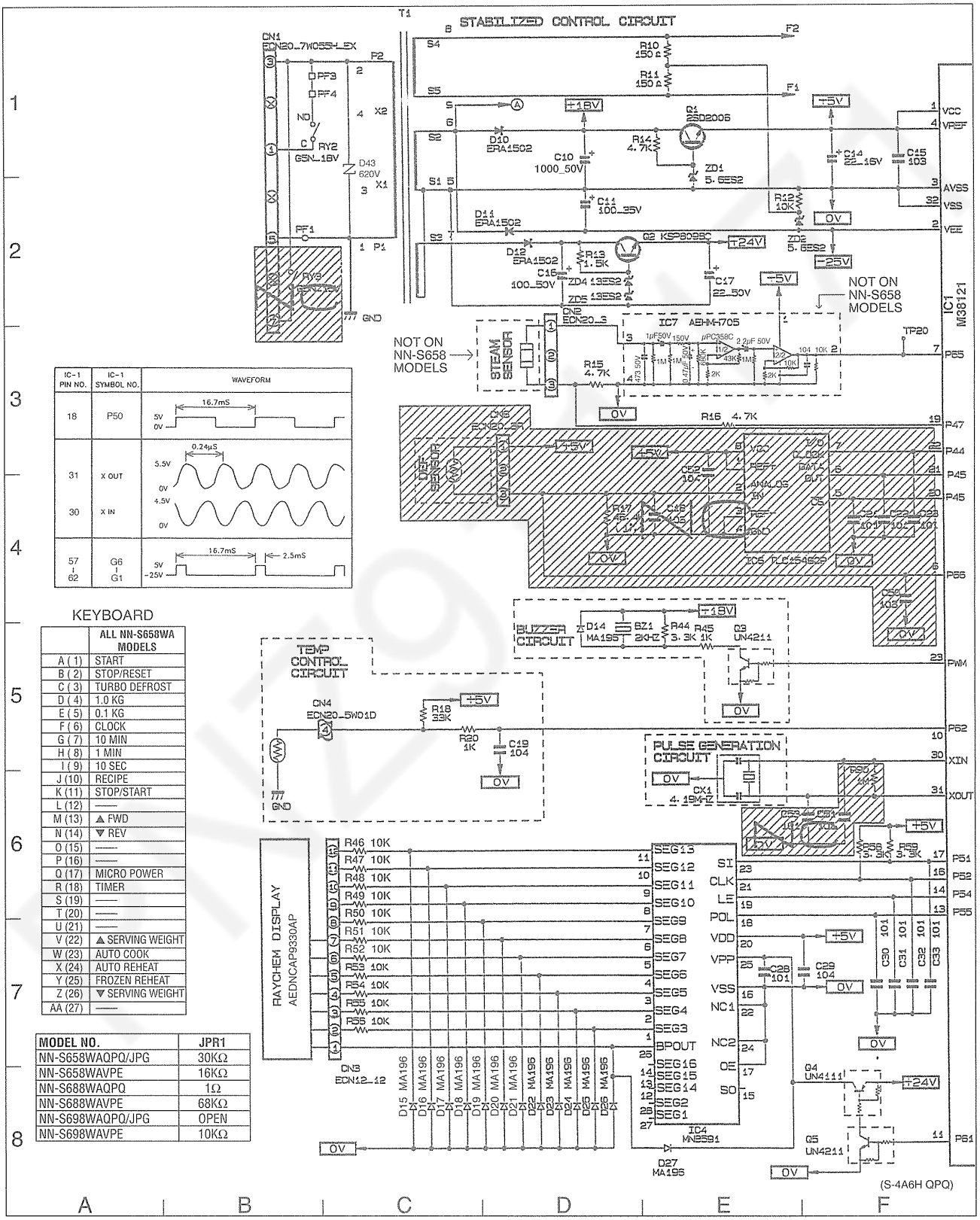
DPC COMMON CHECKER AND ITS CABLE

NOTE: To be used only when DPC common checker is available.

REF No.	PART NO.	DESCRIPTION	QTY	REMARKS	REF No.	PART NO.	DESCRIPTION	QTY	REMARKS
	AT40P003	3 pin Extension Cable	1	Cable No. 48		ANE600ZK70AP	DPC. Common Checker	1	
	AT40P004	4 pin Extension Cable	1	Cable No. 47		AT30A7020AP	DPC. Checker Cable	1	NOTE
	AT40P005	5 pin Extension Cable	1	Cable No. 46					
	AT40E006	1 pinX6 Extension Cable	1	Cable No. 9					

DIGITAL PROGRAMMER CIRCUIT (NN-S658WAQPQ/JPG/VPE, NN-S688WAQPQ/VPE & NN-S698WAQPQ/JPG/VPE)

SCHEMATIC DIAGRAM

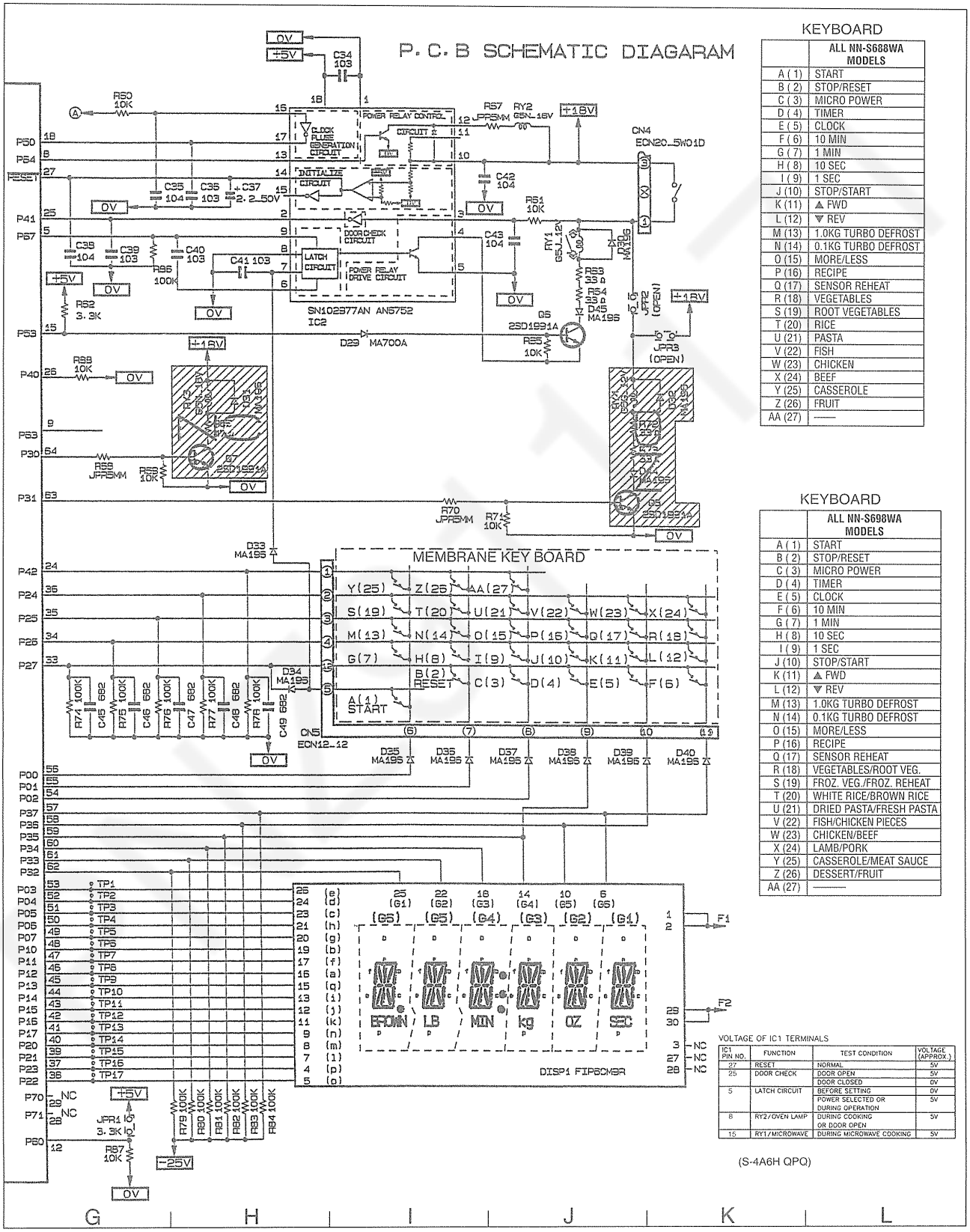


IC-1 PIN NO.	IC-1 SYMBOL NO.	WAVEFORM
18	P50	16.7mS, 5V, 0V
31	X OUT	0.24μS, 5.5V, 0V
30	X IN	4.5V, 0V
57 – 62	G6 – G1	16.7mS, 2.5mS, 5V, -25V

KEYBOARD

	ALL NN-S658WA MODELS
A (1)	START
B (2)	STOP/RESET
C (3)	TURBO DEFROST
D (4)	1.0 KG
E (5)	0.1 KG
F (6)	CLOCK
G (7)	10 MIN
H (8)	1 MIN
I (9)	10 SEC
J (10)	RECIPE
K (11)	STOP/START
L (12)	——
M (13)	▲ FWD
N (14)	▼ REV
O (15)	——
P (16)	——
Q (17)	MICRO POWER
R (18)	TIMER
S (19)	——
T (20)	——
U (21)	——
V (22)	▲ SERVING WEIGHT
W (23)	AUTO COOK
X (24)	AUTO REHEAT
Y (25)	FROZEN REHEAT
Z (26)	▼ SERVING WEIGHT
AA (27)	——

MODEL NO.	JPR1
NN-S658WAQPQ/JPG	30KΩ
NN-S658WAVPE	16KΩ
NN-S688WAQPQ	1Ω
NN-S688WAVPE	68KΩ
NN-S698WAQPQ/JPG	OPEN
NN-S698WAVPE	10KΩ



KEYBOARD

	ALL NN-S688WA MODELS
A (1)	START
B (2)	STOP/RESET
C (3)	MICRO POWER
D (4)	TIMER
E (5)	CLOCK
F (6)	10 MIN
G (7)	1 MIN
H (8)	10 SEC
I (9)	1 SEC
J (10)	STOP/START
K (11)	▲ FWD
L (12)	▼ REV
M (13)	1.0KG TURBO DEFROST
N (14)	0.1KG TURBO DEFROST
O (15)	MORE/LESS
P (16)	RECIPE
Q (17)	SENSOR REHEAT
R (18)	VEGETABLES
S (19)	ROOT VEGETABLES
T (20)	RICE
U (21)	PASTA
V (22)	FISH
W (23)	CHICKEN
X (24)	BEEF
Y (25)	CASSEROLE
Z (26)	FRUIT
AA (27)	——

KEYBOARD

	ALL NN-S698WA MODELS
A (1)	START
B (2)	STOP/RESET
C (3)	MICRO POWER
D (4)	TIMER
E (5)	CLOCK
F (6)	10 MIN
G (7)	1 MIN
H (8)	10 SEC
I (9)	1 SEC
J (10)	STOP/START
K (11)	▲ FWD
L (12)	▼ REV
M (13)	1.0KG TURBO DEFROST
N (14)	0.1KG TURBO DEFROST
O (15)	MORE/LESS
P (16)	RECIPE
Q (17)	SENSOR REHEAT
R (18)	VEGETABLES/ROOT VEG.
S (19)	FROZ. VEG./FROZ. REHEAT
T (20)	WHITE RICE/BROWN RICE
U (21)	DRIED PASTA/FRESH PASTA
V (22)	FISH/CHICKEN PIECES
W (23)	CHICKEN/BEEF
X (24)	LAMB/PORK
Y (25)	CASSEROLE/MEAT SAUCE
Z (26)	DESSERT/FRUIT
AA (27)	——

VOLTAGE OF IC1 TERMINALS

IC1 PIN NO.	FUNCTION	TEST CONDITION	VOLTAGE (APPROX.)
27	RESET	NORMAL	5V
25	DOOR CHECK	DOOR OPEN	5V
		DOOR CLOSED	0V
5	LATCH CIRCUIT	BEFORE SETTING	0V
		POWER SELECTED OR DURING OPERATION	5V
8	RY2/OVEN LAMP	DURING COOKING OR DOOR OPEN	5V
15	RY1/MICROWAVE	DURING MICROWAVE COOKING	5V

DP-058
S-4A6H QPQ
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(MG), (YS), (DP)