

# Service Manual

## Microwave Oven

### NN-G61 AR



#### Specifications

Power Source:		220 V AC, 50 Hz
Power requirement:	Microwave:	1.450 W
	Heater:	860 W
Output:	Microwave:	900 W: Full Power (IEC 705-88)
	Heater:	800 W
Microwave Frequency:		2.450 MHz
Timer:		99 min. 99 sec.
Outside Dimensions:		306 (W) x 555 (D) x 428 (H) mm
Oven Cavity Dimensions:		31 liters
Weight:		Approx. 18 Kg
Specifications subject to change without notice		

## **WARNING**

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

## **WARNING**

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

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

- (A) Do not operate or allow the oven to be operated with the door open.
- (B) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:
  - (1) Interlock operation
  - (2) Proper door closing
  - (3) Seal and sealing surfaces (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 trans-mission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.
- (E) A microwave leakage check to verify compliance with the Federal Performance Standard should be performed on each oven prior to release to the owner.

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## 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 magnetron.**

### 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.

### 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, turn the oven off, wait 30 seconds and short the terminal of the high voltage capacitor (terminal of lead wire from diode) to chassis ground with an insulated handle screwdriver or an insulated jumper lead wire to discharge.

### Important Note

1. High voltage above 250V are existing on following parts during operation.

- Magnetron
- High voltage transformer
- High voltage Diode
- High voltage Capacitor

Unusual attention should be paid during repair or troubleshooting of product.

2. If the microwave oven is operated with incorrect installed door hinge or magnetron, it can cause microwave leakage of over 5mW/cm<sup>2</sup>.

Hence it is absolutely necessary to check if magnetron and door hinge are correctly and safely intalled after repair or replacement.

### WARNING

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

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

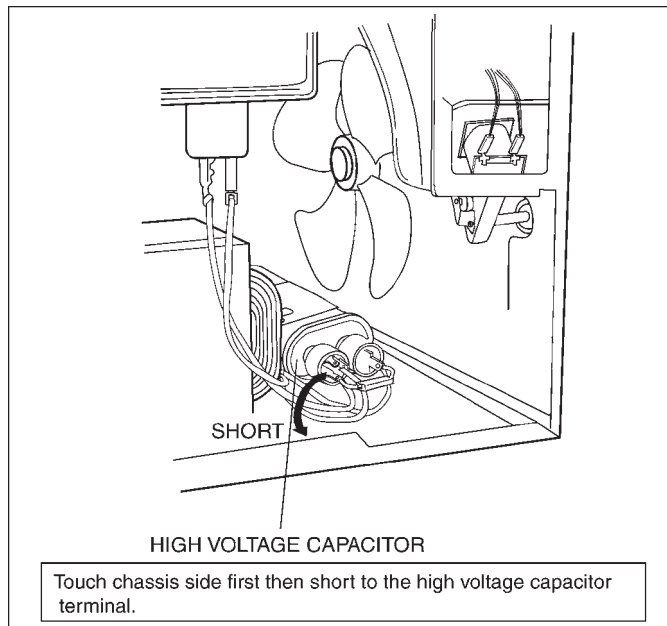
**Avoid inserting nails, wire, etc. through any holes in the unit during operation.**

Never insert a wire, nail or any other metal objects 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.

## 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.

1. Make sure that all electrical connections are tight before inserting the plug into the wall outlet.
2. The special connection cable used for connection of this apparatus may be replaced only by qualified service-personnel using a special cable, which can be obtained only from the "Panasonic" -Service. (Refer to Parts List).



### CAUTION

#### MICROWAVE RADIATION

Personnel should not be exposed to the microwave energy which may radiate from the magnetron or other microwave generating device it is improperly used or connected all input and output microwave connection waveguides, flanges, and gasket must be secure. Never operate the device without a microwave energy absorbing load attached. Never look into an open waveguide or antenna while the device is energized.

# ■ PROCEDURE FOR MEASURING MICROWAVE ENERGY LEAKAGE

## • Equipment

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

## • Procedure for measuring radiation leakage

### Note before measuring:

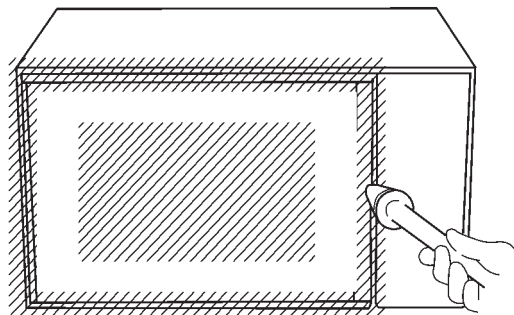
- (1) Do not exceed meter full scale deflection. Leakage monitor should initially be set to the highest scale.
- (2) To prevent false readings the test probe should be held by the grip portion of the handle only and moved along the shaded area shown in Figure no faster than 1 inch/sec (2.5 cm/sec)
-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

### (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.

### (2) Measurements with a fully assembled oven.

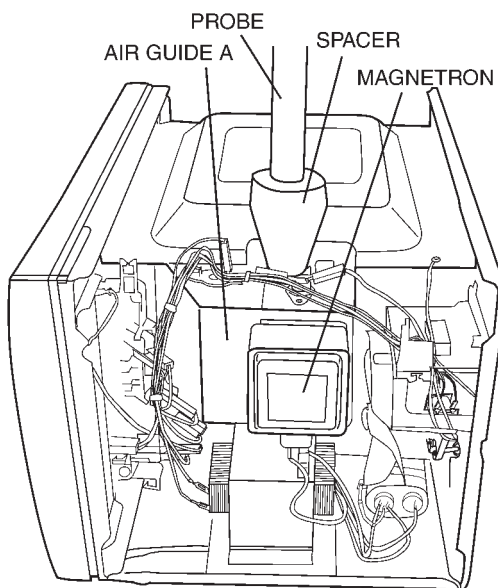
After all components, including the outer panel are fully assembled, measure for radiation leakage around the door periphery, the door viewing window, the exhaust opening and air inlet openings.



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

### WARNING

AVOID CONTACTING ANY HIGH VOLTAGE PARTS.

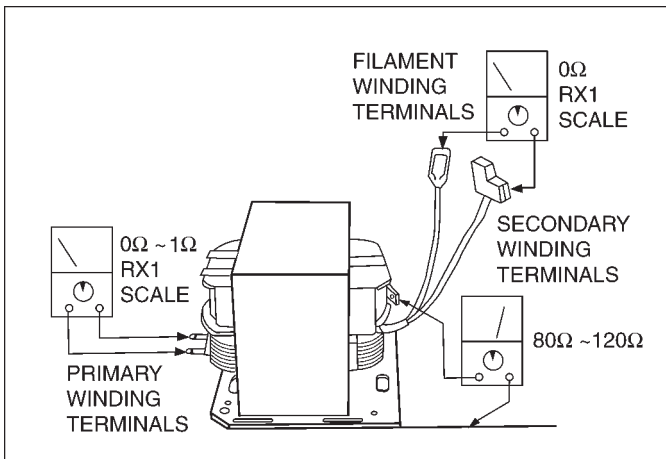


## CAUTION

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.

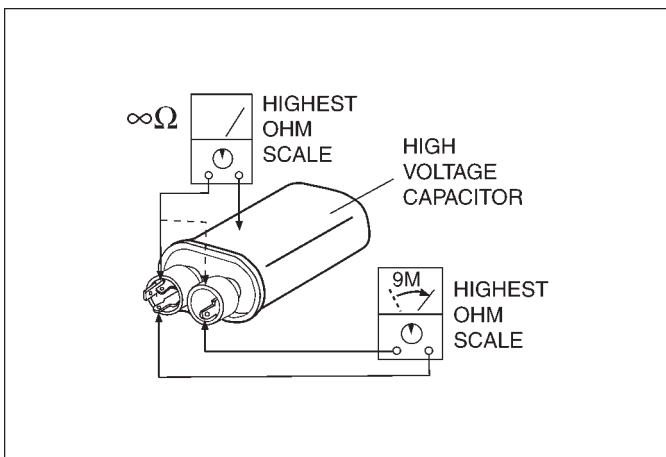
### • High voltage transformer

1. Remove connections from the transformer terminals and check continuity.
2. Normal (cold) resistance readings should be as follows:  
Secondary winding Approx.  $80\Omega$ ;  $\sim 120\Omega$ ;  
Filament winding Approx.  $0\Omega$ ;  
Primary winding ( $0v \sim 230/240V$ ) Approx.  $0\Omega$ ;  $\sim 3\Omega$ ;



### • High voltage capacitor

2. Check continuity of capacitor with ohmmeter 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  $9M\Omega$ ;  
(Due to internal  $9M\Omega$ ; resistor)
5. Resistance between each terminal and chassis should be infinite.



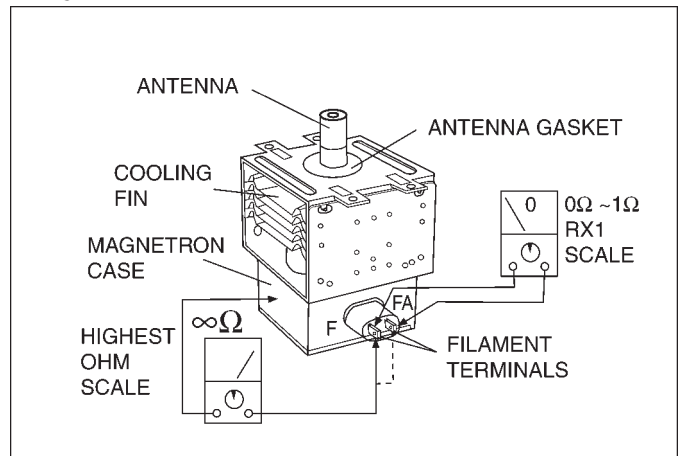
### • Diode

1. Isolate the diode assembly 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 and several hundred  $K\Omega$ ; in the order direction.

### • 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.



### • Membrane key board (Membrane switch assembly)

Check continuity between switch terminals, by pressing an appropriate pad on the key board.

The contacts assignment of the respective pads on the key board is as shown in the schematic diagram.

### • Protector diode

1. Isolate the protector diode assembly from the circuit by disconnecting its leads.
2. 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.

## ■ MEASUREMENTS AND ADJUSTMENTS

### • Adjustment of Primary latch switch, Secondary latch switch and short switch

1. 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 Figure.

**NOTE:** No specific adjustment during installation of Primary latch switch, Secondary latch switch and short switch to the door hook is necessary.

2. When mounting the door hook assembly to the oven assembly, adjust the door hook assembly by moving it in the direction of arrow in Figure 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.

### • Measurement of microwave output

The output power of the magnetron can be determined by performing IEC standard test procedures. However, it is possible to test the magnetron by following procedure outlined below.

#### Necessary equipment:

\*1 liter beaker \*Glass thermometer

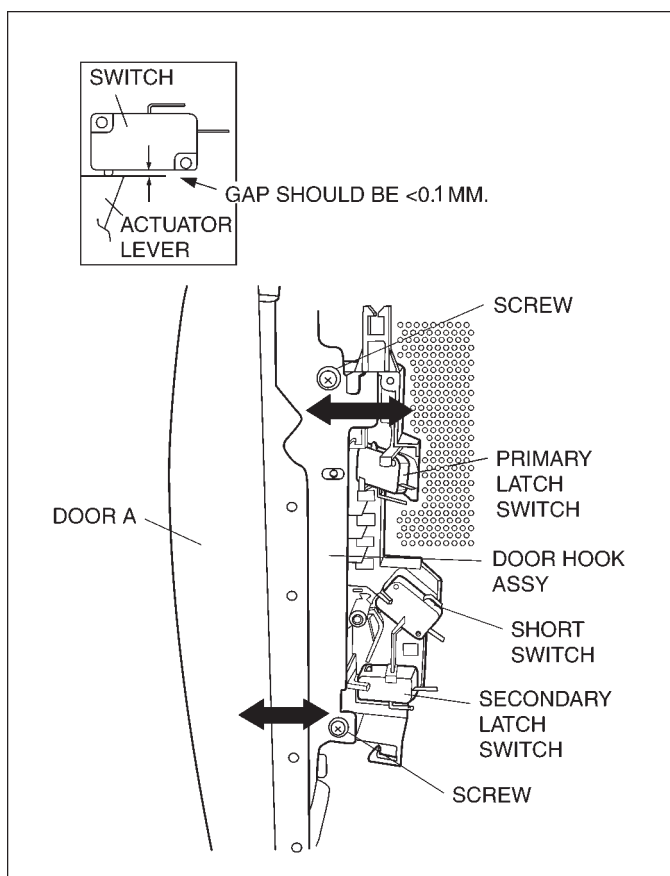
\*Wrist watch or stopwatch

**NOTE:** Check the line voltage under load to ensure it meets specifications. Low voltage condition will cause a reduction in magnetron output. Temperature readings and heating time, should be as accurate as possible.

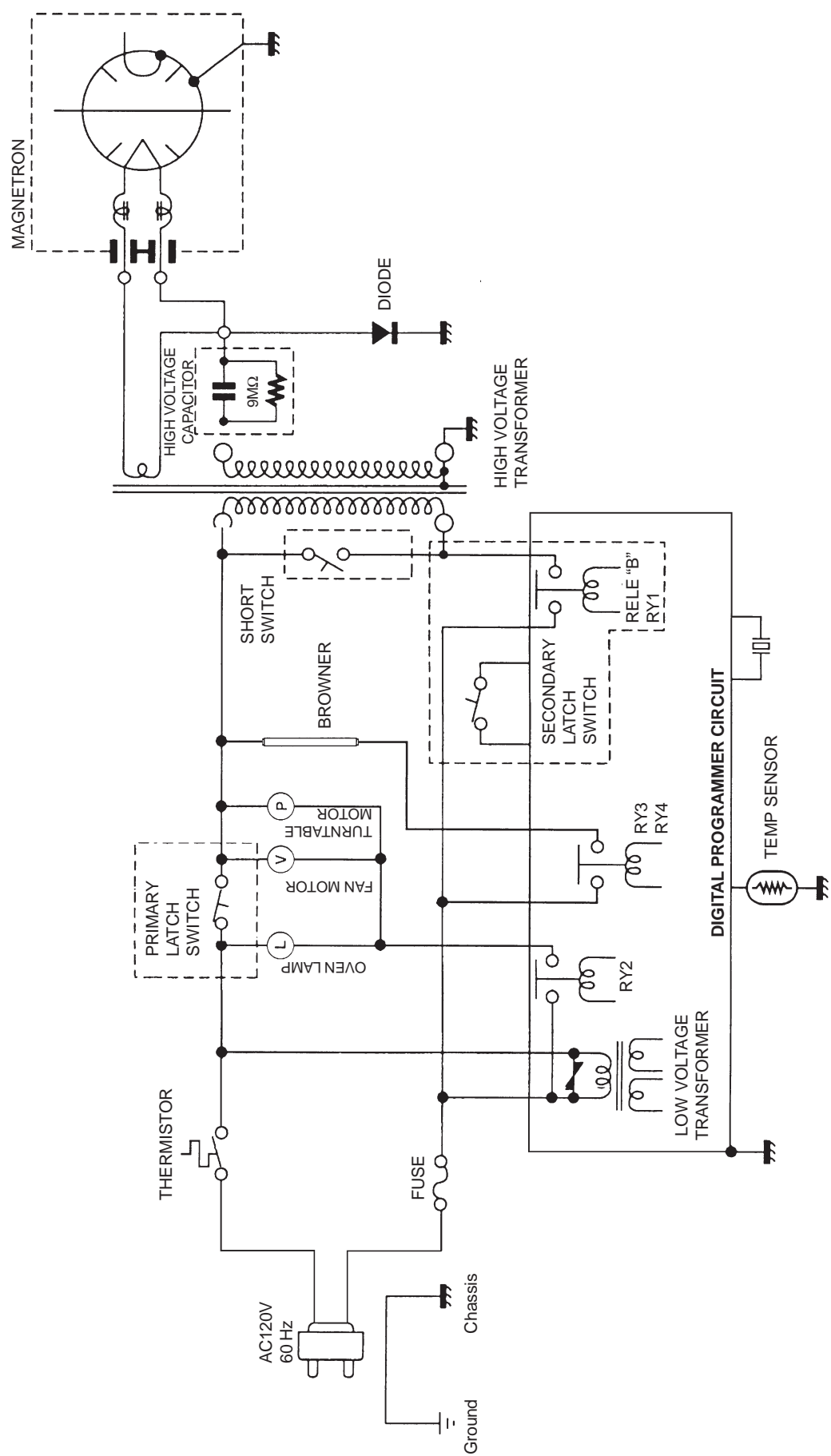
#### Output power performance test procedure.

1. Fill the beaker with exactly one litre of tap water. Stir the water using the thermometer and note the temperature. (Record as T1)
2. Place the beaker in the center of cook plate. Set the oven for High power and heat for exactly one minute.
3. After completion of the heating cycle, stir the water again with the thermometer and note the temperature. (Record as T2)

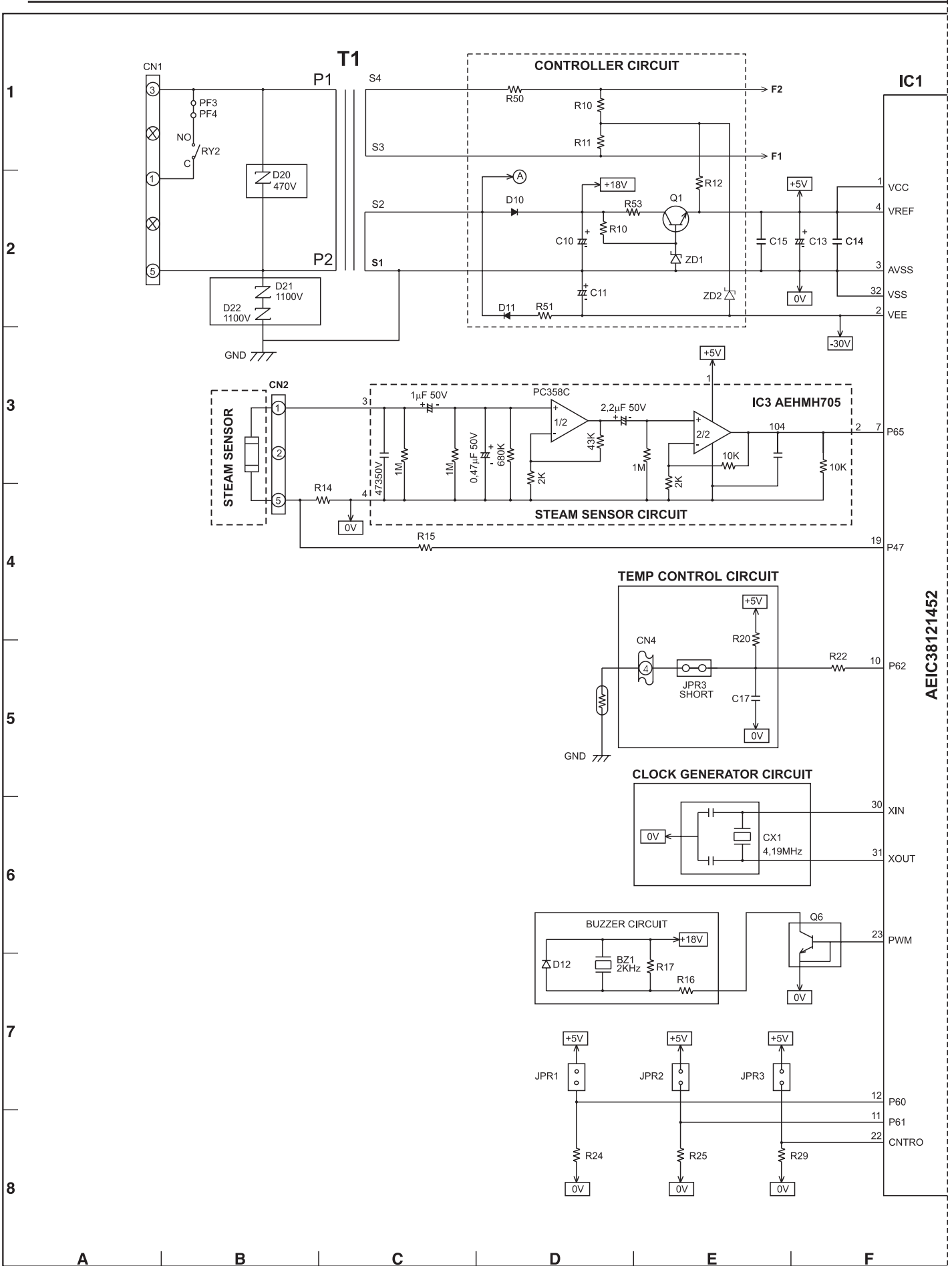
The normal temperature rise (T2-T1), for these models should be more than 7.0°C using the High power selection with the oven operating at the specified line voltage.



Please confirm that the gap between the switch housing and switch actuator lever is no more than 1.0mm when the door is closed.



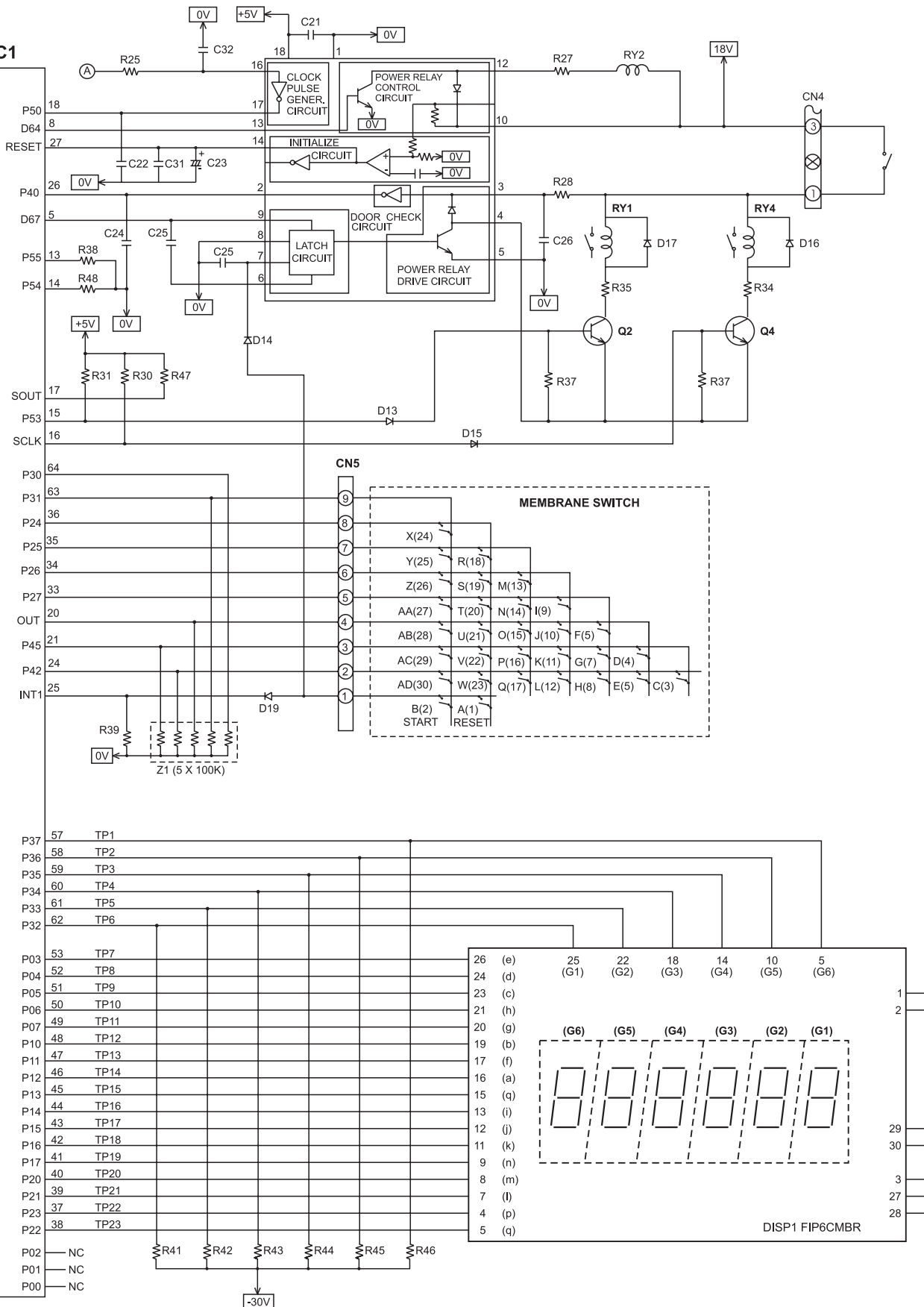
## ■ SCHEMATIC DIAGRAM

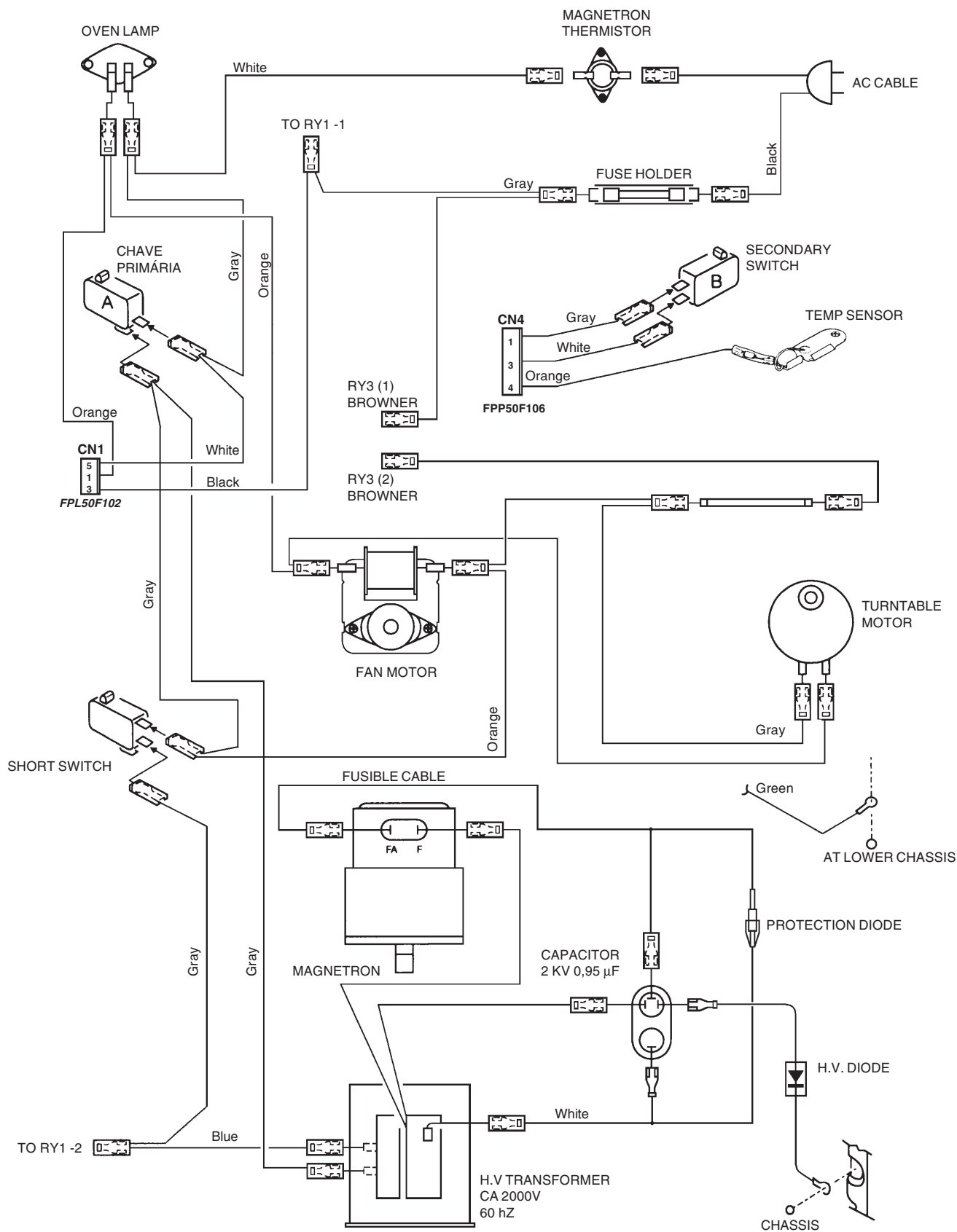


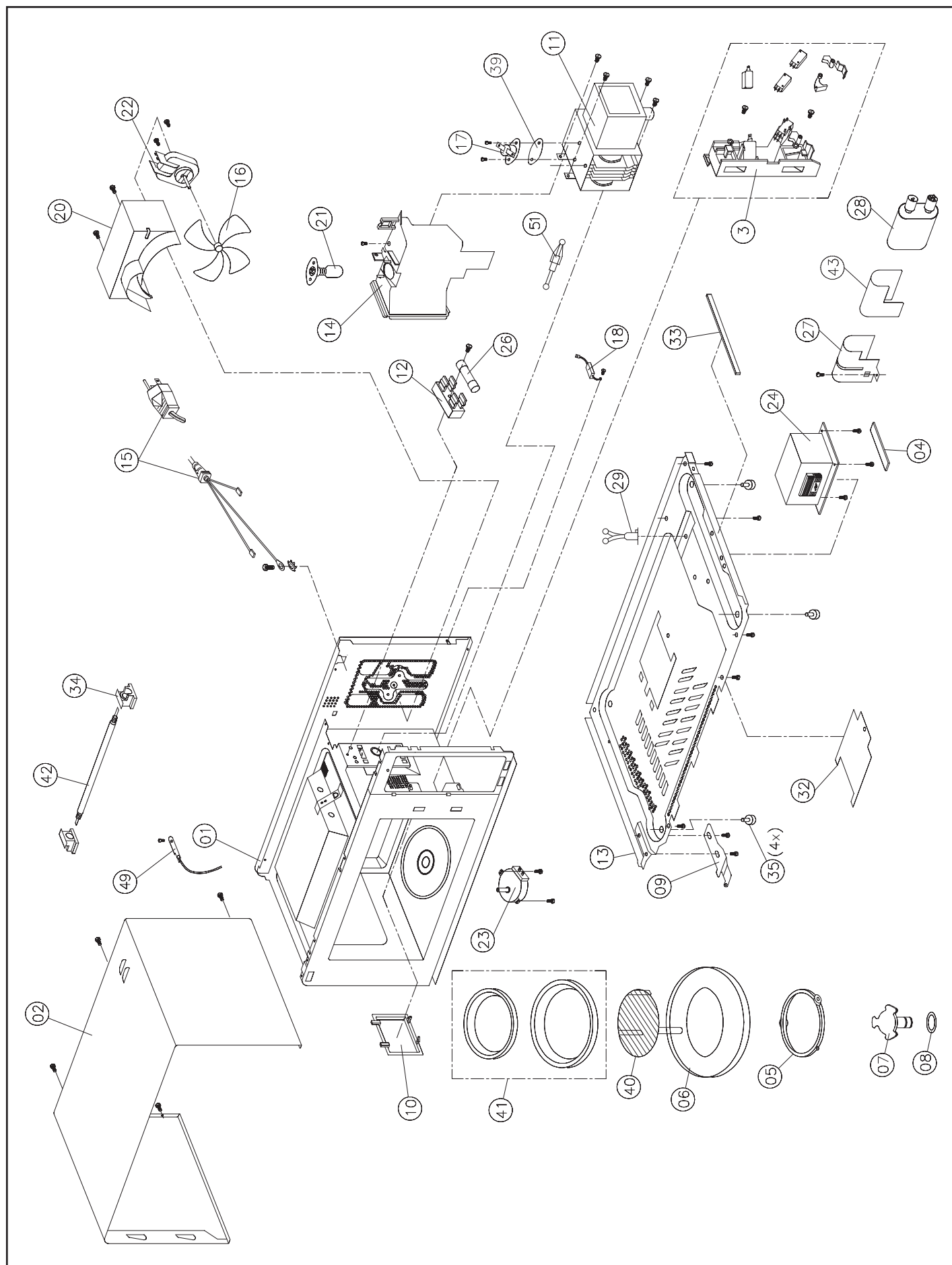


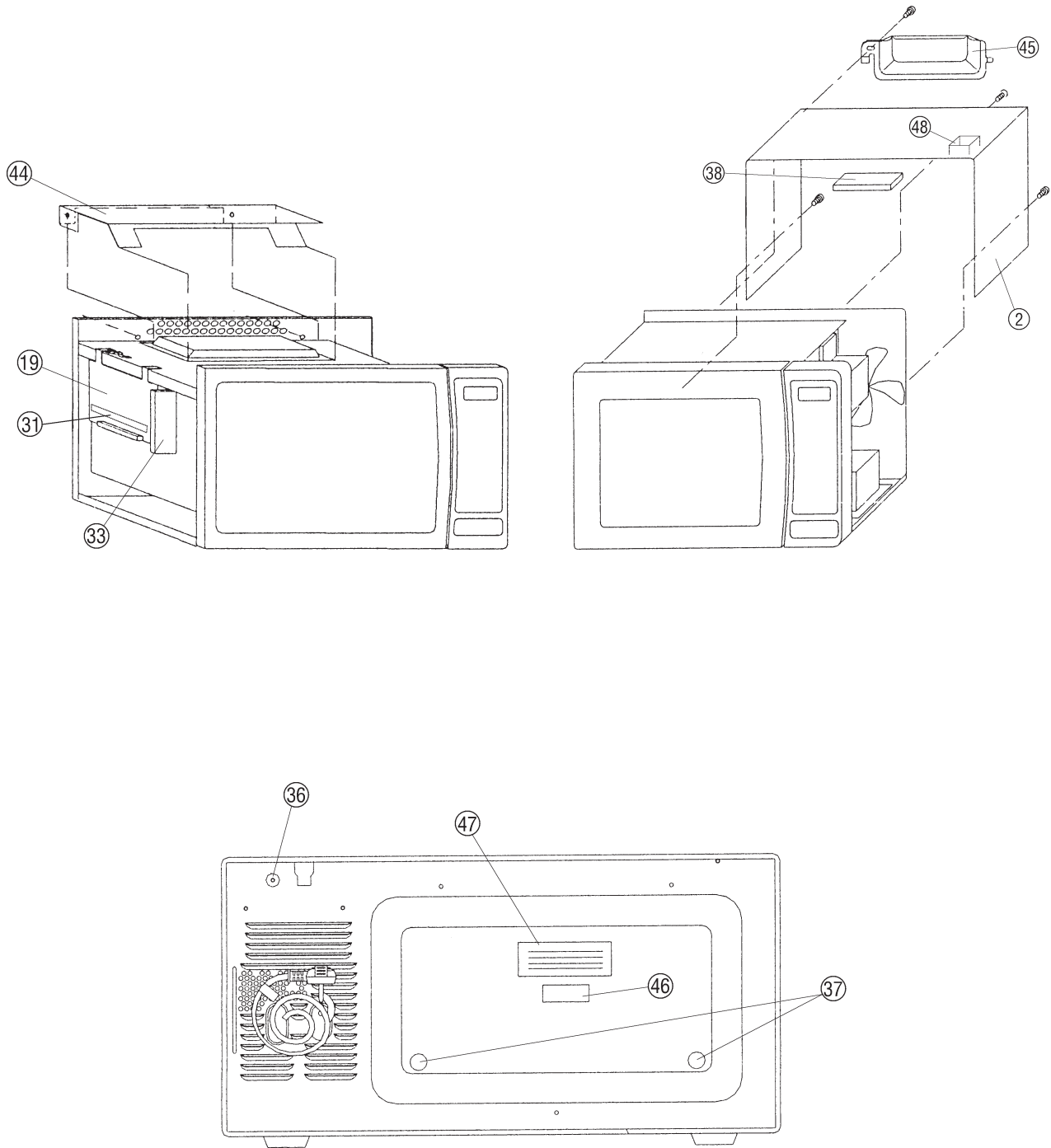
IC1

AEIC38121452

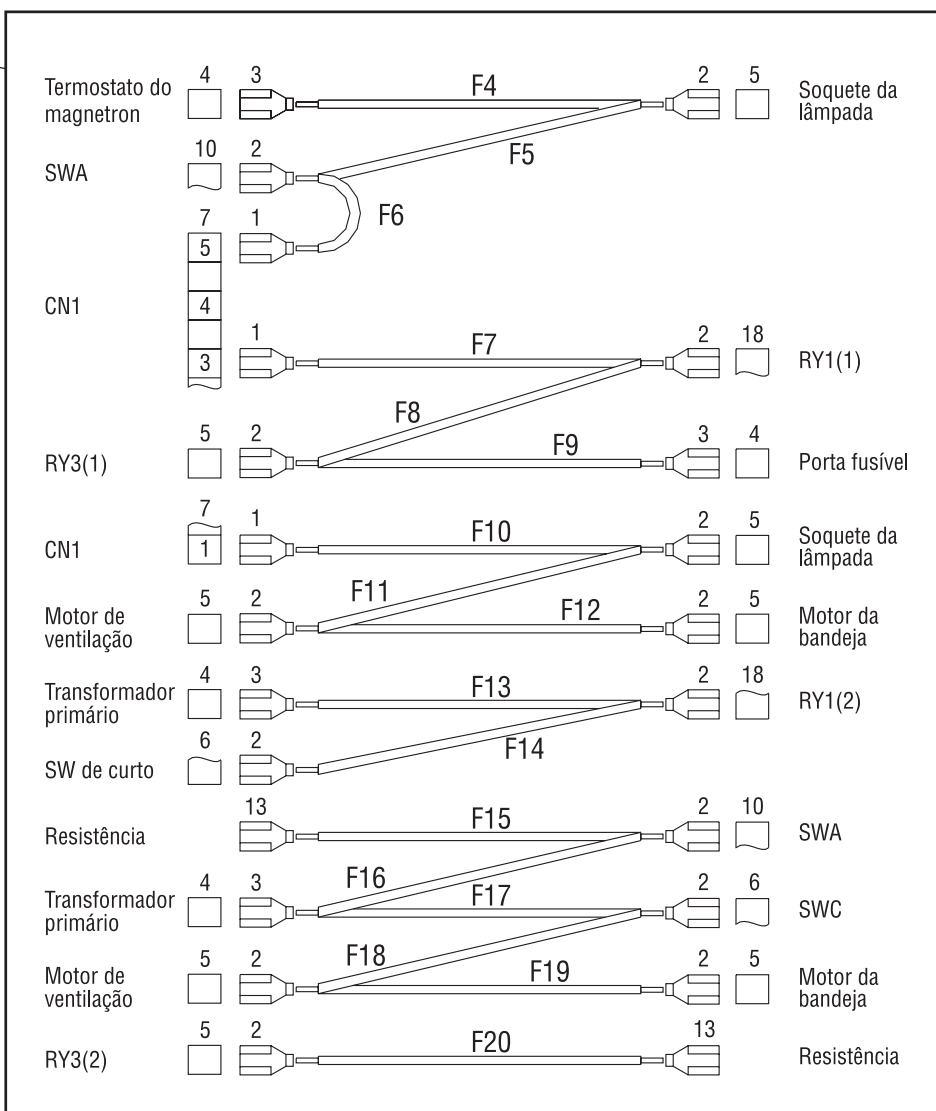




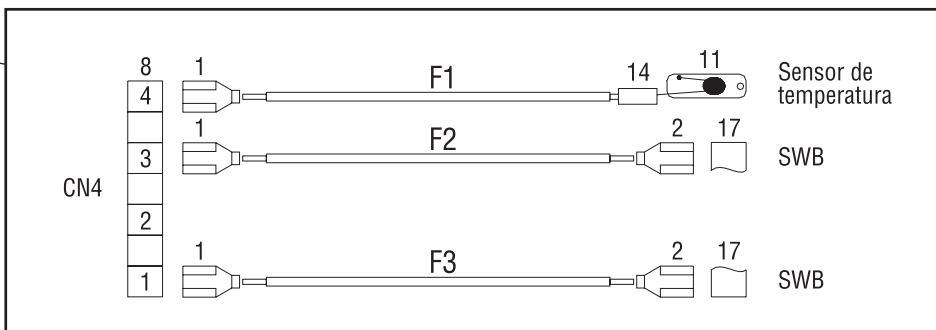




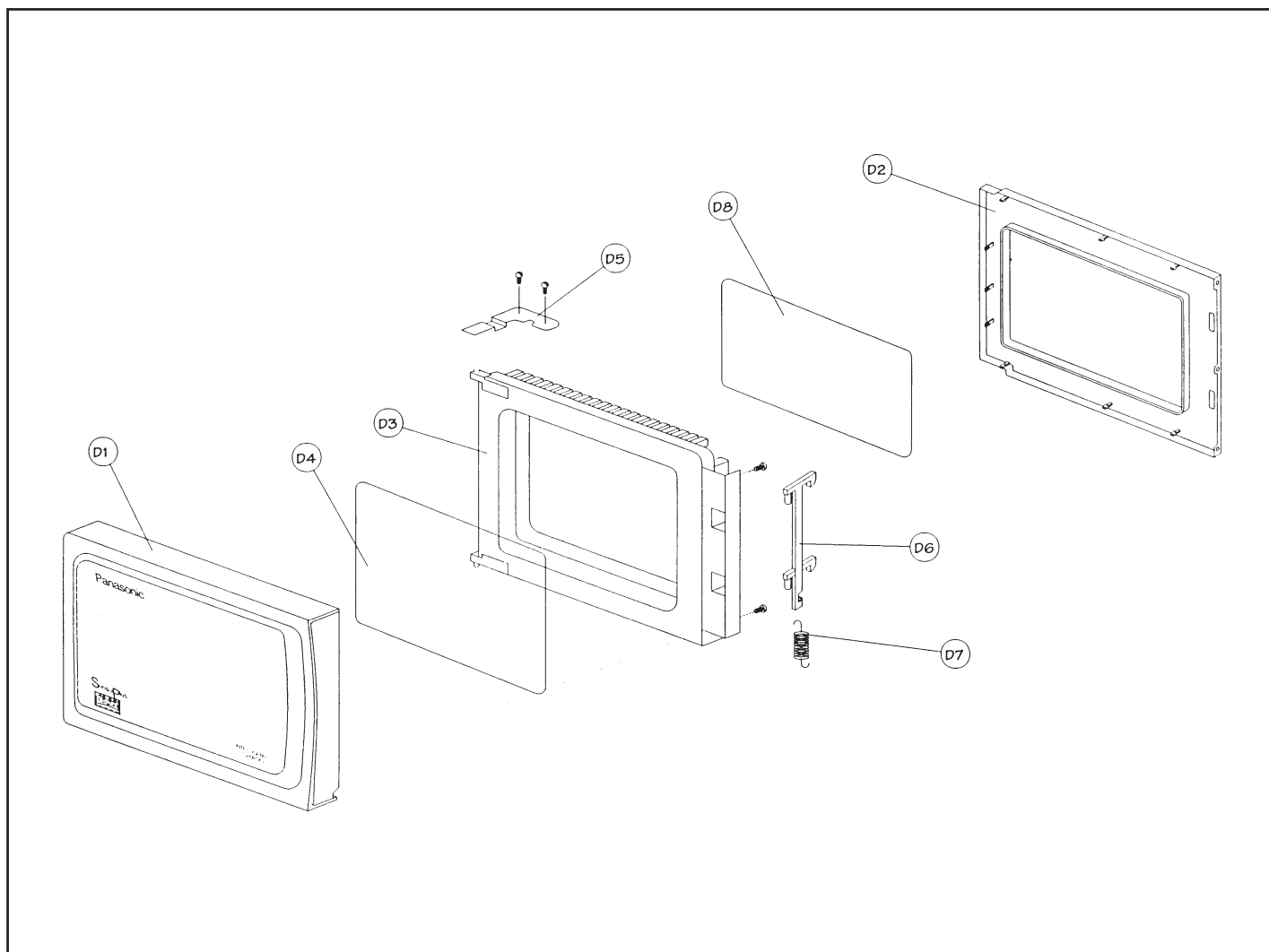
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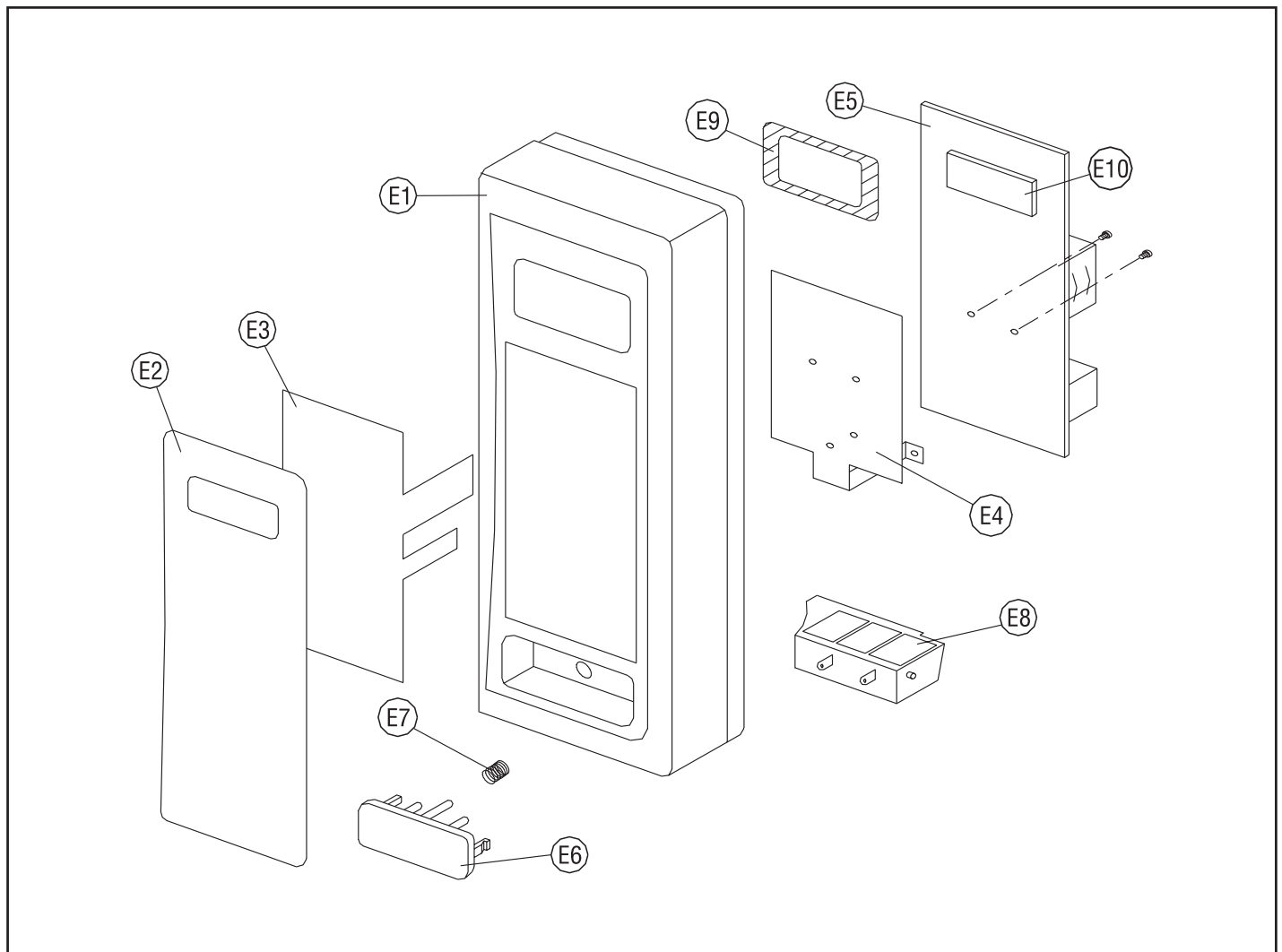
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Ref. No.	Part No.	Part Name & Description
01	FPL20C001AR	OVEN
02	FPK100102(BR)	CABINET BODY
03	B393C4832AP	DOOR HOOK
04	FPM000005	CUSHION RUBBER
05	B290D9330BR	ROLLER RING
06	A06014001AP	COOKING TRAY
07	A21315541AP	PULLEY SHAFT
08	FPD000001	WASHER
09	FPK300015	LOWER HINGE
10	A20554950AP	WAVE GUIDE COVER
11	2M189B-M1F15	MAGNETRON
12	FPA600005A	FUSE HOLDER
13	FPK100004C	LOWER BASE
14	FPI400002A	AIR GUIDE
15	FPG60C115AR-C-A	AC CORD W/ PLUG
16	FPN400007	FAN
17	KSD18.0/10AW	THERMAL CUTOUT
18	HVR-1X-9AB	DIODE
19	FPL100103AR	HEAT SINK
20	FPM400005	AIR GUIDE B
21	SHD-T22-CP-071	INCANDESCENT LAMP W/SOCKET
22	A400A4760JP	FAN MOTOR
23	A63268961JP	TURNTABLE MOTOR
24	ETL114BZ14Z	H.V. TRANSFORMER
25	FPL50F102	LEAD WIRE
26	65TS250V10A	FUSE 250V
27	FPC600014A	CAPACITOR BRACKET
28	HCH-212095D	H.V. CAPACITOR
29	TMM2B415	SPACER
30	FPP50F106-A	TEMP SENSOR WIRE
31	FPK000031	FITA DE ESPUMA (ADESIVADA)
32	FPK100104A	TURNTABLE MOTOR COVER
33	FPD000033	ESPUMA SUPRESSORA
34	A64654953AP	HEATER SUPPORT
35	FPD100106	RUBBER FOOT
36	FPM000030	PROTECTION CUSHION
37	FPM000031	BACK SPACER
38	A22424951AP	CABINET HEAT SPACER
39	FC6004	THERMAL SPACER
40	A06027310RT	HIGH BACKING RACK
41	FPL00C017AR	PANAGRILL DISH
42	J630G7320RP	HEATER
43	FPM600000	BRACKET ISOLATOR
44	FPL100003AR	HEAT SINK
45	E40248001BP	EXHAUST GUIDE
46	S-TQF2B179	SERIAL NUMBER TAG
47	BQF0194AR	IDENTIFICATION TAG
48	BQF0061EP	CAUTION TAG
49	A601L5181AP	TEMP SENSOR
51	A606V4764JP	PROTECTION DIODE



DOOR PARTS LIST		
Ref. No.	Part No.	Part Name & Description
	FPL30K001AR	MOUNTED DOOR
D1	FPL30C407	DOOR A
D2	FPK300022	DOOR C
D3	FPK30C013	DOOR E
D4	FPL300424	DOOR SCREEN B
D5	FPK300008	UPPER HINGE
D6	FPD300018	DOOR KEY A
D7	FPD300020	DOOR KEY SPRING
D8	A31457050AP	DOOR SCREEN A


**ESCUTCHEON BASE PARTS LIST**

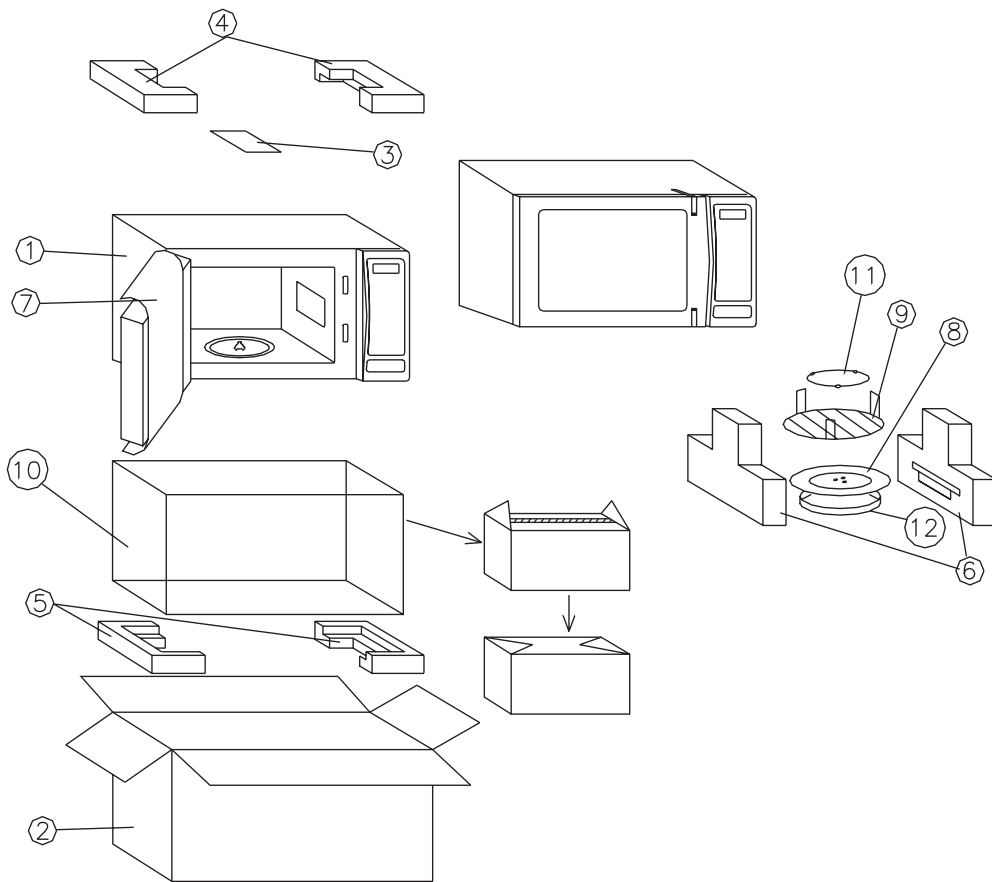
Ref. No.	Part No.	Part Name & Description
	FPL80C501AR	MOUTED PANEL W/O D. P. CIRCUIT
E1	FPP800101AR	ESCUTCHEON BASE
E2	FPL800503AR	ESCUTCHEON SHEET
E3	FPL800212	MEMBRANE SWITCH
E4	FPC800009	BACK PANEL
E5	MBUPNN-G61AR	D. P. CIRCUIT
E6	FPK800211	DOOR OPENING BUTTON
E7	FPD800002A	COOK BUTTON SPRING
E8	FPK800018	DOOR OPENING LEVER
E9	FPP800005	DISPLAY SPACER
E10	A82847010AP	DISPLAY SUPPORT



REF. No.	PART No.	PART NAME & DESCRIPTION
MAIN BOARD		
	MBUPNN-G61AR	D. P. CIRCUIT
CAPACITORS		
C10	ECA1VM471B	CAPACITOR 470,00 µF 35,0 V
C11	ECA1HM101B	CAPACITOR 100,00 µF 50,0 V
C13	ECA1EM100B	CAPACITOR 10,00 µF 25,0 V
C14	ECKR1H103ZF5	CAPACITOR 10,00 nF 50,0 V
C15	ECKR1H103ZF5	CAPACITOR 10,00 nF 50,0 V
C17	ECFR1H104ZF5	CAPACITOR 100,00 nF 50,0 V
C21	ECKR1H103ZF5	CAPACITOR 10,00 nF 50,0 V
C22	ECKR1H103ZF5	CAPACITOR 10,00 nF 50,0 V
C23	ECA1HM2R2B	CAPACITOR 2,20 µF 50,0 V
C24	ECKR1H103ZF5	CAPACITOR 10,00 nF 50,0 V
C25	ECKR1H103ZF5	CAPACITOR 10,00 nF 50,0 V
C26	ECKR1H103ZF5	CAPACITOR 10,00 nF 50,0 V
C28	ECFR1H104ZF5	CAPACITOR 100,00 nF 50,0 V
C31	ECKR1H103ZF5	CAPACITOR 10,00 nF 50,0 V
C32	ECFR1H104ZF5	CAPACITOR 100,00 nF 50,0 V
DIODES		
D10	1SR139-400T-32	DIODE 400V 1,0 A
D11	1SR139-400T-32	DIODE 400V 1,0 A
D12	1N4531T-77	DIODE (HIGH SPEED) 75,0 V 0,5 W
D13	1N4531T-77	DIODE (HIGH SPEED) 75,0 V 0,5 W
D14	1N4531T-77	DIODE (HIGH SPEED) 75,0 V 0,5 W
D15	1N4531T-77	DIODE (HIGH SPEED) 75,0 V 0,5 W
D16	1N4531T-77	DIODE (HIGH SPEED) 75,0 V 0,5 W
D17	1N4531T-77	DIODE (HIGH SPEED) 75,0 V 0,5 W
D19	1N4531T-77	DIODE (HIGH SPEED) 75,0 V 0,5 W
D21	ERZV10D112C1	VARISTOR (SURGE ABSORBER) 1100V
D22	ERZV10D112C1	VARISTOR (SURGE ABSORBER) 1100V
D20	ERZV10D471CS	VARISTOR (SURGE ABSORBER)
ZD1	MTZJT-775.6B	ZENER DIODE 5,6 V 0,5 W
ZD2	MTZJT-775.6B	ZENER DIODE 5,6 V 0,5 W
INTEGRATED CIRCUITS		
IC1	AEIC38121470	L.S.I.
IC2	AN6752	IC
TRANSISTORS		
Q1	2SD2006QRTA	TRANSISTOR
Q2	2SD1991AQSTA	TRANSISTOR
Q4	2SD1991AQSTA	TRANSISTOR
Q6	UN4211-(TA)	BIPOLAR TRANSISTOR 0,3 W
RESISTORS		
R10	ERDS2TJ151T	CARBON FILM RESISTOR 150Ω 1/4 W
R11	ERDS2TJ151T	CARBON FILM RESISTOR 150Ω 1/4 W
R12	ERDS2TJ103T	CARBON FILM RESISTOR 10KΩ 1/4 W
R13	ERDS2TJ472T	CARBON FILM RESISTOR 4,7KΩ 1/4 W
R16	ERDS2TJ102T	CARBON FILM RESISTOR 1KΩ 1/4 W
R17	ERDS2TJ332T	CARBON FILM RESISTOR 3,3KΩ 1/4 W
R20	ERDS2TJ333T	CARBON FILM RESISTOR 33KΩ 1/4 W
R22	ERDS2TJ102T	CARBON FILM RESISTOR 1KΩ 1/4 W

[illegible]

## ■ PACKING PARTS SECTION



### PACKING PARTS SECTION LIST

Ref. No.	Part No.	Part Name & Description
01	NN-G61AR	OVEN
02	FPL000006ME	PACKING
03	BQF0192AR	OPERATING INSTRUCTIONS BOOK
04	FPK000107A	UPPER FILLER
05	FPK000108	LOWER FILLER
06	FPL000110	TRAY FILLER
07	FPK000009	DOOR SHEET
08	A06014001AP	COOKING TRAY
09	A06027310RT	HIGH BACKING RACK
10	TPE2B4010	BAG
11	B290D9330BR	ROLLER RING ASSY
12	FPL00C017AR	PANAGRILL DISH

SYMPTOM	STEP	CHECK	RESULT	Cause/Corrections
No display when oven is first plugged in	1	Low voltage transformer (LVT) secondary voltage	Abnormal	Transformer
			Normal	go to step 2
	2	IC1-pin1voltage (Q1-E)	Abnormal	ZD1, Q1
			Normal	go to step 3
	3	IC1-pin27 voltage (IC2-pin 14)	Abnormal	IC2
			Normal	go to step 4
	4	IC1 pin-2 voltage	Abnormal	D11, C11, R51
			Normal (30V)	go to step 5
	5	Voltage of F1 and F2, pins 1and 2, 29 and 30 of display	Abnormal	R50 or S3 and S4 open or short circuited.
			2,5VAC	
Oven does not accept key input (Program)	1		Abnormal	Membrane switch
			Normal	IC-1
No beep sound	1	IC-1 pin 23 2KHz signal	Abnormal	IC-1
			Normal	BZ1, D12, Q618V
Power relay 1 does not turn on even through the program has been set and the start pad is tapped	1	IC-1 pin 18 voltage while operation	Abnormal	IC-1
			Normal = 5V	RY-1
No microwave oscilation at any power seting	1	IC-1 pin 15 and 5 voltage while operation at high power	Abnormal	IC-1
			Normal pin 5 = 5V pin 15 = 5V	go to step 2
	2	Transistor Q2	Abnormal	Q3
			Normal	IC-2, RY-1
Dark or unclear display	1	Replace display and check operation	Abnormal	IC-1
			Normal	Display
segment	1	Replace display and check operation	Abnormal	Display
			Normal	IC-1

**Panasonic do Brasil Ltda.**

**CS GROUP - TECHNICAL SUPPORT**

# NOTES



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placed and related in this data base are the author's  
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