SERVICE MANUAL

MODEL: RAD125 (RAS125F)

Mini Hi-Fi System
SERVICE MANUAL

MODEL: RAD125 (RAS125F)

P/NO : AFN73250985

JANUARY, 2010

[CONTENTS]

SECTION 1. GENERAL

SERVICING PRECAUTIONS

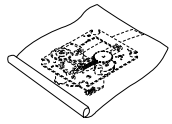
NOTES REGARDING HANDLING OF THE PICK-UP

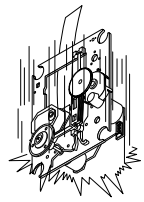
1. Notes for transport and storage

1) The pick-up should always be left in its conductive bag until immediately prior to use.
2) The pick-up should never be subjected to external pressure or impact.

2. Repair notes

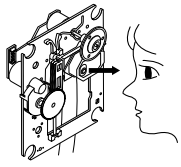
Storage in conductive bag





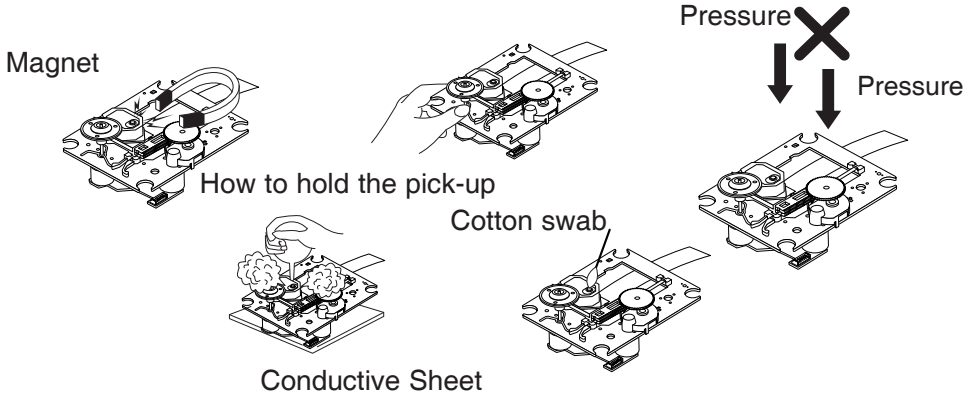
Drop impact

1) The pick-up incorporates a strong magnet, and so should never be brought close to magnetic materials.
2) The pick-up should always be handled correctly and carefully, taking care to avoid external pressure and impact. If it is subjected to strong pressure or impact, the result may be an operational malfunction and/or damage to the printed-circuit board.
3) Each and every pick-up is already individually adjusted to a high degree of precision, and for that reason the adjustment point and installation screws should absolutely never be touched.
4) Laser beams may damage the eyes!
   Absolutely never permit laser beams to enter the eyes!
   Also NEVER switch ON the power to the laser output part (lens, etc.) of the pick-up if it is damaged.



NEVER look directly at the laser beam, and don't allow contact with fingers or other exposed skin.

5) Cleaning the lens surface
   If there is dust on the lens surface, the dust should be cleaned away by using an air bush (such as used for camera lens). The lens is held by a delicate spring. When cleaning the lens surface, therefore, a cotton swab should be used, taking care not to distort lens.



6) Never attempt to disassemble the pick-up.
   Spring has excess pressure. If the lens is extremely dirty, apply isopropyl alcohol to the cotton swab. (Do not use any other liquid cleaners, because they will damage the lens.) Take care not to use too much of this alcohol on the swab, and do not allow the alcohol to get inside the pick-up.

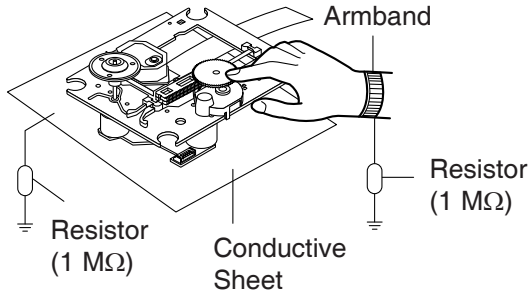
NOTES REGARDING COMPACT DISC PLAYER REPAIRS

1. Preparations

1) Compact disc players incorporate a great many ICs as well as the pick-up (laser diode). These components are sensitive to, and easily affected by, static electricity. If such static electricity is high voltage, components can be damaged, and for that reason components should be handled with care.
2) The pick-up is composed of many optical components and other high-precision components. Care must be taken, therefore, to avoid repair or storage where the temperature or humidity is high, where strong magnetism is present, or where there is excessive dust.

2. Notes for repair

1) Before replacing a component part, first disconnect the power supply lead wire from the unit
2) All equipment, measuring instruments and tools must be grounded.
3) The workbench should be covered with a conductive sheet and grounded.
   When removing the laser pick-up from its conductive bag, do not place the pick-up on the bag. (This is because there is the possibility of damage by static electricity.)
4) To prevent AC leakage, the metal part of the soldering iron should be grounded.
5) Workers should be grounded by an armband (1 MΩ)
6) Care should be taken not to permit the laser pick-up to come in contact with clothing, in order to prevent static electricity changes in the clothing to escape from the armband.



7) The laser beam from the pick-up should NEVER be directly facing the eyes or bare skin.

ESD PRECAUTIONS

Electrostatically Sensitive Devices (ESD)

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive Devices (ESD). Examples of typical ESD devices are integrated circuits and some field-effect transistors and semiconductor chip components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ESD devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ESD devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESD devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESD devices.
6. Do not remove a replacement ESD device from its protective package until immediately before you are ready to install it. (Most replacement ESD devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive materials).
7. Immediately before removing the protective material from the leads of a replacement ESD device, touch the protective material to the chassis or circuit assembly into which the device will by installed.

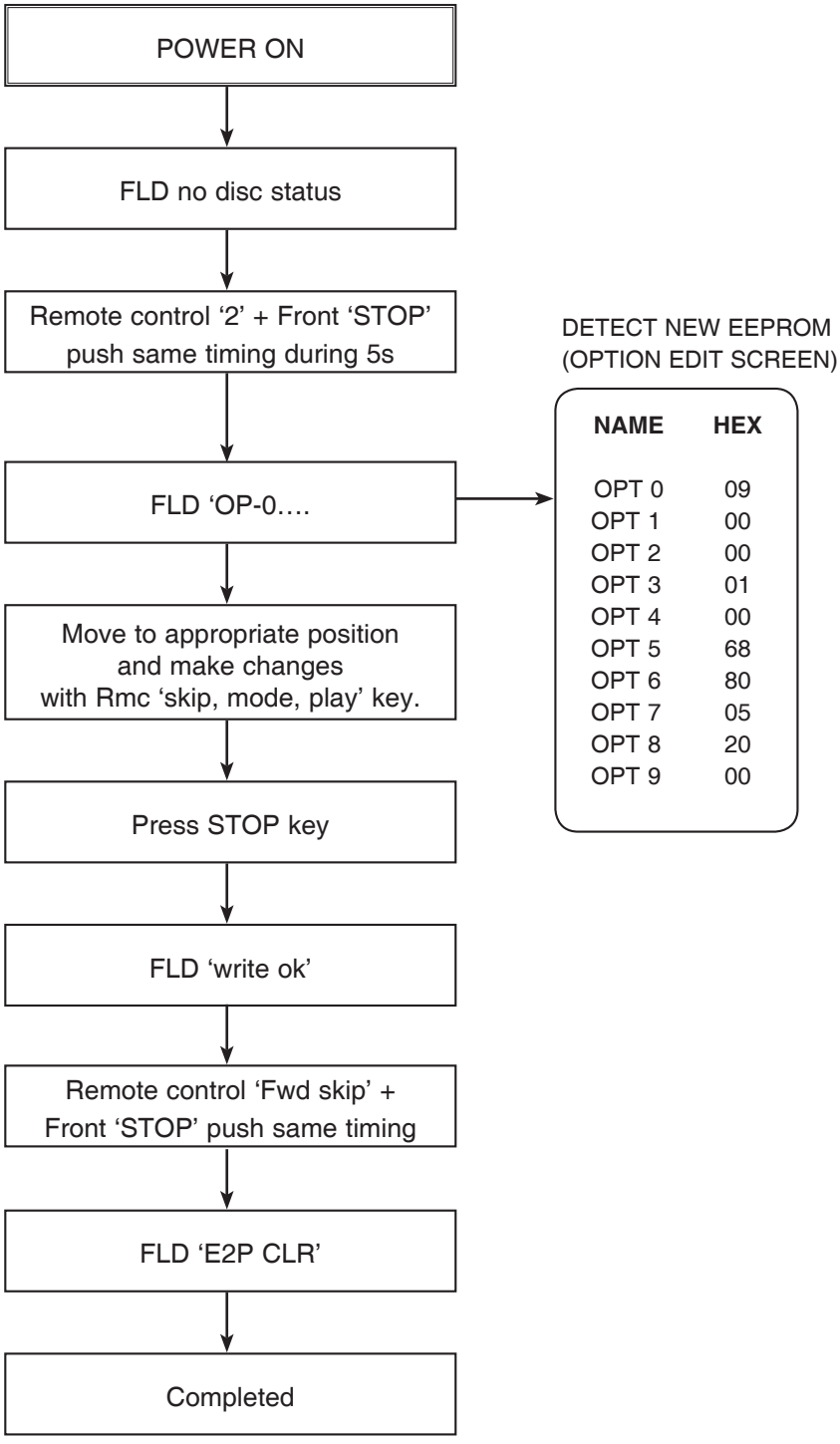
CAUTION : BE SURE NO POWER IS APPLIED TO THE CHASSIS OR CIRCUIT, AND OBSERVE ALL OTHER SAFETY PRECAUTIONS.

8. Minimize bodily motions when handing unpackaged replacement ESD devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ESD device).

CAUTION. GRAPHIC SYMBOLS

	THE LIGHTNING FLASH WITH APROWHEAD SYMBOL. WITHIN AN EQUILATERAL TRIANGLE, IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF UNINSULATED “DANGEROUS VOLTAGE” THAT MAY BE OF SUFFICIENT MAGNITUDE TO CONSTITUTE A RISK OF ELECTRIC SHOCK.
	THE EXCLAMATION POINT WITHIN AN EQUILATERAL TRIANGLE IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF IMPORTANT SAFETY INFORMATION IN SERVICE LITERATURE.

SERVICE INFORMATION FOR EEPROM



PROGRAM DOWNLOAD GUIDE

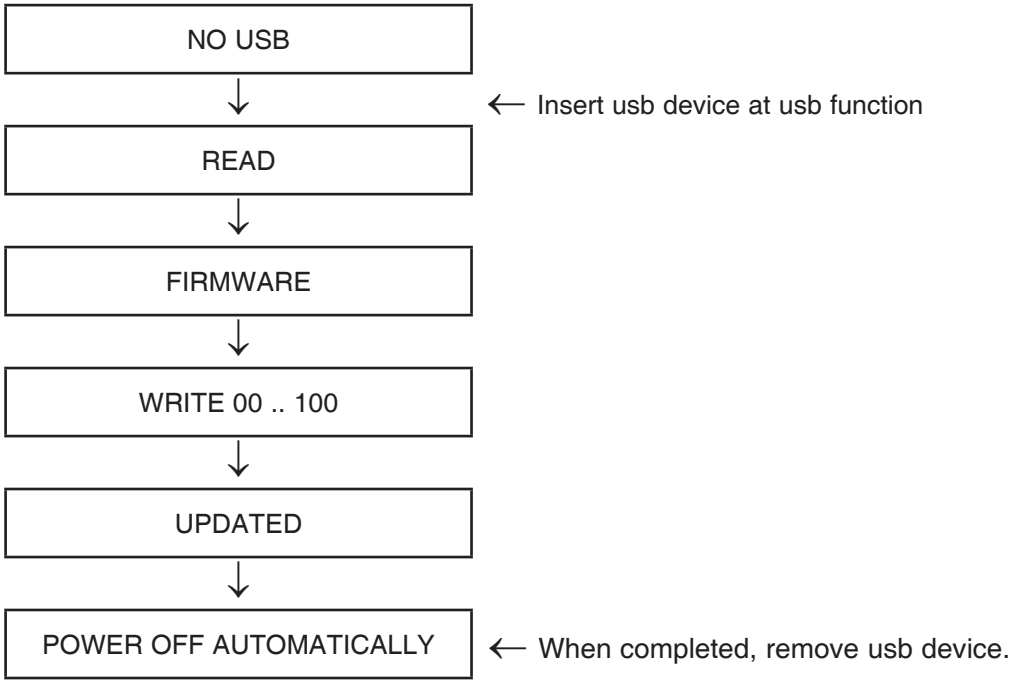
1. AUDIO PROGRAM

Download program file name must be RAD125.HEX

If security program (Water Wall) is activated on your PC, you must save the file to the usb storage device and disable the security software, then download the file to your set.

Caution: When downloading the file, you should neither unplug the usb device, change to the other function, nor power off the device. Usb device must be unplugged when the downloading process is completed.

ON VFD DISPLAY SCREEN



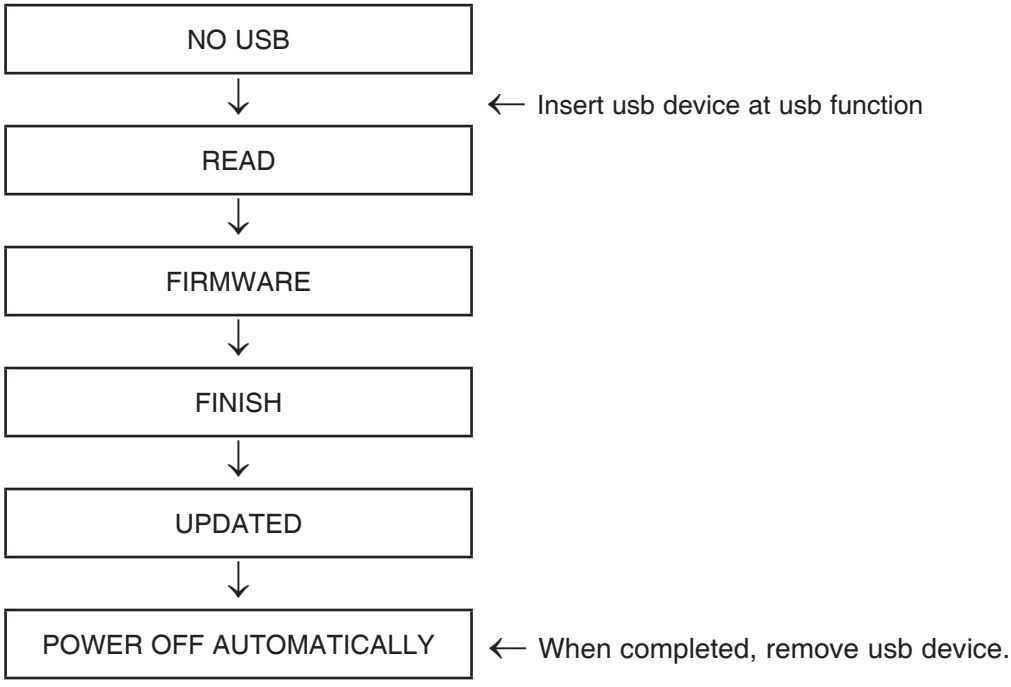
2. CD PROGRAM

Download program file name must be HB001_DATE_00.BIN

If security program (Water Wall) is activated on your PC, you must save the file to the usb storage device and disable the security software, then download the file to your set.

Caution: When downloading the file, you should neither unplug the usb device, change to the other function, nor power off the device. Usb device must be unplugged when the downloading process is completed.

ON VFD DISPLAY SCREEN



SPECIFICATIONS

• GENERAL

Power supply	Refer to main label
Power consumption	Refer to main label
Net Weight	3.5 kg
External dimensions (W x H x D)	202 x 307 x 278 mm
Bus Power Supply (USB)	DC 5 V ⎓ 500 mA
Operating conditions Temperature	5 °C ~ 35 °C, Operation status: Horizontal
Operating humidity	5 % ~ 85 %
Laser	Semiconductor laser, wavelength 650 nm

• TUNER FM/AM [MW]

FM Tuning Range	(87.5 ~ 108.0) MHz or (87.50 ~ 108.00) MHz
FM Intermediate Frequency	128 kHz
AM Tuning Range	(522 ~ 1 620) kHz, (520 ~ 1 710) kHz or (522 ~ 1 710) kHz
AM Intermediate Frequency	45 kHz

• AMPLIFIER

Output Power	60 W + 60 W (4 Ω at 1 kHz, THD 10 %)

• CD

Frequency Response	(40 ~ 20 000) Hz
Signal-to-noise ratio	75 dB
Dynamic range	80 dB

• SPEAKERS

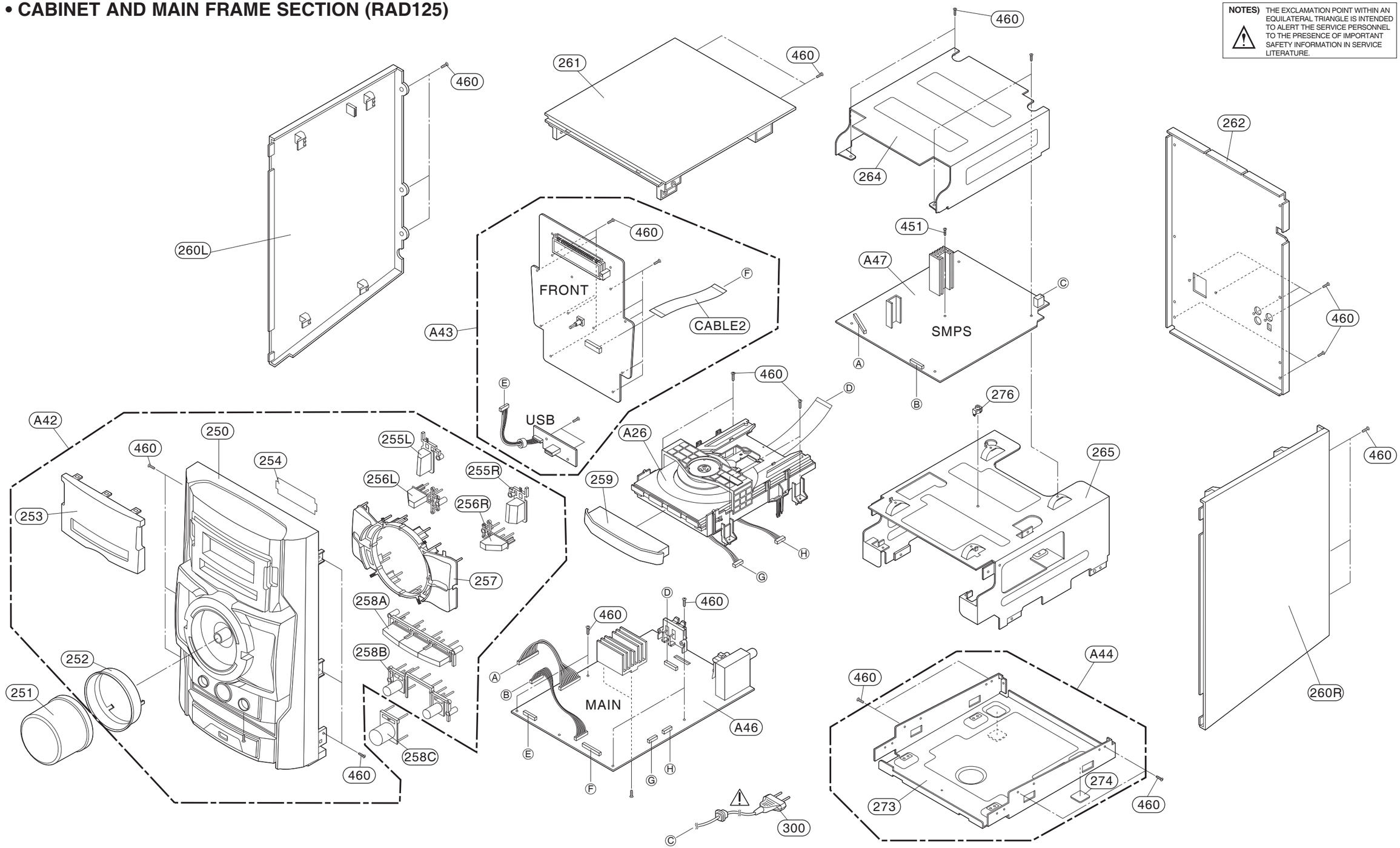
	Front Speaker
Type	2 Way 2 Speaker
Impedance	4 Ω
Rated Input Power	60 W
Max. Input Power	120 W
Net Dimensions (W x H x D)	210 x 310 x 235 mm
Net Weight	2.6 kg

Designs and specifications are subject to change without prior notice

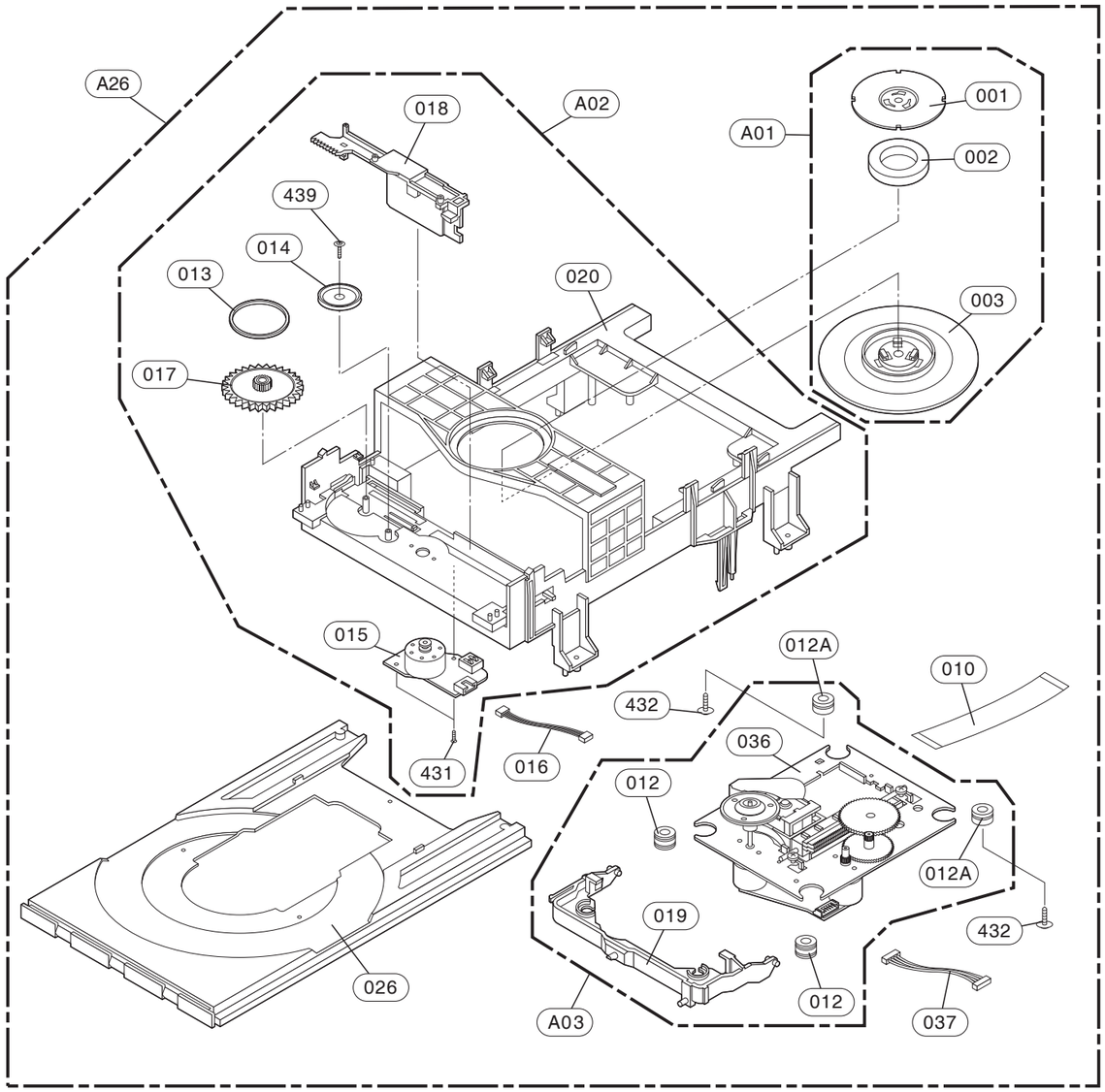
SECTION 2. EXPLODED VIEWS

• CABINET AND MAIN FRAME SECTION (RAD125)

NOTES) THE EXCLAMATION POINT WITHIN AN EQUILATERAL TRIANGLE IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF IMPORTANT SAFETY INFORMATION IN SERVICE LITERATURE.

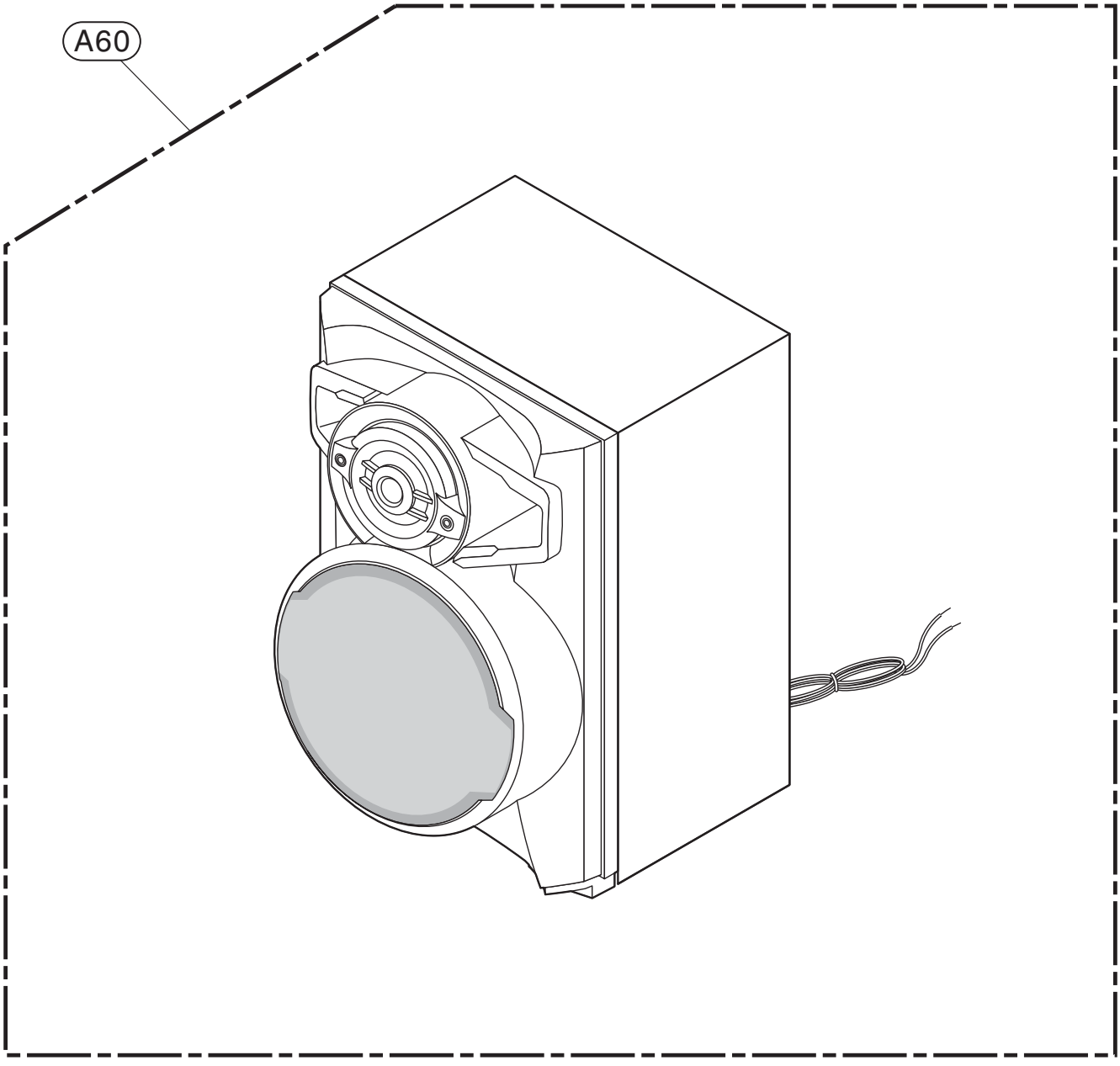


• MECHANISM DECK SECTION (CDM-340)

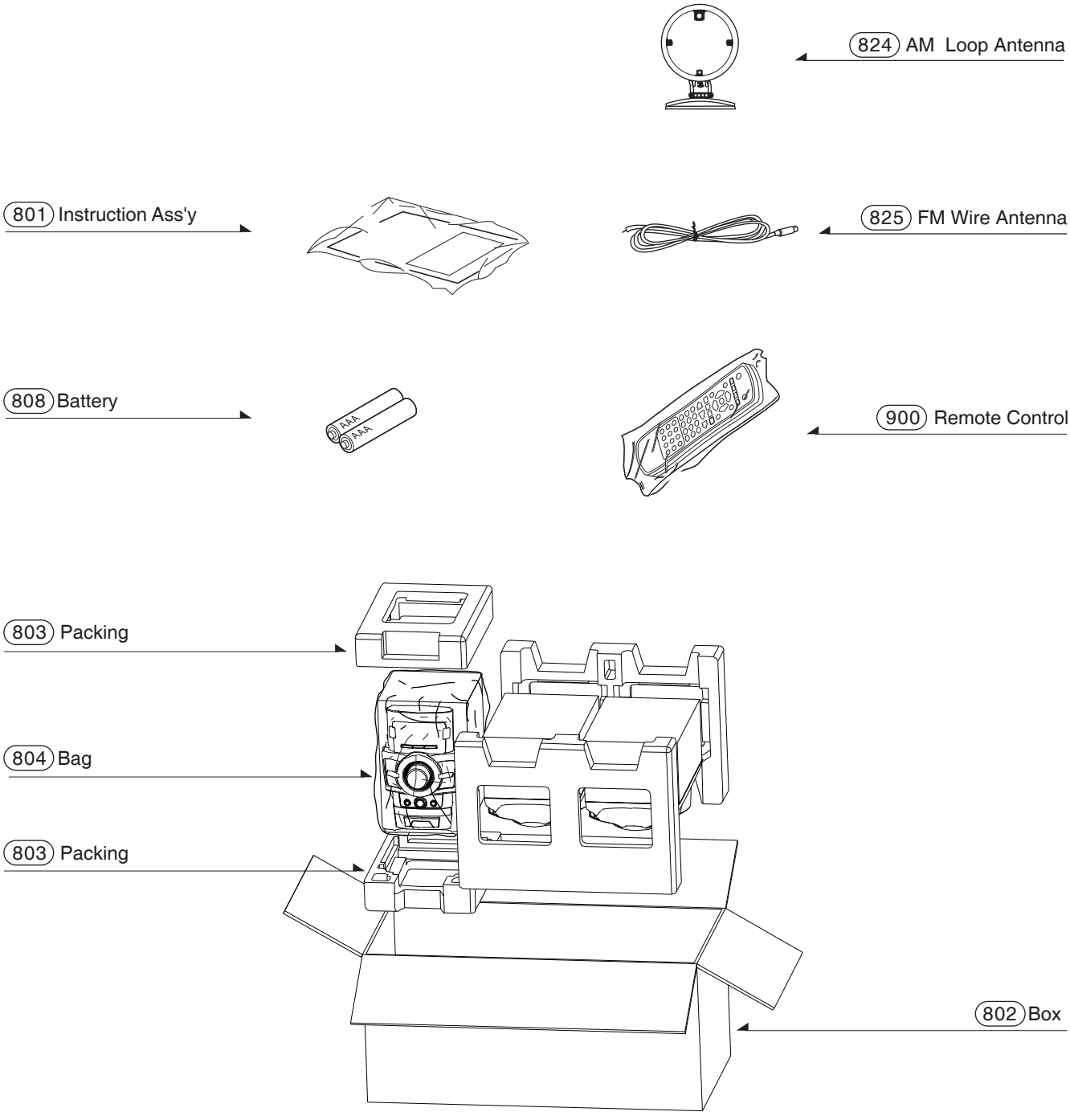


• SPEAKER SECTION

1. FRONT SPEAKER (RAS125F)



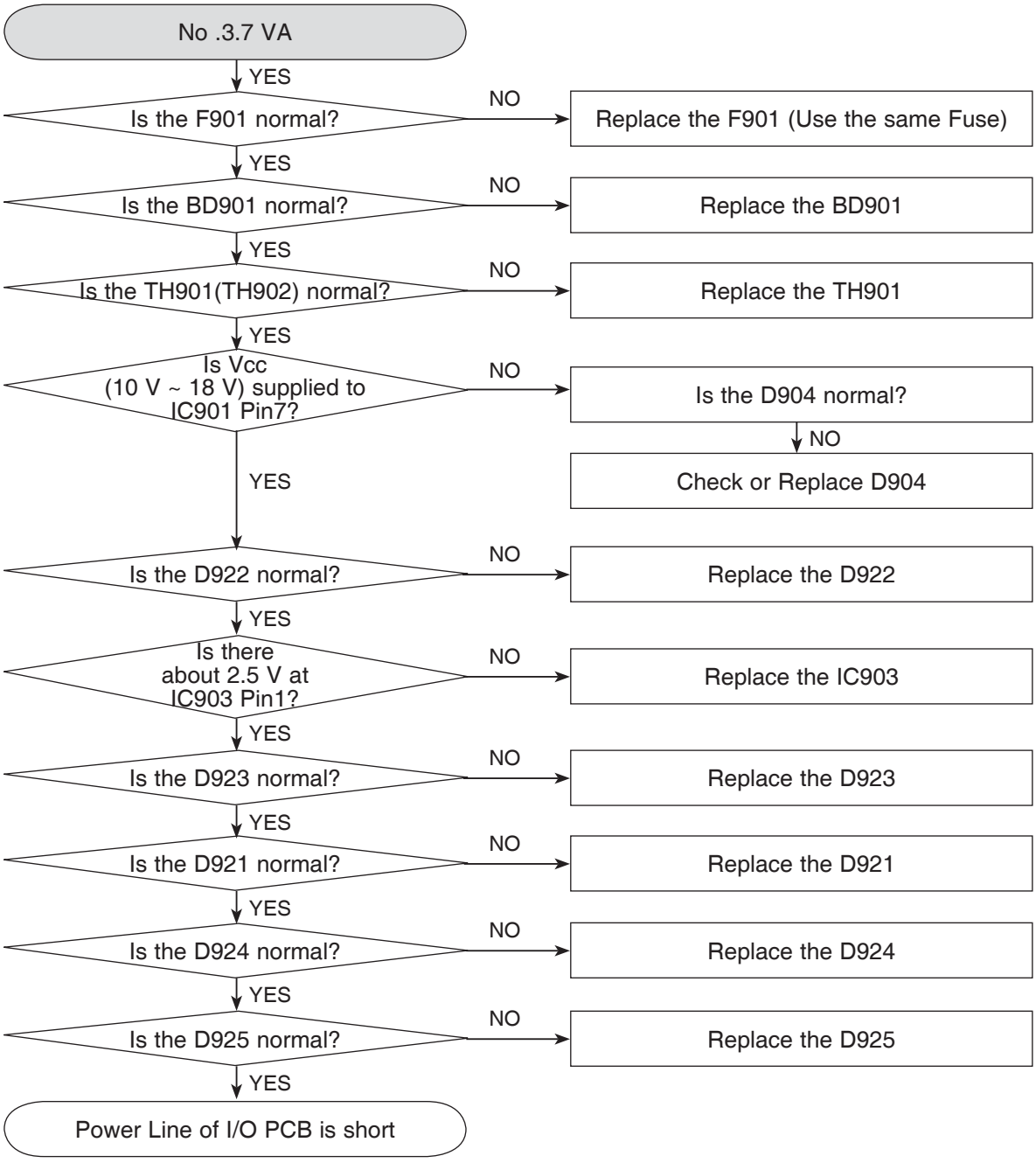
• PACKING ACCESSORY SECTION

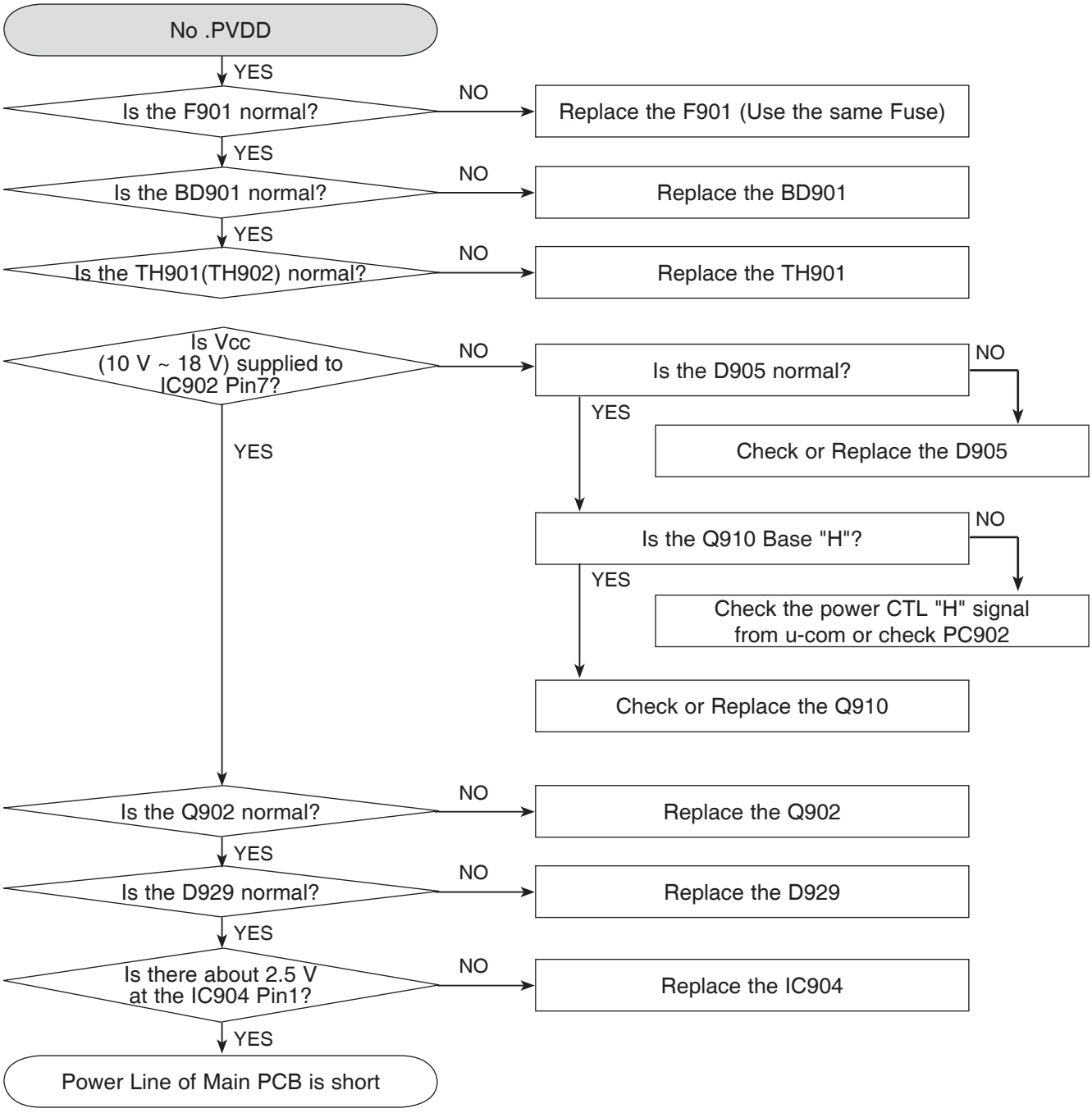


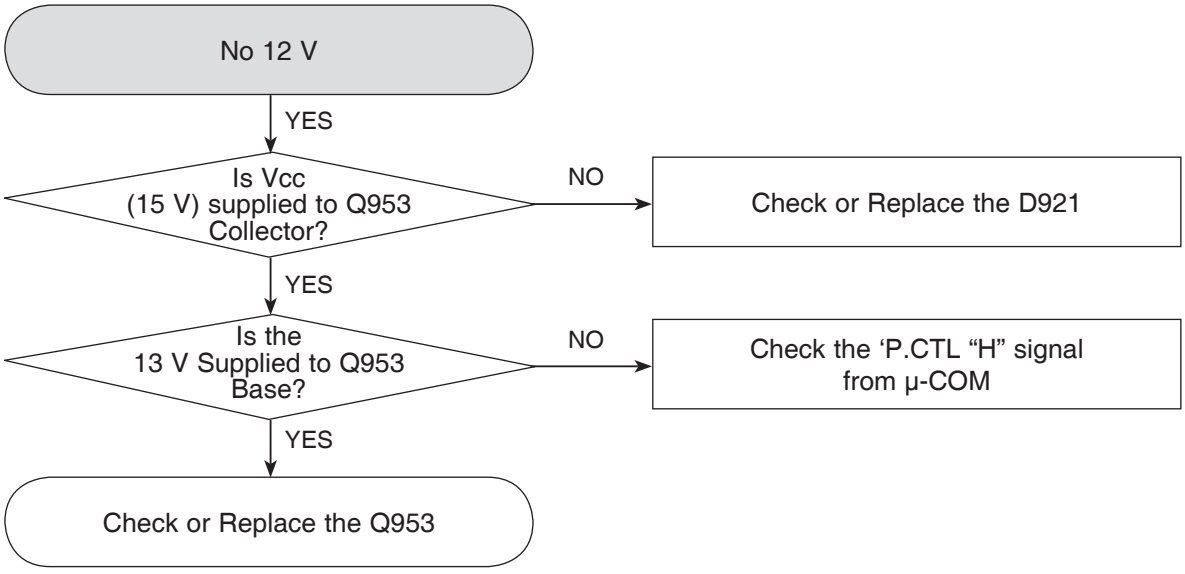
SECTION 3. ELECTRICAL PART

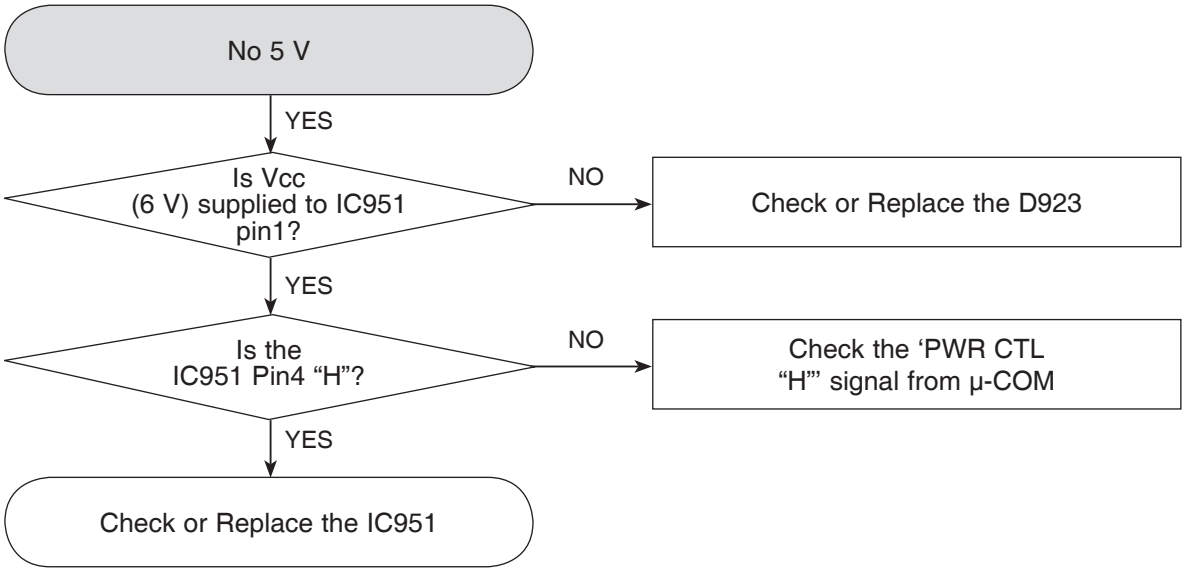
AUDIO ELECTRICAL TROUBLESHOOTIHG GUIDE

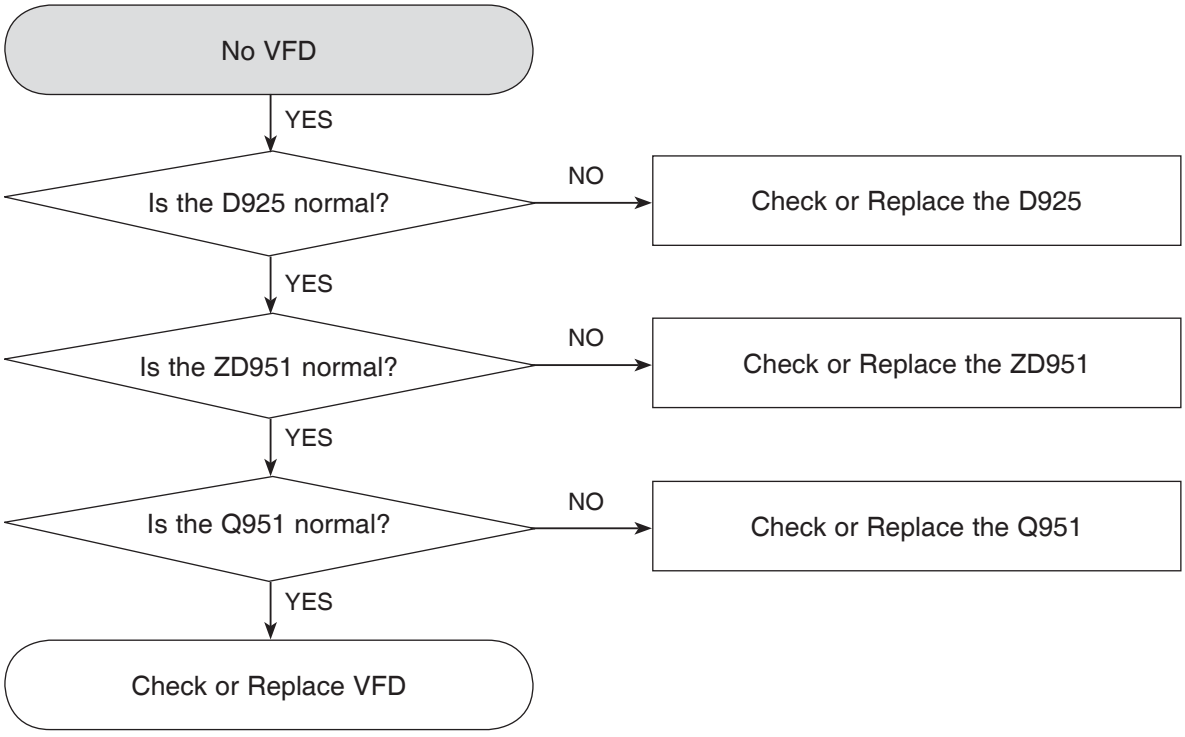
1. POWER (SMPS)



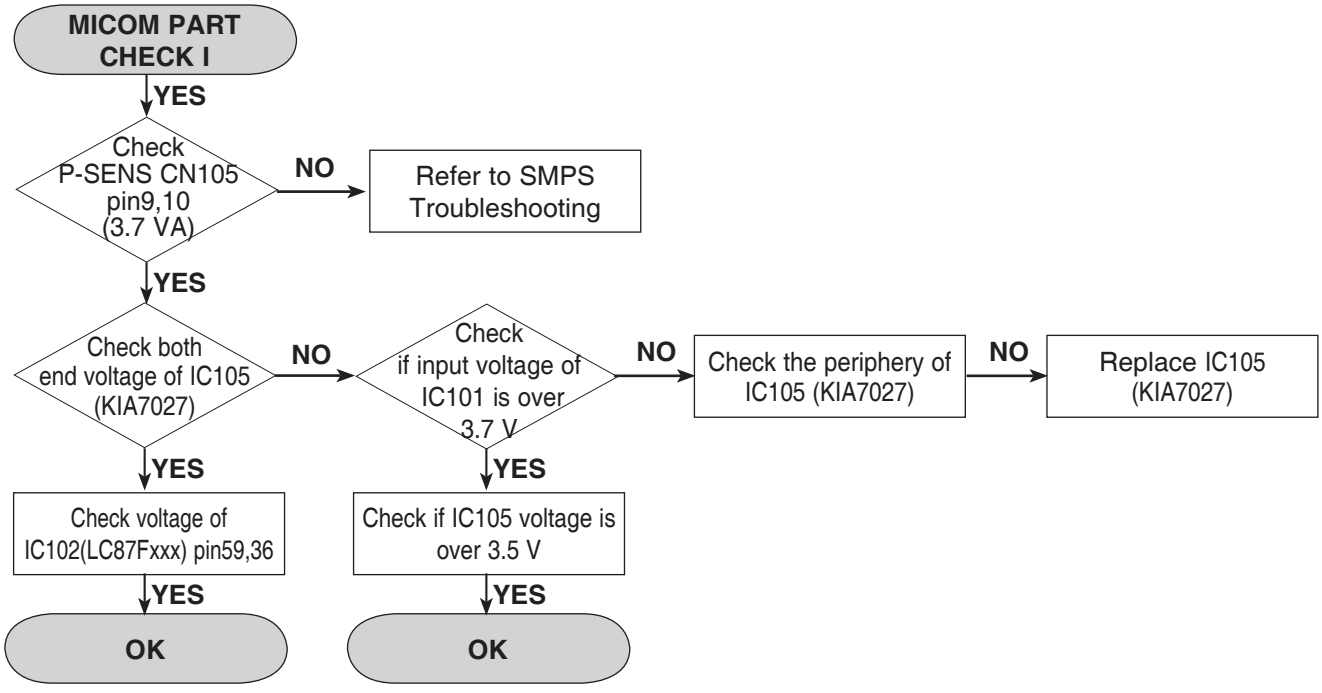




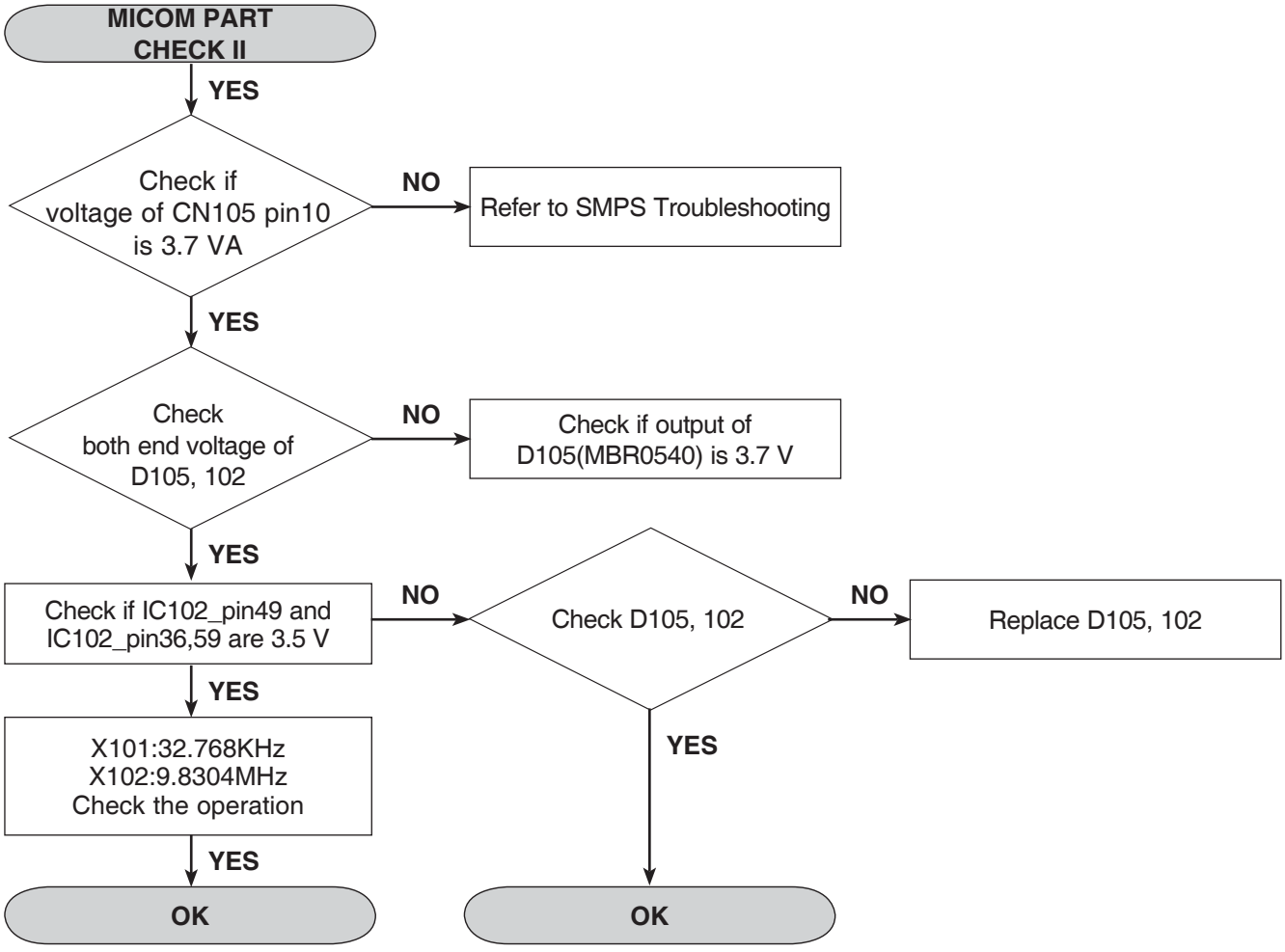




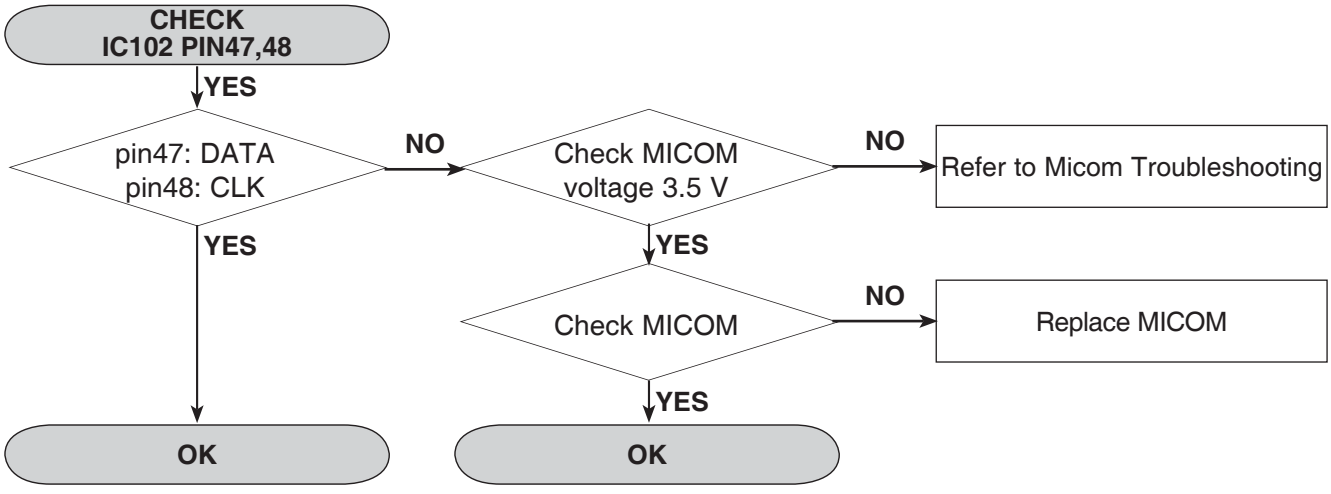
2. MICOM PART CHECK I



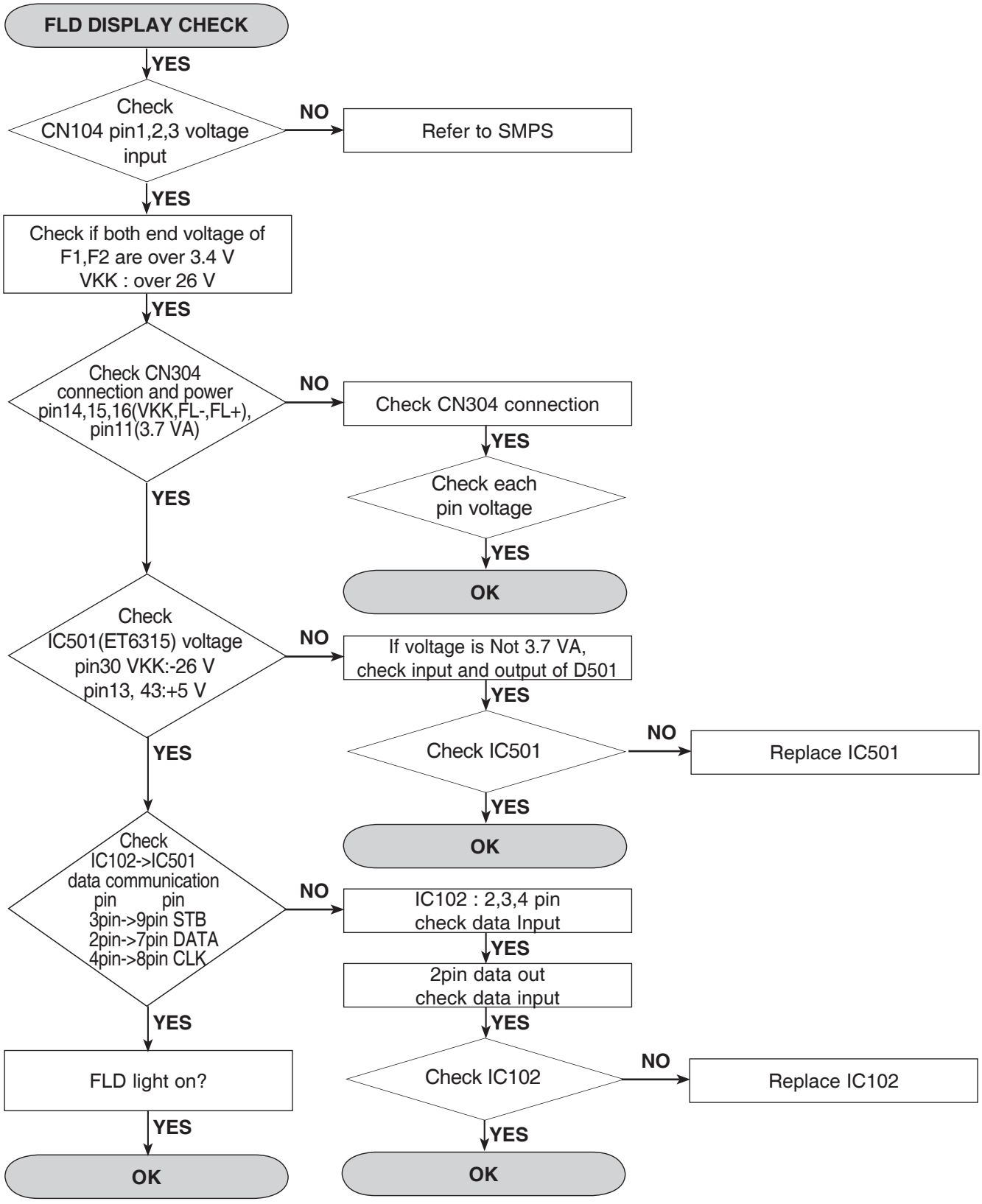
3. MIOM PART CHECK II



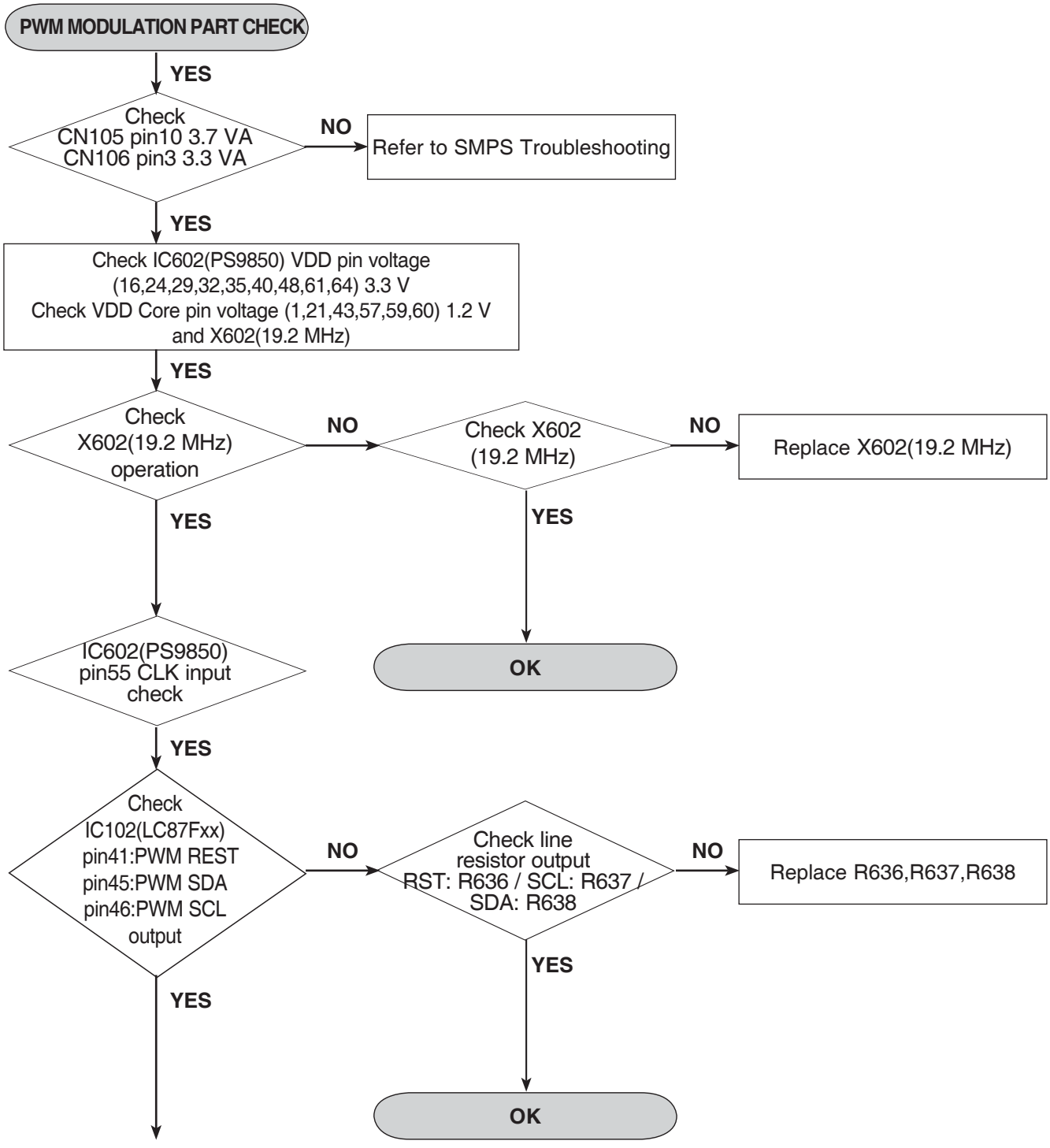
4. IC101(S24CS16A01)CHECK

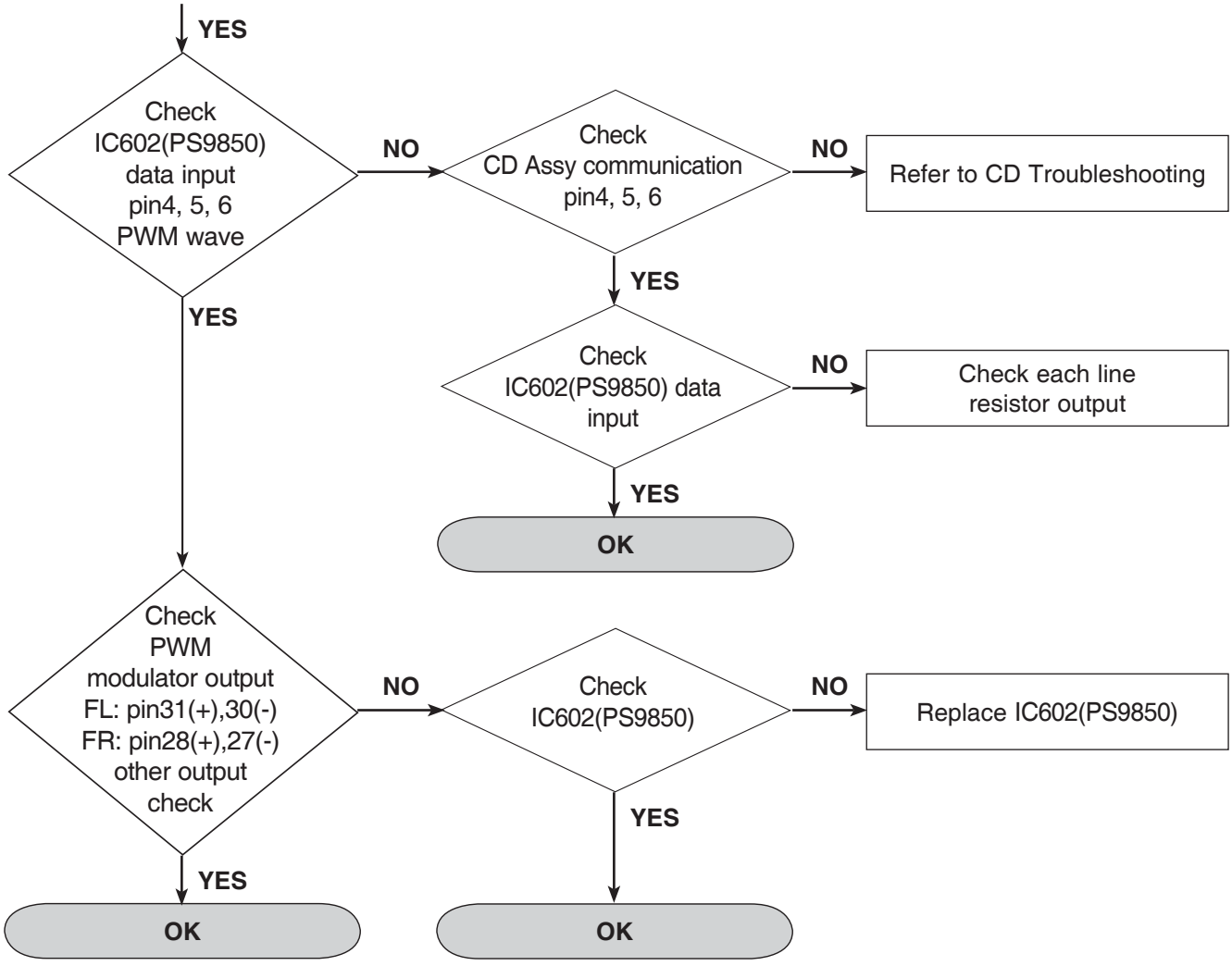


5. FLD DISPLAY CHECK

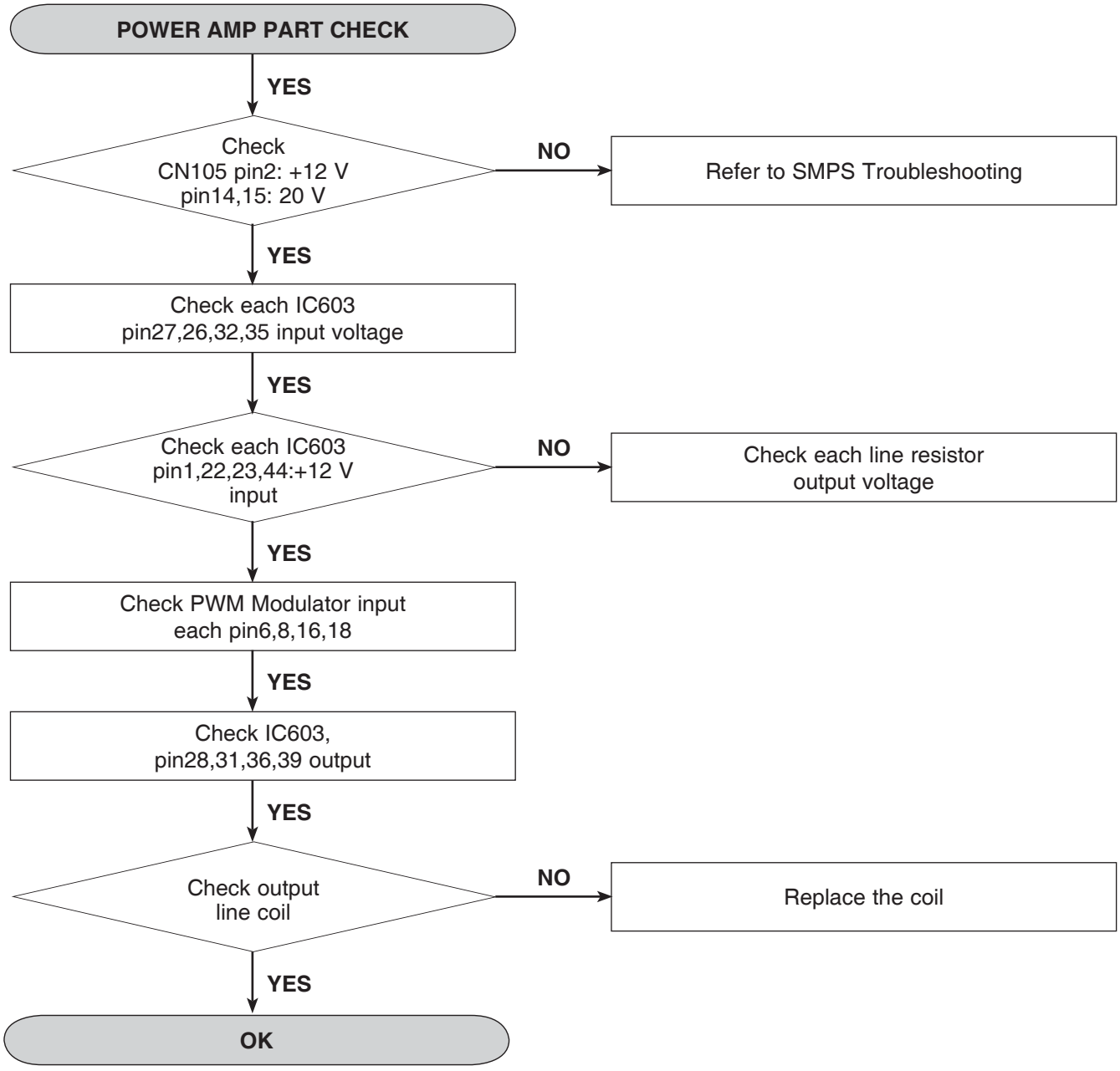


6. PWM MODULATION CHECK

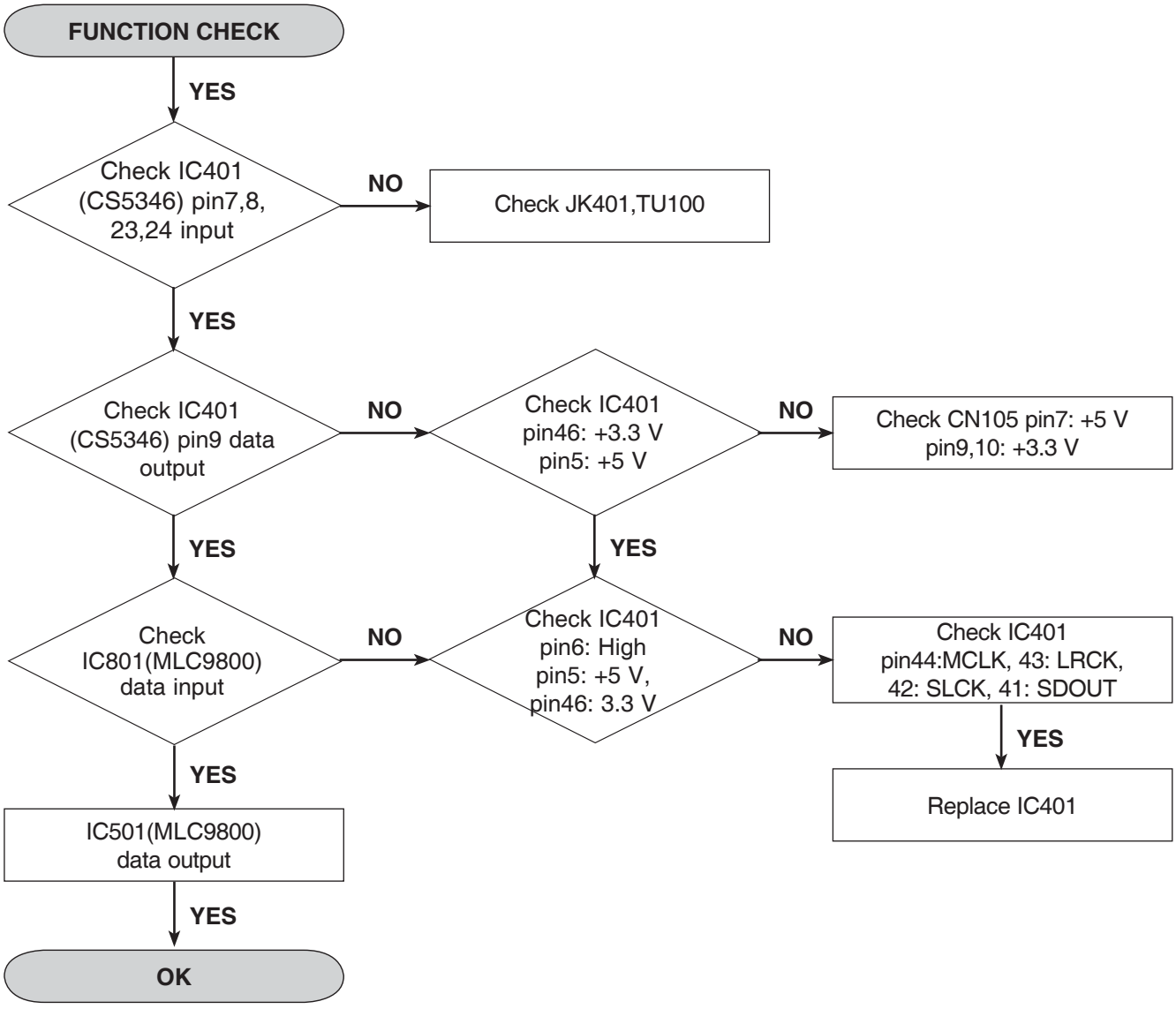




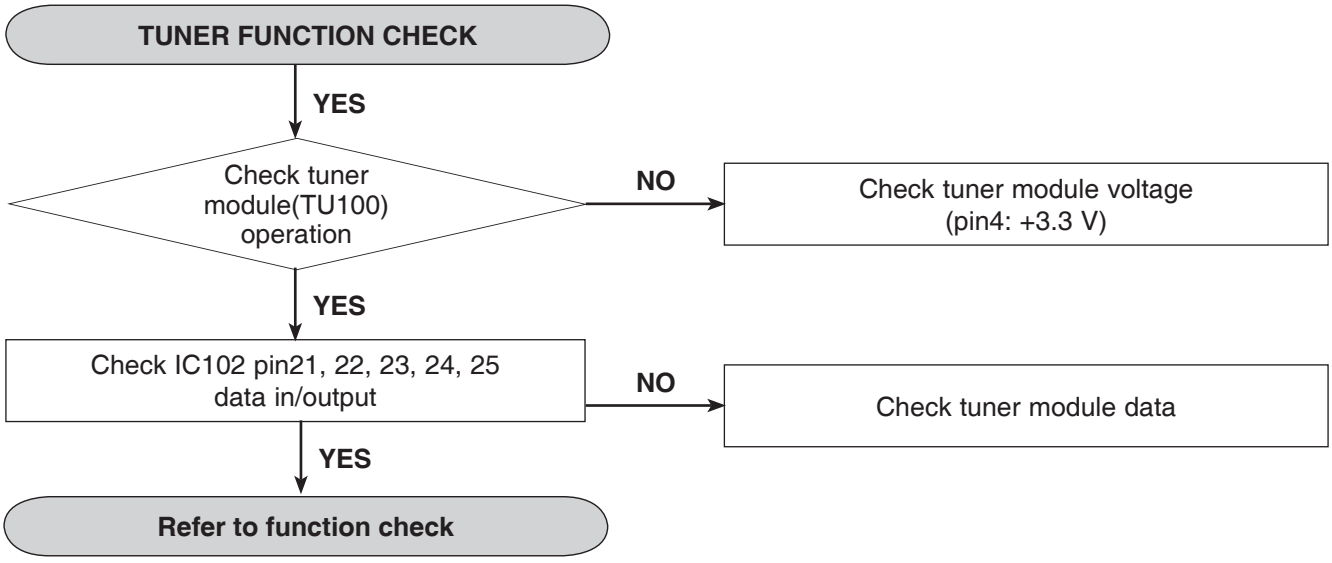
7. POWER AMP PART CHECK



8. TUNER/AUX FUNCTION CHECK

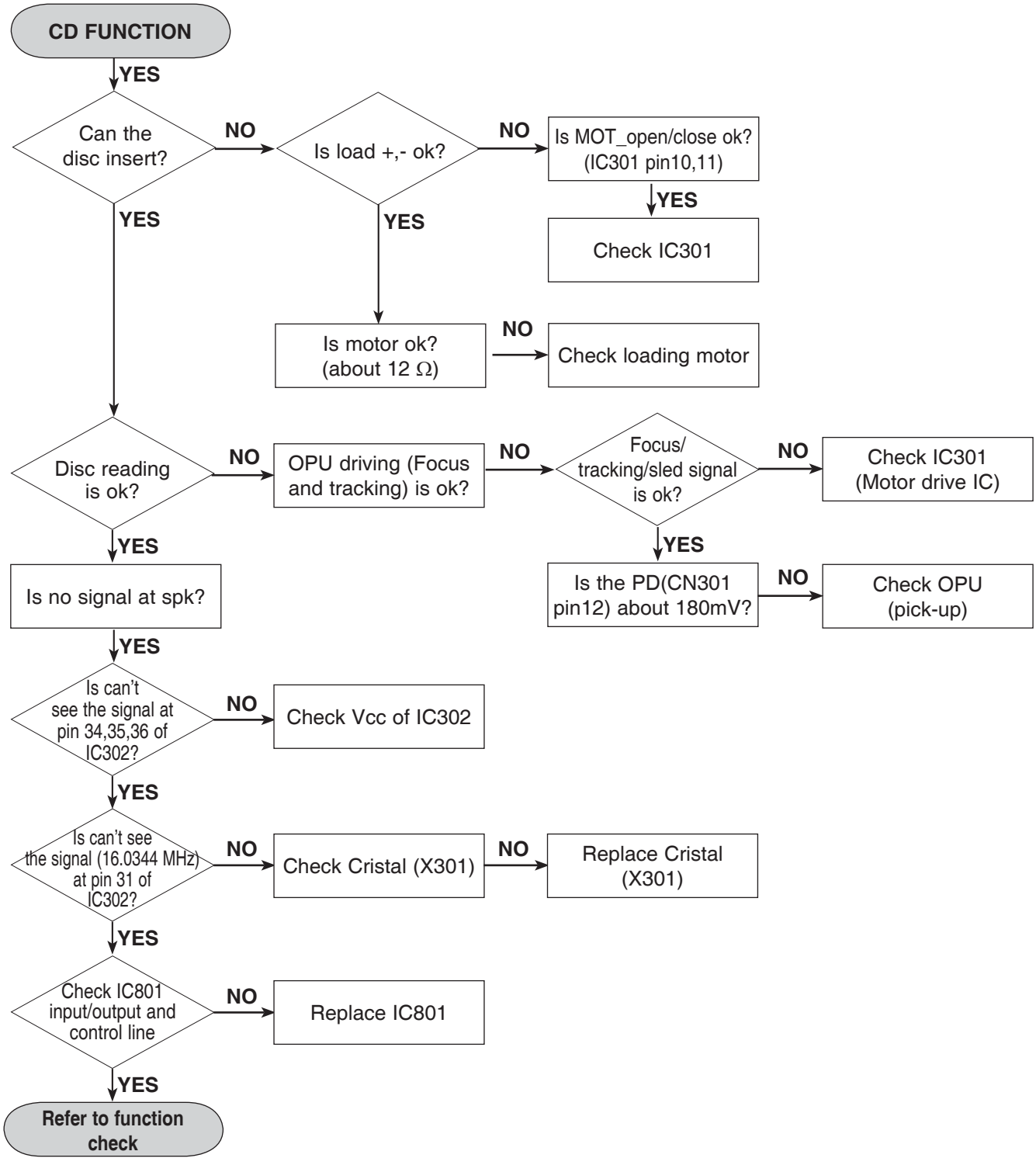


9. TUNER FUNCTION CHECK

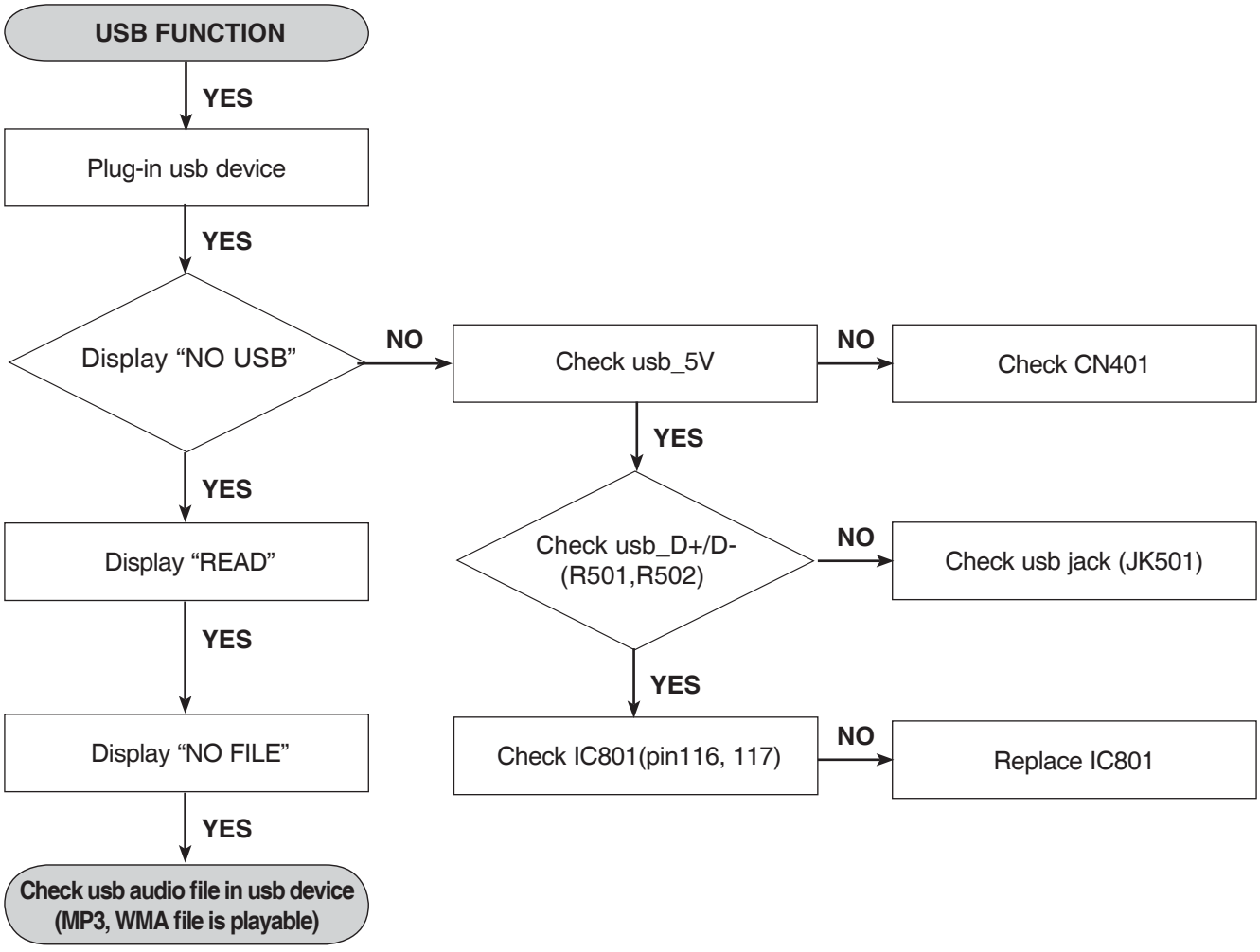


CDP TROUBLESHOOTIHG GUIDE

1. CD FUNCTION

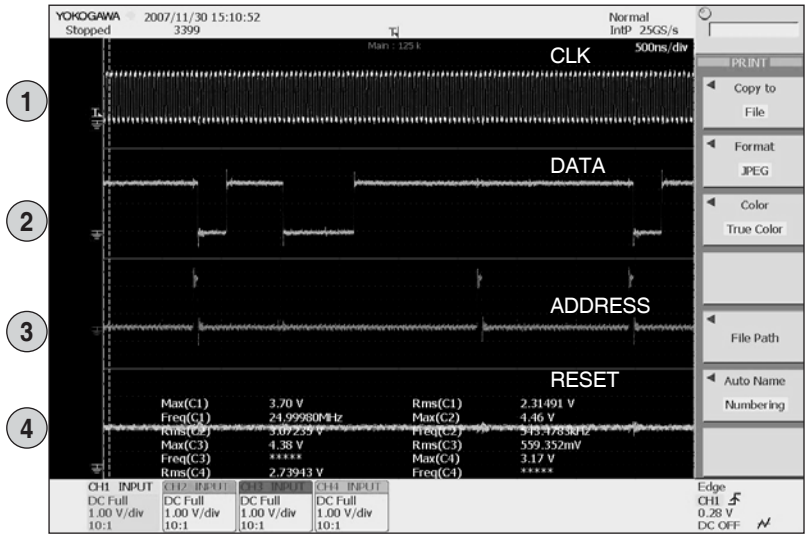


2. USB FUNCTION

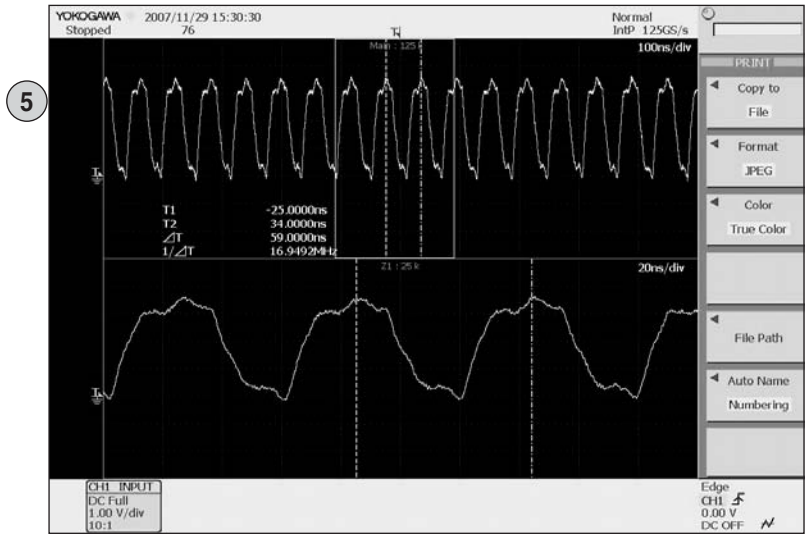


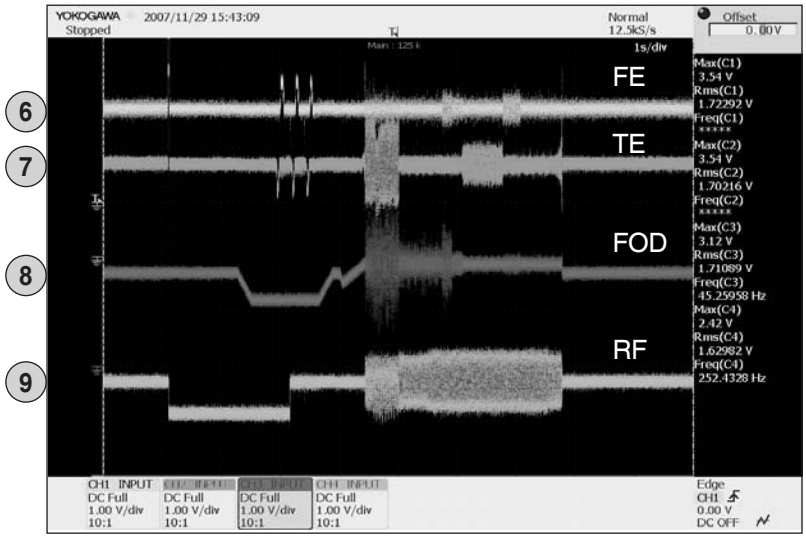
DETAILS AND WAVEFORMS ON SYSTEM TEST AND DEBUGGING

1. FLASH/SDRAM

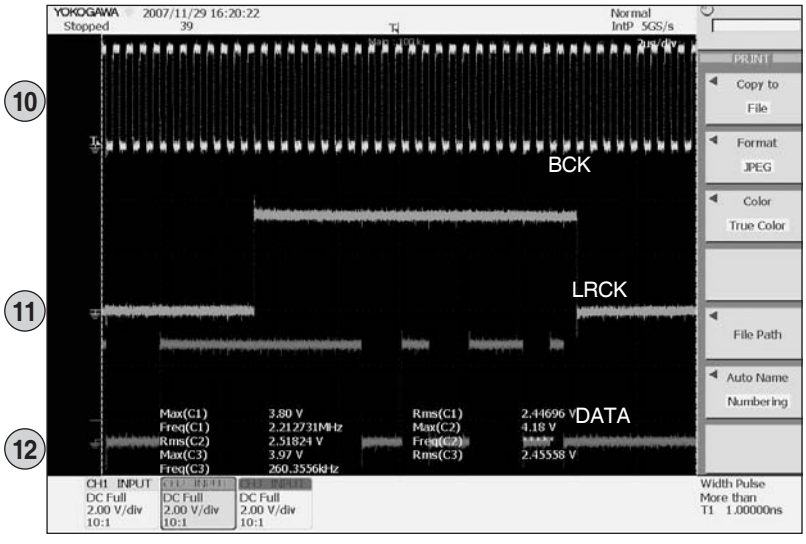


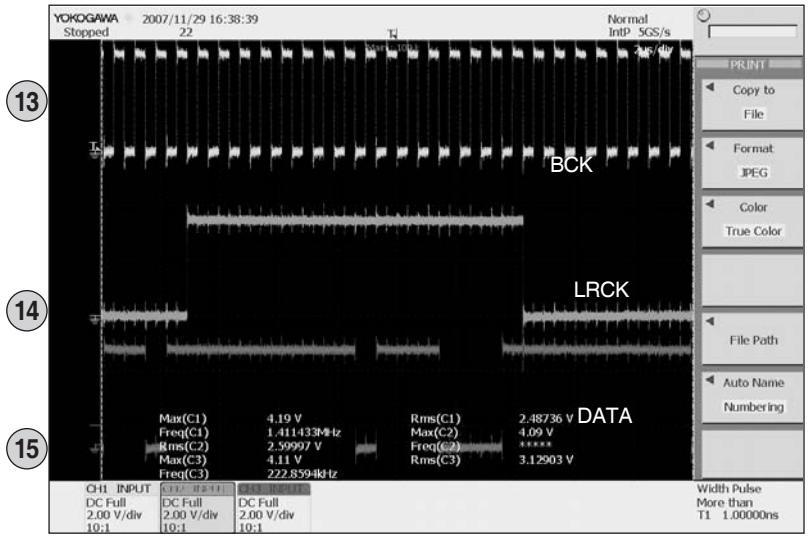
2. SERVO

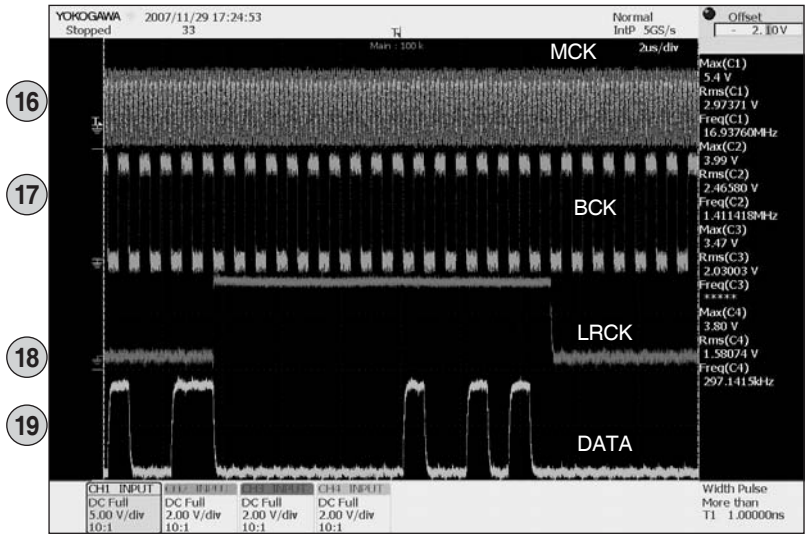


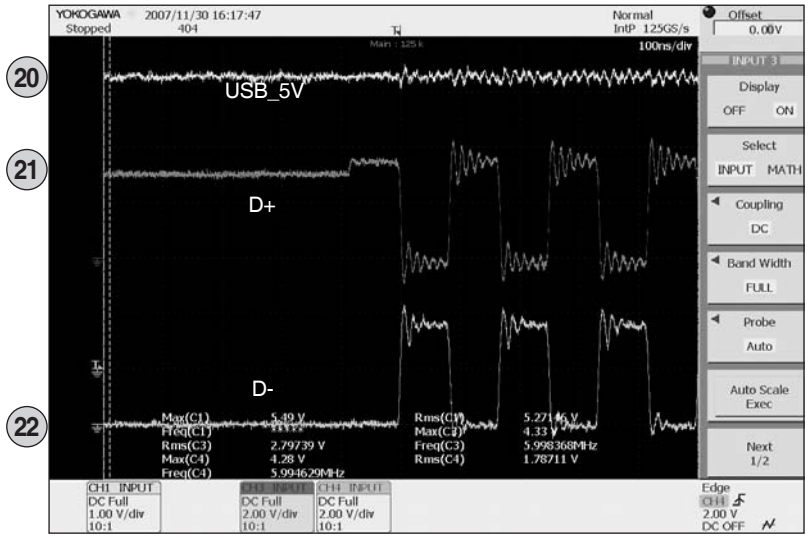


3. AUDIO PATH

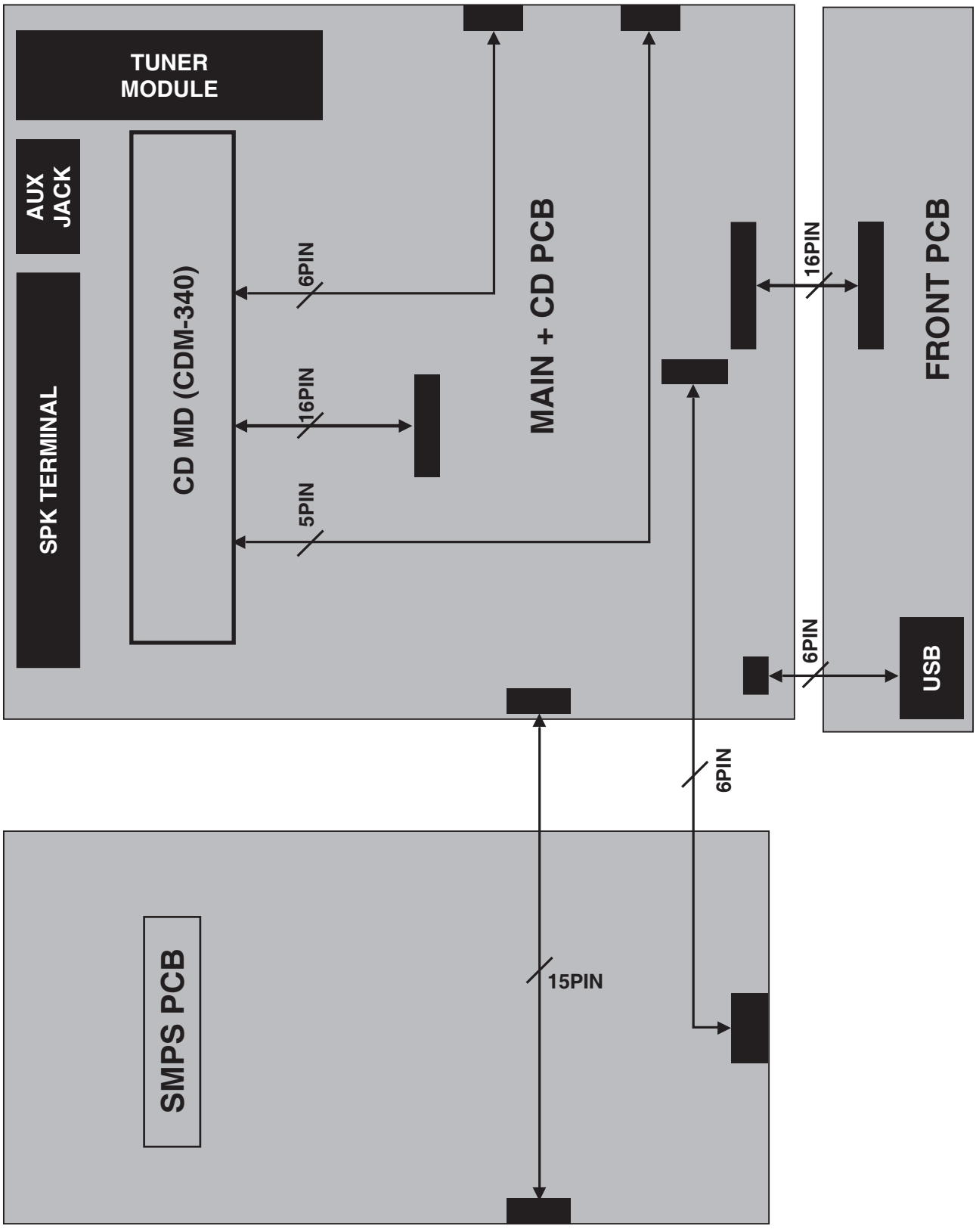






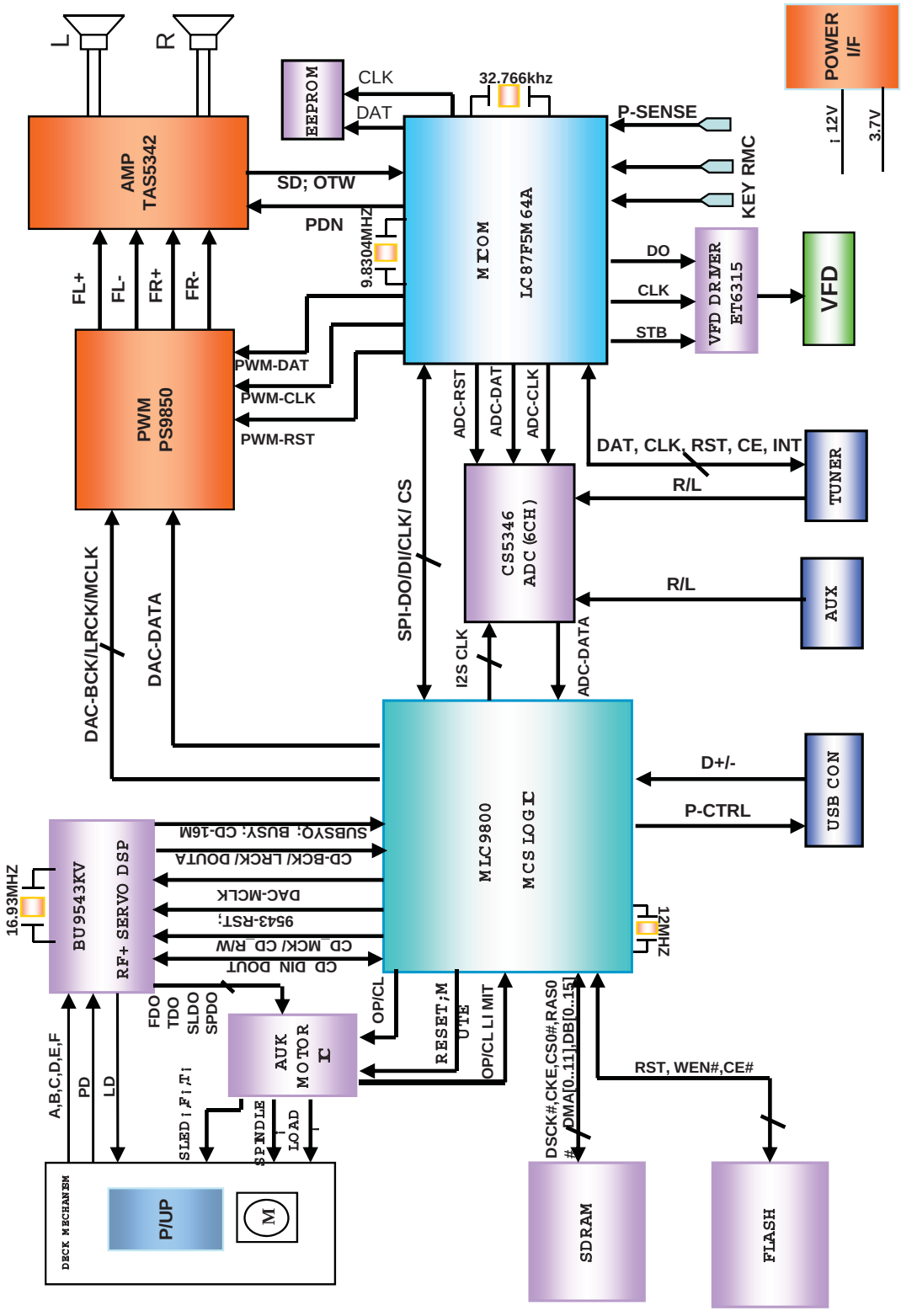


WIRING DIAGRAM

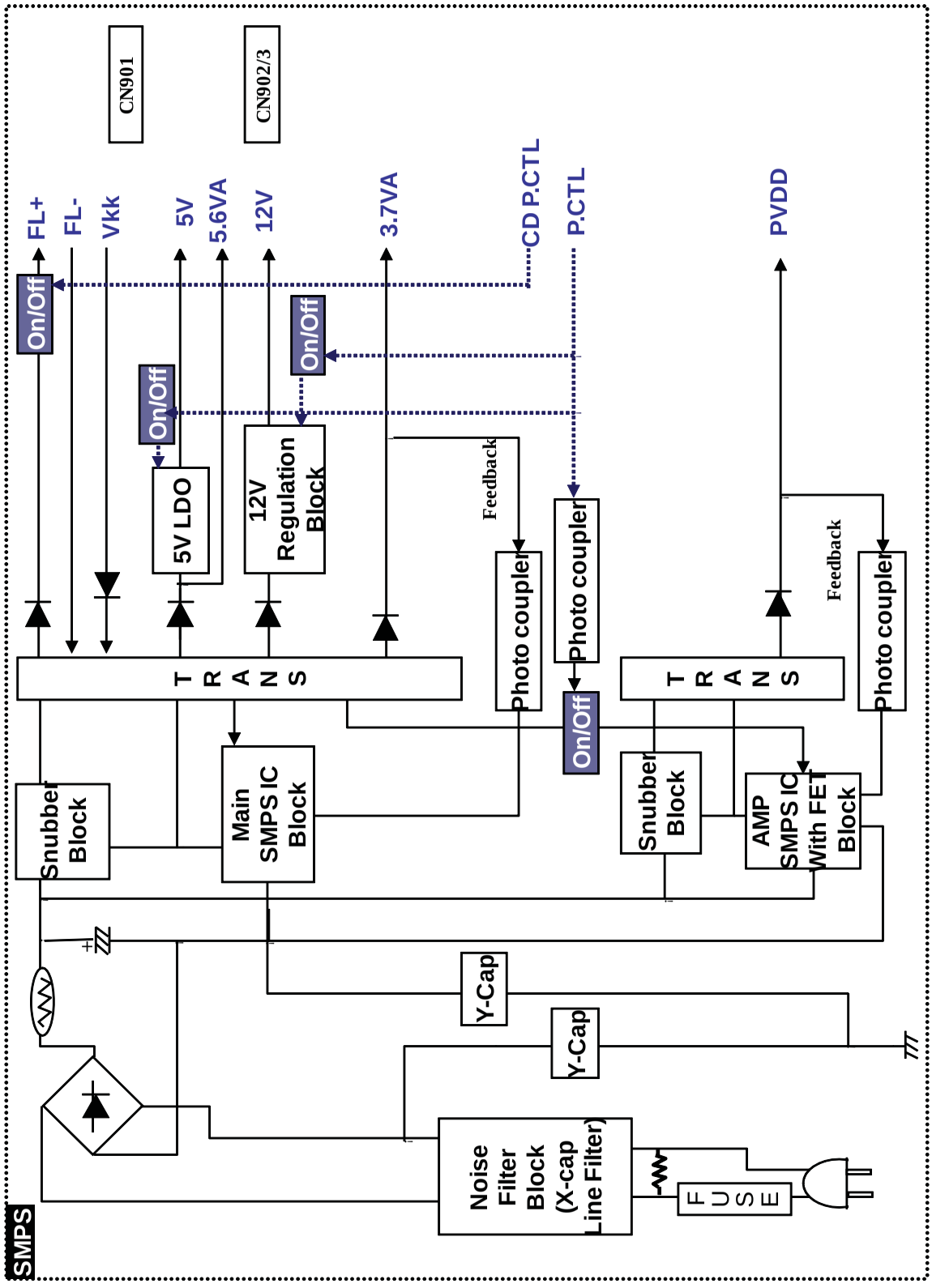


BLOCK DIAGRAMS

1. MAIN BLOCK DIAGRAM



2. SMPS BLOCK DIAGRAM



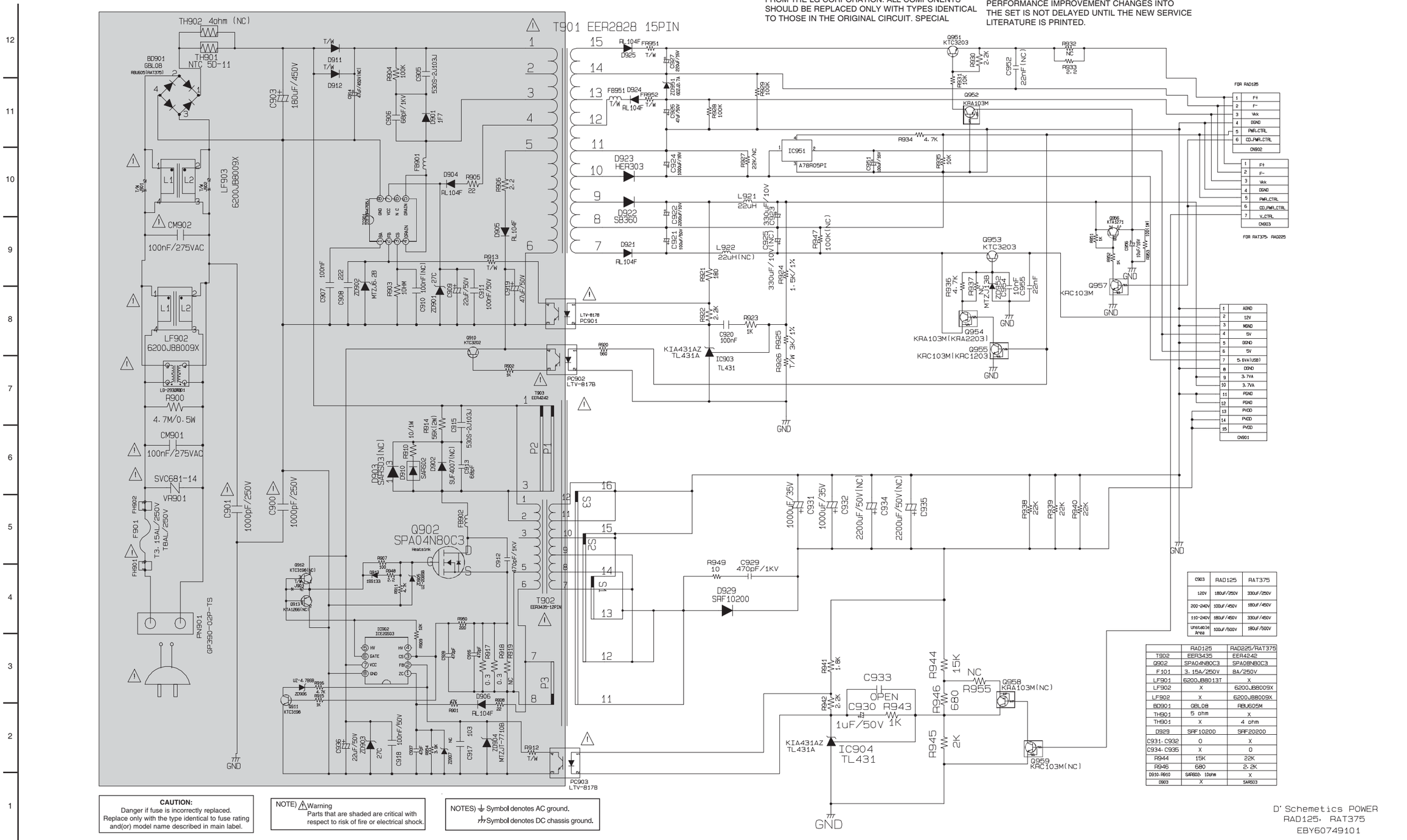
CIRCUIT DIAGRAMS

1. SMPS - POWER CIRCUIT DIAGRAM

IMPORTANT SAFETY NOTICE

WHEN SERVICING THIS CHASSIS, UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE LG CORPORATION. ALL COMPONENTS SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL CIRCUIT. SPECIAL COMPONENTS ARE SHADED ON THE SCHEMATIC FOR EASY IDENTIFICATION.
THIS CIRCUIT DIAGRAM MAY OCCASIONALLY DIFFER FROM THE ACTUAL CIRCUIT USED. THIS WAY, IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

NOTE :
1. Shaded(▨) parts are critical for safety. Replace only with specified part number.
2. Voltages are DC-measured with a digital voltmeter during Play mode.



C903	RAD125	RAT375
120V	180uF/250V	330uF/250V
200-240V	100uF/450V	180uF/450V
110-240V	180uF/450V	330uF/450V
Unstable Area	100uF/500V	180uF/500V

	RAD125	RAD225/RAT375
T902	EER3435	EER4242
Q902	SPA04N80C3	SPA08N80C3
F101	3.15A/250V	8A/250V
LF901	6200JB8013T	X
LF902	X	6200JB8009X
LF902	X	6200JB8009X
BD901	GBL08	RBU605M
TH901	5 ohm	X
TH901	X	4 ohm
D929	SRF10200	SRF20200
C931, C932	0	X
C934, C935	X	0
R944	15K	22K
R946	680	2.2K
D910, R910	SAR502, 10ohm	X
D903	X	SAR503

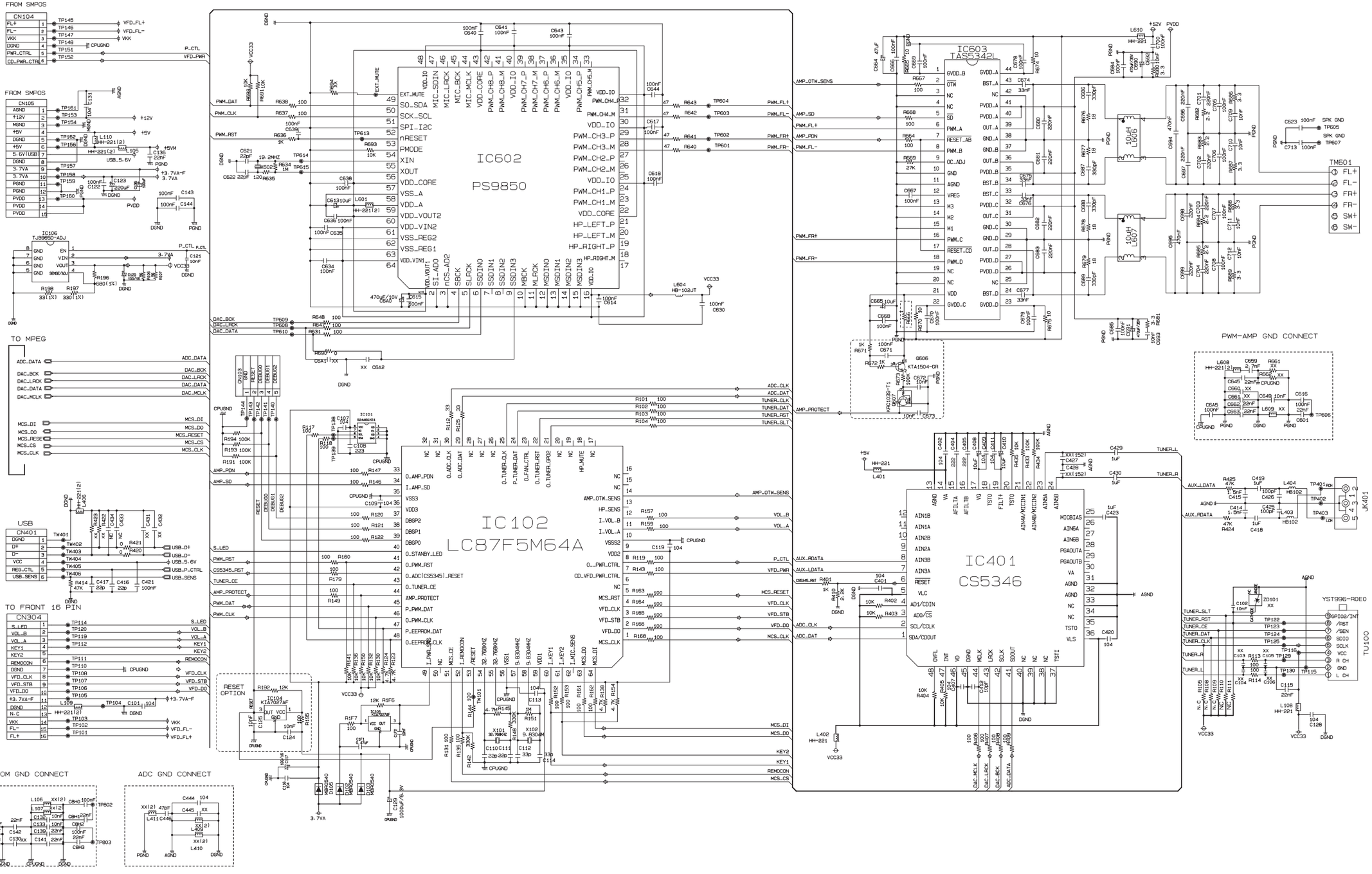
CAUTION:
Danger if fuse is incorrectly replaced.
Replace only with the type identical to fuse rating and(or) model name described in main label.

NOTE) ⚠Warning
Parts that are shaded are critical with respect to risk of fire or electrical shock.

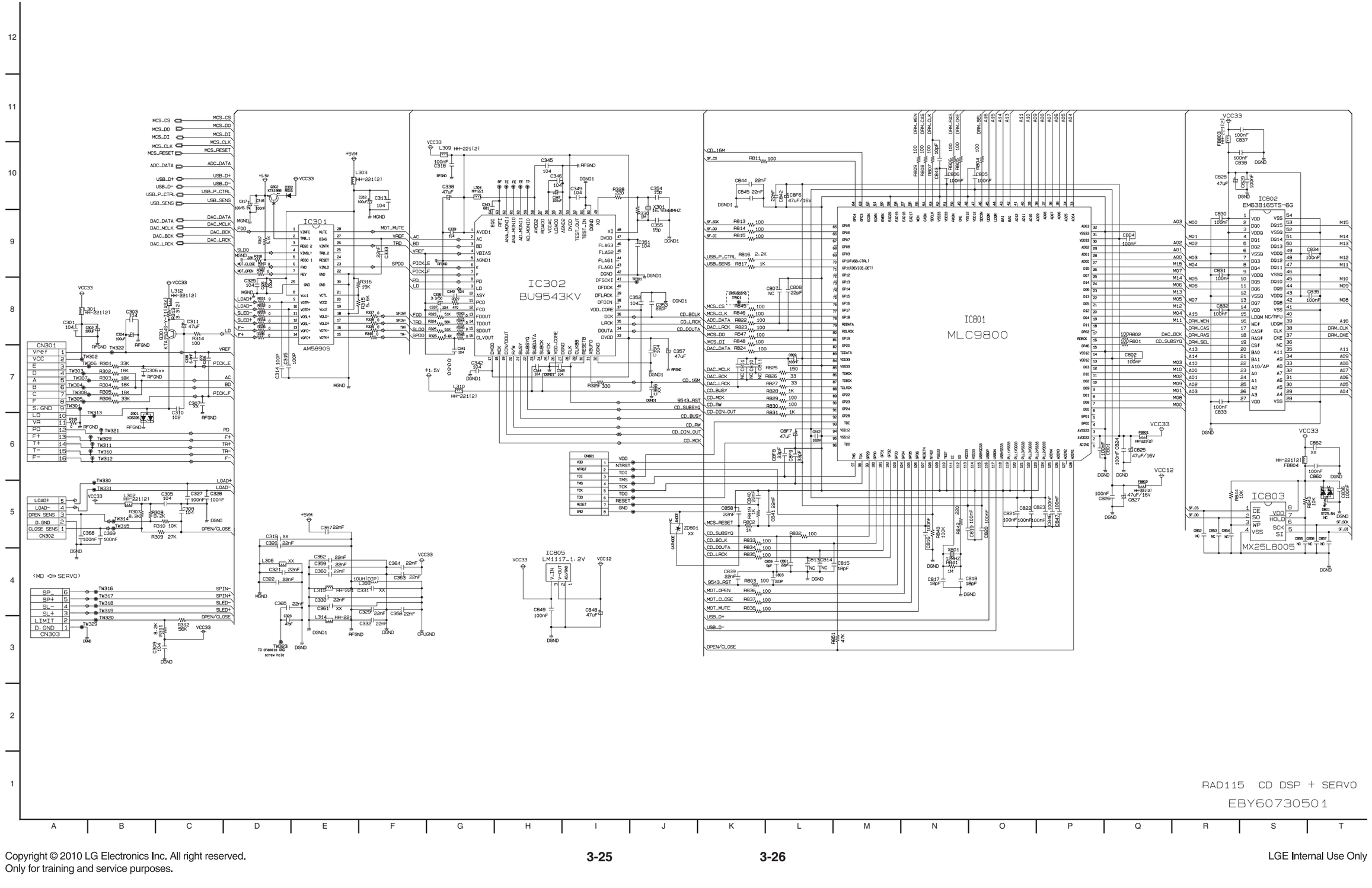
NOTES) ⏚ Symbol denotes AC ground.
⏚ Symbol denotes DC chassis ground.

D' Schemetics POWER
RAD125, RAT375
EBY60749101

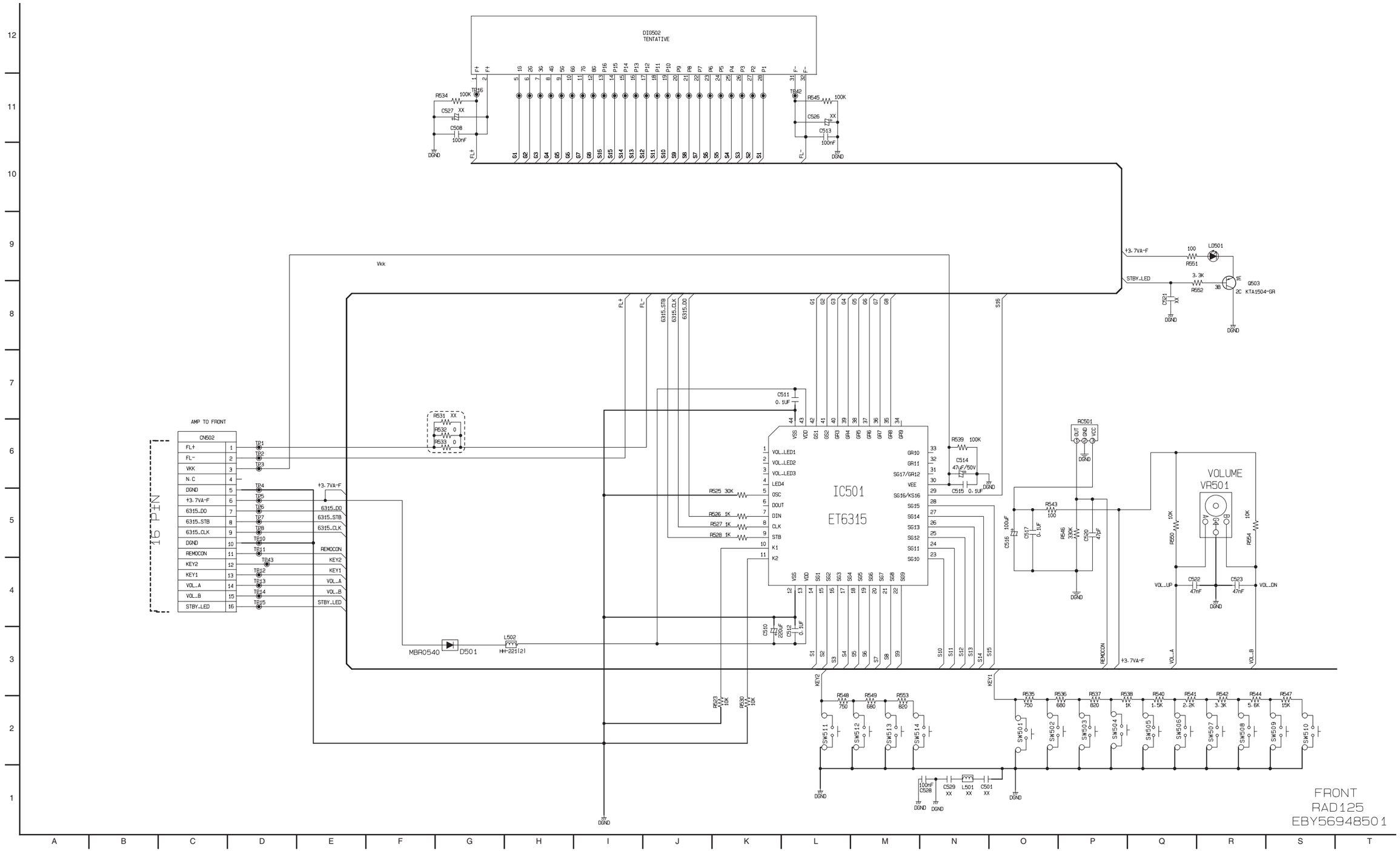
2. MAIN - MICOM CIRCUIT DIAGRAM



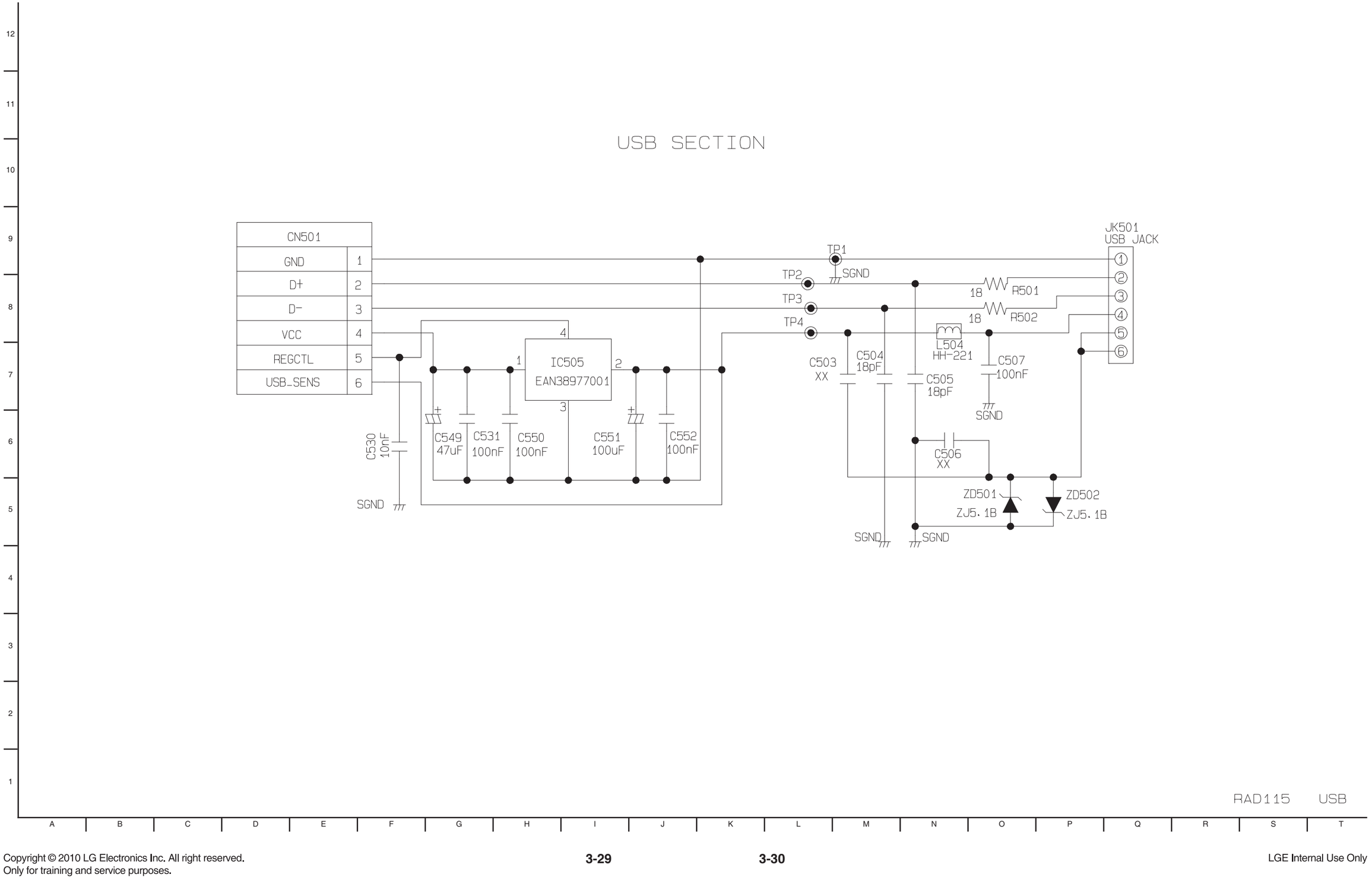
3. MAIN - CD DSP & SERVO CIRCUIT DIAGRAM



4. FRONT CIRCUIT DIAGRAM



5. USB CIRCUIT DIAGRAMS



CIRCUIT VOLTAGE CHART

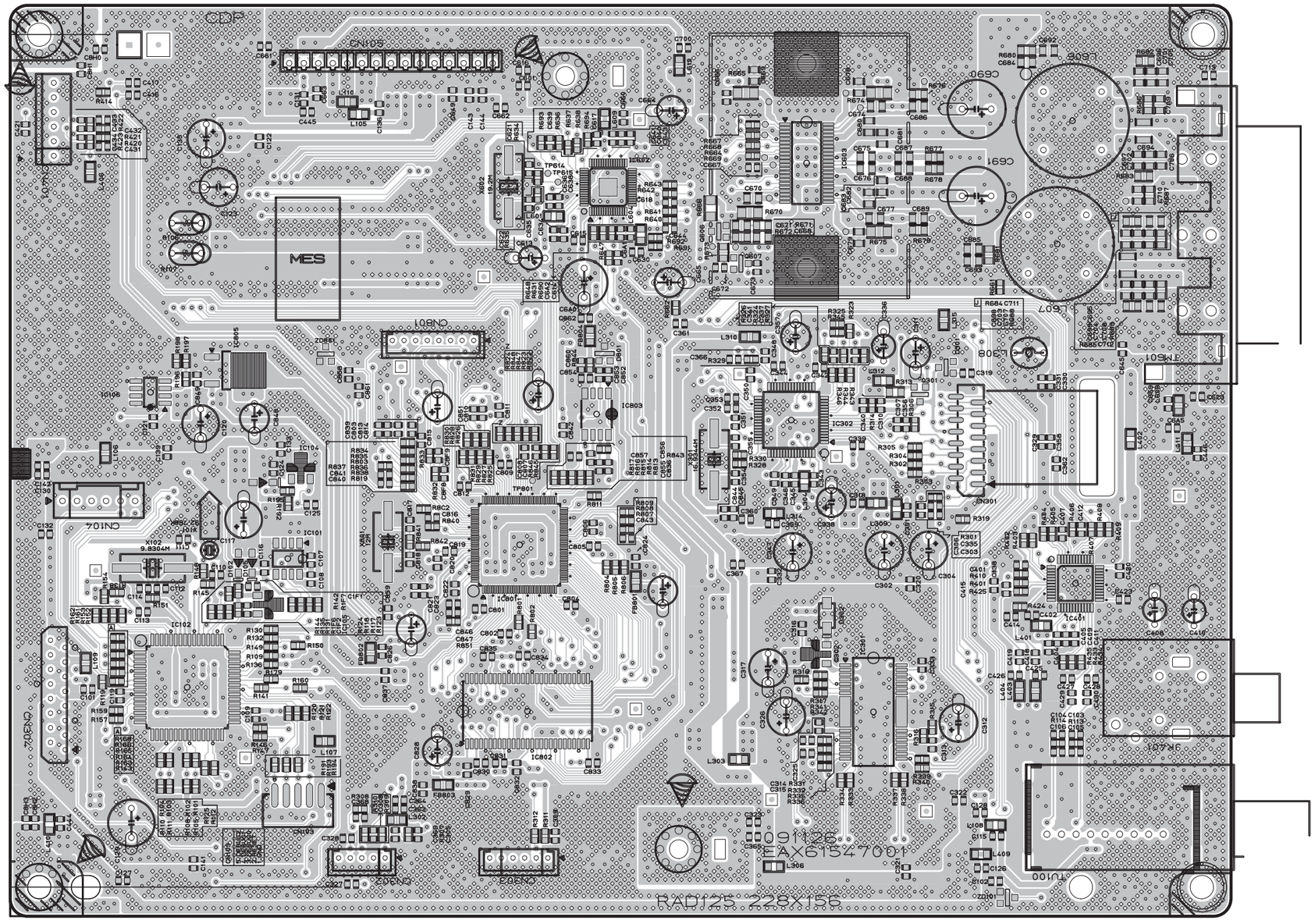
Pin No.	Spec.	EE Mode (V)	Margin	Playback Mode (V)	Margin
MAIN BOARD					
IC101 EEPROM (M24C16)					
8 (VCC)	1.8~5.5	3.38	2.12	3.38	2.12
IC102 MICOM (LC87F5M64A)					
9 (VDD2)	2.8~5.5	3.38	0.58	3.38	0.58
36 (VDD3)	2.8~5.5	3.38	0.58	3.38	0.58
59 (VDD1)	2.8~5.5	3.38	0.58	3.38	0.58
IC301 MOTOR IC					
8 (VCC1)	4.3~13.2	4.94	0.64	4.91	0.61
19 (VCC2)	4.3~Vcc1	4.94	0	4.91	0
IC302 SERVER (BU9543KV)					
1 (AVDD1)	2.7~3.6	3.34	0.26	3.25	0.35
17 (DVDD)	2.7~3.6	3.34	0.26	3.25	0.35
33 (DVDD)	2.7~3.6	3.34	0.26	3.25	0.35
26 (VDD_CORE)	1.35~1.65	1.56	0.09	1.56	0.09
37 (VDD_CORE)	1.35~1.65	1.56	0.09	1.56	0.09
47 (DVDD)	2.7~3.6	3.34	0.26	3.25	0.35
53 (DVDD2)	2.7~3.6	3.34	0.26	3.25	0.35
58 (AVDD2)	2.7~3.6	3.34	0.26	3.25	0.35
IC401 ADC (CS5346)					
5 (VLC)	3.13~5.25	4.93	0.32	4.93	0.32
14 (VA)	4.75~5.25	4.93	0.32	4.93	0.32
30 (VA)	4.75~5.25	4.93	0.32	4.93	0.32
36 (VLS)	3.13~5.25	3.26	0.13	3.25	0.12
46 (VD)	3.13~3.47	3.26	0.13	3.25	0.12
IC602 PWM (PS9850)					
16 (VDD_IO)	2.97~3.63	3.24	0.33	3.24	0.33
21 (VDD_CORE)	1.08~1.32	1.25	0.07	1.25	0.07
24 (VDD_IO)	2.97~3.63	3.24	0.33	3.24	0.33
29 (VDD_IO)	2.97~3.63	3.24	0.33	3.24	0.33
32 (VDD_IO)	2.97~3.63	3.24	0.33	3.24	0.33
35 (VDD_IO)	2.97~3.63	3.24	0.33	3.24	0.33
40 (VDD_IO)	2.97~3.63	3.24	0.33	3.24	0.33
43 (VDD_CORE)	1.08~1.32	1.25	0.07	1.25	0.07
48 (VDD_IO)	2.97~3.63	3.24	0.27	3.24	0.27
57 (VDD_CORE)	1.08~1.32	1.25	0.07	1.25	0.07
59 (VDDA)	1.08~1.32	1.25	0.07	1.25	0.07
61 (VDD_VIN2)	2.20~3.30	3.24	0.06	3.24	0.06
64 (VDD_VIN1)	2.20~3.30	3.24	0.06	3.24	0.06
IC603 AMP (TAS5342)					
1 (GVDD_B)	10.8~13.2	12.17	1.03	12.14	1.06
21 (VDD)	10.8~13.2	12.16	1.04	12.13	1.07
22 (GVDD_C)	10.8~13.2	12.17	1.03	12.14	1.06
23 (GVDD_D)	10.8~13.2	12.17	1.03	12.14	1.06
26 (PVDD_D)	0~34	21.9	12.1	21.9	12.1
27 (PVDD_D)	0~34	21.9	12.1	21.9	12.1
32 (PVDD_C)	0~34	21.9	12.1	21.9	12.1
35 (PVDD_B)	0~34	21.9	12.1	21.9	12.1
40 (PVDD_A)	0~34	21.9	12.1	21.9	12.1
41 (PVDD_A)	0~34	21.9	12.1	21.9	12.1
44 (GVDD_A)	10.8~13.2	12.17	1.03	12.14	1.06
IC801 (MLC9800)					
2 (AVDD33)	2.97~3.63	3.35	0.08	3.26	0.07
13 (VDD12)	1.08~1.32	1.19	0.11	1.18	0.1
30 (IOVDD33)	2.97~3.63	3.35	0.08	3.26	0.07
47 (VDD12)	1.08~1.32	1.19	0.11	1.18	0.1
51 (IOVDD33)	2.97~3.63	3.35	0.08	3.26	0.07
84 (IOVDD33)	2.97~3.63	3.35	0.08	3.26	0.07
94 (VDD12)	1.08~1.32	1.19	0.11	1.18	0.1
113 (IOVDD33)	2.97~3.63	3.35	0.08	3.26	0.07
115 (USBVDD33)	2.97~3.63	3.35	0.08	3.26	0.07
120 (PLL1VDD12)	1.08~1.32	1.19	0.11	1.18	0.1
122 (PLL3VDD12)	1.08~1.32	1.19	0.11	1.18	0.1

Pin No.	Spec.	EE Mode (V)	Margin	Playback Mode (V)	Margin
124 (PLL2VDD12)	1.08~1.32	1.19	0.11	1.18	0.1
IC802 SDRAM					
1 (VDD)	3.0~3.6	3.34	0.26	3.26	0.24
3 (VDDQ)	3.0~3.6	3.34	0.26	3.26	0.24
9 (VDDQ)	3.0~3.6	3.34	0.26	3.26	0.24
14 (VDD)	3.0~3.6	3.34	0.26	3.26	0.24
27 (VDD)	3.0~3.6	3.34	0.26	3.26	0.24
43 (VDDQ)	3.0~3.6	3.34	0.26	3.26	0.24
49 (VDDQ)	3.0~3.6	3.34	0.26	3.26	0.24
IC803 Flash					
8 (VDD)	2.7~3.6	3.26	0.34	3.25	0.35
FRONT BOARD					
IC501 VFD (ET16315)					
13 (VDD)	4.5~5.5	3.42	-1.08	3.42	-1.08
30 (VEE)	VDD-35	-24.8	6.78	-24.3	7.28
43 (VDD)	4.5~5.5	3.42	-1.08	3.42	-1.08

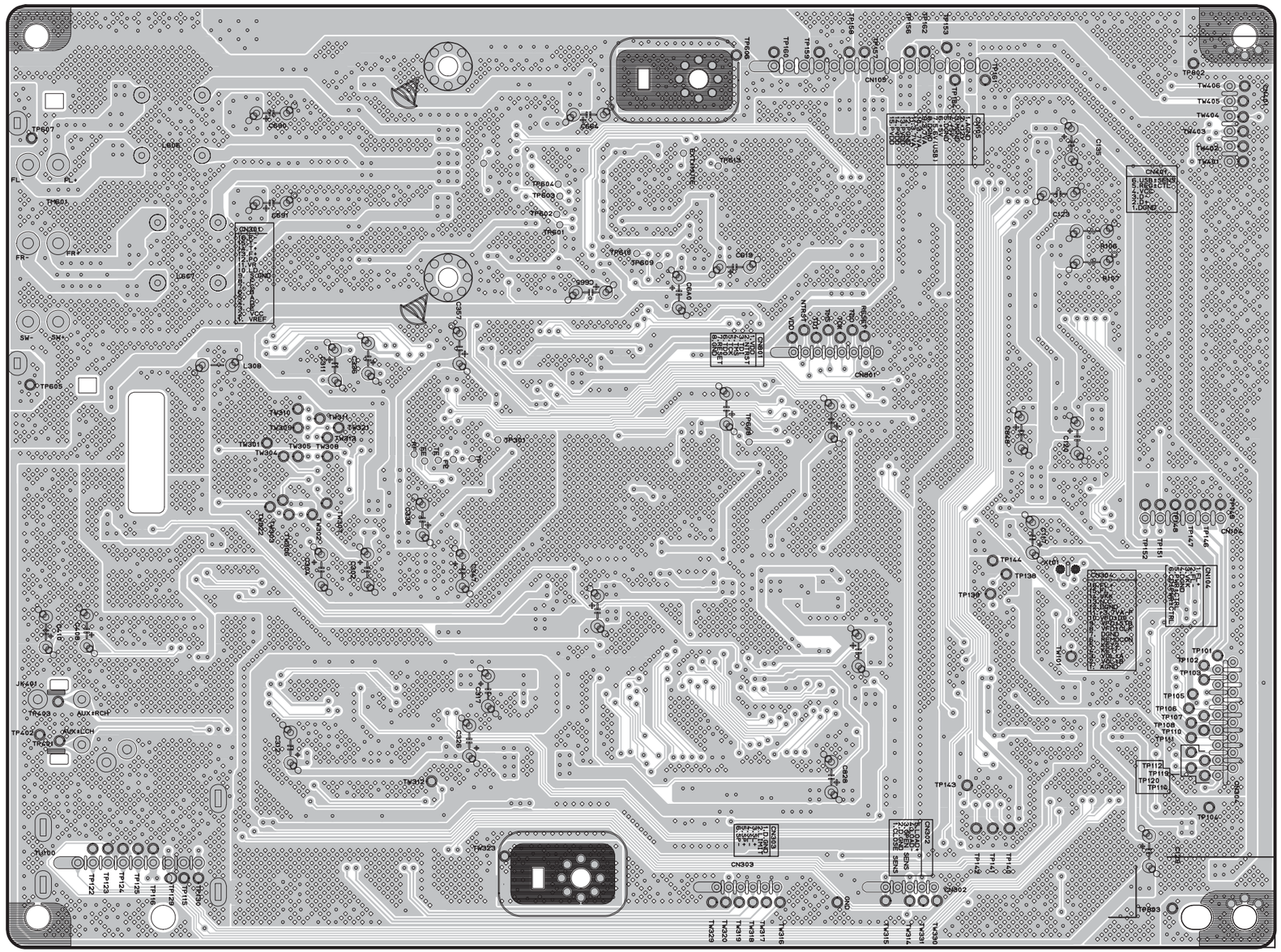
Loca No.	Value Capacitor (uF)	Voltage Spec.	EE Mode				Playback				Rec. Voltage			
			Positive (+)	Negative (-)	Gap	Margin	Positive (+)	Negative (-)	Gap	Margin	Positive (+)	Negative (-)	Gap	Margin
MAIN BOARD														
C118	1000uF	6.3V	3.39V	0V	3.39V	2.91V	3.38V	0V	3.38V	2.92V	3.39V	0V	3.39V	2.91V
C302	100uF	16V	3.26V	0.01V	3.25V	12.75V	3.25	0.03	3.22V	12.78V	3.26	0.03	3.23V	12.77V
C304	100uF	16V	1.63V	0.01V	1.62V	14.38V	1.64V	0.03V	1.61V	14.39V	1.64	0.03	1.61V	14.39V
C311	47uF	16V	3.26V	2.8V	0.46V	15.54V	3.1V	2.37V	0.73V	15.27V	3.1	2.37	0.73V	15.27V
C313	100nF	50V	4.95V	0V	4.95V	45.05V	4.92V	0V	4.92V	45.08V	4.92	0	4.92V	45.08V
C317	100uF	6.3V	1.55V	0V	1.55V	4.75V	1.56V	0V	1.56V	4.74V	1.57	0	1.57V	4.73V
C326	100uF	16V	4.95V	0V	4.95V	11.05V	4.92V	0V	4.92V	11.08V	4.92	0	4.92V	11.08V
C336	3.3uF	50V	1.63V	1.63V	0V	50V	1.65V	1.64V	0.01V	49.99V	1.65	1.64	0.01V	49.99V
C338	47uF	16V	3.26V	0.01V	3.25V	12.75V	3.25	0.03	3.22V	12.78V	3.25	0.03	3.22V	12.78V
C347	100uF	16V	1.63V	0.01V	1.62V	14.38V	1.64V	0.03V	1.61V	14.39V	1.64	0.03	1.61V	14.39V
C357	47uF	16V	3.26V	0.01V	3.25V	12.75V	3.25V	0.03V	3.22V	12.78V	3.25	0.03	3.22V	12.78V
C403	47uF	16V	4.95V	0V	4.95V	11.05V	4.95V	0V	4.95V	11.05V	4.95	0	4.95V	11.05V
C406	47uF	16V	3.26V	0V	3.26V	12.74V	3.26V	0V	3.26V	12.74V	3.26	0	3.26V	12.74V
C408	100uF	16V	0V	0V	0V	16V	0V	0V	0V	16V	0	0	0V	16V
C410	47uF	16V	3V	0V	3V	13V	3.82V	0V	3.82V	12.18V	3.65	0	3.65V	12.35V
C423	47uF	16V	1.41V	0V	1.41V	14.59V	1.41V	0V	1.41V	14.59V	1.41	0	1.41V	14.59V
C613	10uF	16V	1.25V	0V	1.25V	14.75V	1.24V	0V	1.24V	14.76V	1.24	0	1.24V	14.76V
C664	47uF	25V	12.19V	0V	12.19V	12.81V	12.15V	0V	12.15V	12.85V	12.16	0	12.16V	12.84V
C665	10uF	50V	12.18V	0V	12.18V	37.82V	12.14V	0V	12.14V	37.86V	12.14	0	12.14V	37.86V
C690	470uF	50V	21.9V	0V	21.9V	28.1V	21.9V	0V	21.9V	28.1V	21.9	0	21.9V	28.1V
C691	470uF	50V	21.9V	0V	21.9V	28.1V	21.9V	0V	21.9V	28.1V	21.9	0	21.9V	28.1V
C6A0	470uF	10V	1.25V	0V	1.25V	8.75V	1.24V	0V	1.24V	8.76V	1.24	0	1.24V	8.76V
C6A1	100pF	50V	3.26V	0V	3.26V	46.74V	3.25V	0V	3.25V	46.75V	3.25	0	3.25V	46.75V
C6A4	1000uF	6.3V	3.26V	0V	3.26V	3.04V	3.26V	0V	3.26V	3.04V	3.26	0	3.26V	3.04V
C825	47uF	16V	3.26V	0V	3.26V	12.74V	3.26V	0V	3.26V	12.74V	3.26	0	3.26V	12.74V
C827	47uF	16V	1.18V	0V	1.18V	14.82V	1.18V	0V	1.18V	14.82V	1.18V	0V	1.18V	14.82V
C828	47uF	16V	3.26V	0V	3.26V	12.74V	3.26V	0V	3.26V	12.74V	3.26V	0V	3.26V	12.74V
C848	47uF	16V	1.18V	0V	1.18V	14.82V	1.18V	0V	1.18V	14.82V	1.18V	0V	1.18V	14.82V
C849	100nF	50V	3.27V	0V	3.27V	46.73V	3.26V	0V	3.26V	46.74V	3.26V	0V	3.26V	46.74V
C8F6	47uF	16V	3.26V	0V	3.26V	12.74V	3.26V	0V	3.26V	12.74V	3.26	0	3.26V	12.74V
C8F7	47uF	16V	1.18V	0V	1.18V	14.82V	1.18V	0V	1.18V	14.82V	1.18	0	1.18V	14.82V
FRONT BOARD														
C510	47uF	16V	3.4V	0V	3.4V	12.6V	3.4V	0V	3.4V	12.6V	3.4V	0V	3.4V	12.6V
C514	47uF	35V	0V	-25.7V	25.7V	9.3V	0V	-24.9V	24.9V	10.1V	0V	-24.2V	24.2V	10.8V
C516	100uF	16V	3.6V	0V	3.6V	12.4V	3.6V	0V	3.6V	12.4V	3.6V	0V	3.6V	12.4V
C549	47uF	16V	6.1V	0V	6.1V	9.9V	5.8V	0V	5.8V	10.2V	5.7V	0V	5.7V	10.3V
C551	100uF	16V	5V	0V	5V	11V	5V	0V	5V	11V	5V	0V	5V	11V

PRINTED CIRCUIT BOARD DIARGAMS

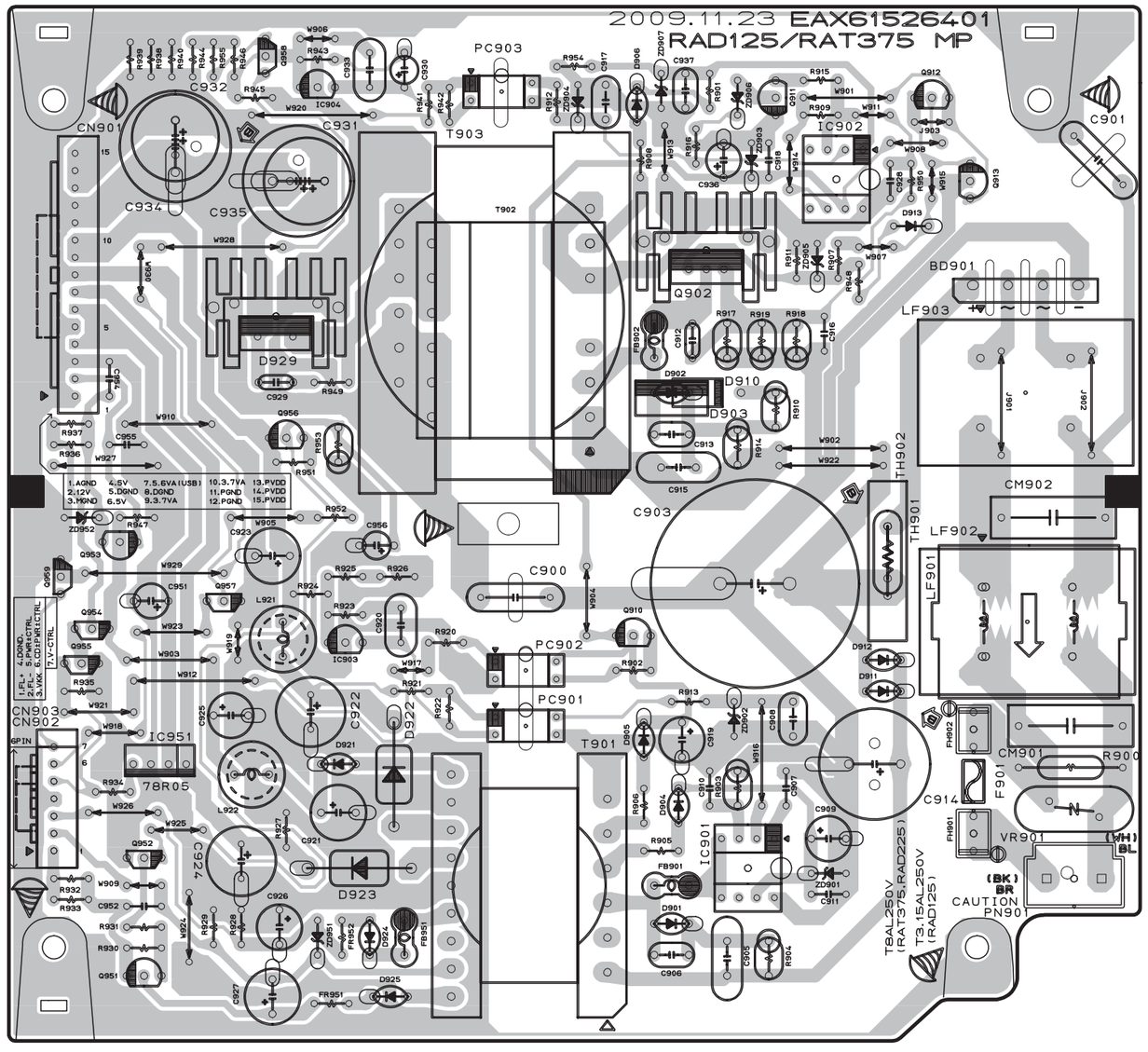
1. MAIN P.C. BOARD DIAGRAM (TOP VIEW)



MAIN P.C. BOARD DIAGRAM (BOTTOM VIEW)

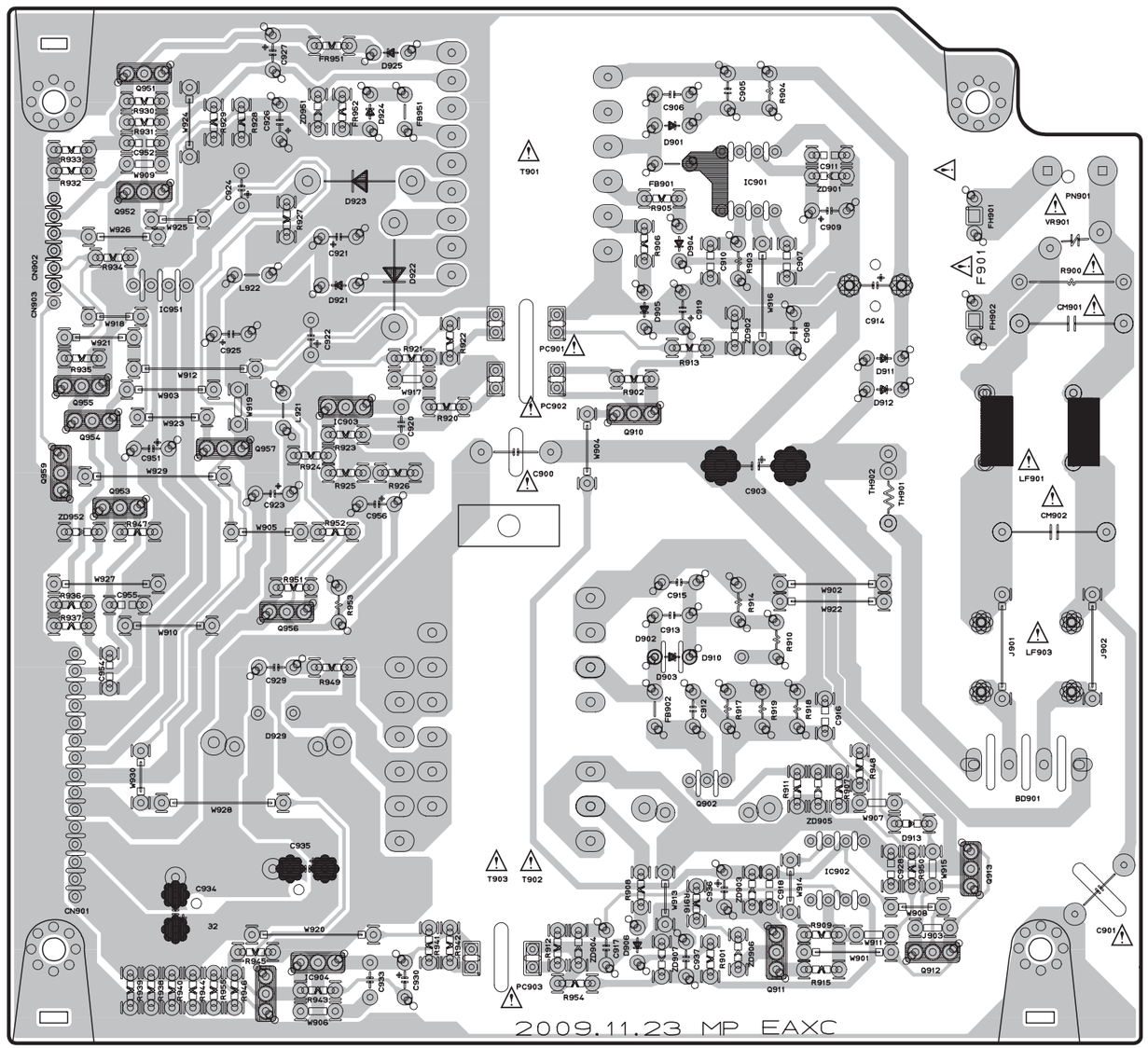


2. SMPS P.C. BOARD DIAGRAM (TOP VIEW)

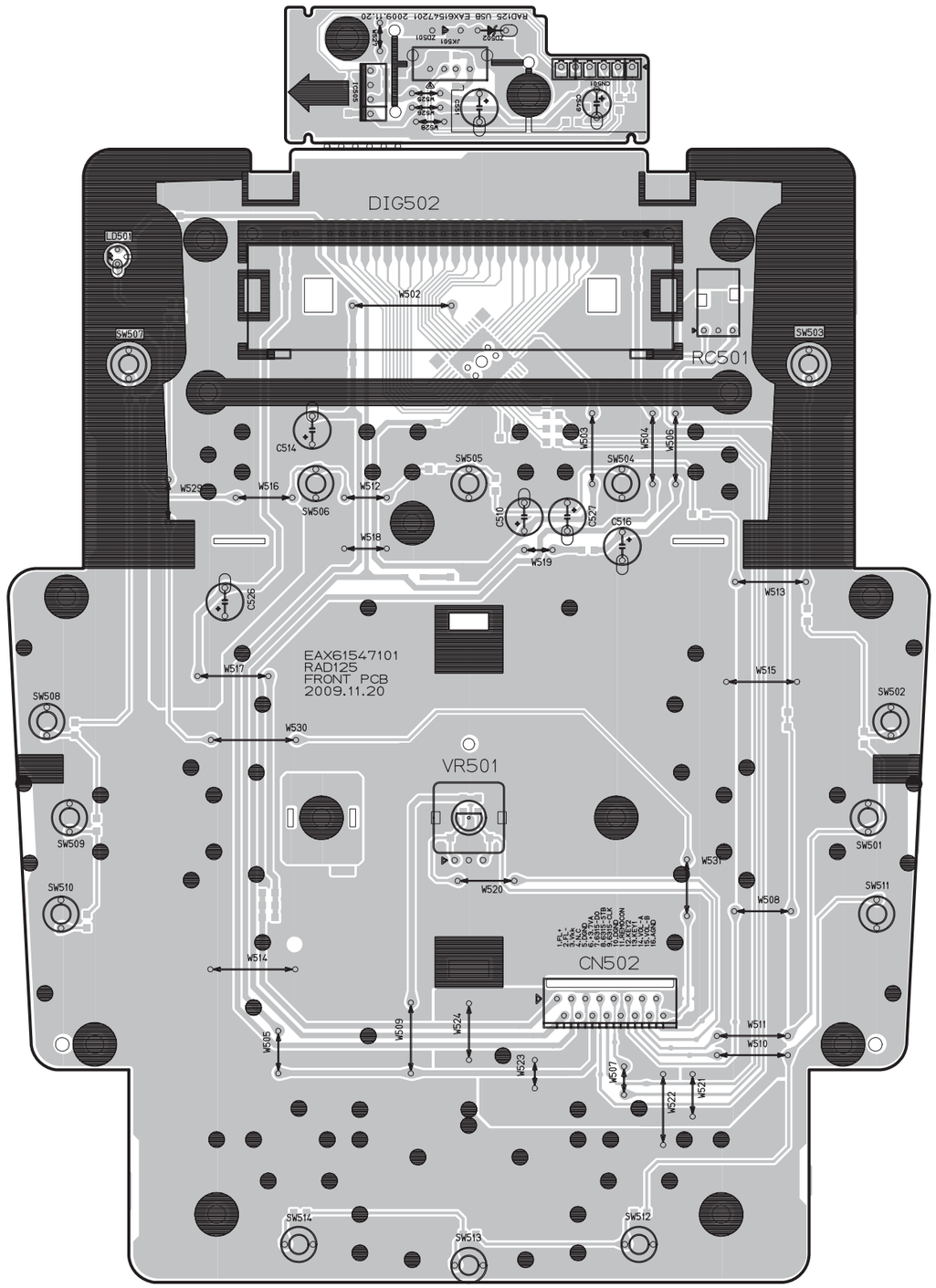


SMPS P.C. BOARD DIAGRAM (BOTTOM VIEW)

NOTE) ⚠ Warning
Parts that are shaded are critical with respect to risk of fire or electrical shock.



3. FRONT & USB P.C. BOARD DIAGRAM (TOP VIEW)



FRONT & USB P.C. BOARD DIAGRAM (BOTTOM VIEW)