

Service
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Service Manual

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Version 1.4



PHILIPS

SPECIFICATIONS

GENERAL:

Mains voltage : 127/240V -15%+10% Switchable for /98
 120V \pm 10% for /37
 230V \pm 10% for /05/12
 Mains frequency : 50/60Hz
 Clock accuracy : < 4 seconds per day
 Dimension centre unit : 194(W)x269(H)x90(D) (mm)

Power consumption

Active : 20W
 Standby : < 5.5W (DEMO mode)
 ECO Power Standby : < 0.5W for /05/12/37

TUNER:

FM

Tuning range : 87.5-108MHz
 Grid : 50kHz for /98/12/05
 100kHz for /98/55/37
 IF frequency : 10.7MHz \pm 20kHz
 Aerial input : 75 Ω coaxial /05/12/98
 300 Ω for /37
 Sensitivity at 26dB S/N : < 22 μ f
 Selectivity at 300kHz bandwidth : > 25dB
 Image rejection : > 25dB [> 75dB]
 IF rejection : > 60B [> 80dB]
 Distortion at RF=1mV, dev. 75kHz : < 3%
 -3dB Limiting point : < 23.5dBf
 Crosstalk at RF=1mV, dev. 40kHz : > 18dB

MW

Tuning range : 531-1602kHz for /05/12/55/98
 530-1700kHz for /37/98
 Grid : 9kHz for /05/12/55/98
 10kHz for /37/98
 IF frequency : 450kHz \pm 1kHz
 Aerial input : Frame aerial 18.1 μ H
 Sensitivity at 26dB S/N : < 4.4mV/M
 Selectivity at 300kHz bandwidth : > 18dB
 IF rejection : > 45dB
 Image rejection : > 28dB
 Distortion at RF=50mV, M=80% : < 5%

AMPLIFIER:

Output power

L & R : 2 x 5.0W (4 Ω , 1kHz, 10% THD)
 : 2 x 4.5W (4 Ω , 1kHz, 10% THD) /98
 : 2 x 4.5W (FTC Power, 4 Ω , 1kHz, 10% THD
 63Hz-12.5kHz) /37

Frequency response within -3dB : 50Hz-16kHz

Digital Sound Control (DSC) : Jazz / Rock / Pop / Classic

Dynamic Bass Boost (DBB) : ON / OFF

Input sensitivity

Aux in (at 1kHz) : 500mV at 600 Ω

USB : Host

Output sensitivity

Headphone output at 32 Ω : 10mW \pm 2dB (Max. vol.)

COMPACT DISC:

Frequency response within \pm 3dB : 125Hz - 16kHz

Output level (in Vrms) : 500mV, $Z_{out} = 100\Omega$

Signal/Noise ratio (unw.) : > 65dB

Signal/Noise ratio (A-weighted): > 76dB

Distortion at 1kHz : < 0.02%

Channel unbalance (-40dB) : < \pm 2dB

Channel separation at 1kHz : > 30dB

Emphasis : 15/50 μ S (switched

automatically by CD10)

THD Noise(1kHz,500mW) : < 1.0%

Volume attenuation(1kHz) : > 60dB

MP3 CD WMA:

MP3 : MPEG 1 (ISO/IEC 11172-3)
 Layer3

MP3-CD Bit Rate : 8-320 kbps

WMA-CD Bit Rate : 64-192 kbps

Sampling Rate : 8, 11.025, 12, 16, 22.05,
 24, 32, 44.1, 48 kHz

Format : ISO9660, Joliet,UDF

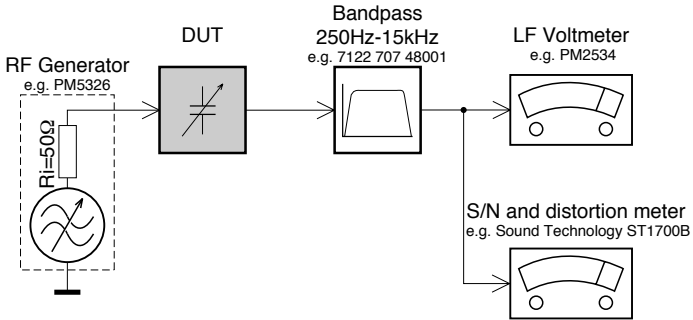
ID3 : V1 tag/V2 2.0/V2 3.0

Language Support : English

[...] Values indicated are for /05/12 only.

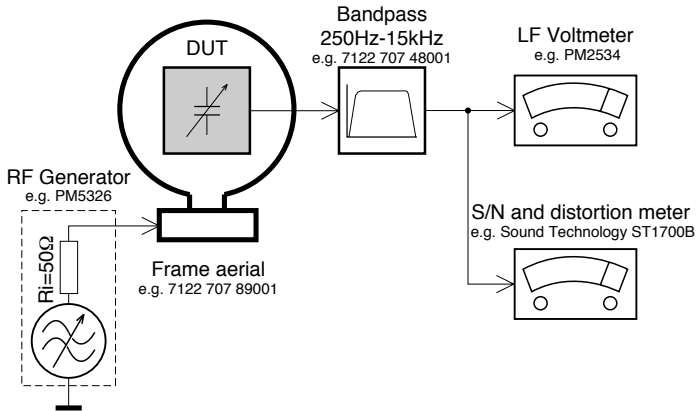
MEASUREMENT SETUP

Tuner FM



Use a bandpass filter to eliminate hum (50Hz, 100Hz) and disturbance from the pilotone (19kHz, 38kHz).

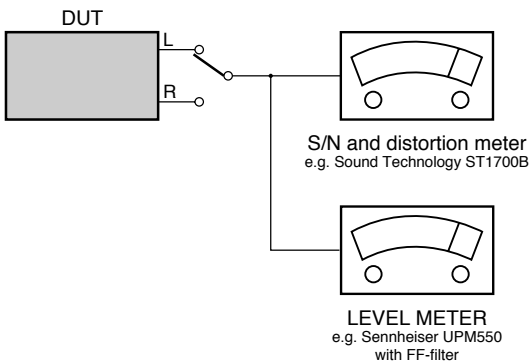
Tuner AM (MW,LW)



To avoid atmospheric interference all AM-measurements have to be carried out in a Faraday's cage.
Use a bandpass filter (or at least a high pass filter with 250Hz) to eliminate hum (50Hz, 100Hz).

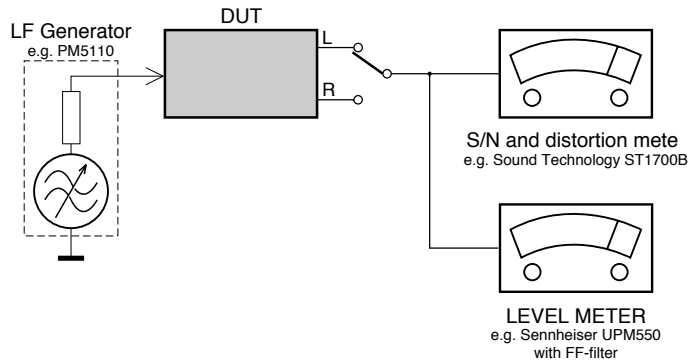
CD

Use Audio Signal Disc SBC429 4822 397 30184
(replaces test disc 3)



Recorder

Use Universal Test Cassette **CrO2** SBC419 4822 397 30069
or Universal Test Cassette **Fe** SBC420 4822 397 30071



SERVICE AIDS

Service Tools:

Universal Torx driver holder	4822 395 91019
Torx bit T10 150mm	4822 395 50456
Torx driver set T6-T20	4822 395 50145
Torx driver T10 extended	4822 395 50423

Compact Disc:

SBC426/426A Test disc 5 + 5A	4822 397 30096
SBC442 Audio Burn-in test disc 1kHz	4822 397 30155
SBC429 Audio Signals disc	4822 397 30184
Dolby Pro-logic Test Disc	4822 395 10216




WARNING

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools also at this potential.

ESD



Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified, be used

Safety components are marked by the symbol .

**CLASS 1
LASER PRODUCT**

INFORMATION ABOUT LEAD-FREE SOLDERING

Philips CE is producing lead-free sets from 1.1.2005 onwards.

IDENTIFICATION:

Regardless of special logo (not always indicated) one must treat all sets from 1 Jan 2005 onwards, according next rules:



- On our website www.atyourservice.ce.Philips.com you find more information to:
 - * BGA-de-/soldering (+ baking instructions)
 - * Heating-profiles of BGAs and other ICs used in Philips-sets
 - * Lead free

You will find this and more technical information within the "magazine", chapter "workshop news".

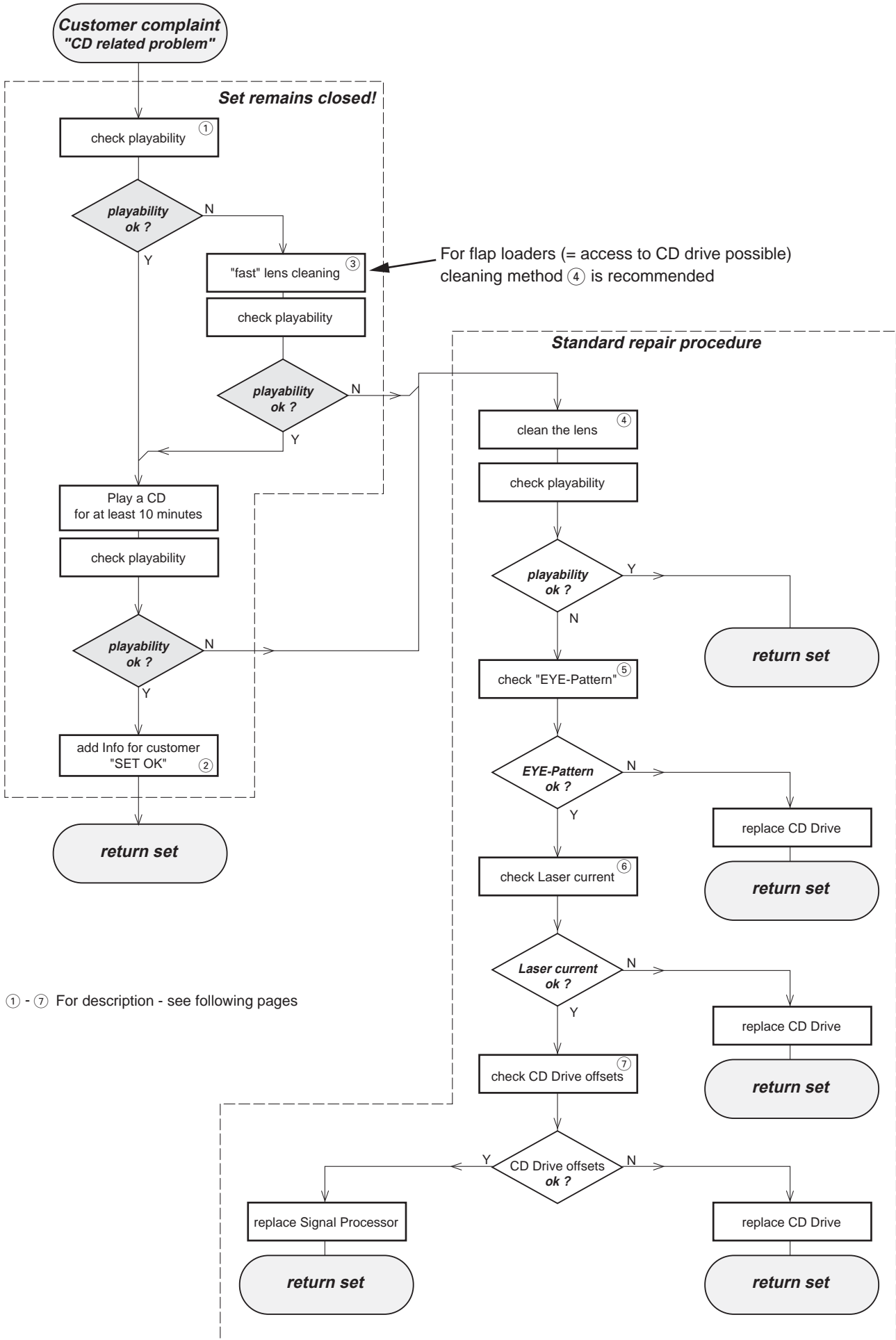
For additional questions please contact your local repair-helpdesk.

SERVICE INSTRUCTION

Safety regulations require that after a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the AC Power lead for external damage.
- Check the strain relief of the AC Power cord for proper function.
- Check the electrical DC resistance between the AC Power Plug and the secondary side (only for sets which have a AC Power isolated power supply):
 1. Unplug the AC Power cord and connect a wire between the two pins of the AC Power plug.
 2. Set the AC Power switch to the "on" position (keep the AC Power cord unplugged!).
 3. Measure the resistance value between the pins of the AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be larger than 4.5 Mohm (For U.S. it should be between 4.2 Mohm and 12 Mohm).
 4. Switch "off" the set, and remove the wire between the two pins of the AC Power plug.
- Check the cabinet for defects, to avoid touching of any inner parts by the customer.

CD PLAYABILITY CHECK



① - ⑦ For description - see following pages

CD PLAYABILITY CHECK

①

PLAYABILITY CHECK

For sets which are compatible with **CD-RW** discs
 use CD-RW Printed Audio Disc.....7104 099 96611
 TR 3 (Fingerprint)
 TR 8 (600µ Black dot) **maximum at 01:00**

- playback of these two tracks without audible disturbance
 playing time for: Fingerprint ≥10seconds
 Black dot from 00:50 to 01:10
- jump forward/backward (search) within a reasonable time

For all other sets
 use CD-DA SBC 444A.....4822 397 30245
 TR 14 (600µ Black dot) **maximum at 01:15**
 TR 19 (Fingerprint)
 TR 10 (1000µ wedge)

- playback of all these tracks without audible disturbance
 playing time for: 1000µ wedge ≥10seconds
 Fingerprint ≥10seconds
 Black dot from 01:05 to 01:25
- jump forward/backward (search) within a reasonable time

②

CUSTOMER INFORMATION

It is proposed to add an addendum sheet to the set which informs the customer that the set has been checked carefully - but no fault was found. The problem was obviously caused by a scratched, dirty or copy-protected CD. In case problems remain, the customer is requested to contact the workshop directly. The lens cleaning (method ③) should be mentioned in the addendum sheet.

The final wording in national language as well as the printing is under responsibility of the Regional Service Organizations.

③

FAST LENS CLEANING (dry brush)

Use lens cleaning CD
 SBC AC300.....9082 100 00043

Insert the lens cleaning CD, press PLAY and follow the voice guide's instructions on the CD.

④

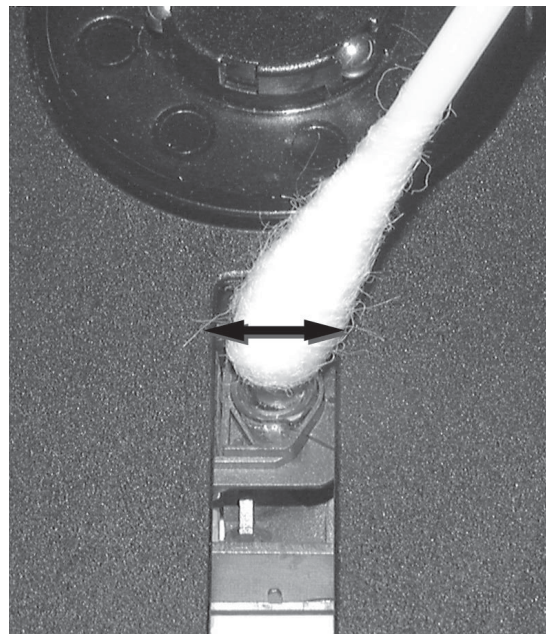
LIQUID LENS CLEANING

Before touching the lens it is advised to clean the surface of the lens by blowing clean air over it. This to avoid that little particles make scratches on the lens.

Because the material of the lens is synthetic and coated with a special anti-reflectivity layer, cleaning must be done with a non-aggressive cleaning fluid. It is advised to use "Cleaning Solvent B4-No2", available with codenumber 4822 389 10026.

The actuator is a very precise mechanical component and may not be damaged in order to guarantee its full function. Clean the lens gently (don't press too hard) with a soft and clean cotton bud moistened with the special lens cleaner.

The direction of cleaning must be in the way as indicated in the picture below.

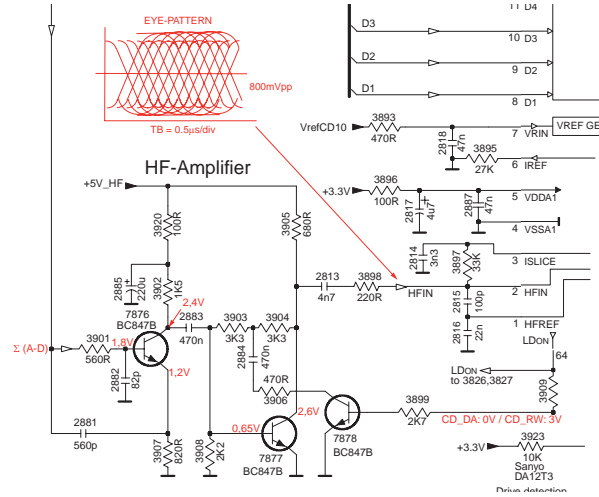


CD PLAYABILITY CHECK

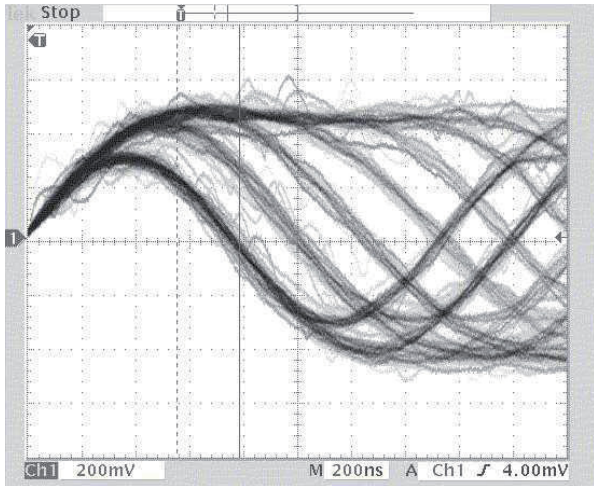
5

EYE-PATTERN SIGNAL – JITTER MEASUREMENT

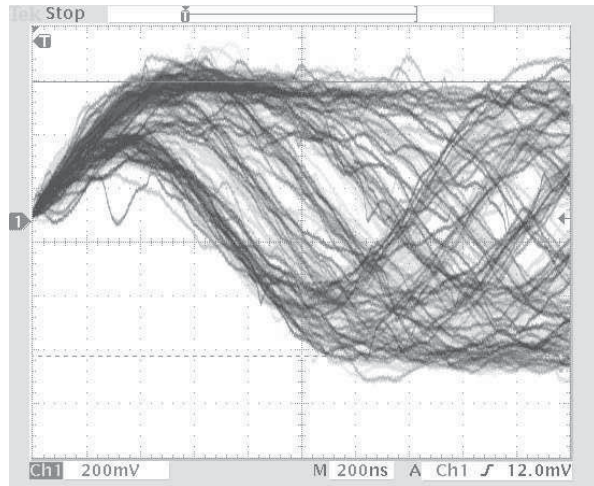
Measure the signal on the input of the Signal processor using an **analog** oscilloscope. Please find the exact measuring point in your Service Manual.



See below examples of the signal. Amplitude should read at least 700mVpp using SBC444A.



good



bad

If the oscilloscope shows a signal like the 'bad' one, and/or the amplitude decreases within 1 minute - the CD drive has to be replaced.

6

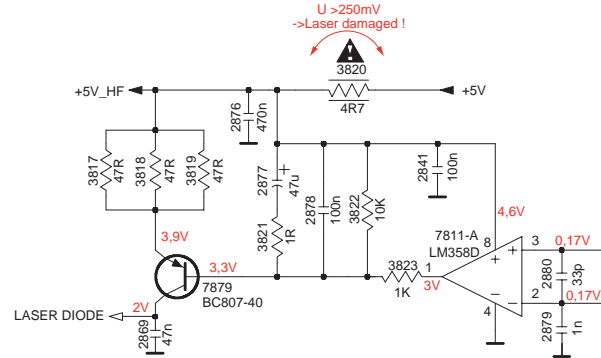
CD DRIVE – LASER CURRENT MEASUREMENT

The laser current can be measured as a voltage drop on a resistor. The resistor is marked in every Service Manual. The value depends on the type of CD drive.

	typical value	most probably defect
VAMxxxx	: 150-230mV	≥350mV
MCDxx	: 170-230mV	≥300mV
DA1x	: 210-250mV	≥350mV
DA2x	: 175-200mV	≥250mV

Use SBC444A (CD-DA) for measurement.

Laser power control



7

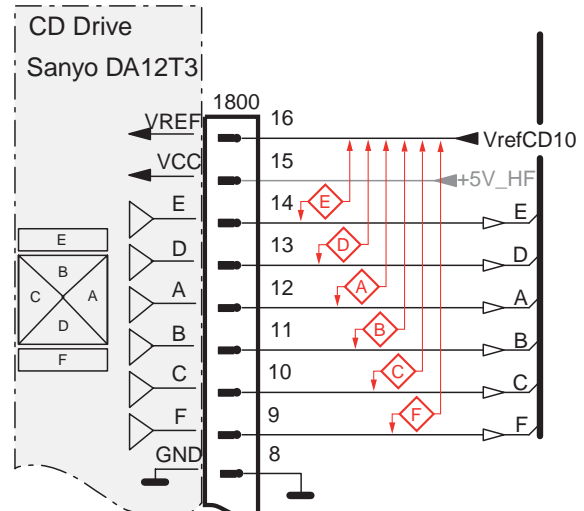
CD DRIVE – OFFSET MEASUREMENT

The photodiodes of the CD-drive may have an offset. These offsets have to be compensated by the signal processor. High offsets can lead to poor playability of some CDs (skipping tracks).

To measure the offset values, start the **Service Test Program** - section "Focus Test" without a CD.

The offsets can be measured with a DC Millivoltmeter directly on the connector (see drawing below). Pin numbering varies from drive to drive.

The values from diode A-D should read $0 \pm 10mV$. Diodes E and F are less critical.



If one of the offsets is higher than $\pm 10mV$ the CD drive has to be replaced. Otherwise replace the Signal Processor.

DISMANTLING INSTRUCTIONS

Dismantling the Rear Portion and PCBs

- 1) Press the 2 juts and pull out the Stand as shown in figure 1.

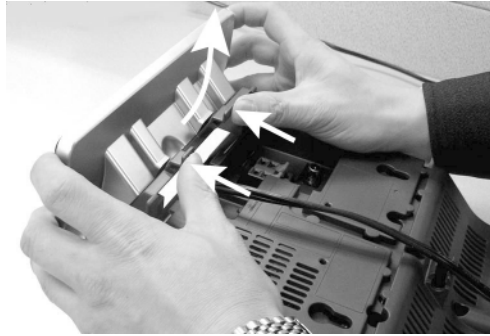


Figure 1

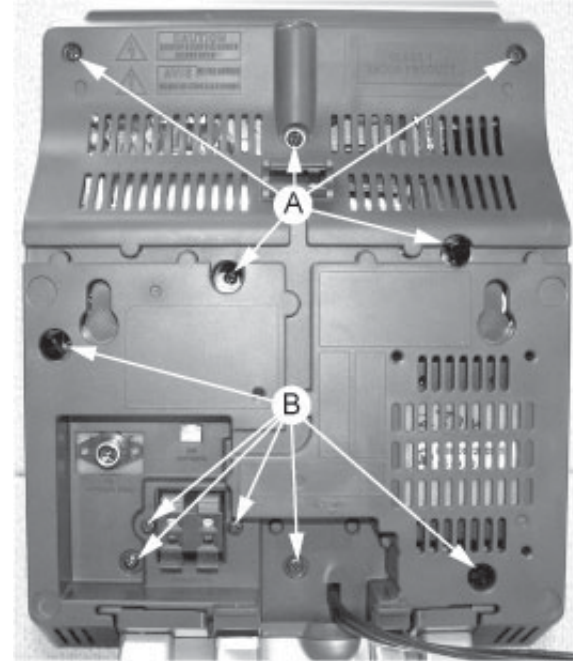


Figure 2

- 2) Loosen 5 screws A and 6 screws B to remove the Rear Cabinet as shown in figure 2.
- 3) Loosen 3 screws C to remove the SP & ANT Jack Board as shown in figure 3.
- 4) Loosen 5 screws D to remove the Power Module as shown in figure 3.

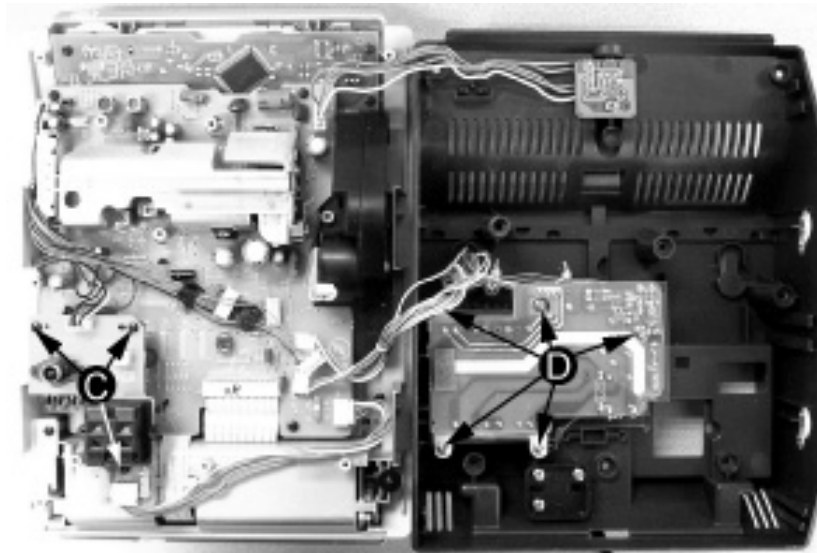


Figure 3

Dismantling the Rear Portion and PCBs

- 5) Loosen 2 screws E to remove the Bracket Jack Board as shown in Figure 4.
- 6) Loosen 3 screws F to remove the Main Board as shown in figure 5.

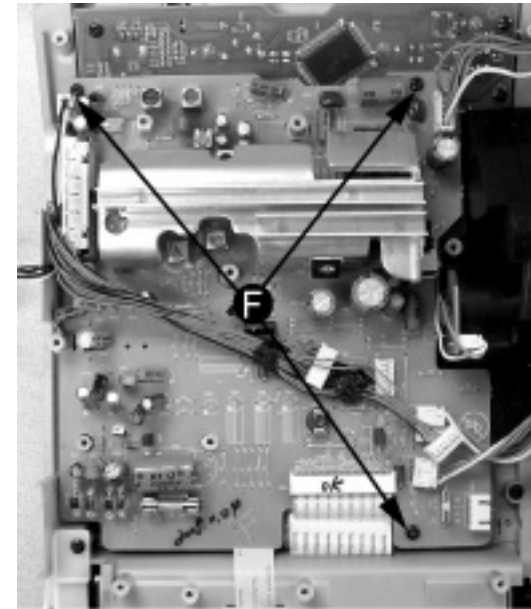


Figure 5

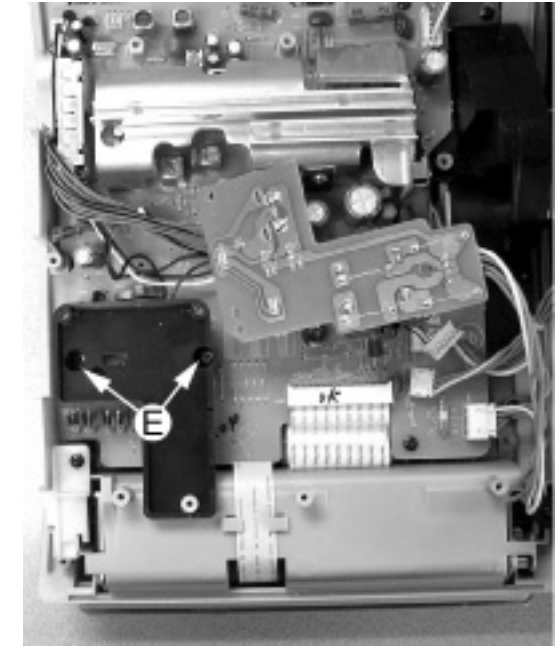


Figure 4

Dismantling of the Display Lens & the Volume knob

- 1) Use a flat head screw driver to give a push in the direction as shown in figure 6.



Figure 6

- 2) Place two small screw drivers in between the front cabinet & knob to give more leverage in pulling out the Volume Knob as shown in figure 7.



Figure 7

Dismantling of the CD Module & CD Door Carrier

- 1) Loosen 5 screws J mounting the Key Board to the Front Cabinet to remove the Key Board as shown in figure 8.
- 2) Loosen 4 screws H and 3 screws G to CD Module as shown in figure 8.
- 3) Loosen 2 screws I to remove the Servo Motor Mechanism as shown in figure 8.

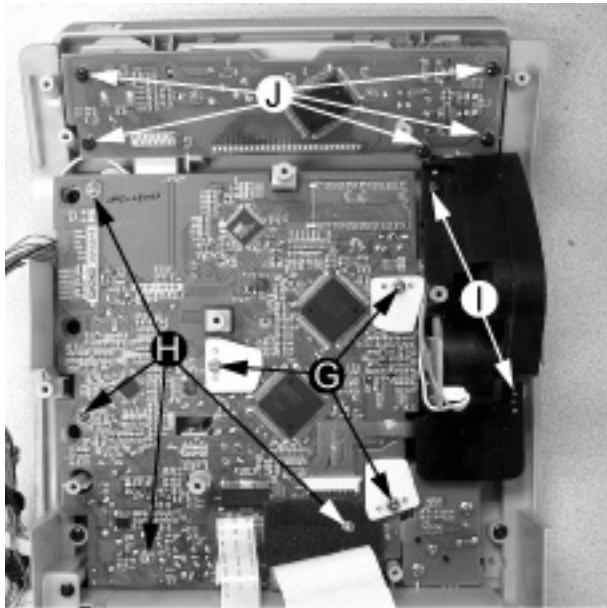


Figure 8

- 4) Loosen 4 screws K to remove the Right CD Door Carrier and 4 screws L to remove the Left CD Door Carrier as shown in figure 9.

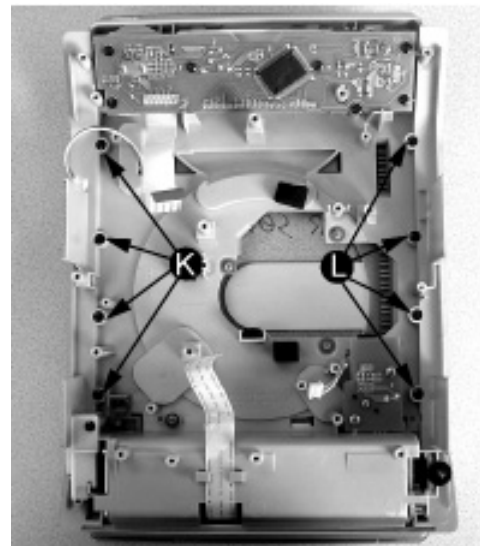
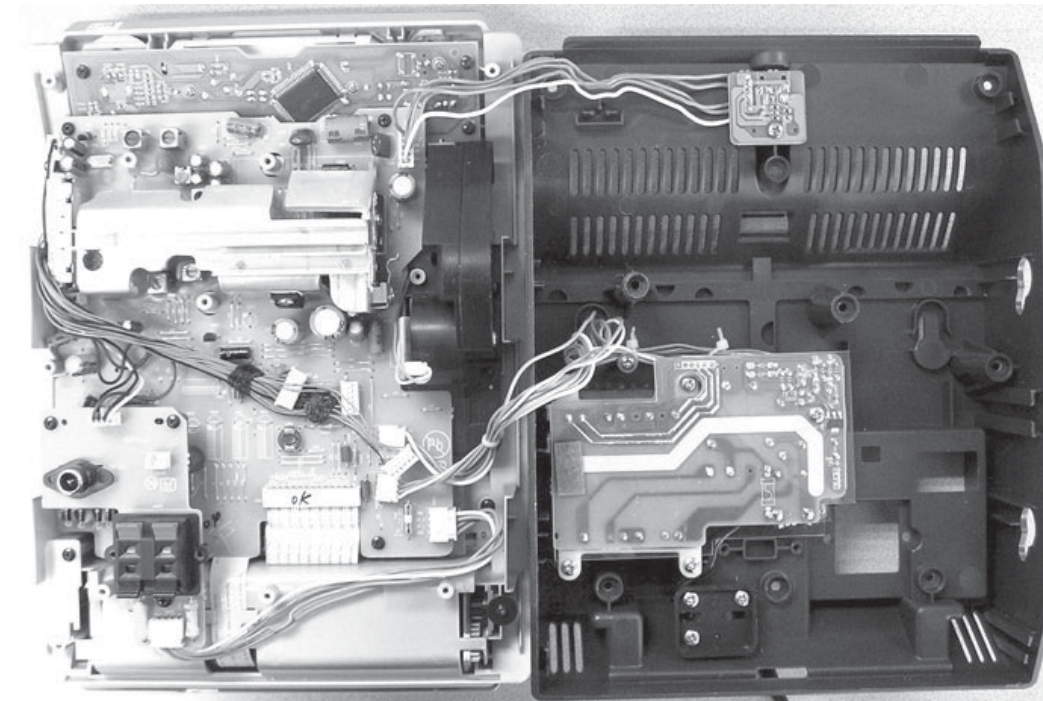


Figure 9

Service pos A



Service pos B



Note: After re-assembly, it is very important to ensure all wires are routed properly to ensure that they do not touch/obstruct all moving parts.

SERVICE TEST PROGRAM

To enter Service Testprogram hold **DBB & Source** buttons depressed for **3 sec.** at USB mode (no USB).

* Door switch is ignored → CD door can be opened.

Display shows the MCU version "V.yy" (Main menu)

V refers to Version
yy refers to Software version number of the uProcessor (counting up from 01 to 99)

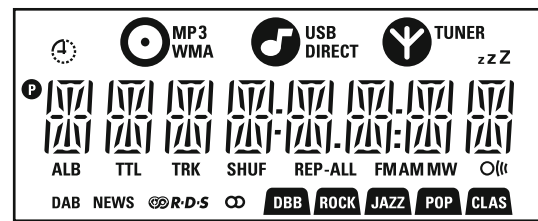
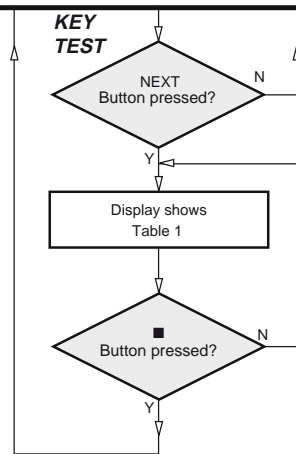
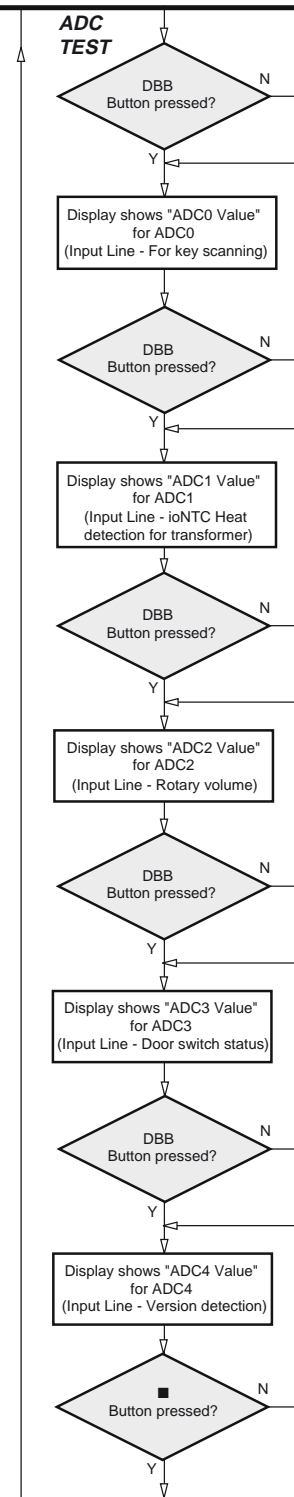
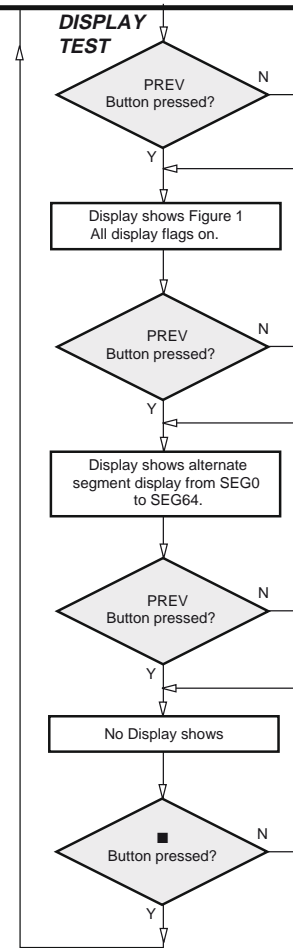
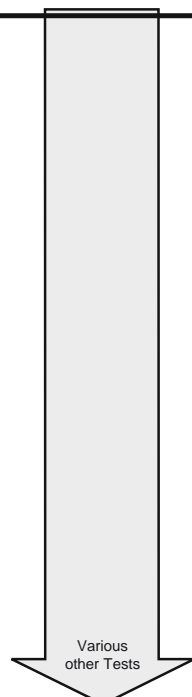


Figure 1



ADC Test is used for checking the ADC inputs to the microprocessor. The display shows an ADC value between 0 and 255 for an input signal between 0 and 5V.

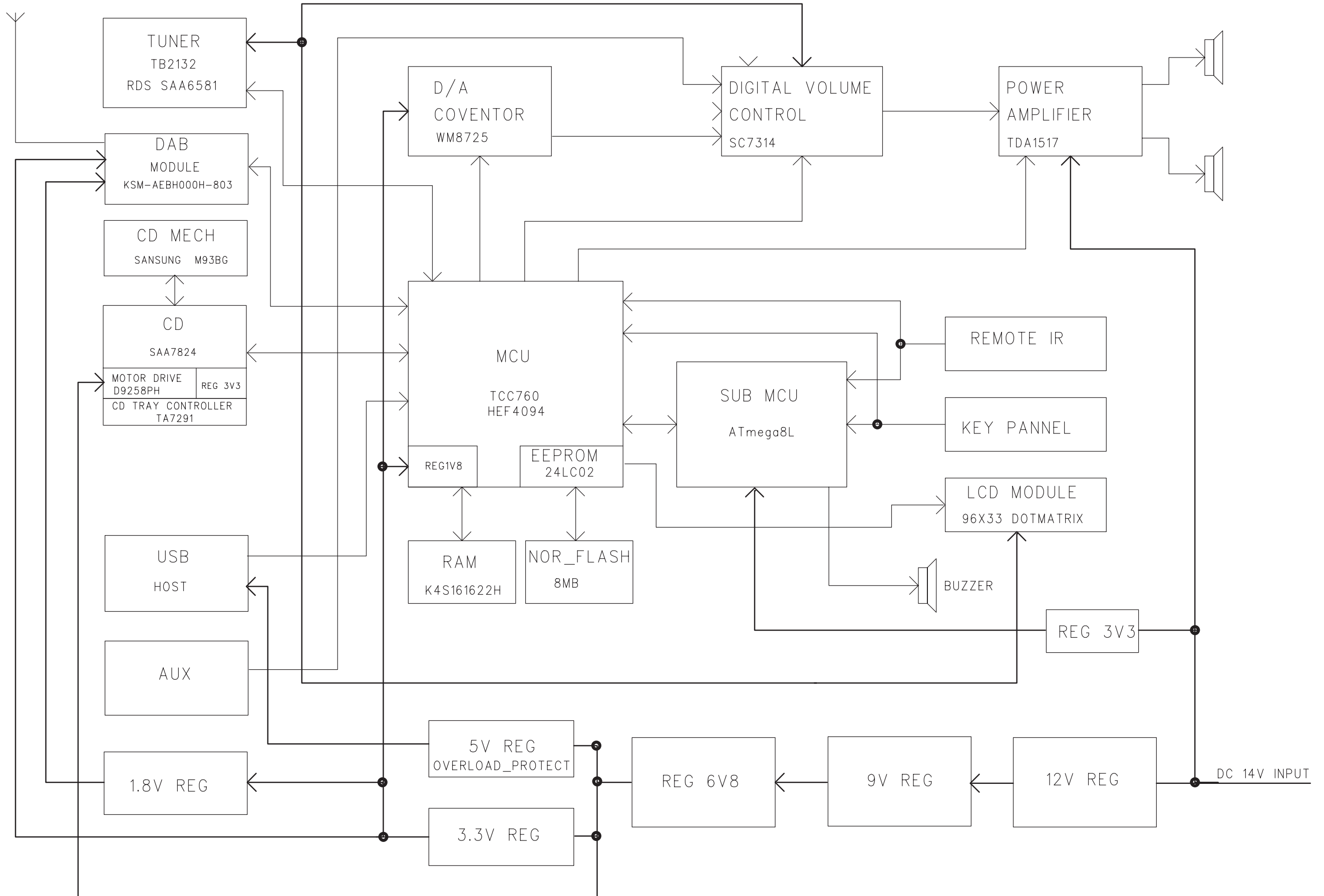


TEST	Activated with	ACTION
EEPROM CLEAR	PROGRAM ■ to Exit	A test pattern will be sent to the EEPROM. "EEP CLR" is displayed while the erase processing. Caution! All presets from the customer will be lost!!
LEAVE SERVICE TEST PROGRAM	Disconnect mains cord	

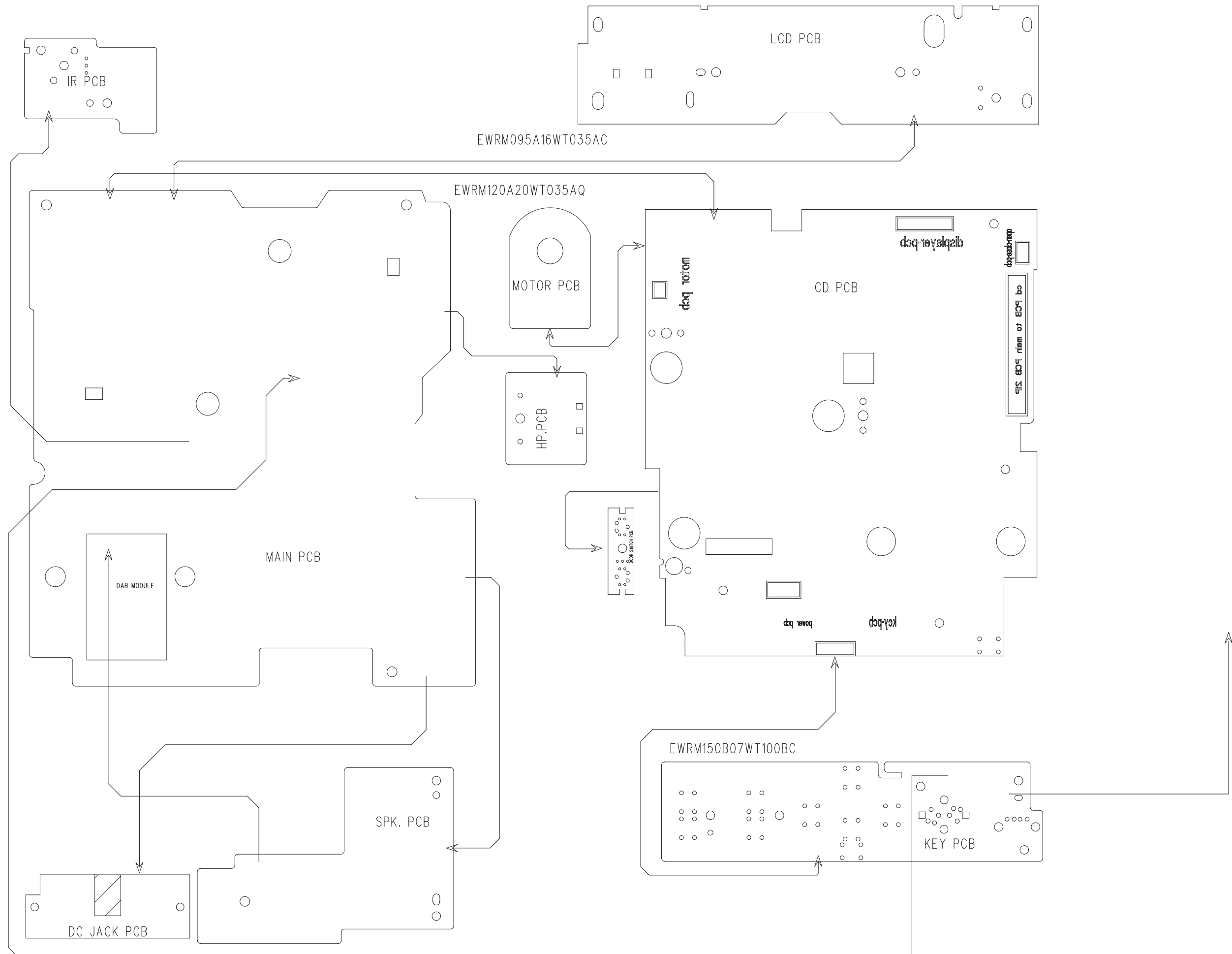
Key test table					
KeyNr	Setkey	KeyNr	Setkey	KeyNr	Set key
0	CD	10	RDS	20	PROGRAM
1	AUX	11	▶	21	SHUFFLE
2	TUNER	12	CLOCK/DISPLAY	22	NULL
3	SOURCE	13	ALBUM +	23	SLEEP
4	STANDBY/ON	14	ALBUM -	24	TIMER
5	OPEN/CLOSE	15	SKIP PREV	25	DBB
6	VOLUME DOWN	16	SKIP NEXT	26	DSC
7	VOLUME UP	17	NULL	27	MUTE
8	NULL	18	NULL	28	USB
9	NULL	19	REPEAT		

Table 1

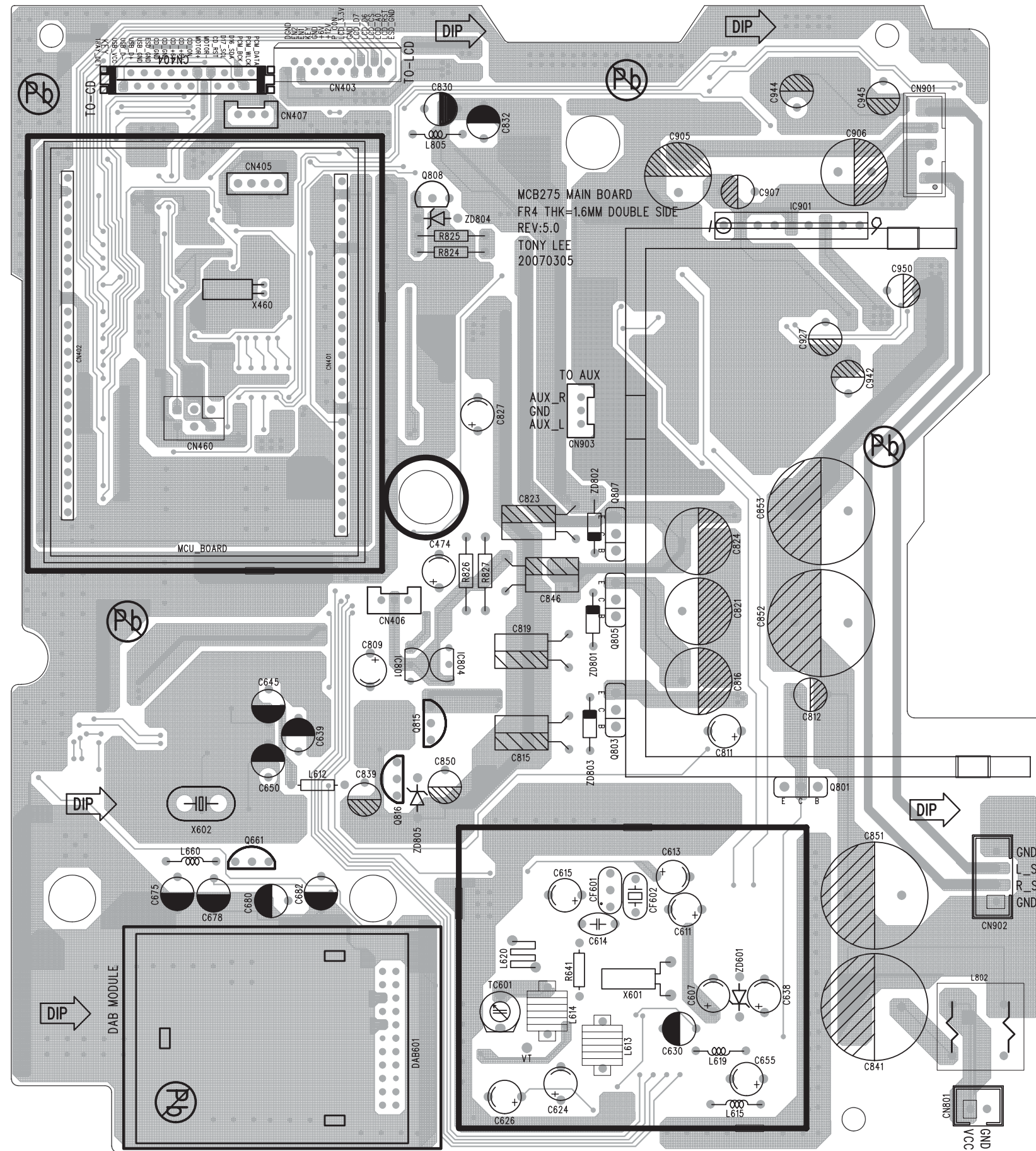
SET BLOCK DIAGRAM



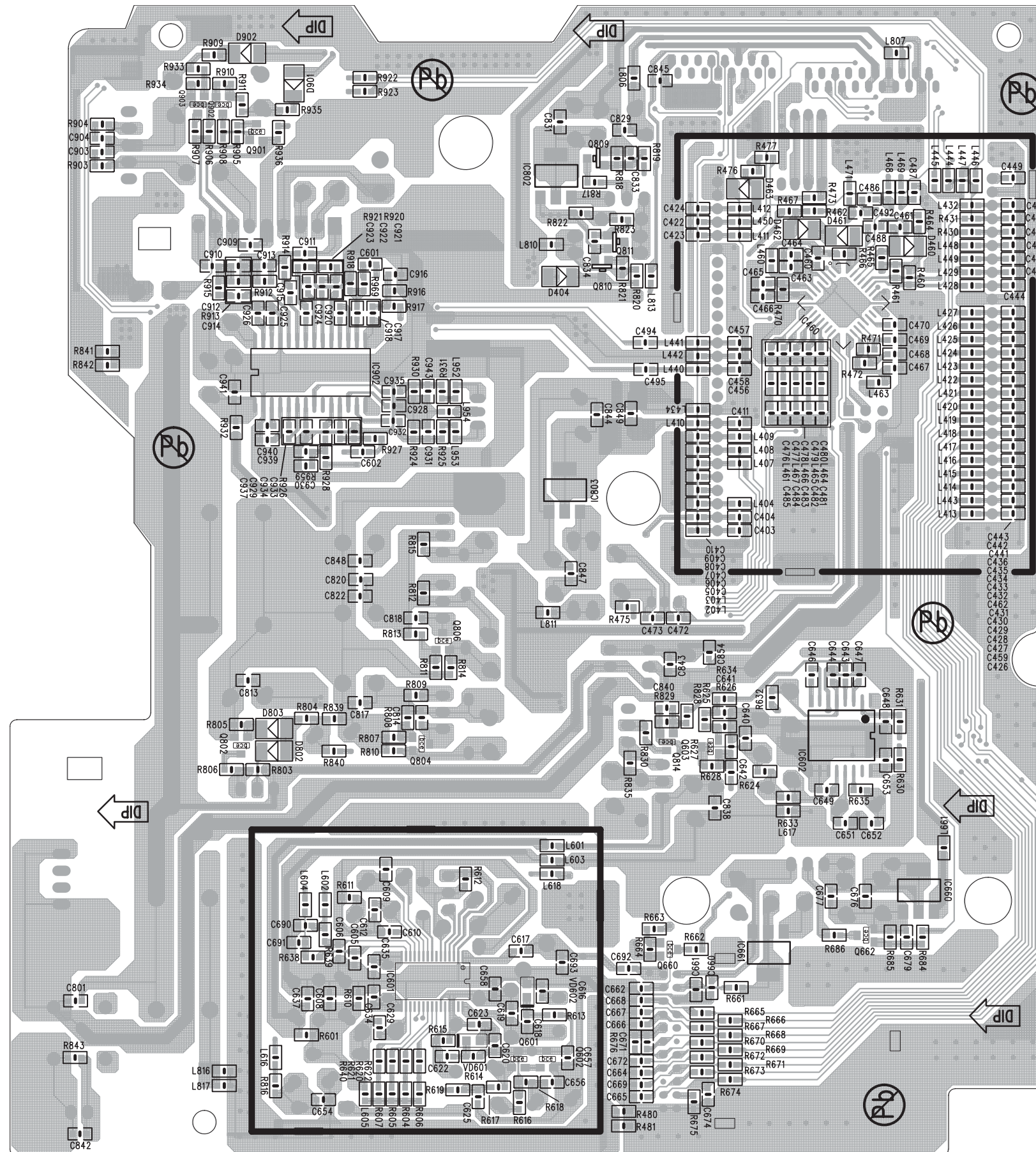
SET WIRING DIAGRAM



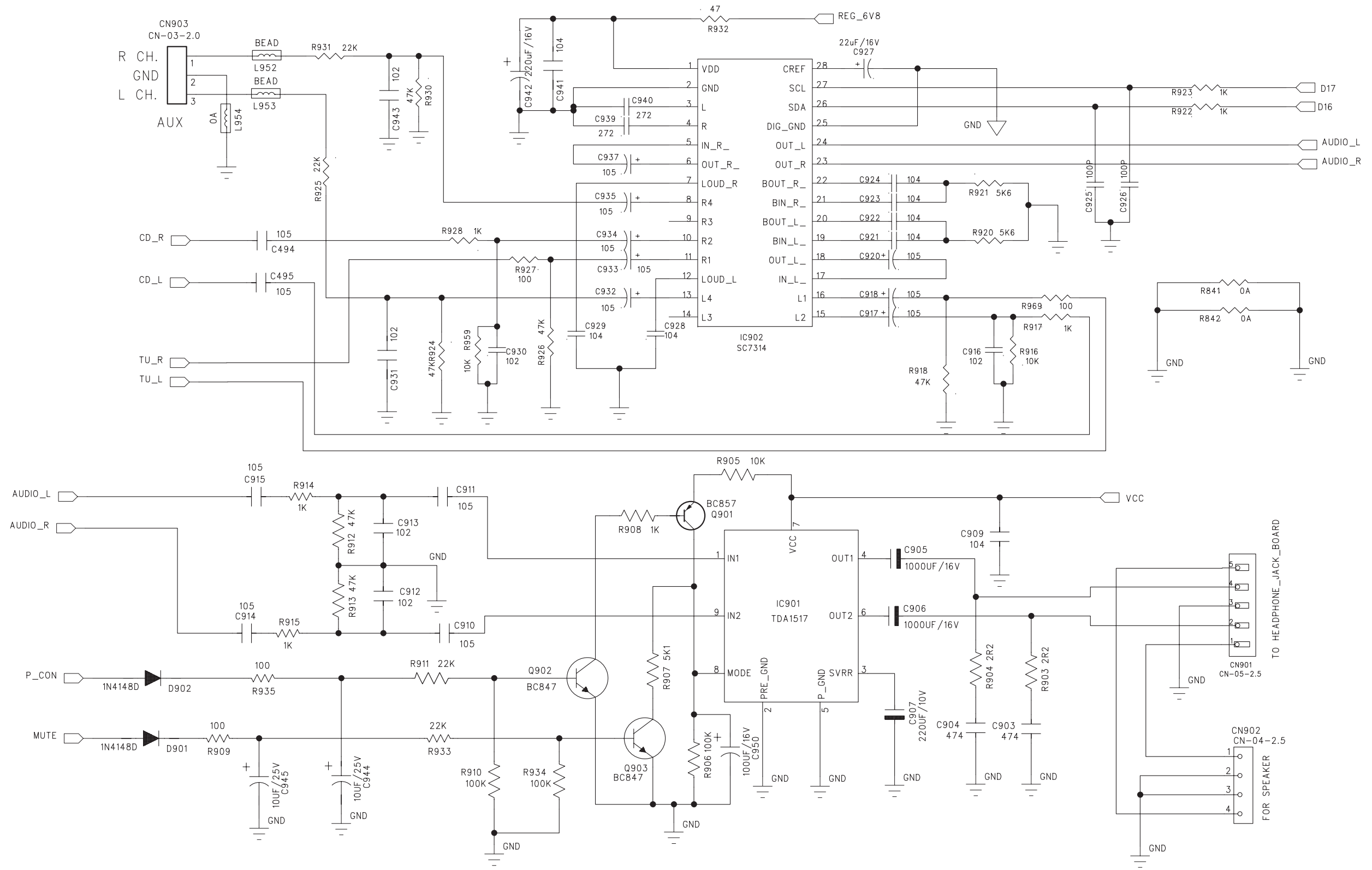
PCB LAYOUT - MAIN BOARD (TOP VIEW)



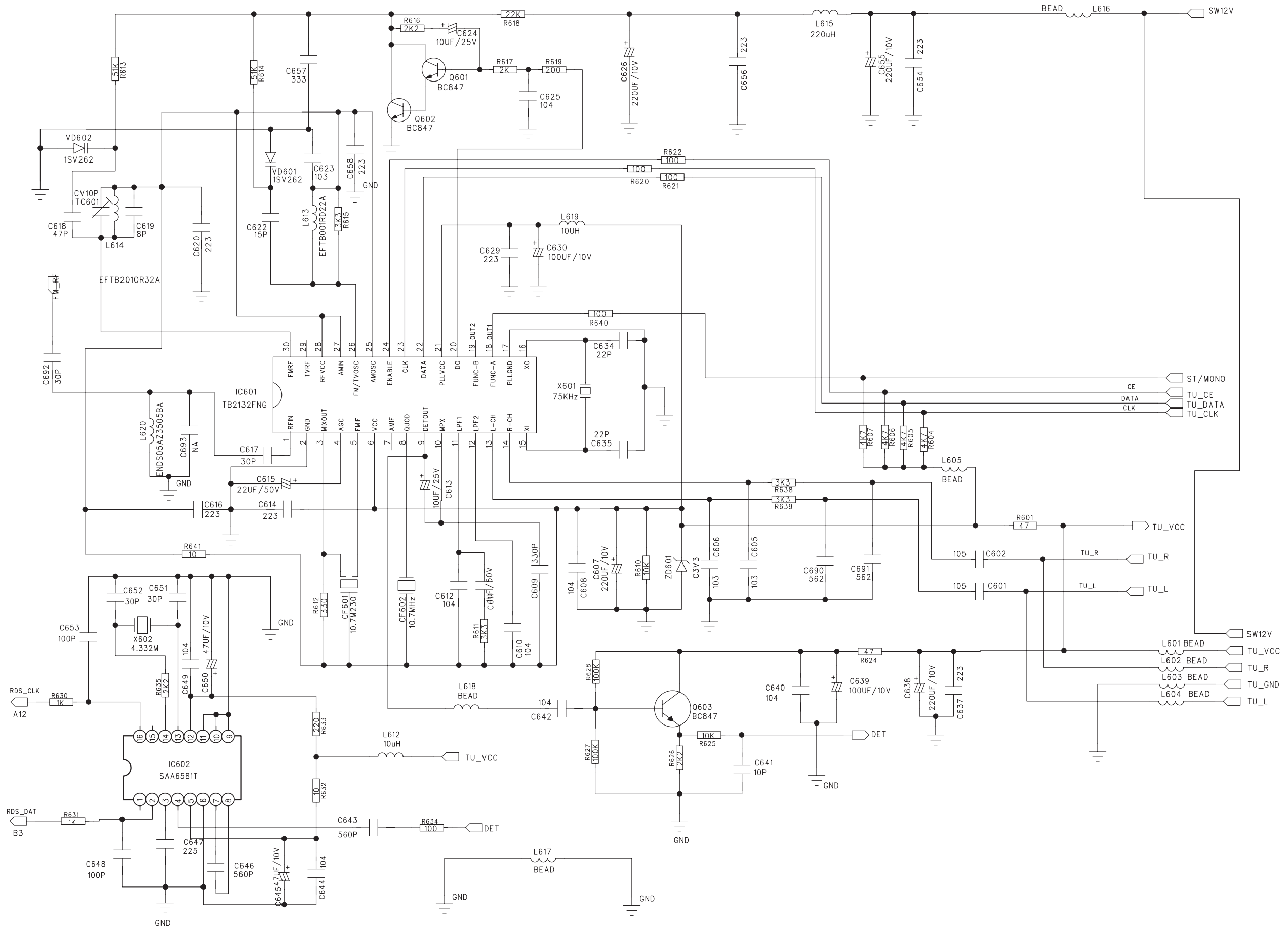
PCB LAYOUT - MAIN BOARD (BOTTOM VIEW)



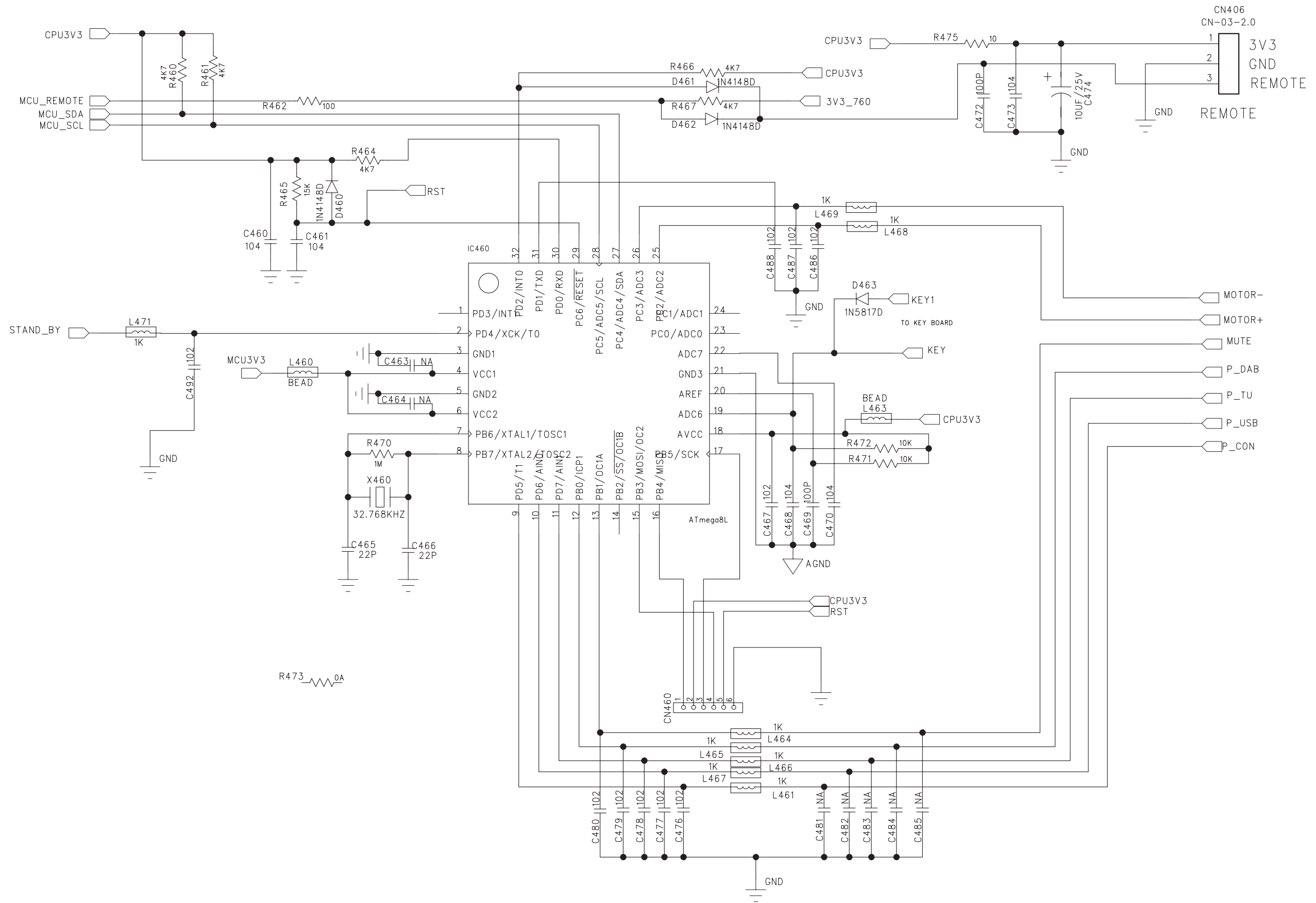
CIRCUIT DIAGRAM - MAIN BOARD AUDIO PART



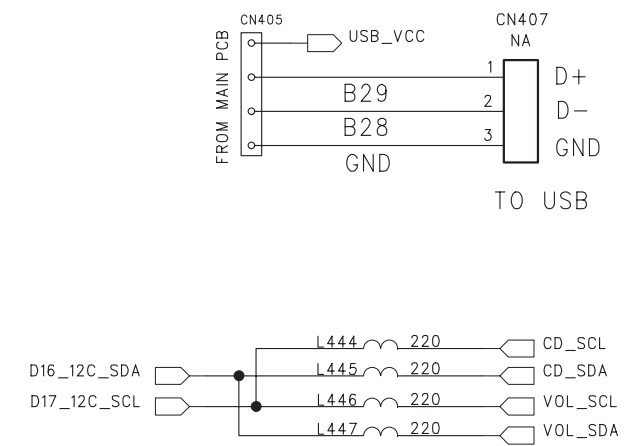
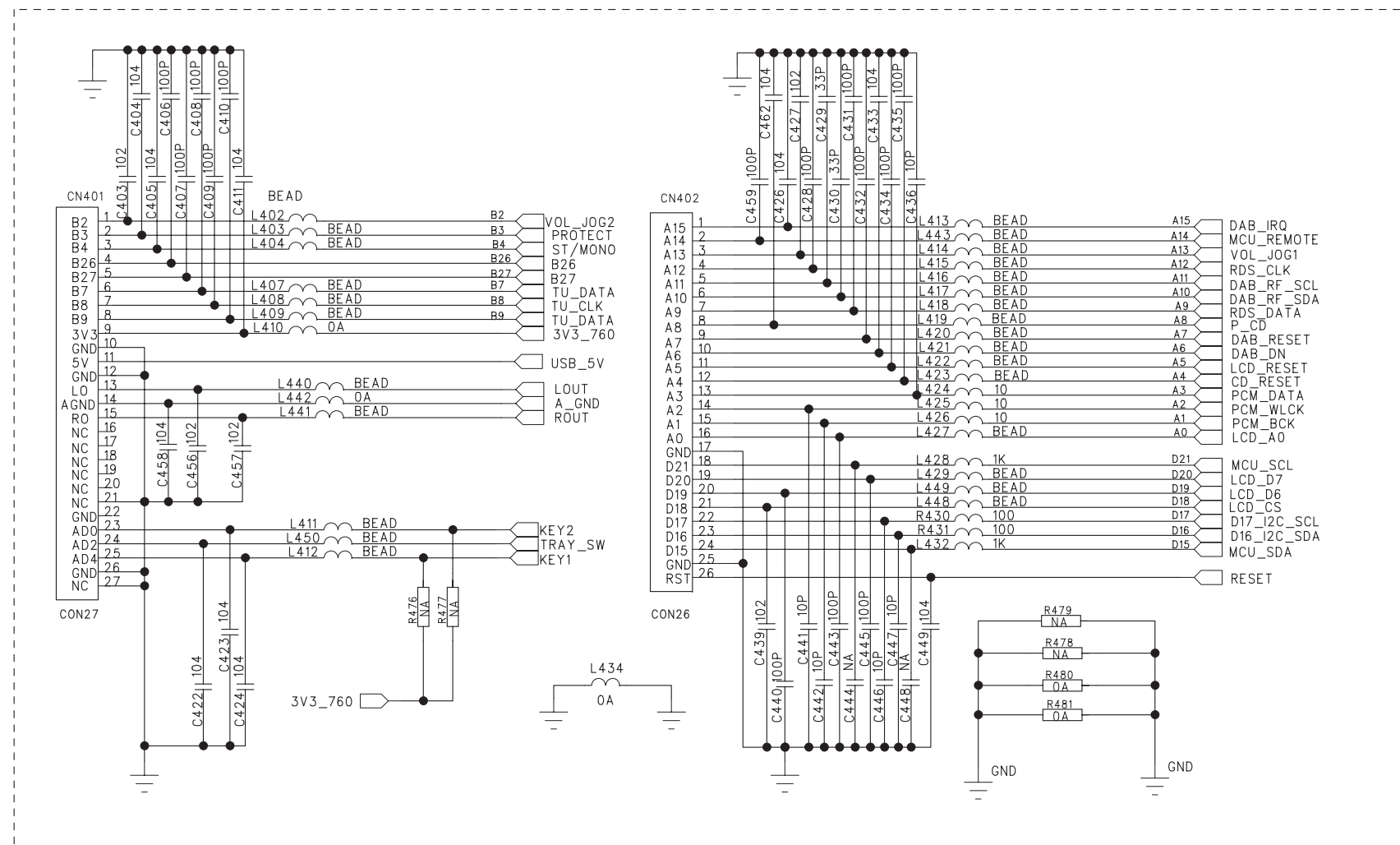
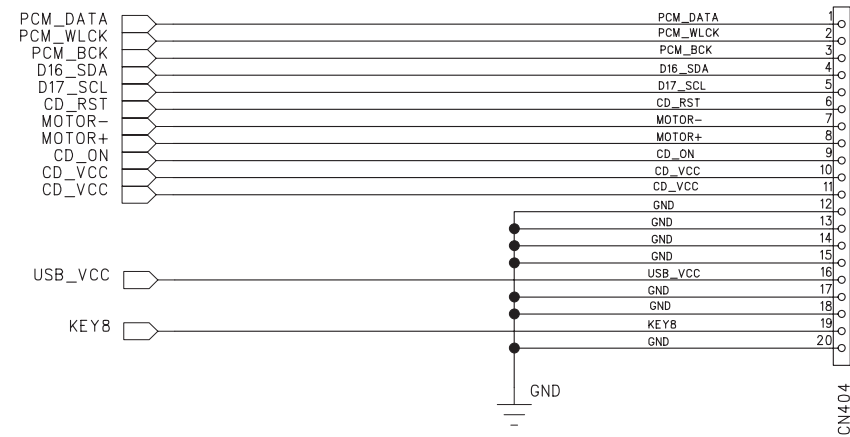
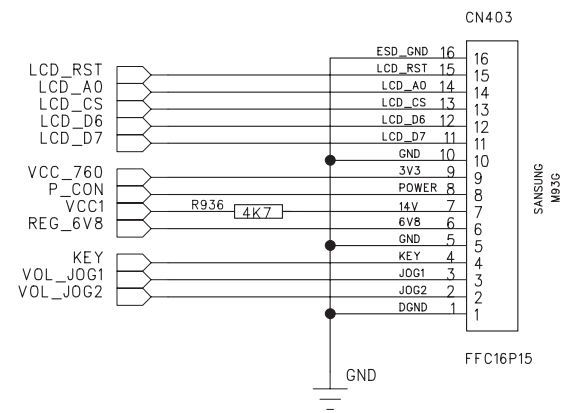
CIRCUIT DIAGRAM - MAIN BOARD FM TUNER PART



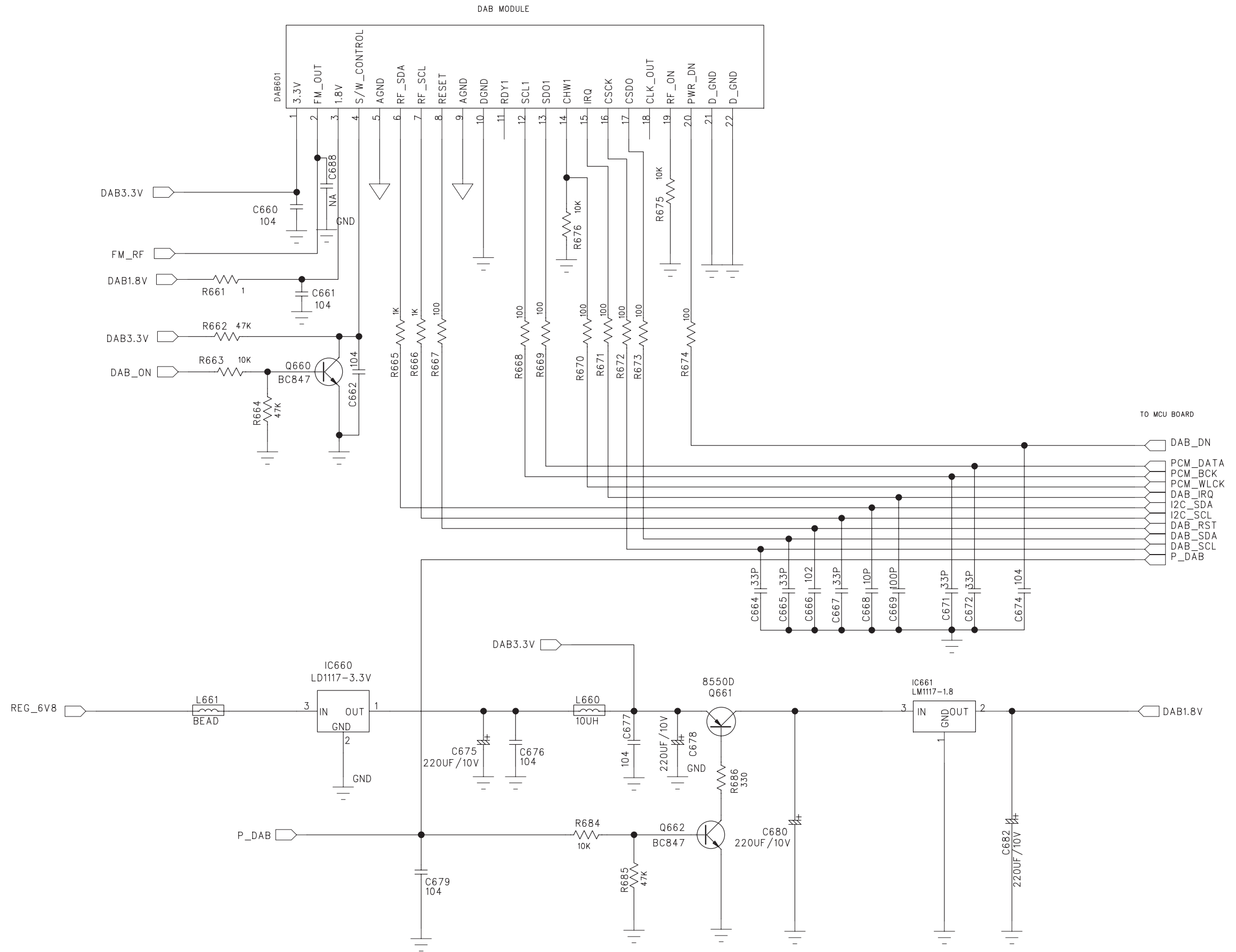
CIRCUIT DIAGRAM - MAIN BOARD SUB MCU PART



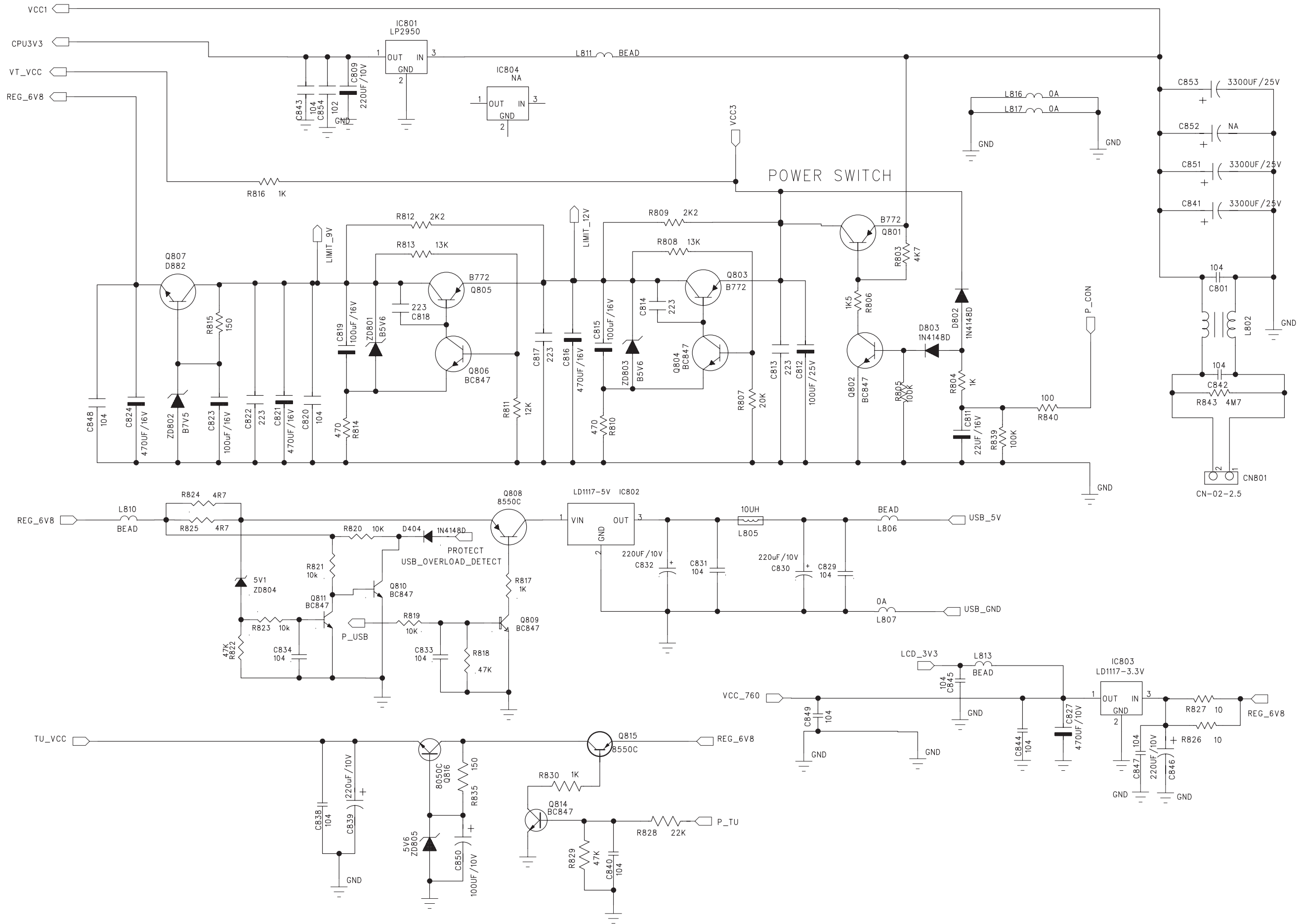
CIRCUIT DIAGRAM - MAIN BOARD INTERFACE PART



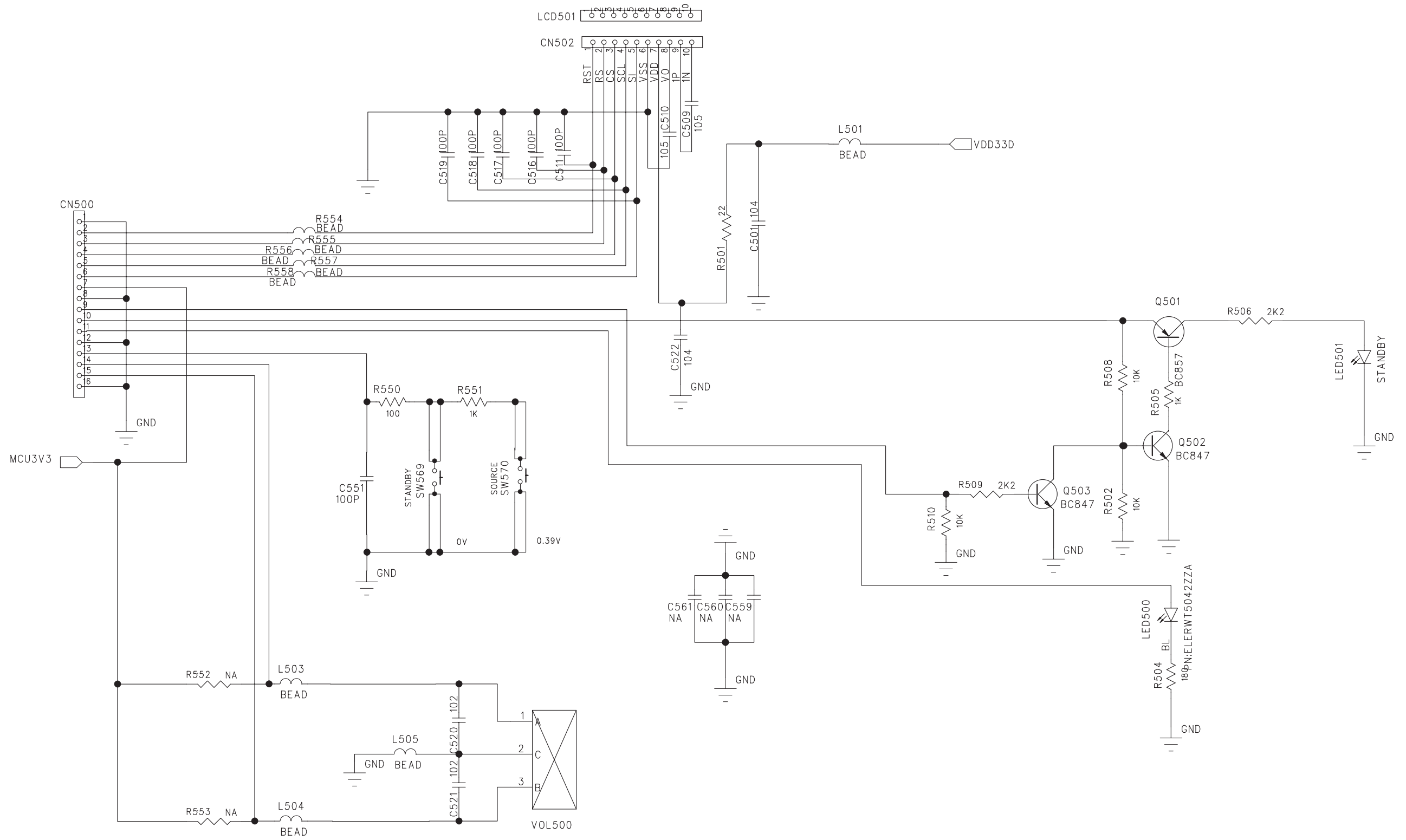
CIRCUIT DIAGRAM - MAIN BOARD DAB PART



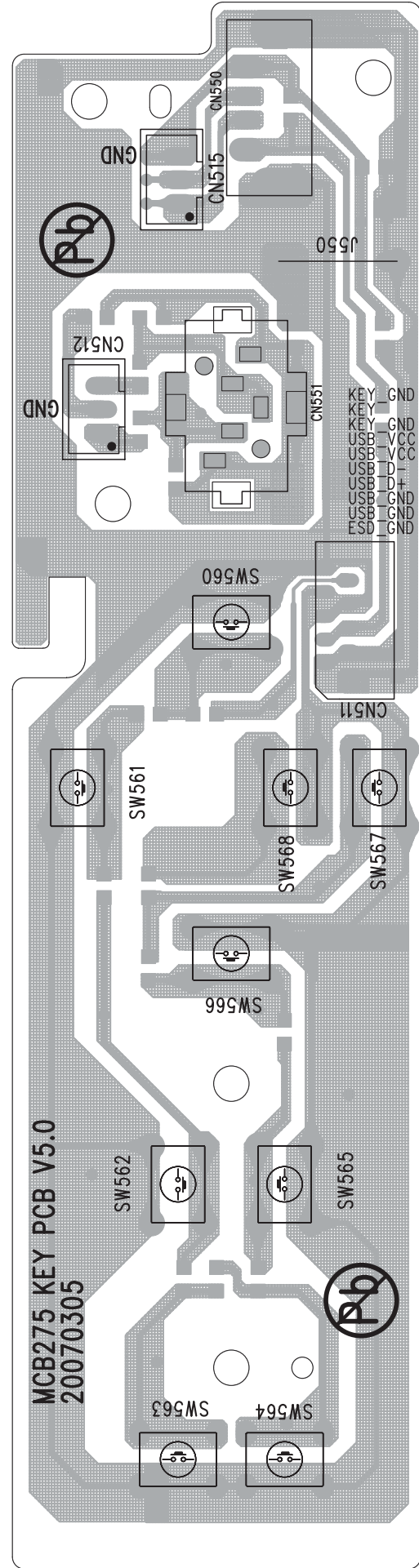
CIRCUIT DIAGRAM - MAIN BOARD POWER PART



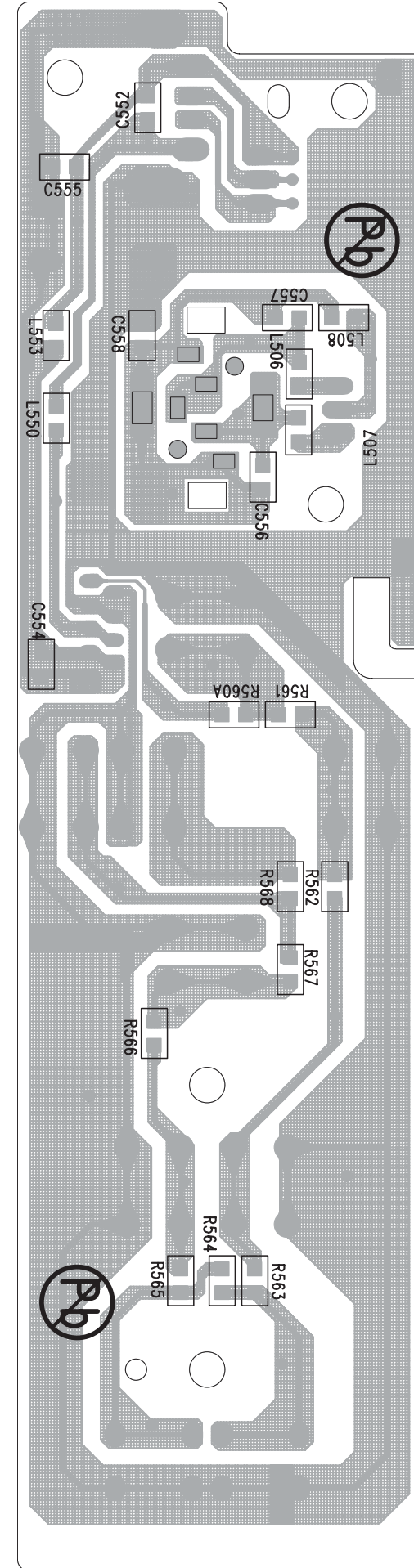
CIRCUIT DIAGRAM - LCD BOARD



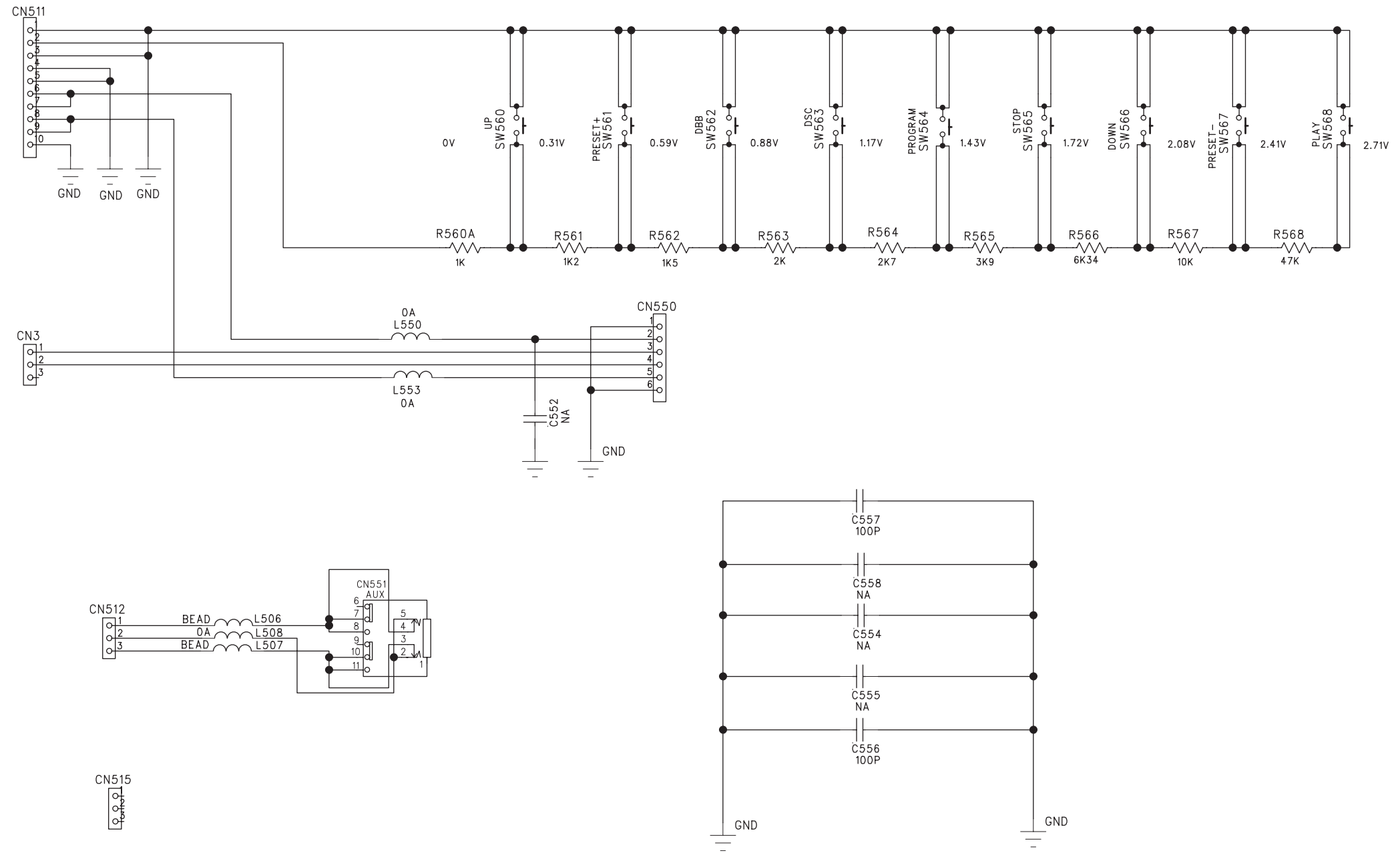
PCB LAYOUT - KEY BOARD (TOP VIEW)



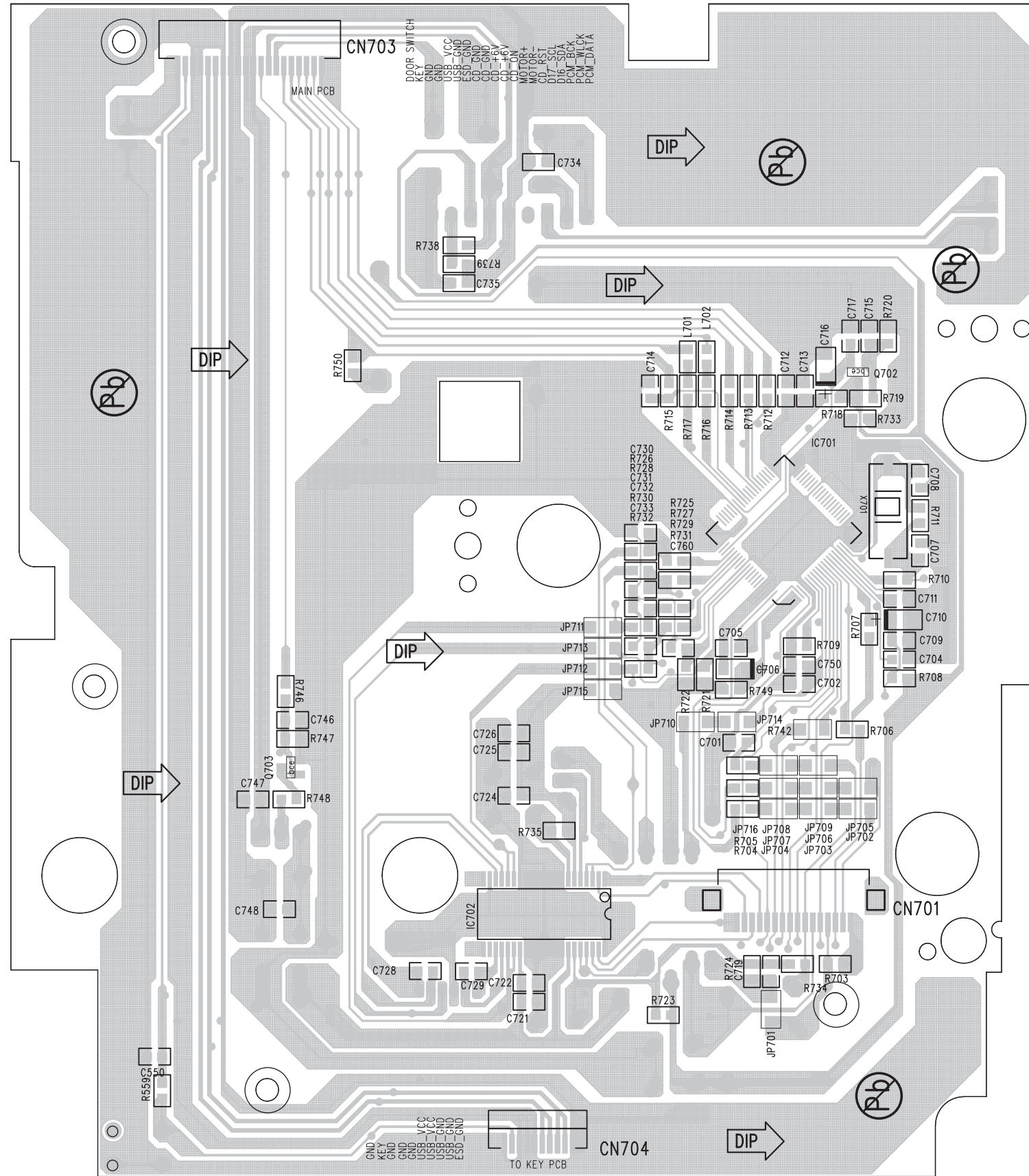
PCB LAYOUT - KEY BOARD (BOTTOM VIEW)



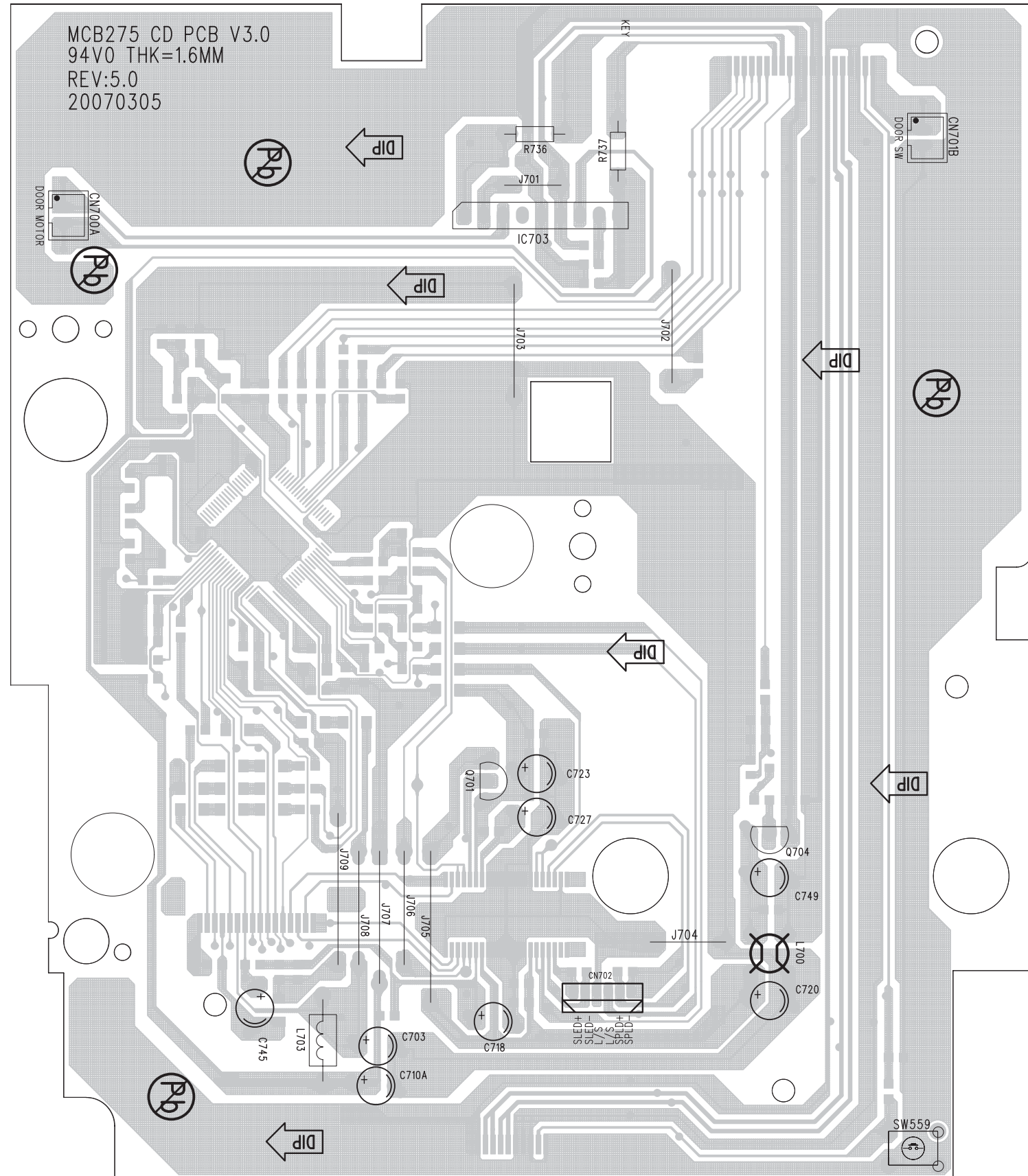
CIRCUIT DIAGRAM - KEY BOARD



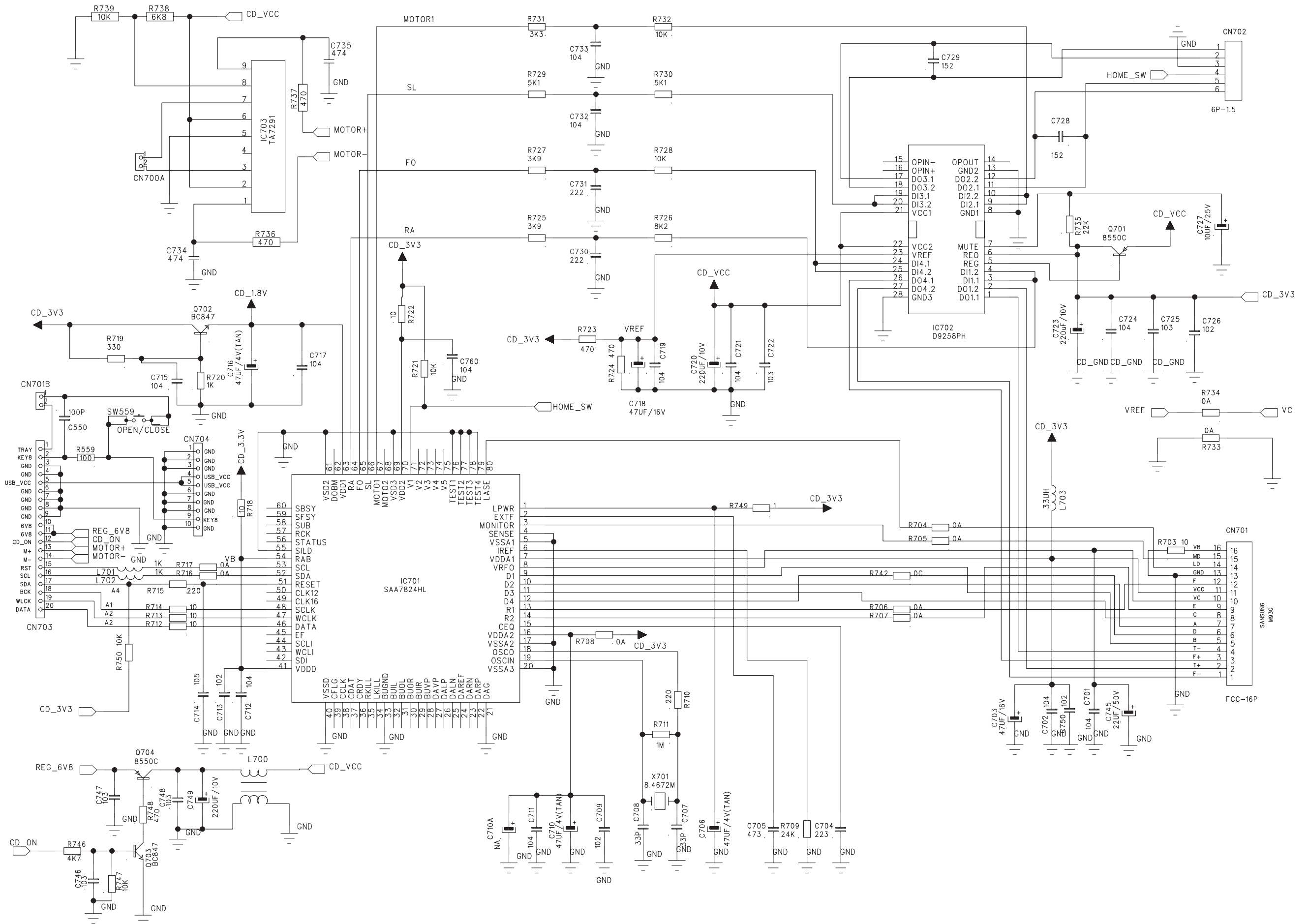
PCB LAYOUT - CD BOARD (TOP VIEW)



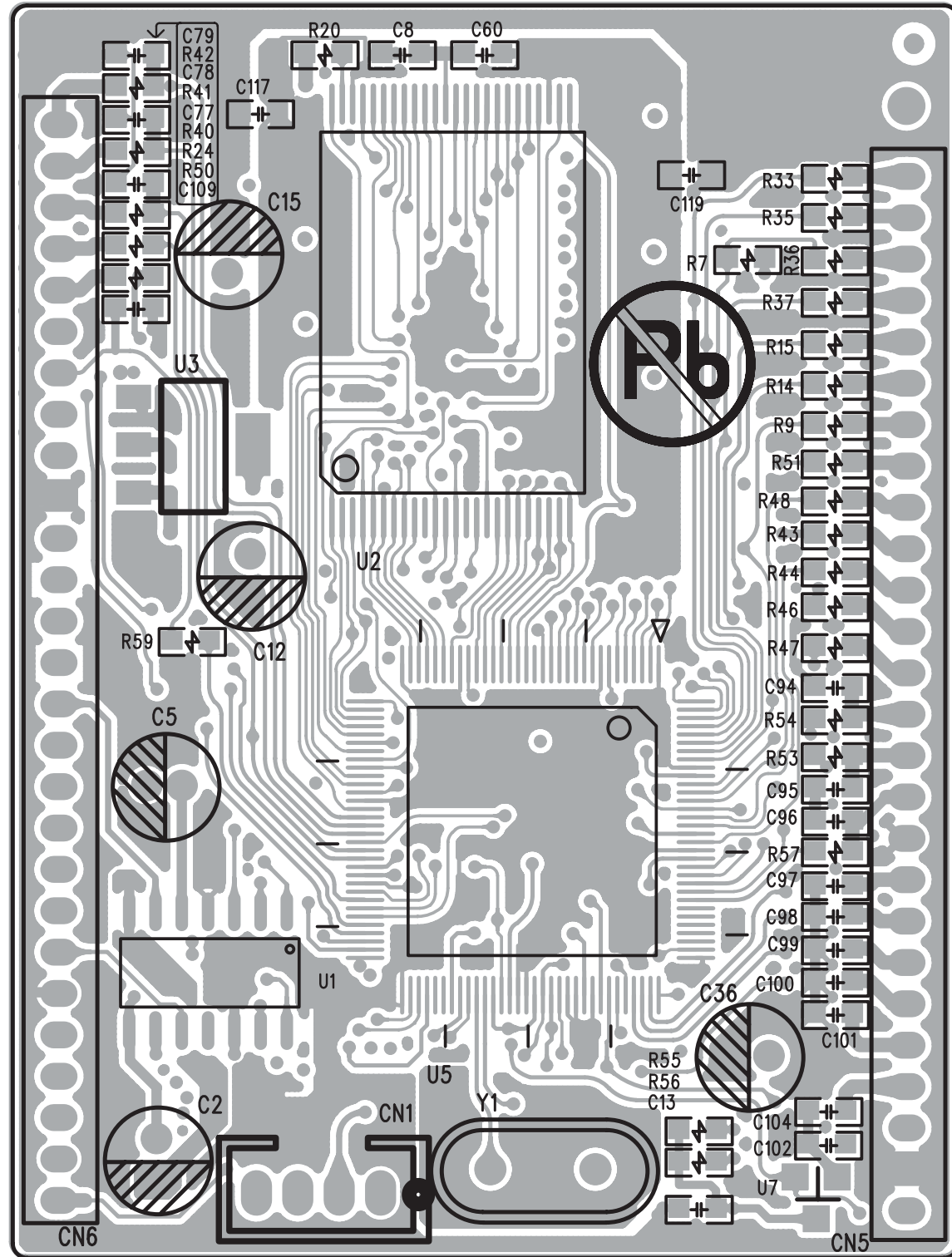
PCB LAYOUT - CD BOARD (BOTTOM VIEW)



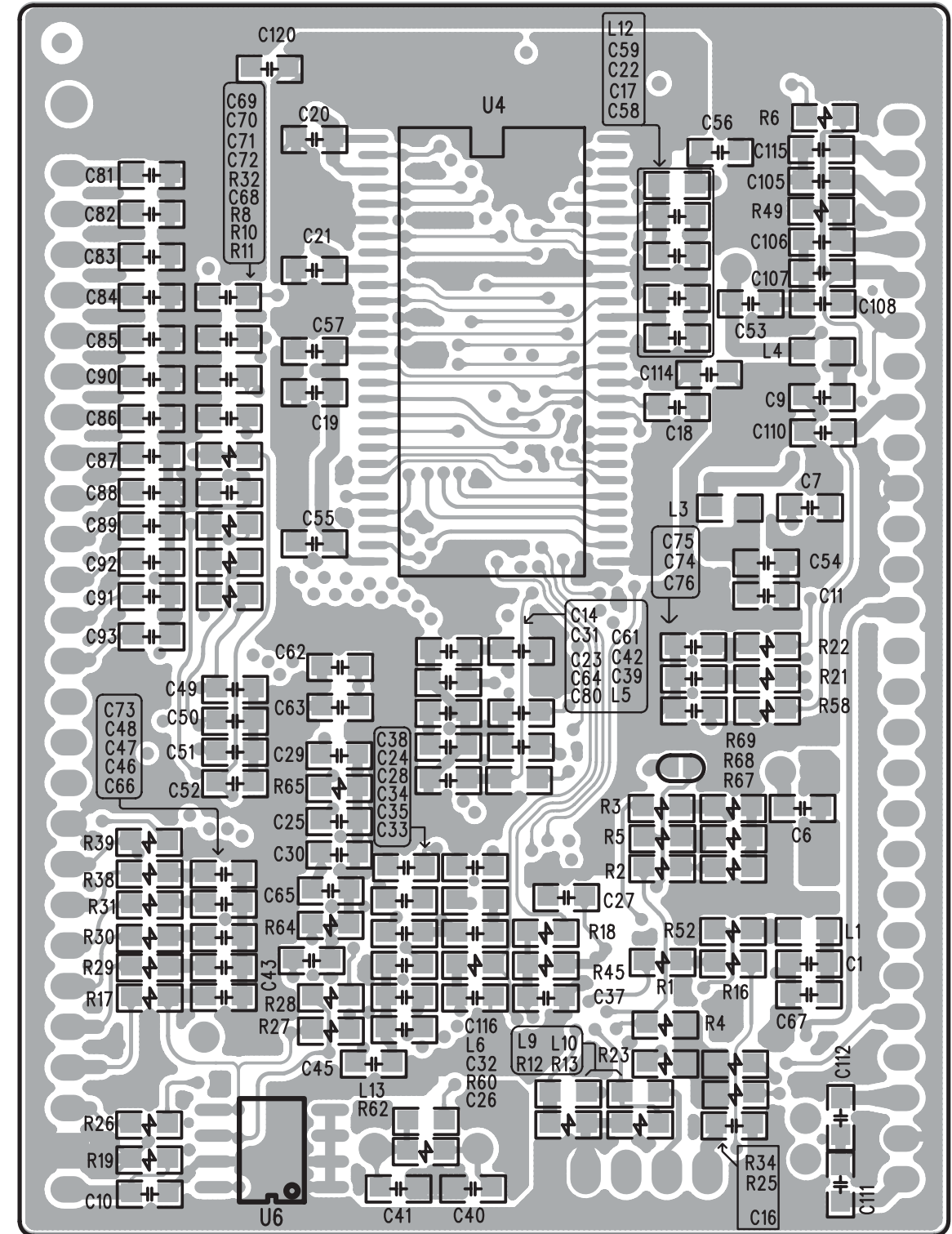
CIRCUIT DIAGRAM - CD BOARD



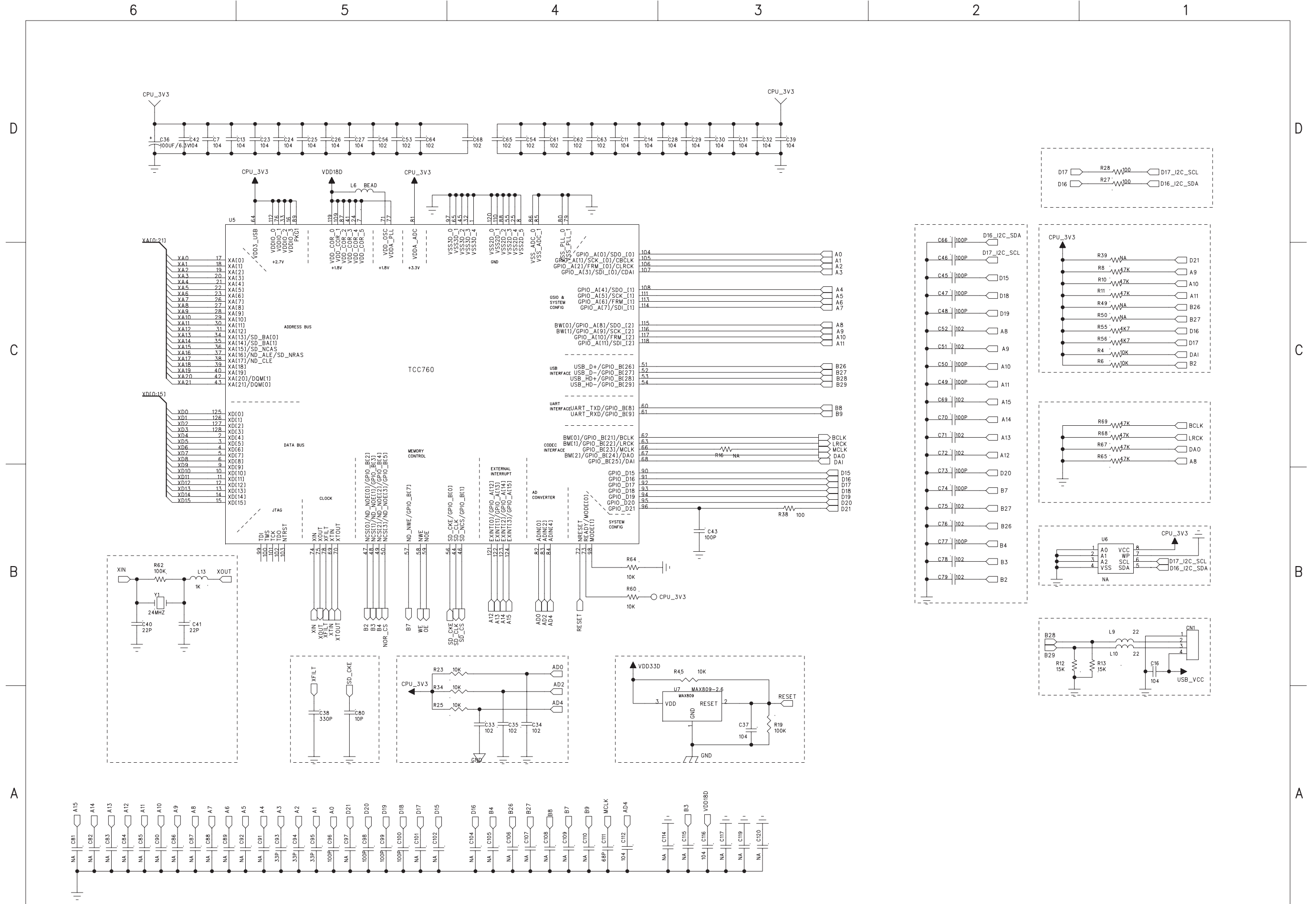
LAYOUT DIAGRAM - MCU BOARD (TOP VIEW)



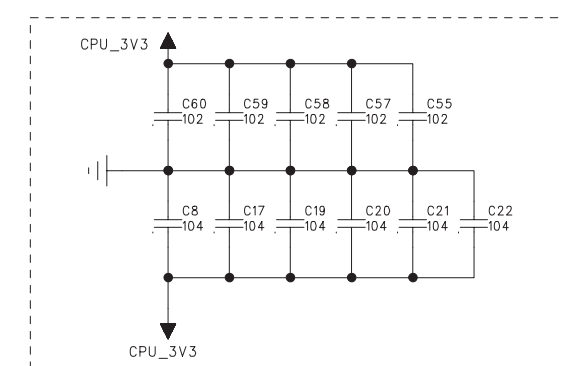
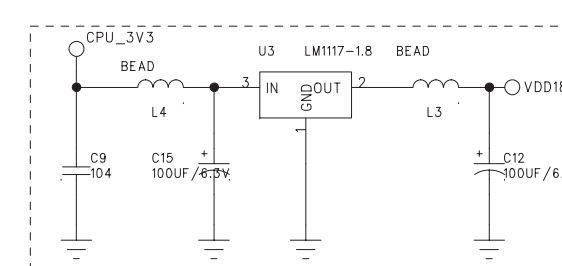
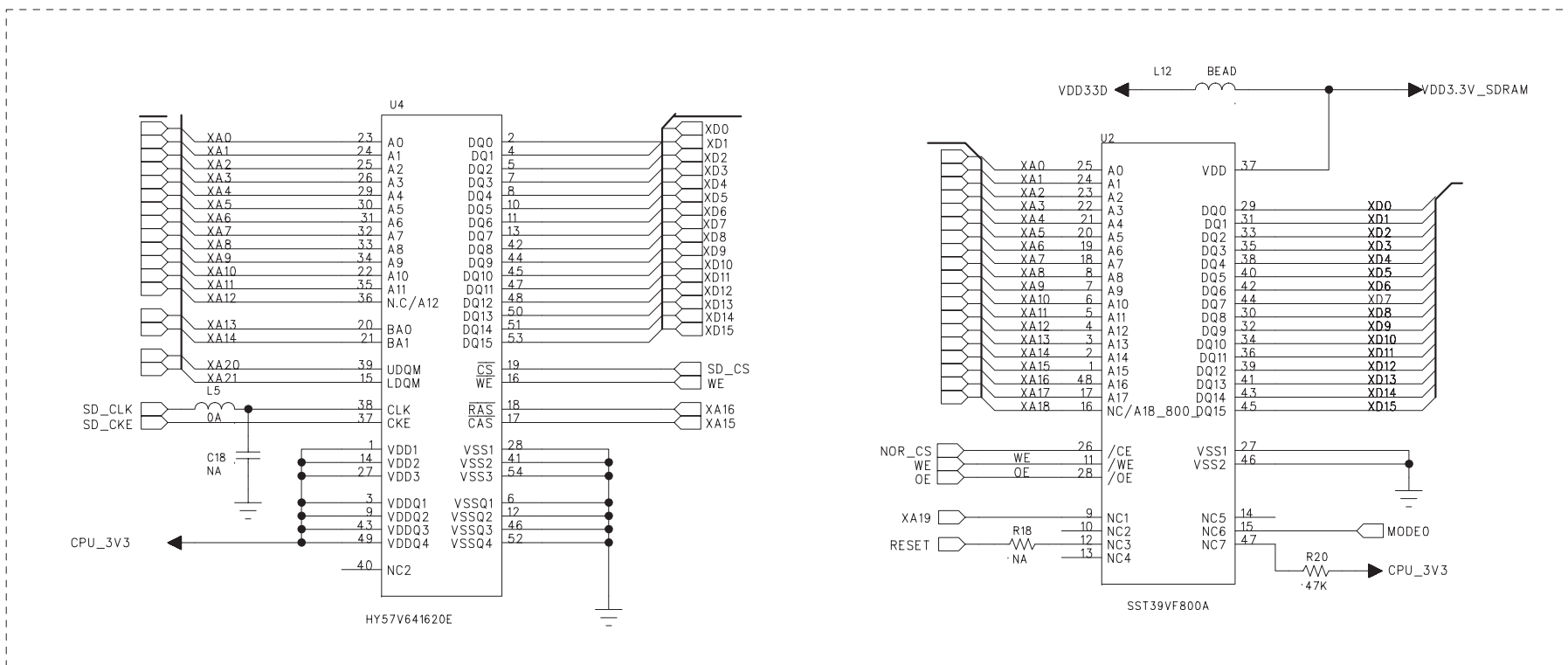
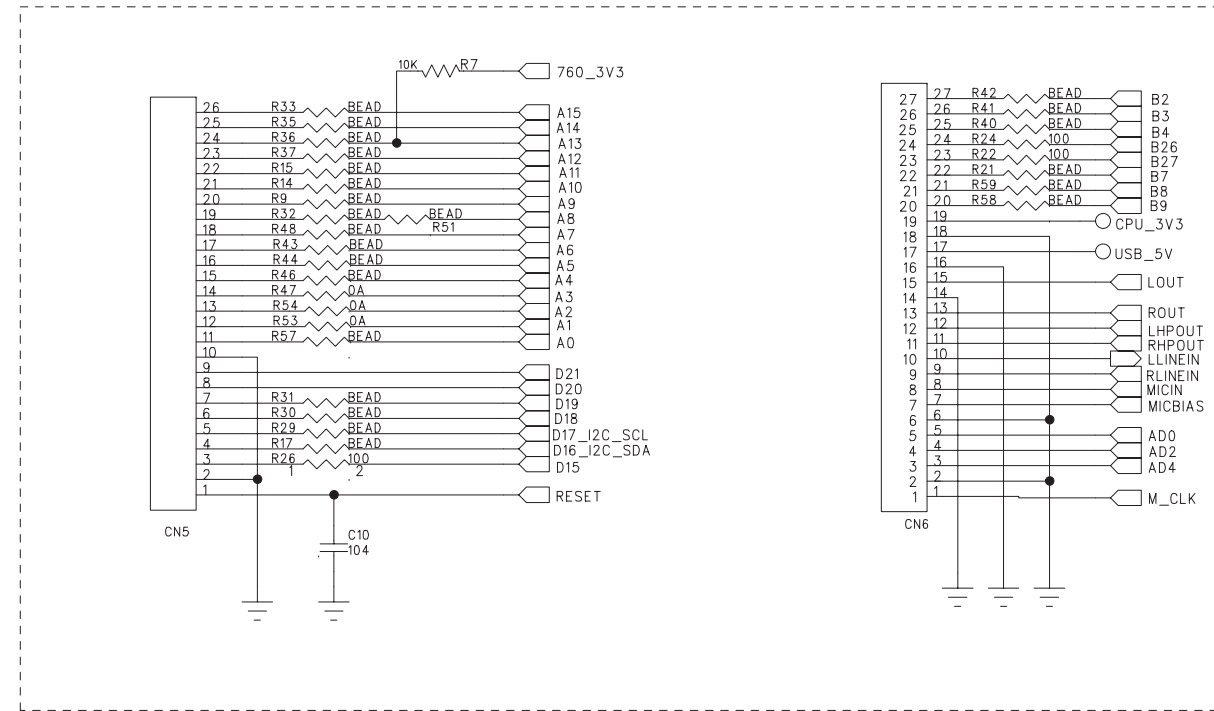
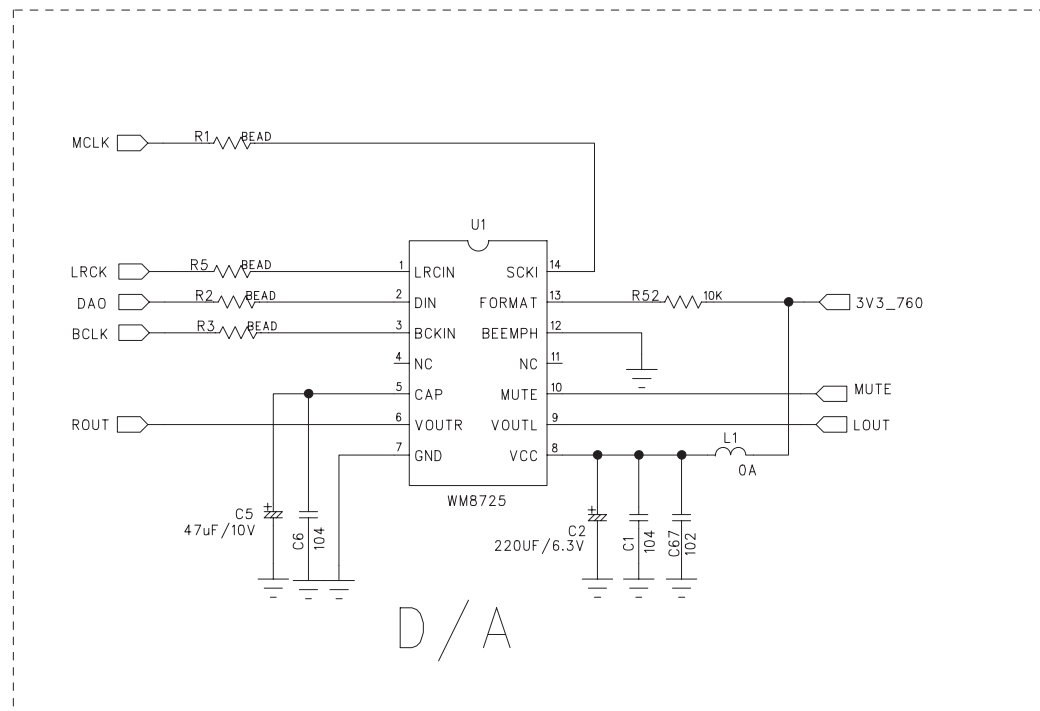
LAYOUT DIAGRAM - MCU BOARD (BOTTOM VIEW)



CIRCUIT DIAGRAM - MCU BOARD



CIRCUIT DIAGRAM - MCU BOARD MEMORY PART



MECHANICAL & ACCESSORIES PARTS LIST

1	996510003912	LENS CD DOOR	ANT	996510003766	ANT WIRE ASSEMBLY L2500MM 2P
2	996510003917	CD DOOR	AUX	996510001906	AUX STEREO CORD BLACK
3	996510003928	CD DOOR CARRIER L	A2	996510003933	FFC CABLE 150MM P1.0MM 10P
4	996510003920	COVER POWER BUTTON	A3	996510003931	FFC CABLE 95MM P1.0MM 16P
5	996510003907	VOLUME KNOB	A4	996510003932	FFC CABLE 20PIN TYPE A
6	996510003913	LENS DISPLAY	MOTOR	996510003940	DOOR MOTOR RF-500TB-14415
7	996510003929	CD DOOR CARRIER R	A	996510003934	SPEAKER BOX (LEFT+RIGHT)
8	996510003914	LENS BAR	B	△ 996510003937	AC CORD 0.71M BS TYPE
9	996510003905	FRONT CABINET	C	996510003938	REMOTE CONTROL
11	996510003908	POWER/SOURCE BUTTON	D	△ 996510003939	POWER SUPPLY 14V 1.8A
12	996510003925	GEAR WHEEL C	MOUNPL	996520035971	PLUG FOR WALL MOUNTING
13	996510003923	GEAR WHEEL A	MOUNSC	996510024007	MOUNTING SCREW W/WASHER
14	996510003924	GEAR WHEEL B			
15	994000004325	BELT MOTOR			
17	996510003906	REAR CABINET			
19	996510003935	STAND COVER			
20	996510003936	STAND BASE			
22	996510003903	DAMPER A			
23	996510006482	CD MECHANISM CMS-M93BGP			
24	994000001664	DAMPER GEAR ASS'Y			
26	994000005312	CATCH ASSEMBLY			
28	996510003927	BRACKET OPEN/CLOSE BUTTON			
29	996510003902	SPRING CONTROL PANEL			
30	996510003916	OPEN/CLOSE BUTTON LENS			
31	996510003921	COVER PLAY BUTTON			
32	996510003909	FF/FW BUTTON			
33	996510003918	FUNCTION PANEL			
34	996510003919	COVER FUNCTION PANEL			
35	996510003910	FUNCTION BUTTON			
36	996510003911	PLAY BUTTON			
37	996510003915	IR LENS			
38	996510003926	PULLEY SERVO MOTOR			
40	996510003922	COVER SERVO MOTOR			

Note: Only these parts mentioned in the list are normal service parts.

ELECTRICAL PARTSLIST**MCU BOARD**

U1	996510003740	I.C. WM8725ED 14-PIN SOIC
U2	996510003897	IC SST39VF800A-70-4C-EKE W/SW
U3	996510003733	I.C. UTCLD1117/A 1.8V SOT-223
U4	996510003898	IC HY57V641620ETP-7 64M SDRAM
U5	996510003739	I.C. TCC760
U7	996510003738	I.C. MAX809STR SOT-23
Y1	996510003735	X'TAL 24.000MHZ 20PF +/-20PPM

MAIN BOARD

C841	994000003217	AL.E.CAP 3300UF 25V
C851	994000003217	AL.E.CAP 3300UF 25V
C853	994000003217	AL.E.CAP 3300UF 25V
CF601	996510003723	FM CERAMIC FILTER LT10.7MS2
CF602	996510003722	FM CER. DISCRIMINATOR J10.7C
D463	996510003726	SCHO BARRIER DIODE PRLL5817
DAB601	996510003725	DAB TUNER MODULE
IC460	996510003899	IC ATMEGA88-20AU W/SW
IC601	996510003732	I.C. TB2132FNG
IC602	994000003215	RDS IC SAA6581T
IC660	996510003731	I.C. V REGULATOR LD1117-3.3
IC661	996510003733	I.C. UTCLD1117/A 1.8V SOT-223
IC801	996510003845	I.C. LP2950ACZ-3.3 TO-92
IC802	996510003844	I.C. VOLTAGE REGULATOR
IC803	996510003731	I.C. V REGULATOR LD1117-3.3
IC901	996510003715	I.C. TDA1517 SOT110
IC902	996510003846	I.C. SC7314 SELECTOR & E_VOL
L613	996510003728	BOBBIN COIL 2 1/2T
L614	996510003729	BOBBIN COIL 3 1/2T MD6B-03F44
L615	996510003900	AXIAL INDUCTOR 220UH D2.5MM

L620	996510003734	SPRING COIL 3.5X0.5X5 1/2T
L802	994000003226	AC LINE FILTER 400UH -30%
Q661	996510003901	TRANSISTOR 8550D
Q801	996510001414	TRANSISTOR KTB772 TAPE
Q803	996510001414	TRANSISTOR KTB772 TAPE
Q805	996510001414	TRANSISTOR KTB772 TAPE
Q807	996510003717	TRANSISTOR KTD882
Q808	996510003718	TRANSISTOR KTC-8550C
Q815	996510003718	TRANSISTOR KTC-8550C
Q816	996500039268	TRANSISTOR KTC-8050C
TC601	994000002418	TRIMMER CAP 220VDC 50%-0%
VD601	996510003727	DIODE 1SV262
VD602	996510003727	DIODE 1SV262

HEADPHONE BOARD

HP901	994000001456	STEREO HEADPHONE JACK
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IR BOARD

IR501	994000005759	INFRARED RECEIVER IRM502H-S
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KEY BOARD

CN550	996510003885	USB SOCKET
CN551	996510003884	3.5MM EARPHONE AUX SOCKET
SW560	996500039269	TACT SWITCH
SW561	996500039269	TACT SWITCH
SW562	996500039269	TACT SWITCH
SW563	996500039269	TACT SWITCH
SW564	996500039269	TACT SWITCH
SW565	996500039269	TACT SWITCH
SW566	996500039269	TACT SWITCH
SW567	996500039269	TACT SWITCH
SW568	996500039269	TACT SWITCH

DC JACK BOARD

DC800	996510001054	6.5MM DC JACK (DJ32-2)
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DOOR SWITCH BOARD

SW401	996510003887	CD DOOR SWITCH
SW402	996510003887	CD DOOR SWITCH

SPK JACK BOARD

CN913	996510003889	SPEAKER SOCKET 4P
CN920	996510003890	FM ANT SOCKET
L904	996510000388	CHOKE COIL 8UH 3A1941N
L905	996510000388	CHOKE COIL 8UH 3A1941N
L906	996510000388	CHOKE COIL 8UH 3A1941N
L907	996510000388	CHOKE COIL 8UH 3A1941N

LCD BOARD

LCD501	996510003892	DOT MATRIX LCD DISPLAY
LED500	996510003894	LED INDICATOR WHITE
LED501	996510003893	LED INDICATOR RED EL-204HD
SW569	996500039269	TACT SWITCH
SW570	996500039269	TACT SWITCH

VOL500	996510003891	ROTARY ENCODER
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CD BOARD

IC701	996510003730	I.C. SAA7824HL/M1A 557
IC702	994000005753	I.C. D9258PH
IC703	996510003896	IC TA7291S(M) (MOTOR DRIVER)
Q701	996510003718	TRANSISTOR KTC-8550C
Q704	996510003718	TRANSISTOR KTC-8550C

SW559	996500039269	TACT SWITCH
X701	996510003895	CHIP X'TAL 8.4672MHZ +/-20PPM

Note: Only these parts mentioned in the list are normal service parts.

REVISION LIST

1.0 Manual 3141 785 31770

Initial Service Manual released.

1.1 Manual 3141 785 31771

In this version, the instruction of CD playability check is added and Electrical Partslist is updated

1.2 Manual 3141 785 31772

In this version,

P9-2 Mechanical Partslist is updated. Change Pos. 23 CDM 12NC from 996510003930 to 996510006482.

1.3 Manual 3141 785 31773

In this version,

P3-1 Service Test Program is updated. (Firmware Version Check Procedure changed)

1.4 Manual 3141 785 31774

In this version,

P9-2 Mechanical Partslist is updated.

Add:

MOUNPL	996520035971	PLUG FOR WALL MOUNTING
MOUNSC	996510024007	MOUNTING SCREW W/WASHER