

Portable compact disc player

Service
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AX2000 AX5000
AX2001 AX5001
AX2002 AX5002
AX2003 AX5003
AX2011 AX5004
all versions

PRODUCT FAMILY ULTRA – ESP

Service Manual



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PHILIPS



TECHNICAL SPECIFICATION

General

Dimensions (WxHxD)	: 128x28x139.5mm
Weight without batteries	: 212g

Power supply modes

DC-in socket	: 2.9-8.0V
Primary batteries (2xLR6)	: 1.6-3.6V
Rechargeable batteries (AY3362)	: 1.6-3.6V

Battery lifetime

BATTERY TYPE	ESP OFF	ESP ON
Primary batteries 2 x LR6	≥14h (20h typ.)	≥14h (20h typ.)
Rechargeable batteries AY3362 (1200mAh)	≥7h (9.5h typ.)	≥7h (9.5h typ.)

Battery level detection

DETECTION LEVEL	Primary batteries	Rechargeable batteries
Battery empty	1.8V +100/-50mV	1.8V +100/-50mV
Battery weak 1	battery empty level + 0.85V ±100mV	battery empty level + 0.65V ±100mV
Battery weak 2	battery empty level + 0.55V ±100mV	battery empty level + 0.45V ±100mV
Battery weak 3	battery empty level + 0.25V ±100mV	battery empty level + 0.25V ±100mV

Charge section (not on all versions)

Charge current	: 250mA ±10%
Charge time for 80% AY3362	: 4.0h nom.
Charge time for 100% AY3362	: 6.0h nom.
Max. charge time (μP controlled)	: 7h
Temperature protection	: 50°C ±5°C

Current consumption

OPERATION MODE	DC-IN SUPPLY (4.5V)		BATT. SUPPLY (2.25V)	
	ESP OFF	ESP ON	ESP OFF	ESP ON
Play-mode	100mA typ.	100mA typ.	120mA typ.	120mA typ.
Jump-mode	220mA typ.	220mA typ.	300mA typ.	400mA typ.
Stand-by (excl. recharge)	30mA typ.		50μA typ.	

Shock resistance

+X/-X direction	: ≥2.5g
+Y/-Y direction	: ≥2.5g
+Z/-Z direction	: ≥2.0g

Headphone out (measured with 16Ω load, DBB/ESP off)

Output power (THD=10%)	
/17 version only	: 2x12mW (+1/-3dB)
all other versions	: 2x6mW (+1/-3dB)
Frequency response (1mW)	: 100Hz-20kHz within 6dB
S/N ratio (unwght)	: ≥80dB (83dB typ.)
S/N ratio (A-wght)	: ≥82dB (85dB typ.)
THD+N (1kHz, 1mW)	: ≤1% (0.2% typ.)
Channel crosstalk (1kHz, no load)	: ≤-24dB (-44dB typ.)
Channel unbalance (-40dB)	: ≤5dB
Volume attenuation (1kHz)	: ≥60dB

Dynamic Bass Boost DBB

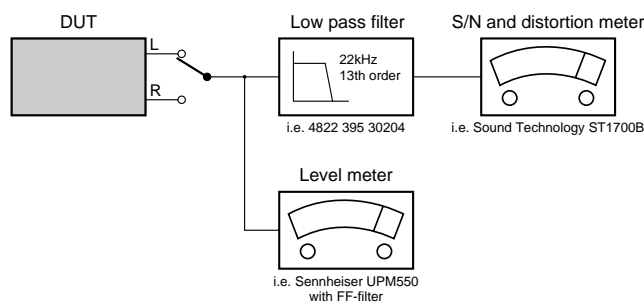
DBB STAGE	Frequency response		
	63kHz	1kHz	10kHz
DBB 1	+6dB ±2dB	0dB ±2dB	0dB ±2dB
DBB 2	+9dB ±2dB	0dB ±2dB	+5dB ±2dB

Laser

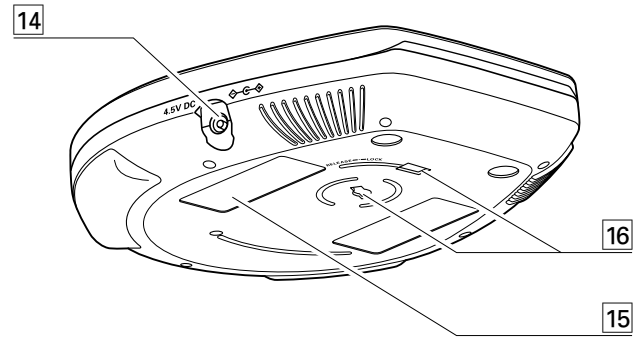
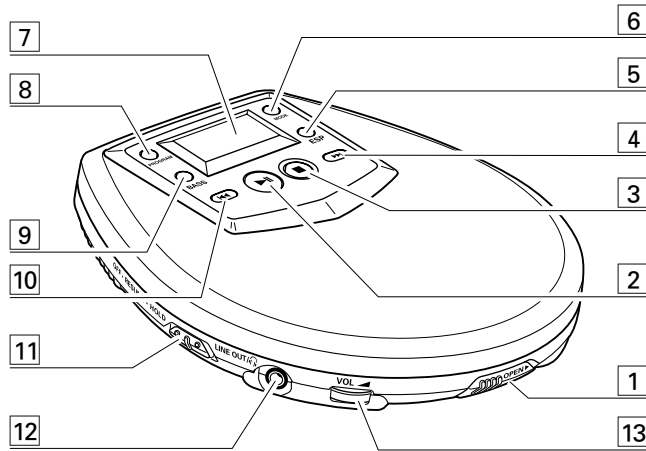
Output power	: <5mW (3mW typ.)
Wavelength	: 780nm

Measurement setup

Use Audio Signal disc SBC429 4822 397 30184



CONNECTIONS AND CONTROLS



- 1 OPEN ►opens the CD lid
- 2 ►||switches the player on, starts or pauses CD play
- 3 ■stops CD play, clears a program or switches the player off
- 4 ►►skips and searches CD tracks forwards
- 5 ESPElectronic Skip Protection ensures continuous CD playback regardless of vibrations and shocks
- 6 MODEselects the different playing possibilities:
SHUFFLE, SHUFFLE REPEAT ALL, REPEAT, REPEAT ALL and *S.C.R.A.M.*
- 7display
- 8 PROGRAMprograms tracks and reviews the program
- 9 BASSswitches the bass enhancement on and off.
This button also switches acoustic feedback (the beep) on/off when it is pressed for more than 2 seconds

- 10 ◀◀skips and searches CD tracks backwards
- 11 RESUMEstores the last position of a CD track played
HOLDlocks all buttons
OFFswitches RESUME and HOLD off
- 12 LINE OUT/🎧3.5mm headphone socket, socket to connect the player to another audio input of an additional appliance, remote control socket (not on all versions)
- 13 VOL ◀adjusts the volume
- 14 4.5V DCsocket for external power supply
- 15typeplate
- 16belt clip holder

TROUBLESHOOTING (excerpt from the Instruction For Use)

Problem	Possible cause	Solution
No power, playback does not start	Batteries	
	Batteries inserted incorrectly	Insert the batteries correctly
	Batteries are empty	Change the batteries
	Contact pins are dirty	Clean them with a cloth
	Mains adapter	
	Loose connection	Connect the adapter securely
	In-car use	
	Cigarette lighter is not powered when ignition is off	Switch on ignition or insert batteries
<i>n.F. d. I.S.C.</i> indication	CD-RW (CD-R) is not recorded properly	Use FINALIZE on the CD Recorder to complete the recording
<i>n.S. d. I.S.C.</i> indication	The CD is badly scratched or dirty	Replace or clean the CD
	CD is not or incorrectly inserted	Insert a CD, label upwards
	The laser lens is steamed up	Wait until the lens has cleared
Hold indication and/or no reaction to controls	HOLD is activated	Deactivate HOLD
	Electrostatic discharge	Disconnect the set from power supply or take out the batteries for a few seconds

Problem	Possible cause	Solution
CD skips tracks	The CD is damaged or dirty	Replace or clean the CD
	RESUME, SHUFFLE or PROGRAM is active	Switch RESUME, SHUFFLE or PROGRAM off
No sound or bad sound quality	PAUSE is activated	Press ►
	Loose, wrong or dirty connections	Check and clean connections
	Volume is not adjusted	Adjust the volume
	Malfunctions due to nearness of active mobile phones	Keep the player away from active mobile phones
	Strong magnetic fields near the player	Change the player's position or connections
	In-car use	
	Cassette adapter is inserted incorrectly	Insert the cassette adapter correctly
	Temperature inside the car is too high/low	Let the player adjust to the temperature
	Cigarette lighter socket is dirty	Clean the cigarette lighter socket
	Wrong playback direction of the car cassette player's autoreverse feature	Change the autoreverse direction

FEATURES

FEATURES OF CD-PORTABLE PRODUCT FAMILY "ULTRA – ESP"	AX2000	AX2001	AX2002	AX2003	AX2011	AX5000	AX5001	AX5002	AX5003	AX5004	AX5006	AX5011	AX5012	AX5013	AX5014	AX5015	AX5016	AX5017	AX5018	AX5019	
CD-RW COMPATIBILITY	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ELECTRONIC SKIP PROTECTION	12s	12s	12s	12s	12s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s
ESP DRAM SIZE [Mbit]	4	4	4	4	4	8	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
HOLD / RESUME FUNCTION	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●
DBB STAGES	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
ACOUSTIC FEEDBACK	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PROGRAM MEMORY	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
RECHARGE NiCd / NiMH	-/-	-/-	●/●	-/-	-/-	-/-	-/-	●/●	-/-	●/●	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
BELT-CLIP	-	-	-	-	-	●	●	●	●	●	●	-	-	●	●	-	-	●	●	●	●
CORD REMOTE CONTROL	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-
LCD BACKLIGHT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LINE / OPT. DIGITAL OUTPUT	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-

ACCESSORIES

ACCESSORIES FOR CD-PORTABLE PRODUCT FAMILY "ULTRA – ESP"		AX2000		AX2001		AX2002		AX2003		AX2011		AX5000		AX5001		AX5002		AX5003		AX5004		AX5006		AX5011		AX5012		AX5013		AX5014		AX5015		AX5016		AX5017		AX5018		AX5019	
		/00	/00z	/00	/05	/11	/00	/05	/18	/19	/19z	/00	/05	/00	/00z	/00	/05	/01	/10	/00	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17	/17		
AY3170/00 AC/DC Adaptor	4822 219 10617	O	O	X			O				X	O	O	X	X					X																					
AY3170/02 AC/DC Adaptor	4822 219 10676							X										X																							
AY3170/05 AC/DC Adaptor	4822 219 10672				X			X				X					X																								
AY3170/09 AC/DC Adaptor	4822 219 10679								X																																
AY3170/10 AC/DC Adaptor	4822 219 10681																				X																				
AY3170/12 AC/DC Adaptor	4822 219 10671					X																																			
AY3170/17 AC/DC Adaptor	4822 219 10616																				X	X	O	O			X	X	O	O								X	X	X	
AY3170/19 AC/DC Adaptor	local supplier								X	X																															
AY3266/00 Pouch (Neoprene)	3140 113 10360																				X																			X	
AY3362/00 Rechargeable Batt. NiMH	3103 308 84120					X	X								X						X																				
AY3464 HiFi Cord (3.5mm L-plug→cinch)	4822 320 11881	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
AY3501/00 Car Adaptor Cassette	4822 397 10059	O	O	O	O	O	O	X	X	X	X	O	O	O	O	O	O	O	O	X	X	O	O	X	O	O	O	O	O	O	O	O	O	O	X	X	X	X	X	O	
AY3545/00 Car DC/DC Converter	4822 219 10033	O	O	O	O	O	O	X	X	X	X	O	O	O	O	O	O	O	O	X	X	O	O	X	O	O	O	O	O	O	O	O	X	X	X	X	X	X	X	O	
AY3767/00 Cord Remote Control	3103 309 72380																																								
SBC HE545/77 Headphone (L-plug)	9082 100 00268	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																				
SBC HE545/77s Headphone (S-plug)	9082 100 00269																				X																				
SBC HL350/77 Headphone (L-plug)	9082 100 00235																				X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	
BELT-CLIP	3103 304 70250	O	O	O	O	O	O	O	O	O	O	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	O	X	X	X	X	O	O	X	X	X	X	

X...supplied with the set, O...optional available

SAFETY & WARNINGS

Ⓒ **WARNING**

All ICs and many other semiconductors 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 wristband with resistance. Keep components and tools at this potential.

Ⓕ **ATTENTION**

Tous les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharges statiques (ESD). Leur longévité pourrait être considérablement écourtée par le fait qu'aucune précaution n'est prise à leur manipulation.

Lors de réparations, s'assurer de bien être relié au même potentiel que la masse de l'appareil et enfilez le braceleterti d'une résistance de sécurité.

Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.

Ⓓ **WARNUNG**

Alle ICs und viele andere Halbleiter sind empfindlich gegenüber elektrostatischen Entladungen (ESD).

Unvorsichtige Behandlung im Reparaturfall kann die Lebensdauer drastisch reduzieren.

Sorgen Sie dafür, daß Sie im Reparaturfall über ein Pulsarmband mit Widerstand mit dem Massepotential des Gerätes verbunden sind.

Halten Sie Bauteile und Hilfsmittel ebenfalls auf diesem Potential.



Ⓖ **WAARSCHUWING**

Alle IC's en vele andere halfgeleiders zijn gevoelig voor electrostatische ontladingen (ESD).

Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen. Zorg ervoor dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat.

Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.

Ⓘ **AVVERTIMENTO**

Tutti IC e parecchi semi-conduttori sono sensibili alle scariche statiche (ESD).

La loro longevità potrebbe essere fortemente ridatta in caso di non osservazione della più grande cauzione alla loro manipolazione. Durante le riparazioni occorre quindi essere collegato allo stesso potenziale che quello della massa del'apparecchio tramite un braccialetto a resistenza.

Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

Ⓒ **AVAILABLE ESD PROTECTION EQUIPMENT :**

anti-static table mat large 1200x650x1.25mm
small 600x650x1.25mm

anti-static wristband

connection box (3 press stud connections, 1M Ω)

extendible cable (2m, 2M Ω , to connect wristband to connection box)

connecting cable (3m, 2M Ω , to connect table mat to connection box)

earth cable (1M Ω , to connect any product to mat or to connection box)

KIT ESD3 (combining all 6 prior products - small table mat)

wristband tester

4822 466 10953

4822 466 10958

4822 395 10223

4822 320 11307

4822 320 11305

4822 320 11306

4822 320 11308

4822 310 10671

4822 344 13999

Ⓒ

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

Ⓕ

Les normes de sécurité exigent que l'appareil soit remis à l'état d'origine et que soient utilisées les pièces de rechange identiques à celles spécifiées.

Les composants de sécurité sont marqués

Ⓓ

Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten. Der Originalzustand des Gerätes darf nicht verändert werden. Für Reparaturen sind Originalersatzteile zu verwenden.

Sicherheitsbauteile sind durch das Symbol

SAFETY



Ⓖ

Veiligheidsbepalingen vereisen, dat het apparaat in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, identiek aan de gespecificeerde, worden toegepast. De Veiligheidsonderdelen zijn aangeduid met het symbool

Ⓘ

Le norme di sicurezza estigono che l'apparecchio venga rimesso nelle condizioni originali e che siano utilizzati i pezzi di ricambio identici a quelli specificati. Componenti di sicurezza sono marcati con

Ⓒ **DANGER:** Invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.



Ⓒ **Varning !**

Osynlig laserstrålning när apparaten är öppnad och spårren är urkopplad. Betrakta ej strålen.

Ⓓ **Advarsel !**

Usynlig laserstrålning ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for strålning.

Ⓖ **Varoitus !**

Avatussa laitteessa ja suojalukituksen ohitettaessa olet alltiina näkymättömälle laserisäteilylle. Älä katso säteeseen !

Ⓒ

After servicing and before returning the set to customer perform a leakage current measurement test from all exposed metal parts to earth ground, to assure no shock hazard exists.

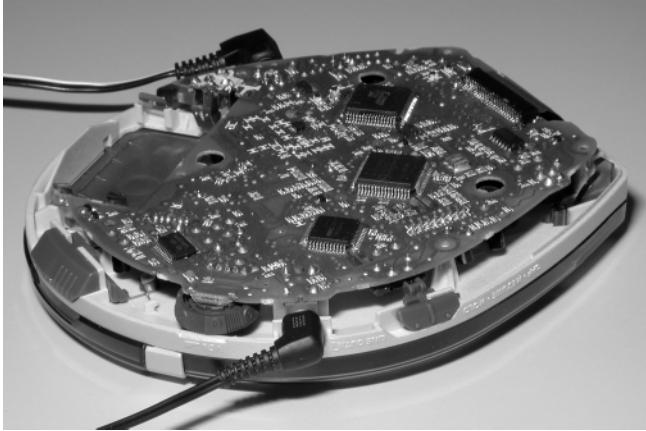
The leakage current must not exceed 0.5mA.

Ⓕ

"Pour votre sécurité, ces documents doivent être utilisés par des spécialistes agréés, seuls habilités à réparer votre appareil en panne".

SERVICE HINTS

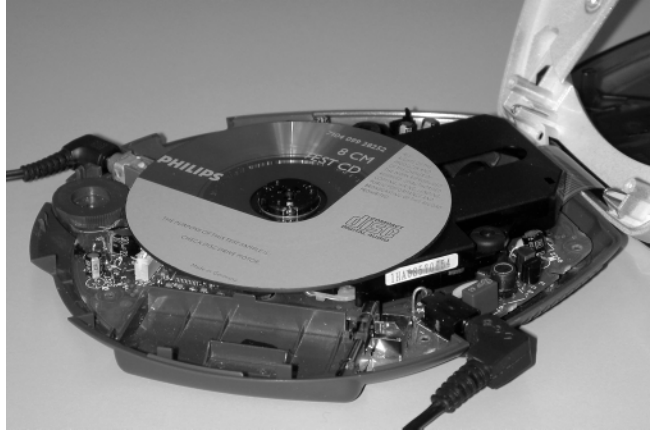
REPAIR POSITION COPPERSIDE



To get access to the copperside of the printed board assembly proceed as follows:

1. Remove the bottom screws (6x)
2. Lift the bottom-cabinet
3. Supply the unit via external DC-socket
4. Take care that the door switch is closed during measurements

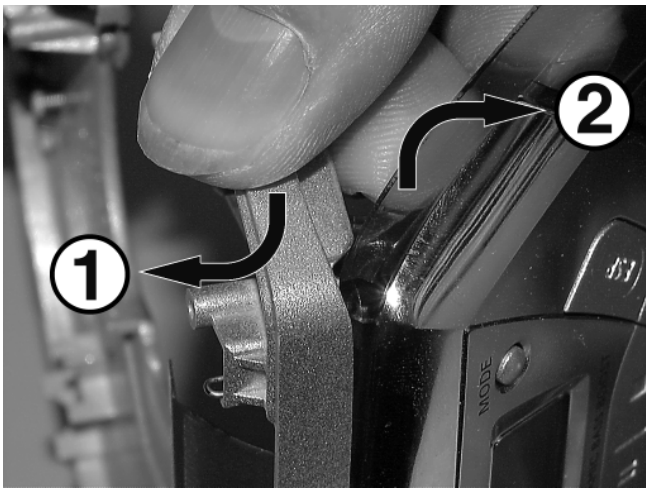
REPAIR POSITION COMPONENTSIDE



To get access to the componentside of the printed board assembly proceed as follows:

1. Remove the bottom screws (6x)
2. Open the CD-door
3. Lift the top-cabinet and put it backwards on the table
4. Supply the unit via the external DC-socket
5. Take care that the door switch is closed during measurements

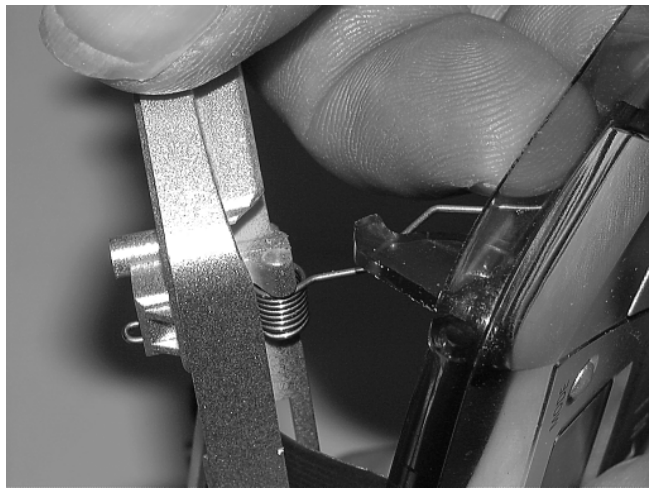
DISMANTLING THE CD-DOOR



To dismantle the CD-door proceed as follows:

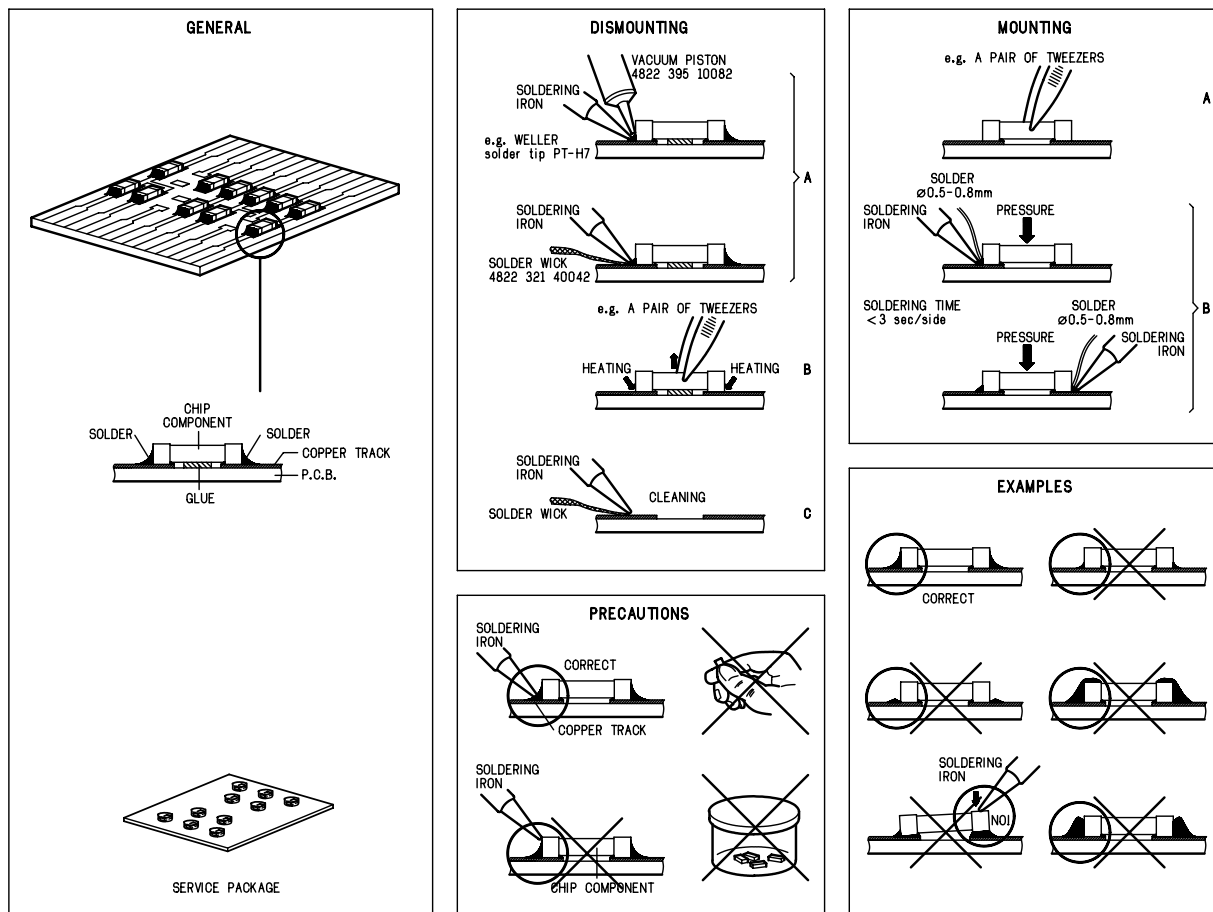
1. Dismantle bottom and printed board/drive assembly
2. Disconnect membrane keyboard (flex-foil connector on copperside of printed board)
3. Bend the cabinet leftwards downwards ①, while bending the CD-door rightwards upwards ②

The procedure appears to be tricky at first, but force needs to be applied with thumb and middle finger only. It's just like snapping one's fingers.



Remark: Don't worry about applied force - both parts have a solid design. However, do not use screwdrivers or tools like that. Sharp edges could damage hinge or cabinet part.

HANDLING CHIP COMPONENTS



SERVICE TOOLS

- Audio signal disc SBC429** 4822 397 30184
- Playability test disc SBC444** 4822 397 30245
- Test disc 5** (disc without errors) + **Test disc 5A** (disc with dropout errors, black spots and fingerprints) **SBC426/SBC426A** 4822 397 30096

ESD PROTECTION EQUIPMENT

- Anti-static table mat** large 1200x650x1.25mm 4822 466 10953
- small 600x650x1.25mm 4822 466 10958
- Anti-static wristband** 4822 395 10223
- Connection box** (3 press stud connections, 1MΩ) 4822 320 11307
- Extendible cable** (2m, 2MΩ, to connect wristband to connection box) 4822 320 11305
- Connecting cable** (3m, 2MΩ, to connect table mat to connection box) 4822 320 11306
- Earth cable** (1MΩ, to connect any product to mat or to connection box) 4822 320 11308
- KIT ESD3** (combining all 6 prior products - small table mat) 4822 310 10671
- Wristband tester** 4822 344 13999

PIN DESCRIPTION OF INTEGRATED CIRCUITS

TZA1024 – HF-PREAMPLIFIER AND LASER SUPPLY CIRCUIT

<i>Pin</i>	<i>Name</i>	<i>Direction</i>	<i>Description</i>
1	LD	HF-preamp → CD-drive	current output to laser diode
2	VCCL	+2.6V	laser supply voltage
3	CFIL	→ HF-preamp	external filter capacitor
4	MON	CD-drive → HF-preamp	laser monitor diode input
5	DIN	CD-drive → HF-preamp	central diode input
6	GND	GND	ground
7	PWRON	CD10 → HF-preamp	power-on select input
8	CMFB	+2.6V / 2	common mode feedback voltage input
9	RFFB	→ HF-preamp	external RF feedback resistor
10	RFEQO	HF-preamp →	RF amplifier output
11	CDRW	CD10 → HF-preamp	gain select input for CDDA/CDRW
12	EQSEL	CD10 → HF-preamp	equalizer/speed select input
13	VCC2	+2.6V	supply voltage
14	RGADJ	GND	external laser supply gain adjust resistor

SC111259FTA – SERVO DRIVER & POWER MANAGEMENT IC

<i>Pin</i>	<i>Name</i>	<i>Direction</i>	<i>Description</i>
1	SLEEP	μP → servo driver	sleep input
2	WAKW	μP → servo driver	wake input
3	VR	+VR	reference voltage input (motor driver)
4	ERR4	CD10 → servo driver	control signal input (slide error signal)
5	CF4	→ servo driver	phase correction capacitor connect (CH4)
6	CF3	→ servo driver	phase correction capacitor connect (CH3)
7	ERR3	CD10 → servo driver	control signal input (radial error signal)
8	ERR2	CD10/μP → servo driver	control signal input (disc speed error signal)
9	CF2	→ servo driver	phase correction capacitor connect (CH2)
10	CF1	→ servo driver	phase correction capacitor connect (CH1)
11	ERR1	CD10 → servo driver	control signal input (focus error signal)
12	OUT1A	servo driver → CD-drive	positive drive output (CH1)
13	PGND1	GND	H-bridge driver ground
14	OUT1B	servo driver → CD-drive	negative drive output (CH1)
15	VIN12	+A	CH1 and CH2 H-bridge driver supply voltage
16	OUT2B	servo driver → CD-drive	negative drive output (CH2)
17	PGND2	GND	H-bridge driver ground
18	OUT2A	servo driver → CD-drive	positive drive output (CH2)
19	OUT3A	servo driver → CD-drive	positive drive output (CH3)
20	PGND2	GND	H-bridge driver ground
21	OUT3B	servo driver → CD-drive	negative drive output (CH3)
22	VIN34	+A	CH3 and CH4 H-bridge driver supply voltage
23	OUT4B	servo driver → CD-drive	negative drive output (CH4)
24	PGND4	GND	H-bridge driver ground
25	OUT4A	servo driver → CD-drive	positive drive output (CH4)
26	VG	+VG	charge pump output
27	C2H	→ servo driver	charge pump capacitor connect
28	C1H	→ servo driver	charge pump capacitor connect
29	C1L	→ servo driver	charge pump capacitor connect
30	C2L	→ servo driver	charge pump capacitor connect
31	VIN	battery → servo driver	battery supply voltage
32	RSTB	servo driver → μP	reset block output
33	CHGSW	servo driver → charge circuit	transistor drive output for battery charger
34	RS	charge circuit → servo driver	OpAmp non-inverting input for battery charger
35	INM2	+A stabilizer → servo driver	error amplifier inverting input
36	RF2	+A stabilizer → servo driver	error amplifier output
37	DCIN	+DC	DC power supply from AC/DC adaptor
38	VDET	servo driver →	DCIN over voltage and VIN low voltage detect output
39	VREF	servo driver →	Voltage reference circuit output
40	DTC	→ servo driver	max. duty control voltage input for power management
41	VOUT	servo driver → DC/DC converter	PWM output for power management
42	VC	→ servo driver	power management power supply
43	CGND	GND	internal ground
44	RF1	servo driver →	OpAmp output for power management
45	INM1	→ servo driver	OpAmp inverting input for power management
46	CLK	→ servo driver	clock input
47	OE	μP → servo driver	output enable for motor drivers
48	CHGON	μP → servo driver	charge enable for battery charger

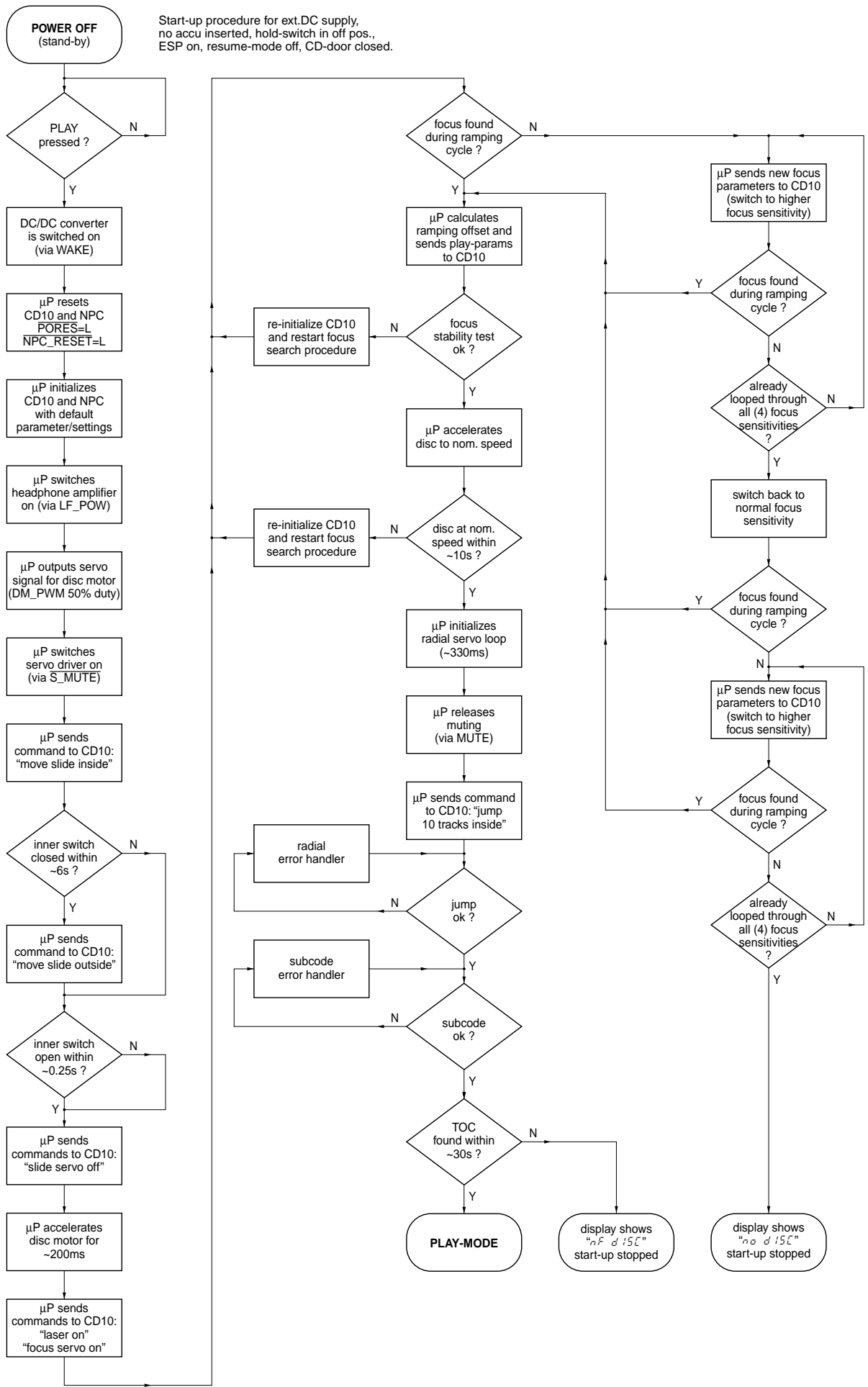
SAA7324 – DECODER, DIGITAL SERVO IC AND D/A-CONVERTER CD10 (low voltage version)

<i>Pin</i>	<i>Name</i>	<i>Direction</i>	<i>Description</i>
1	HFREF	→ CD10	comparator common mode input
2	HFIN	→ CD10	comparator signal input
3	ISLICE	CD10 →	current feedback from data slicer
4	VSSA1	GND	analog ground 1
5	VDDA1	+2.6V	analog supply voltage 1
6	IREF	CD10 →	reference current output pin
7	VRIN	CD10 →	reference voltage for servo ADC's
8	D1	CD-drive → CD10	unipolar current input (central diode signal input)
9	D2	CD-drive → CD10	unipolar current input (central diode signal input)
10	D3	CD-drive → CD10	unipolar current input (central diode signal input)
11	D4	CD-drive → CD10	unipolar current input (central diode signal input)
12	R1	CD-drive → CD10	unipolar current input (satellite diode signal input)
13	R2	CD-drive → CD10	unipolar current input (satellite diode signal input)
14	VSSA2	GND	analog ground 2
15	CROUT	CD10 → X-TAL	crystal/resonator output
16	CRIN	X-TAL → CD10	crystal/resonator input
17	VDDA2	+2.6V	analog supply voltage 2
18	LN	CD10 →	DAC left channel differential output - negative
19	LP	CD10 →	DAC left channel differential output - positive
20	VNEG	GND	DAC negative reference input
21	VPOS	+2.6V	DAC positive reference input
22	RN	CD10 →	DAC right channel differential output - negative
23	RP	CD10 →	DAC right channel differential output - positive
24	SELPLL	CD10 →	selects whether internal clock multiplier PLL is used
25	TEST1	GND	test control input 1; this pin should be tied low
26	CL16	CD10 → NPC	16.9344 MHz system clock output
27	DATA	CD10 → NPC	serial data output (3-state)
28	WCLK	CD10 → NPC	word clock output (3-state)
29	SCLK	CD10 → NPC	serial bit clock output (3-state)
30	EF	CD10 → NPC	C2 error flag output (3-state)
31	TEST2	GND	test control input 2; this pin should be tied low
32	KILL	CD10 → Mute control	kill output (programmable; open-drain)
33	VSSD1	GND	digital ground 2
34	V2/V3	CD10 → NPC	versatile I/O: input versatile pin 2 or output versatile pin 3 (open-drain)
35	WCLI	NPC → CD10	word clock input (for data loopback to DAC)
36	SDI	NPC → CD10	serial data input (for data loopback to DAC)
37	SCLI	NPC → CD10	serial bit clock input (for data loopback to DAC)
38	RESETn	μP → CD10	power-on reset input (active low)
39	SDA	μP ↔ CD10	microcontroller interface data I/O line (open-drain output)
40	SCL	μP → CD10	microcontroller interface clock line input
41	RAB	μP → CD10	microcontroller interface R/W and load control line input (4-wire bus mode)
42	SILD	μP → CD10	microcontroller interface R/W and load control line input (4-wire bus mode)
43	STATUS	CD10 →	servo interrupt request line/decoder status register output (open-drain)
44	TEST3	GND	test control input 3; this pin should be tied low
45	RCK	→ CD10	subcode clock input
46	SUB	CD10 →	P-to-W subcode bits output (3-state)
47	SFSY	CD10 → μP	subcode frame sync output (3-state)
48	SBSY	CD10 → NPC	subcode block sync output (3-state)
49	CL11/4	CD10 →	11.2896 MHz or 4.2336 MHz (for microcontroller) clock output
50	VSSD2	GND	digital ground 3
51	DOBM	CD10 →	bi-phase mark output (externally buffered; 3-state)
52	VDDD1P	+2.6V	digital supply voltage 2 for periphery
53	CFLG	CD10 →	correction flag output (open-drain)
54	RA	CD10 → servo driver	radial actuator output
55	FO	CD10 → servo driver	focus actuator output
56	SL	CD10 → servo driver	slide control output
57	VDDD2C	+2.6V	digital supply voltage 3 for core
58	VSSD3	GND	digital ground 4
59	MOTO1	CD10 → servo driver	motor output 1; versatile (3-state)
60	MOTO2	CD10 →	motor output 2; versatile (3-state)
61	V4	CD10 → HF-preamp	versatile output pin 4
62	V5	CD10 → HF-preamp	versatile output pin 5
63	V1	innerswitch → CD10	versatile input pin 1
64	LDON	CD10 → HF-preamp	laser drive on output (open-drain)

SM5903BF – COMPRESSION-TYPE ANTI-SHOCK MEMORY CONTROLLER NPC

<i>Pin</i>	<i>Name</i>	<i>Direction</i>	<i>Description</i>
1	VDD	+2.6V	supply voltage
2	UC1	NPC ↔	μP interface extension I/O line 1
3	UC2	NPC ↔	μP interface extension I/O line 2
4	UC3	NPC ↔	μP interface extension I/O line 3
5	UC4	NPC ↔	μP interface extension I/O line 4
6	UC5	NPC ↔	μP interface extension I/O line 5
7	TEST1/DIT	NPC →	digital audio interface output
8	TEST2	+2.6V	test pin
9	CLK	CD10 → NPC	16.9344MHz clock input
10	VSS	GND	ground
11	YSRDATA	CD10 → NPC	audio serial data input
12	YLRCK	CD10 → NPC	audio serial L/R clock input
13	YSCK	CD10 → NPC	audio serial bit clock input
14	ZSCK	NPC → CD10	audio serial bit clock output
15	ZLRCK	NPC → CD10	audio serial L/R clock output
16	ZSRDATA	NPC → CD10	audio serial data output
17	YFLAG	CD10 → NPC	signal processor IC RAM overflow flag
18	YFCLK	GND	crystal-controlled frame clock input
19	YBLKCK	CD10 → NPC	subcode block clock signal output
20	RESET	μP → NPC	system reset input (active low)
21	ZSENSE	NPC →	μP interface status output
22	VDD2	+2.6V	supply voltage
23	YDMUTE	→ NPC	forced mute input
24	YMLD	μP → NPC	μP interface latch clock input
25	YMDATA	μP → NPC	μP interface serial data input
26	YMCLK	μP → NPC	μP interface shift clock input
27	OE	NPC → DRAM	DRAM OE control output (active low)
28	CAS	NPC → DRAM	DRAM CAS control output (active low)
29	D2	NPC ↔ DRAM	DRAM data input/output 2
30	D3	NPC ↔ DRAM	DRAM data input/output 3
31	D0	NPC ↔ DRAM	DRAM data input/output 0
32	D1	NPC ↔ DRAM	DRAM data input/output 1
33	WE	NPC → DRAM	DRAM WE control output (active low)
34	RAS	NPC → DRAM	DRAM RAS control output (active low)
35	A9	NPC → DRAM	DRAM address output 9
36	A8	NPC → DRAM	DRAM address output 8
37	A7	NPC → DRAM	DRAM address output 7
38	A6	NPC → DRAM	DRAM address output 6
39	A5	NPC → DRAM	DRAM address output 5
40	A4	NPC → DRAM	DRAM address output 4
41	A0	NPC → DRAM	DRAM address output 0
42	A1	NPC → DRAM	DRAM address output 1
43	A2	NPC → DRAM	DRAM address output 2
44	A3	NPC → DRAM	DRAM address output 3

START-UP PROCEDURE – FLOW CHART



SERVICE TEST PROGRAM

1. PRELIMINARY SETUP

- To enter the service test program disconnect the AC/DC adaptor and remove batteries, open the CD-door and hold the buttons "PLAY" & "PREV" depressed while turning power on (i.e. connecting the AC/DC adaptor).
- The display shows the software version of the built-in μP (i.e. "5 - 25"). Versions are counted from "00" onwards; that means the higher the number the newer the software.
- The program is now in the main menu – various tests can be entered by pressing the corresponding buttons (see flow chart on next page or detailed description of available tests below).
- To exit the service test program press the "STOP" button or disconnect the set from the power source.

2. DISPLAY TEST

Purpose: Check functionality of display and display driver.

- To enter the display test start the service test program and press the "NEXT" button.
- The display shows test pattern1. All segments are activated for finding open circuits (see flow chart on next page).
- To jump to the next pattern press the "NEXT" button.
- The display shows test pattern2. All alternate pins (2, 4, ...) are activated for finding short circuits (see flow chart on next page).
- To jump back to test pattern1 press the "NEXT" button, to exit the display test and return to the main menu press the "STOP" button.

3. KEY TEST

Purpose: Check operation of keys and cord remote control.

- To enter the key test start the service test program and press the "MODE" button.
- The display shows "- -".
- Hold key depressed and check corresponding key code on the display. Key codes can be found in table1 (see flow chart on next page).
- To exit the key test and return to the main menu press the "STOP" button.

4. PLAYBACK TEST WITH ERROR ANALYSIS

Purpose: Analyze errors that occur during playback and search for intermittent failures.

- To enter the playback test start the service test program and press the "BASS" button.
- To start the error analysis press the "PLAY" button. Note that the playback test can only be entered if the CD-door is closed.
- The set will read the TOC and start playback.

As long as the playback is free of errors the display shows track and time information like in normal play-mode. In case of errors corresponding error codes will be displayed. The meaning of these error codes can be found in table2 (see flow chart on next page).

Note: Errors can either be "fatal" or "non fatal". Fatal errors always stop the playback, non fatal errors only cause a short interruption of the music. Fatal errors are displayed as long as the set is connected to the power source, non fatal errors are displayed until a new error occurs or a button is pressed.

- To stop the playback test disconnect the set from the power source.

5. SERVO TEST

Purpose: Check door switch, inner switch of CD-drive, movement of slide and acceleration of discmotor.

- To enter the servo test start the service test program and press the "PLAY" button.
- The display shows " $\bar{c} \bar{d} xy$ ".
"x" indicates state of door switch;
"y" indicates state of inner switch.
 $x,y = \bar{c}$ means switch is closed; "i" means switch is open.
- To move slide outside hold the "NEXT" button depressed.
- To move slide inside hold the "PREV" button depressed.
- To accelerate the discmotor clockwise hold the "MODE" button depressed.
- To accelerate the discmotor counter-clockwise hold the "PROG" button depressed.
- To enter the focus test press the "PLAY" button, to exit the servo test and return to the main menu press the "STOP" button.

6. FOCUS TEST

Purpose: Check movement of lens and operation of focus servo for CDDA and CDRW discs.

Since the CDRW reflects much less light than an ordinary CDDA, the gain of the HF-amplifier stage and the sensitivity of the ADC inside the Decoder&Digital Servo IC "CD10" must be adapted accordingly. The gain is switched via the CDRW input of the HF-preamplifier. The ADC-sensitivity is set via software parameters (sent from μP to "CD10"). In total, there are 4 sensitivity modes available: 1 for CDDA and 3 for CDRW. The modes are listed in table3 (see next page). In normal play-mode, the correct focus sensitivity is chosen automatically during start-up (see "Start-up procedure" on previous page). In the service test program, the sensitivity can be chosen manually in order to allow individual measurements in several modes.

- The focus servo loop is switched on and the set starts searching the focus ("focus ramping"). As soon as the focus has been found the focus servo loop is closed and the state of the focus is monitored continuously.
- If the focus is OK the display shows " F x", else "- F x".
"x" indicates the sensitivity mode. Details can be found in table3 (see flow chart on next page).
- To toggle between sensitivity modes press the "BASS" button.
- To move slide outside hold the "NEXT" button depressed.
- To move slide inside hold the "PREV" button depressed.
- To accelerate the discmotor clockwise hold the "MODE" button depressed.
- To accelerate the discmotor counter-clockwise hold the "PROG" button depressed.
- In case the focus is OK the discmotor test can be entered by pressing the "PLAY" button, to exit the focus test and return to the main menu press the "STOP" button.

7. DISCMOTOR TEST

Purpose: Check speed regulation of discmotor.

- The speed regulation is switched on and the discmotor starts rotating. If the speed reaches 75% of the nom. speed the display shows " d", else "- d".
- In parallel also the state of the focus is monitored continuously (display " F x" or "- F x").
- In case the disc speed is OK and the focus is OK the radial test can be entered by pressing the "PLAY" button, to exit the discmotor test and return to the main menu press the "STOP" button.

8. RADIAL TEST

Purpose: Check if radial loop locks and an audio signal is audible at the headphone output.

- The radial servo loop is switched on, mute is released and the audio signal is audible. If the system is on track the display shows " r", else "- r".
- In parallel also the disc speed (display " d" or "- d") and the state of the focus (display " F x" or "- F x") are monitored continuously. Note: In case of radial errors the audio output is muted and mute is not released automatically when the systems recovers from the error. "- r" remains on the display.
To open mute again press the "NEXT" or "PREV" button.
- To jump 16 tracks outside press the "NEXT" button.
- To jump 16 tracks inside press the "PREV" button.
- To exit the radial test and return to the main menu press the "STOP" button, to exit the service test program disconnect the set from the power source.

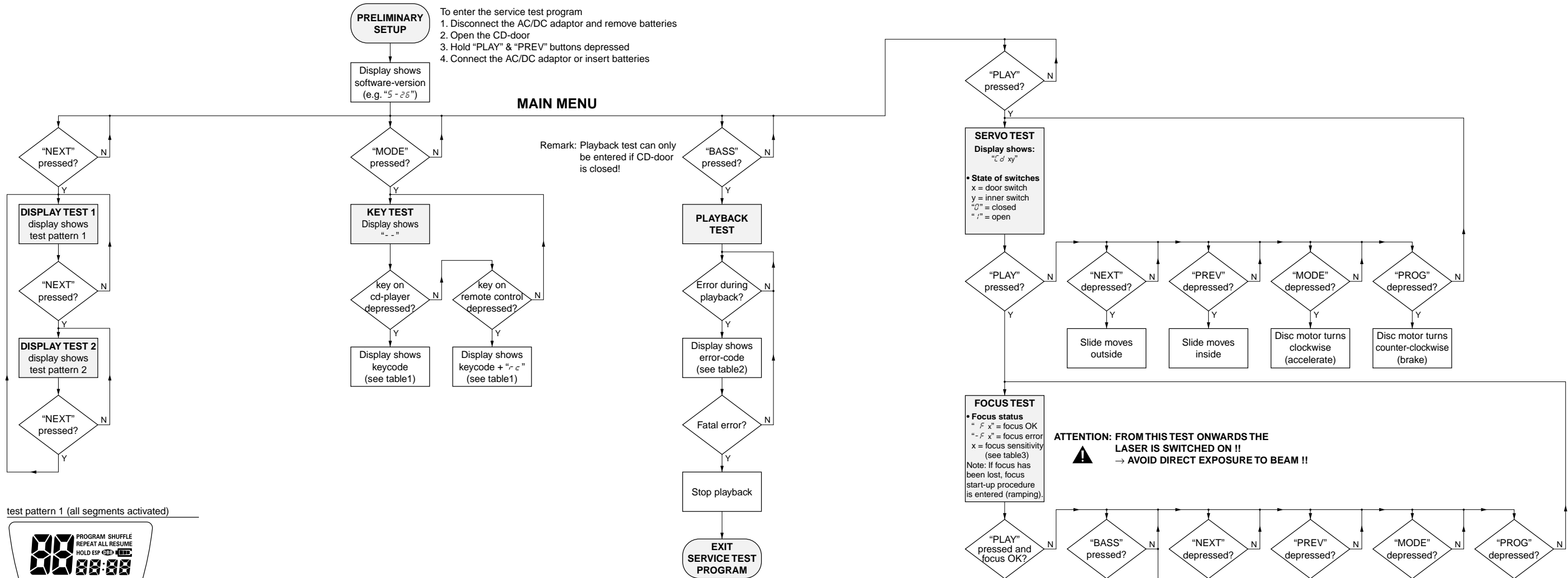
Important remark:

In radial test mode data to the DRAM is written at 1.2 times the nominal speed, and read from the DRAM at nominal speed. Because writing is done faster than reading the DRAM gets full after a certain time.

In normal play mode the system would now wait until the DRAM is partly emptied again, jump backwards and resume filling at the last written position. However, in radial test mode the jumps would disturb measurements on the radial servo loop.

Therefore this function has been disabled and filling restarts immediately from the current position of the pick-up unit. As a result "jumps" are audible during playback.

SERVICE TEST PROGRAM – FLOW CHART



test pattern 1 (all segments activated)



test pattern 2 (alternate segments activated)



table2 – playback error analysis

CODE	ERROR	TYPE	CAUSE
E 1000	focus error	non fatal	Focus point lost for at least 3ms.
E 1001	radial error	non fatal	The radial servo was offtrack for a certain amount of time.
E 1002	sledge in error	non fatal	The slide did not reach it's inner pos. (inner switch of CD-drive does not close) within approx. 6s.
E 1003	sledge out error	non fatal	The slide did not come out of it's inner pos. (inner switch of CD-drive is open) within approx. 250ms.
E 1004	DRAM filling error	non fatal	The DRAM controller was not able to connect two consecutive audio frames. The microcontroller had to perform a direct audio connection that produces audible clicks.
E 1005	jump error	non fatal	The offtrack values do not decrease properly when jumping tracks, the jump destination could not be found.
E 1006	subcode error	non fatal	No valid subcode for approx. 230ms.
E 1008	turntable motor error	fatal	During start-up, the disc speed did not reach 75% of the nom. speed within approx. 6 seconds.
E 1009	audio error (error flag)	non fatal	Uncorrectable audio error (EF error flag from CD-Decoder).
E 1020	focus search error	fatal	The focus point could not be found within approx. 10s (no valid TOC info), resp. 30s (valid TOC info).

table1 – key test

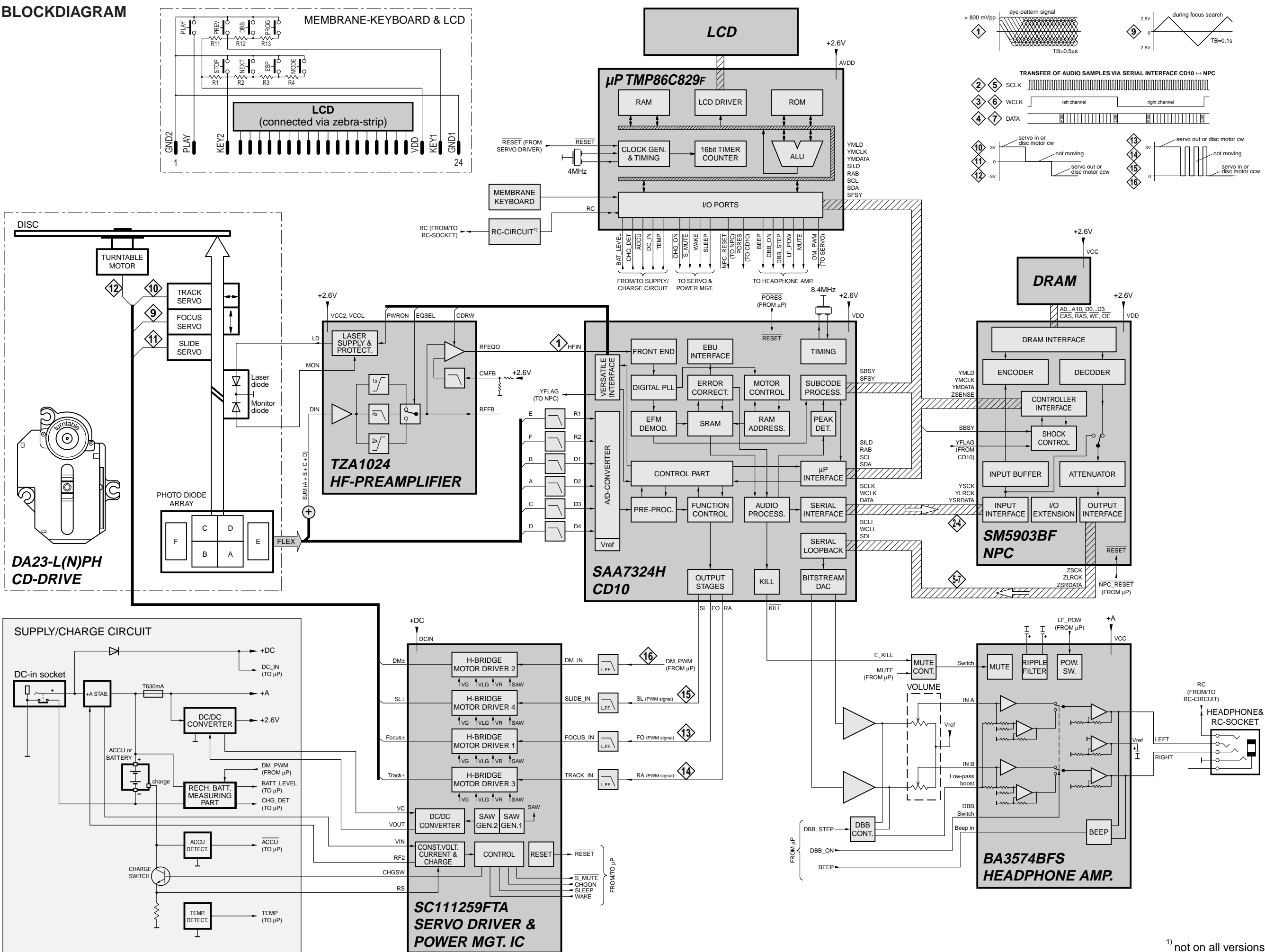
	DISPLAY SET
KEYS OF SET	
BASS	1
PROGRAM	2
MODE	3
PLAY	5
NEXT	6
PREVIOUS	7
ESP	8
KEYS OF CORD REMOTE CONTROL	
STOP	4 r c
PLAY	5 r c
NEXT	6 r c
PREVIOUS	7 r c

Press "STOP" on the CD-player to exit the key test.

table3 – focus sensitivity

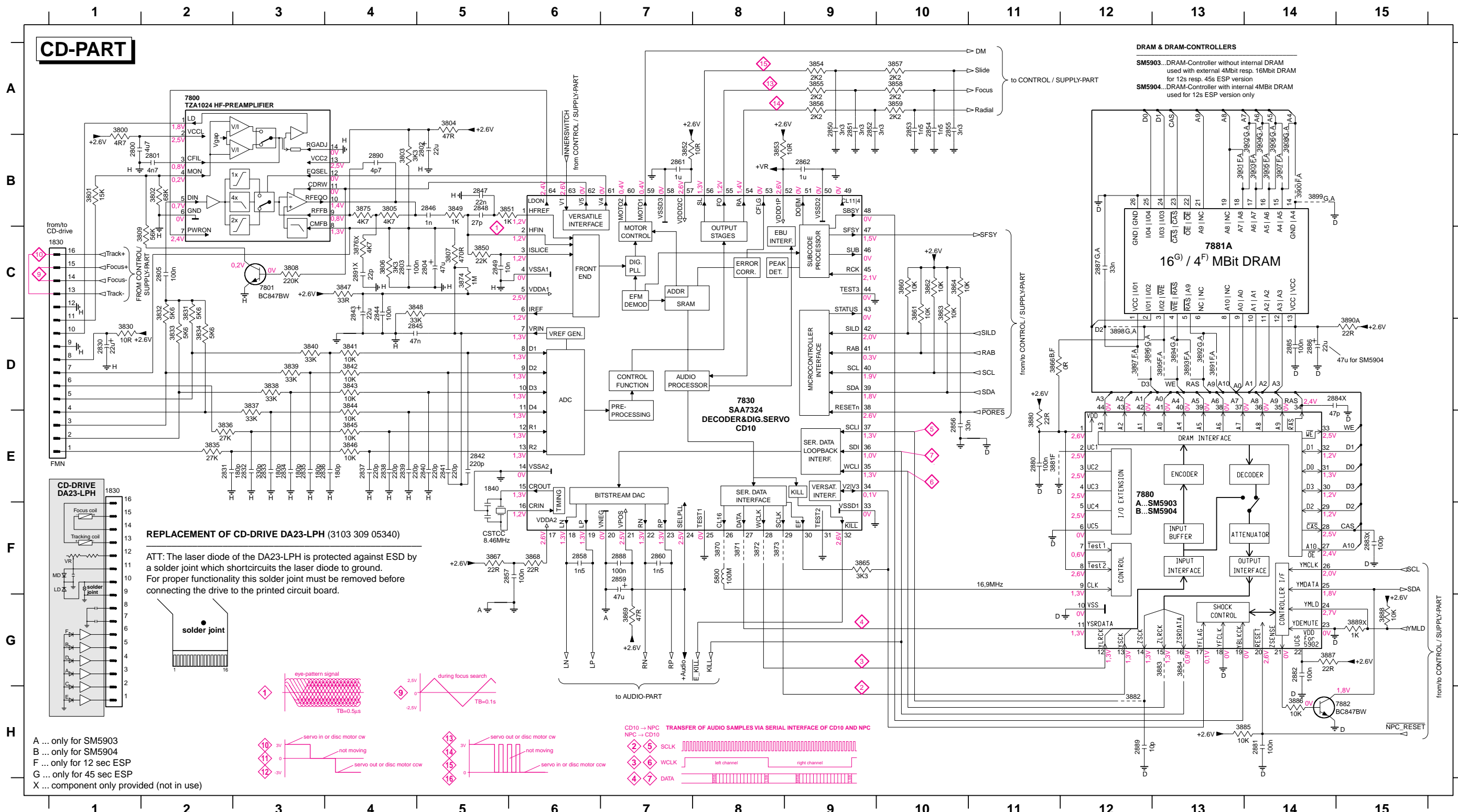
DISPLAY	ESP-FLAG	FOCUS SENSITIVITY
F 01	off	Normal focus sensitivity for CDDA
F 02	on	Low focus sensitivity for high-reflective CD-RW
F 03	on	Medium focus sensitivity for normal-reflective CD-RW
F 04	on	High focus sensitivity for low-reflective CD-RW

BLOCKDIAGRAM

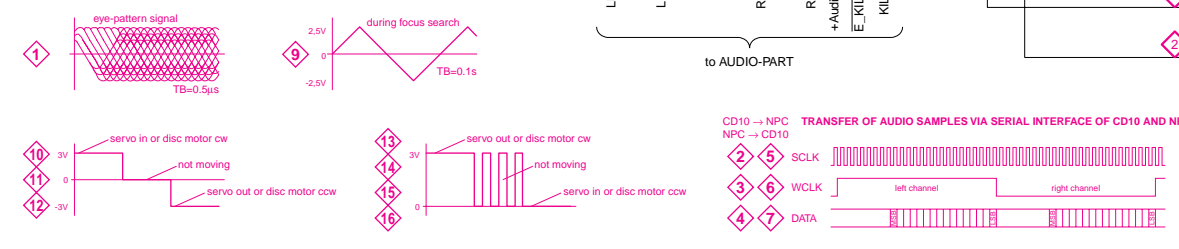


1) not on all versions

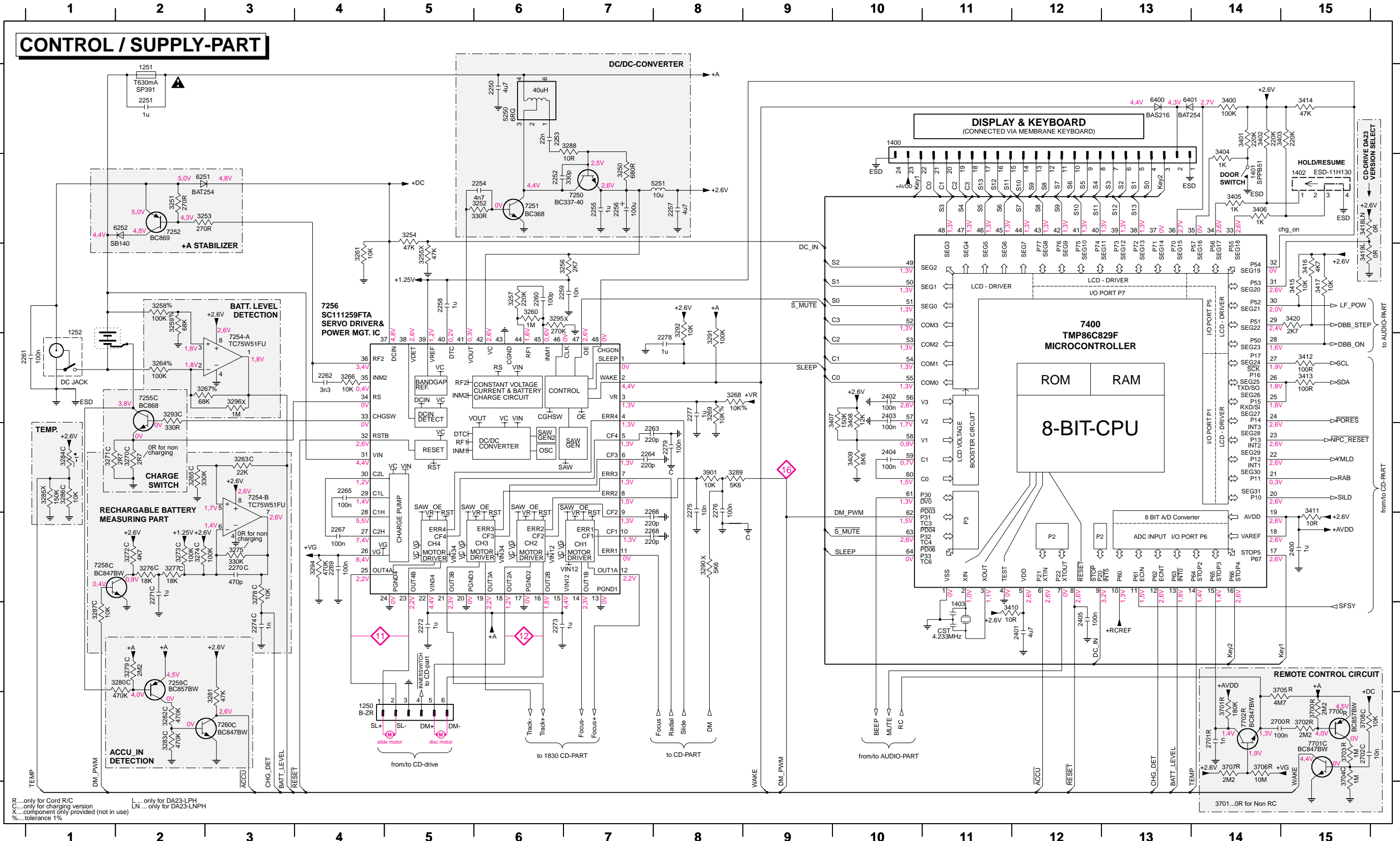
1830 C1	2803 C4	2832 E3	2837 E4	2842 E5	2847 B5	2852 A9	2857 F6	2862 B9	2884 D14	2889 H12	3802 B2	3807 C5	3832 C2	3837 D3	3842 D4	3847 C4	3852 B7	3857 A10	3862 C10	3867 F5	3872 F8	3880 E11	3885 H13	3890 D15	3895 D13	3900 B14	3905 B14	7800 A2	7882 H14
1840 E5	2804 C5	2833 E3	2838 E4	2843 C4	2848 B5	2853 A10	2858 F6	2880 E11	2885 D14	2890 B4	3803 B4	3808 C3	3833 D2	3838 D3	3843 D4	3848 C4	3853 B8	3858 A10	3863 C10	3868 F7	3873 F8	3881 E11	3886 H14	3891 D13	3896 D12	3901 B13	3906 B14	7801 C3	
2800 B1	2805 C2	2834 E3	2839 E4	2844 C4	2849 C5	2854 A10	2859 F7	2881 H14	2886 D14	2891 C4	3804 A5	3809 C2	3834 D2	3839 D3	3844 D4	3849 B5	3854 A9	3859 A10	3864 C10	3869 G6	3874 C5	3882 G12	3887 G14	3892 D13	3897 D12	3902 B14	3907 B14	7800 C3	7830 B5
2801 B2	2830 D1	2835 E3	2840 E5	2845 D4	2850 A9	2855 A10	2860 F7	2882 G14	2887 C12	3800 A1	3805 B4	3830 D1	3835 E2	3840 D3	3845 E4	3850 C5	3855 A9	3860 C10	3865 F9	3870 F8	3875 B4	3883 G13	3888 G15	3893 D13	3898 D12	3903 B14	3908 B14	7880 D12	
2802 B5	2831 E2	2836 E4	2841 E5	2846 B5	2851 A9	2856 E10	2861 B7	2883 F15	2888 F7	3801 B1	3806 C4	3831 C2	3836 E2	3841 D4	3846 E4	3851 B5	3856 A9	3861 C10	3866 D11	3871 F8	3876 C4	3884 G13	3889 G15	3894 D13	3899 B14	3904 B14	5800 F8	7881 C12	



A ... only for SM5903
 B ... only for SM5904
 F ... only for 12 sec ESP
 G ... only for 45 sec ESP
 X ... component only provided (not in use)



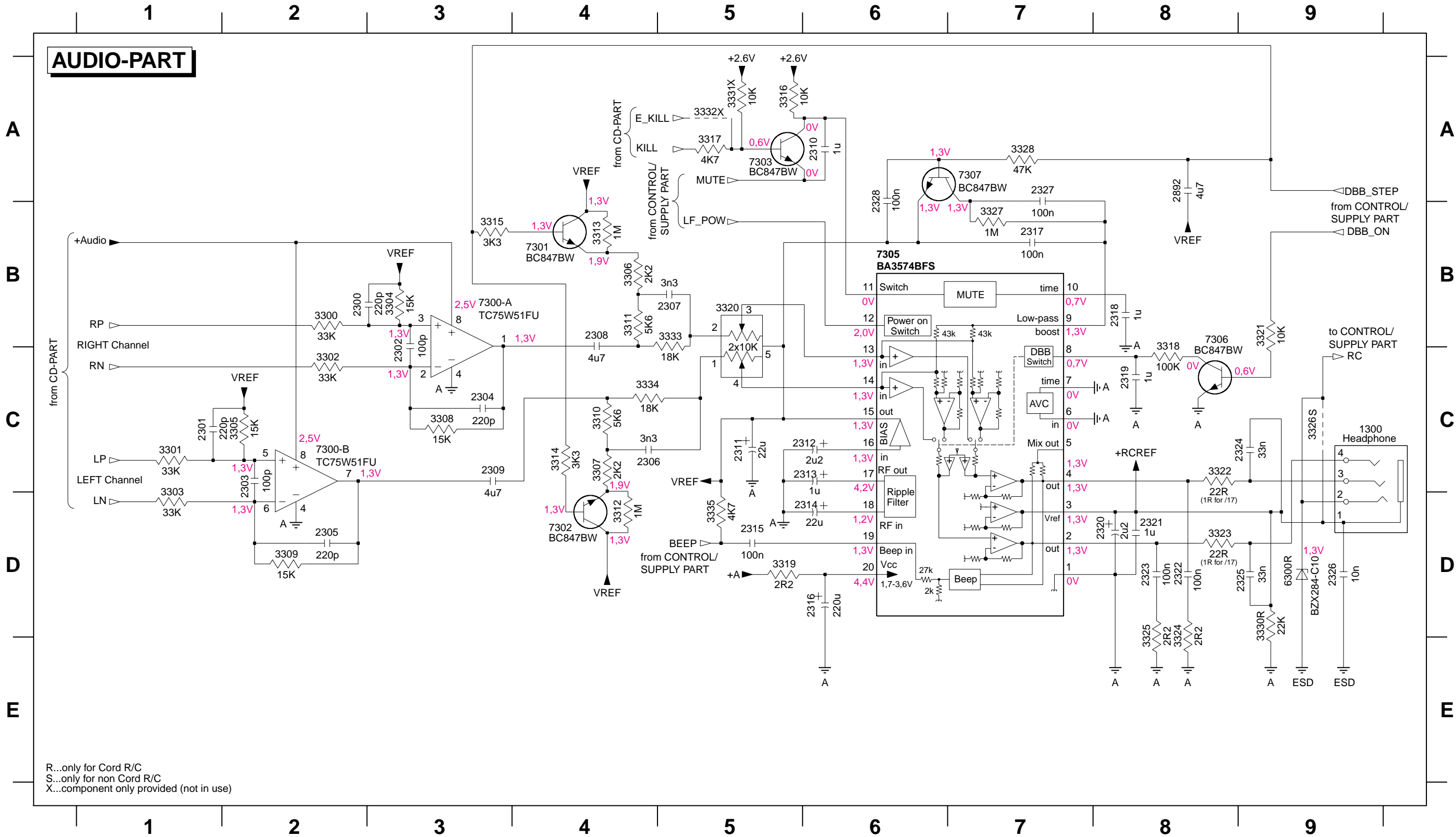
1250 H4	2250 A6	2257 B8	2264 E7	2271 F2	2278 D8	2405 G12	3253 B2	3260 C6	3268 D8	3275 F3	3282 H2	3289 E8	3296 D3	3406 B14	3413 D15	3420 C15	3706 H14	6252 B2	7254-B E3	7700 H15
1251 A2	2251 A2	2258 C5	2265 E4	2272 G5	2279 E8	2700 H14	3254 B5	3261 C4	3269 D8	3276 F2	3283 H2	3290 F8	3400 A14	3407 D10	3414 A15	3700 H15	3707 H14	6400 A13	7255 D2	7701 H15
1252 D1	2252 B6	2259 C7	2266 F7	2273 G6	2400 F15	2701 H14	3255 C5	3262 E3	3270 E2	3277 F2	3284 E1	3291 D8	3401 A14	3408 D10	3415 C15	3701 H14	3708 H15	6401 A13	7256 C7	7702 H14
1400 A10	2253 A6	2260 C6	2267 F4	2274 G3	2401 G12	2702 H15	3256 C7	3263 E2	3271 E1	3278 F3	3285 E1	3292 C8	3402 A14	3409 E10	3416 C15	3702 H15	3901 E8	7257 B7	7258 F1	
1401 B14	2254 B6	2261 D1	2268 F7	2275 E8	2402 D10	2703 H15	3257 C6	3264 E2	3272 F2	3279 G2	3286 E1	3293 D2	3403 A15	3410 G11	3417 C15	3703 H15	5250 A6	7251 B6	7259 G2	
1402 B15	2255 B7	2262 D4	2269 F4	2276 E8	2403 D10	2704 H15	3251 B2	3265 D4	3273 F2	3280 G2	3287 F4	3294 F4	3404 B14	3411 F15	3418 H15	3704 H15	5251 B8	7252 B2	7260 H3	
1403 F11	2256 B7	2263 E7	2270 F3	2277 D8	2404 E10	2705 H15	3252 B6	3259 C2	3267 D2	3274 F2	3281 H3	3288 A7	3295 C6	3405 B14	3412 D15	3419 C15	6251 B2	7254-A D3	7400 B10	



R...only for Cord R/C
 C...only for charging version
 X...component only provided (not in use)
 %...tolerance 1%

L... only for DA23-LPH
 LN ... only for DA23-LNPH

1300 C9	2303 C2	2307 B5	2311 C5	2315 D5	2319 C8	2323 D8	2327 A7	3301 C1	3305 C2	3309 D2	3313 B4	3317 A5	3321 B9	3325 D8	3330 D9	3334 C4	7300-B C2	7305 B6
2300 B2	2304 C3	2308 B4	2312 C6	2316 D6	2320 D8	2324 C9	2328 A6	3302 C2	3306 B4	3310 C4	3314 C4	3318 C8	3322 C8	3326 C9	3331 A5	3335 D5	7301 B4	7306 B8
2301 C1	2305 D2	2309 C3	2313 C6	2317 B7	2321 D8	2325 D9	2892 A8	3303 D1	3307 C4	3311 B4	3315 B3	3319 D5	3323 D8	3327 B7	3332 A5	6300 D9	7302 D4	7307 A7
2302 C3	2306 C4	2310 A6	2314 D6	2318 B8	2322 D8	2326 D9	3300 B2	3304 B3	3308 C3	3312 D4	3316 A5	3320 B5	3324 D8	3328 A7	3333 B5	7300-A B3	7303 A5	



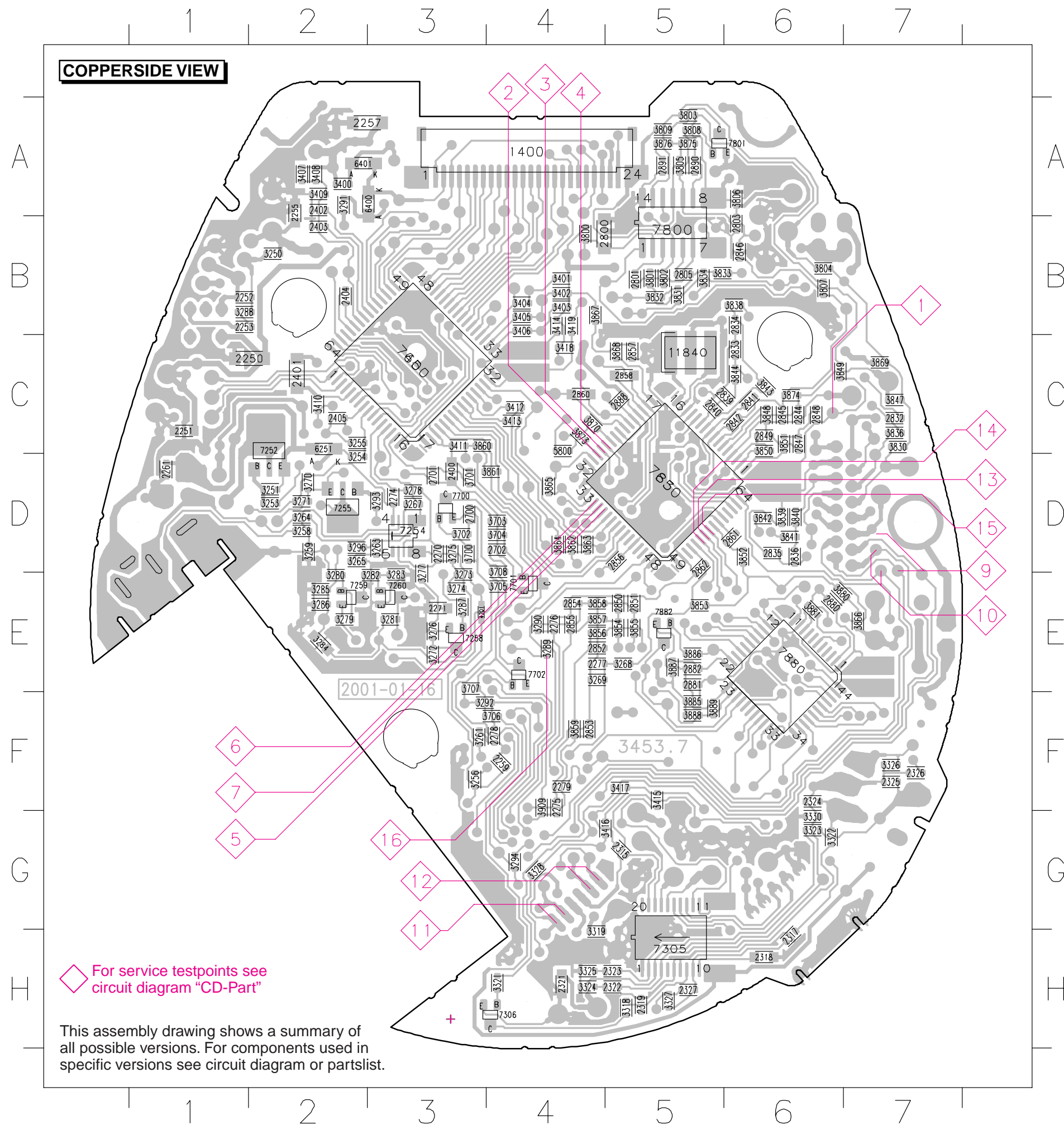
R...only for Cord R/C
 S...only for non Cord R/C
 X...component only provided (not in use)

COMPONENTSIDE VIEW



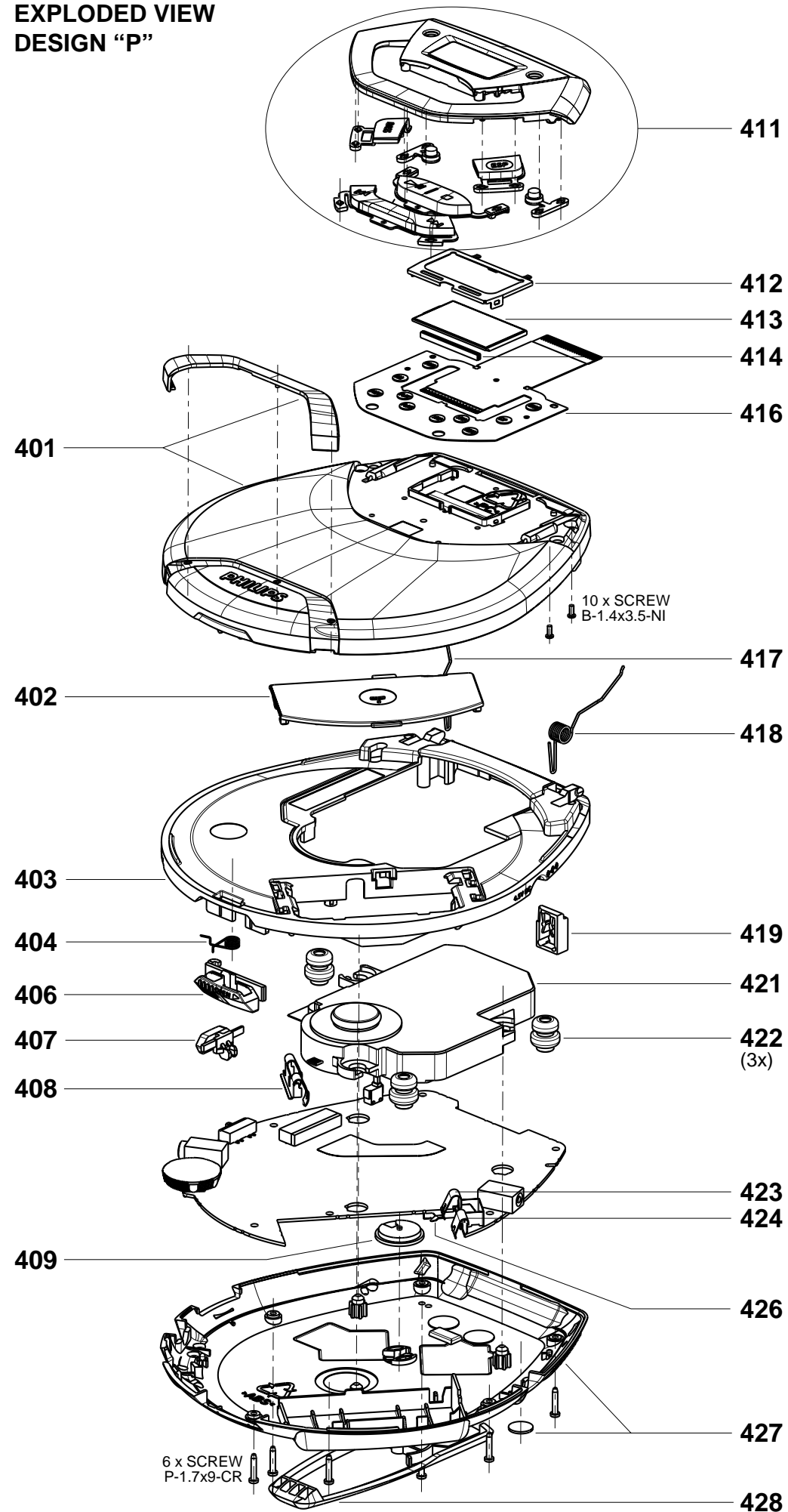
1250 G4	3304 H3
1251 C7	3305 G2
1252 C7	3306 H3
1300 F1	3307 H3
1401 B1	3308 H3
1402 E1	3309 H3
1403 C7	3310 H3
1830 D2	3311 H3
2254 F5	3312 H3
2256 A6	3313 H3
2258 G5	3314 H3
2260 F4	3315 H4
2262 G5	3316 G3
2263 F4	3317 F3
2264 F4	3320 G2
2265 G4	3331 F3
2266 F4	3332 F3
2267 G4	3333 H3
2268 F4	3334 H2
2269 G4	3335 G2
2272 G4	3420 G3
2273 G4	3835 C2
2300 H3	3837 C2
2301 G2	3845 C1
2302 G3	3846 C2
2303 G3	3871 D3
2304 G3	3872 D3
2305 G3	3882 E3
2306 H2	3883 E3
2307 H3	3884 E3
2308 H3	3890 E2
2309 H3	3891 F3
2310 F3	3892 E2
2311 G2	3893 E2
2312 G3	3894 F3
2313 G3	3895 F3
2314 G3	3896 F3
2316 H4	3897 F3
2320 H4	3898 F3
2328 H4	3899 E1
2802 B2	3900 E1
2804 A2	3901 F2
2830 D1	3902 F2
2831 C2	3903 F2
2837 C2	3904 F1
2838 C2	3905 F1
2843 C1	3906 F1
2859 F3	3907 E1
2883 F2	3908 E1
2884 E2	5250 C7
2885 E2	5251 A6
2886 E1	6252 D7
2887 F2	6300 F1
2889 E2	7250 B6
2892 H4	7251 B7
3252 F5	7256 G4
3257 F4	7300 G3
3260 F4	7301 H3
3266 G5	7302 H3
3295 F4	7303 F3
3300 G3	7307 H4
3301 G3	7881 F2
3302 G3	
3303 G3	

This assembly drawing shows a summary of all possible versions. For components used in specific versions see circuit diagram or partslist.

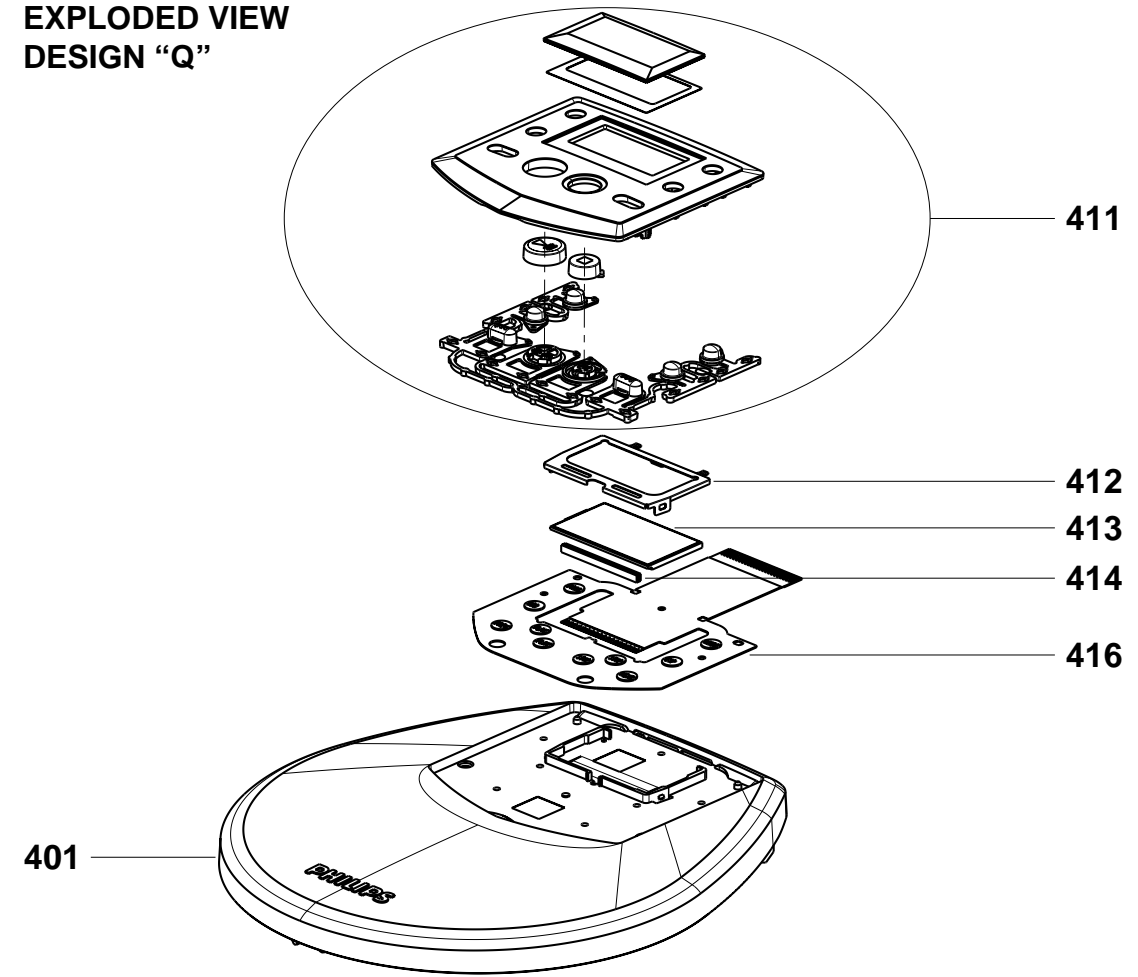


1400 A4	2857 C5	3401 B4	3860 C3
1840 C5	2858 C5	3402 B4	3861 D4
2250 C2	2860 C4	3403 B4	3862 D4
2251 C1	2861 D6	3404 B4	3863 D4
2252 B1	2862 D5	3405 B4	3864 D4
2253 B1	2880 E6	3406 B4	3865 D4
2255 A2	2881 E5	3407 A2	3866 E7
2257 A2	2882 E5	3408 A2	3867 B4
2259 F4	2888 C5	3409 A2	3868 C5
2261 D1	2890 A5	3410 C2	3869 C7
2270 D3	2891 A5	3411 C3	3870 C4
2271 E3	3250 B2	3412 C4	3873 C4
2274 D3	3251 D2	3413 C4	3874 C6
2275 F4	3253 D2	3414 B4	3875 A5
2276 E4	3254 D2	3415 F5	3876 A5
2277 E4	3255 C2	3416 G4	3880 E7
2278 F4	3256 F3	3417 F5	3881 E6
2279 F4	3258 D2	3418 C4	3885 F5
2315 G5	3259 D2	3419 B4	3886 E5
2317 H6	3261 F3	3700 D3	3887 E5
2318 H6	3263 D3	3701 D3	3888 F5
2319 H5	3264 D2	3702 D3	3889 F5
2321 H4	3265 D2	3703 D4	3909 F4
2322 H5	3267 D3	3704 D4	4201 E3
2323 H5	3268 E5	3705 E4	5800 C4
2324 F6	3269 E4	3706 F4	6251 C2
2325 F7	3270 D2	3707 E3	6400 A3
2326 F7	3271 D2	3708 D4	6401 A2
2327 H5	3272 E3	3800 B4	7252 C2
2400 D3	3273 E3	3801 B5	7254 D3
2401 C2	3274 E3	3802 B5	7255 D2
2402 A2	3275 D3	3803 A5	7258 E3
2403 B2	3276 E3	3804 B6	7259 E2
2404 B2	3277 E3	3805 A5	7260 E3
2405 C2	3278 D3	3806 A6	7305 H5
2700 D3	3279 E2	3807 B6	7306 H4
2701 D3	3280 E2	3808 A5	7400 C3
2702 D4	3281 E3	3809 A5	7700 D3
2800 B4	3282 E3	3830 C7	7701 E4
2801 B5	3283 E3	3831 B5	7702 E4
2803 B6	3284 E2	3832 B5	7800 B5
2805 B5	3285 E2	3833 B5	7801 A5
2832 C7	3286 E2	3834 B5	7830 D5
2833 C6	3287 E3	3836 C7	7880 E6
2834 B6	3288 B1	3838 B6	7882 E5
2835 D6	3289 E4	3839 D6	
2836 D6	3290 E4	3840 D6	
2839 C6	3291 A2	3841 D6	
2840 C5	3292 F3	3842 D6	
2841 C6	3293 D3	3843 C6	
2842 C6	3294 G4	3844 C6	
2844 C6	3296 D2	3847 C7	
2845 C6	3318 H5	3848 C6	
2846 B6	3319 H4	3849 C6	
2847 C6	3321 H4	3850 C6	
2848 C6	3322 G6	3851 C6	
2849 C6	3323 G6	3852 D6	
2850 E5	3324 H4	3853 E5	
2851 E5	3325 H4	3854 E5	
2852 E4	3326 F7	3855 E5	
2853 F4	3327 H5	3856 E4	
2854 E4	3328 G4	3857 E4	
2855 E4	3330 G6	3858 E4	
2856 D5	3400 A2	3859 F4	

5-1

EXPLODED VIEW
DESIGN "P"

5-1

EXPLODED VIEW
DESIGN "Q"

MECHANICAL PARTSLIST

401	3103 308 11040	DOOR-CD-P-ASSY-1-TRANSLUCENT-BLUE-12s	424	3103 301 45420	SPRING-BATTERY-PLUS
401	3103 308 11110	DOOR-CD-P-ASSY-2-TRANSLUCENT-BROWN-12s	426	3103 301 45430	SPRING-BATTERY-CHARGE
401	3103 308 11090	DOOR-CD-P-ASSY-3-BRONZE-45s	427	3103 307 99620	BOTTOM-ASSY-1 (not for /17)
401	3103 308 11060	DOOR-CD-P-ASSY-4-FLIP-FLOP-45s	427	3103 307 99860	BOTTOM-ASSY-2 (only for /17)
401	3103 308 11070	DOOR-CD-P-ASSY-5-TRANSLUCENT-BLUE-45s	428	3103 304 70250	BELT CLIP
401	3103 308 11080	DOOR-CD-P-ASSY-6-TRANSLUCENT-BROWN-45s			
401	3103 308 11100	DOOR-CD-Q-ASSY-1-AUBERGINE-45s	4822	462 41819	RUBBER FOOT
402	3103 307 99670	DOOR-BATTERY-LAC (only for translucent versions)	3140	110 40670	SCREW B-1.4x3.5-NI
402	3103 304 70320	DOOR-BATTERY-2 (not for translucent versions)	3103	300 41580	SCREW P-1.7x9-CR
403	3103 307 99610	CABINET-ASSY-1 (only for translucent versions)			
403	3103 307 99710	CABINET-ASSY-2 (not for translucent versions)			
404	3103 301 06500	SPRING-SLIDER-OPEN-2			
406	3103 304 69580	SLIDER-OPEN			
407	3103 304 69570	SLIDER-RESUME			
408	3103 301 45180	SPRING-BATTERY-SHORT-2			
409	3103 304 69540	COVER-BOTTOM			
411	3103 308 11050	INSERT-P-ASSY-1-SILVER-DESIGN "P"			
411	3103 308 11120	INSERT-P-ASSY-3-BLACK-DESIGN "P"			
411	3103 308 11130	INSERT-Q-ASSY-1-AUBERGINE-DESIGN "Q"			
412	3103 301 45400	BRACKET-LCD			
413	3103 308 84250	LCD-ULTRA-ESP			
414	3103 304 69510	ZEBRASTRIP			
416	3103 304 69500	MEMBRANE-KEYBOARD-P (only for Design "P")			
416	3103 304 69680	MEMBRANE-KEYBOARD-Q (only for Design "Q")			
417	3103 301 06570	SPRING-OPEN-LEFT			
418	3103 301 06580	SPRING-OPEN-RIGHT			
419	3103 304 69560	BRAKE			
421	3103 309 05340	CD-DRIVE DA23-LPH			
422	3103 304 69590	SUSPENSION			
423	3103 301 45410	SPRING-BATTERY-MINUS			

ELECTRICAL PARTSLIST

MISCELLANEOUS

413	3103 308 84250	LCD-ULTRA-ESP
421	3103 309 05340	CD-DRIVE DA23-LPH
1250	2422 025 12272	CONNECTOR, CD-DRIVE (6 pins)
1251 ▲	2422 086 10946	FUSE T630mA 65V
1252	2422 026 05086	EXT.DC-JACK
1300	4822 265 11247	SOCKET, HEADPHONE HSJ1537
1300	4822 265 11565	SOCKET, HEADPHONE/RC HSJ1637
1400	4822 265 11248	CONNECTOR, MEMBRANE (24 pins)
1401	4822 276 12889	SWITCH, CD-ROOR
1402	4822 277 21643	SWITCH-SLIDE, HOLD/RESUME
1830	4822 267 11028	CONNECTOR, CD-DRIVE (16 pins)

CAPACITORS

2250◎	4822 126 14083	4,7μF	20%	10V
2251◎	4822 126 14472	1μF	10%	10V
2252◎	4822 126 14241	330pF		50V
2253◎	4822 126 14494	22nF	10%	25V
2254◎	4822 126 13193	4,7nF	10%	63V
2255◎	4822 126 14472	1μF	10%	10V
2256	4822 124 12248	100μF	20%	4V
2257◎	4822 126 14083	4,7μF	20%	10V
2258◎	3198 017 41050	1μF	20%	10V
2259◎	5322 126 11583	10nF	10%	63V
2260◎	4822 122 31765	100pF	5%	50V
2261◎	4822 126 14305	100nF	10%	16V
2262◎	5322 126 11579	3,3nF	10%	63V
2263◎	4822 126 13883	220pF	5%	50V
2264◎	4822 126 13883	220pF	5%	50V
2265◎	4822 126 14305	100nF	10%	16V
2266◎	4822 126 13883	220pF	5%	50V
2267◎	4822 126 14305	100nF	10%	16V
2268◎	4822 126 13883	220pF	5%	50V
2269◎	4822 126 14305	100nF	10%	16V
2270◎	4822 126 13881	470pF	5%	50V
2271◎	4822 126 14472	1μF	10%	10V
2272◎	4822 126 14472	1μF	10%	10V
2273◎	4822 126 14472	1μF	10%	10V
2274◎	5322 126 11578	1nF	10%	63V
2275◎	5322 126 11583	10nF	10%	63V
2276◎	4822 126 14305	100nF	10%	16V
2277◎	3198 017 41050	1μF	20%	10V
2278◎	3198 017 41050	1μF	20%	10V
2279◎	4822 126 14305	100nF	10%	16V
2300◎	4822 126 13883	220pF	5%	50V
2301◎	4822 126 13883	220pF	5%	50V
2302◎	4822 122 31765	100pF	5%	50V
2303◎	4822 122 31765	100pF	5%	50V
2304◎	4822 126 13883	220pF	5%	50V
2305◎	4822 126 13883	220pF	5%	50V
2306◎	5322 126 11579	3,3nF	10%	63V
2307◎	5322 126 11579	3,3nF	10%	63V
2308◎	4822 126 14083	4,7μF	20%	10V
2309◎	4822 126 14083	4,7μF	20%	10V
2310◎	4822 126 14472	1μF	10%	10V
2311	4822 124 40998	22μF	20%	6,3V
2312	4822 124 22652	2,2μF	20%	50V
2313	4822 124 22651	1μF	20%	50V
2314	4822 124 40998	22μF	20%	6,3V
2315◎	4822 126 14305	100nF	10%	16V
2316	4822 124 12052	220μF	20%	6,3V
2317◎	4822 126 14305	100nF	10%	16V

CAPACITORS

2318◎	4822 126 14472	1μF	10%	10V
2319◎	3198 017 41050	1μF	20%	10V
2320	4822 124 22652	2,2μF	20%	50V
2321◎	4822 126 14472	1μF	10%	10V
2322◎	4822 126 14305	100nF	10%	16V
2323◎	4822 126 14305	100nF	10%	16V
2324◎	4822 126 14549	33nF	10%	16V
2325◎	4822 126 14549	33nF	10%	16V
2326◎	5322 126 11583	10nF	10%	63V
2327◎	4822 126 14305	100nF	10%	16V
2328◎	4822 126 14305	100nF	10%	16V
2400◎	4822 126 14472	1μF	10%	10V
2401◎	4822 126 14083	4,7μF	20%	10V
2402◎	4822 126 14305	100nF	10%	16V
2403◎	4822 126 14305	100nF	10%	16V
2404◎	4822 126 14305	100nF	10%	16V
2405◎	4822 126 14305	100nF	10%	16V
2700◎	4822 126 14305	100nF	10%	16V
2701◎	5322 126 11578	1nF	10%	63V
2702◎	5322 126 11583	10nF	10%	63V
2800◎	4822 126 14083	4,7μF	20%	10V
2801◎	4822 126 13193	4,7nF	10%	63V
2802	4822 124 40998	22μF	20%	6,3V
2803◎	4822 126 14305	100nF	10%	16V
2804	4822 124 12362	47μF	20%	4V
2805◎	4822 126 14305	100nF	10%	16V
2830	4822 124 40998	22μF	20%	6,3V
2831◎	4822 126 14508	180pF	5%	50V
2832◎	4822 126 14241	330pF		50V
2833◎	4822 126 14508	180pF	5%	50V
2834◎	4822 126 14508	180pF	5%	50V
2835◎	4822 126 14508	180pF	5%	50V
2836◎	4822 126 14508	180pF	5%	50V
2837◎	4822 126 13883	220pF	5%	50V
2838◎	4822 126 13883	220pF	5%	50V
2839◎	4822 126 13883	220pF	5%	50V
2840◎	4822 126 13883	220pF	5%	50V
2841◎	4822 126 13883	220pF	5%	50V
2842◎	4822 126 13883	220pF	5%	50V
2843	4822 124 40998	22μF	20%	6,3V
2844◎	4822 126 14305	100nF	10%	16V
2845◎	3198 017 34730	47nF	10%	16V
2846◎	5322 126 11578	1nF	10%	63V
2847◎	4822 126 14494	22nF	10%	25V
2848◎	4822 126 11669	27pF	10%	50V
2849◎	5322 126 11583	10nF	10%	63V
2850◎	5322 126 11579	3,3nF	10%	63V
2851◎	5322 126 11579	3,3nF	10%	63V
2852◎	5322 126 11579	3,3nF	10%	63V
2853◎	4822 126 14247	1,5nF	10%	50V
2854◎	4822 126 14247	1,5nF	10%	50V
2855◎	5322 126 11579	3,3nF	10%	63V
2856◎	4822 126 14549	33nF	10%	16V
2857◎	4822 126 14305	100nF	10%	16V
2858◎	4822 126 13344	1,5nF	5%	63V
2859	4822 124 12362	47μF	20%	4V
2860◎	4822 126 13344	1,5nF	5%	63V
2861◎	3198 017 41050	1μF	20%	10V
2862◎	3198 017 41050	1μF	20%	10V
2880◎	4822 126 14305	100nF	10%	16V
2881◎	4822 126 14305	100nF	10%	16V
2882◎	4822 126 14305	100nF	10%	16V
2885◎	4822 126 14305	100nF	10%	16V
2886	4822 124 40998	22μF	20%	6,3V

RESISTORS

3833	© 4822 051 30562	5,6kΩ	5%	0,06W
3834	© 4822 051 30562	5,6kΩ	5%	0,06W
3835	© 4822 051 30273	27kΩ	5%	0,06W
3836	© 4822 051 30273	27kΩ	5%	0,06W
3837	© 4822 051 30333	33kΩ	5%	0,06W
3838	© 4822 051 30333	33kΩ	5%	0,06W
3839	© 4822 051 30333	33kΩ	5%	0,06W
3840	© 4822 051 30333	33kΩ	5%	0,06W
3841	© 4822 051 30103	10kΩ	5%	0,06W
3842	© 4822 051 30103	10kΩ	5%	0,06W
3843	© 4822 051 30103	10kΩ	5%	0,06W
3844	© 4822 051 30103	10kΩ	5%	0,06W
3845	© 4822 051 30103	10kΩ	5%	0,06W
3846	© 4822 051 30103	10kΩ	5%	0,06W
3847	© 4822 051 30339	33Ω	5%	0,06W
3848	© 4822 051 30333	33kΩ	5%	0,06W
3849	© 4822 051 30102	1kΩ	5%	0,06W
3850	© 4822 051 30223	22kΩ	5%	0,06W
3851	© 4822 051 30102	1kΩ	5%	0,06W
3852	© 4822 051 30109	10Ω	5%	0,06W
3853	© 4822 051 30109	10Ω	5%	0,06W
3854	© 4822 051 30222	2,2kΩ	5%	0,06W
3855	© 4822 051 30222	2,2kΩ	5%	0,06W
3856	© 4822 051 30222	2,2kΩ	5%	0,06W
3857	© 4822 051 30222	2,2kΩ	5%	0,06W
3858	© 4822 051 30222	2,2kΩ	5%	0,06W
3859	© 4822 051 30222	2,2kΩ	5%	0,06W
3860	© 4822 051 30103	10kΩ	5%	0,06W
3861	© 4822 051 30103	10kΩ	5%	0,06W
3862	© 4822 051 30103	10kΩ	5%	0,06W
3863	© 4822 051 30103	10kΩ	5%	0,06W
3864	© 4822 051 30103	10kΩ	5%	0,06W
3865	© 4822 051 30332	3,3kΩ	5%	0,06W
3866	© 4822 051 30008	CHIP JUMPER 0603		
3867	© 4822 117 12139	22Ω	5%	0,06W
3868	© 4822 117 12139	22Ω	5%	0,06W
3869	© 4822 051 30479	47Ω	5%	0,06W
3870	© 4822 051 30008	CHIP JUMPER 0603		
3871	© 4822 051 30008	CHIP JUMPER 0603		
3872	© 4822 051 30008	CHIP JUMPER 0603		
3873	© 4822 051 30008	CHIP JUMPER 0603		
3874	© 4822 051 30105	1MΩ	5%	0,06W
3875	© 4822 051 30472	4,7kΩ	5%	0,06W
3880	© 4822 117 12139	22Ω	5%	0,06W
3881	© 4822 051 30008	CHIP JUMPER 0603		
3882	© 4822 051 30008	CHIP JUMPER 0603		
3883	© 4822 051 30008	CHIP JUMPER 0603		
3884	© 4822 051 30008	CHIP JUMPER 0603		
3885	© 4822 051 30103	10kΩ	5%	0,06W
3886	© 4822 051 30103	10kΩ	5%	0,06W
3887	© 4822 117 12139	22Ω	5%	0,06W
3888	© 4822 051 30103	10kΩ	5%	0,06W
3890	© 4822 117 12139	22Ω	5%	0,06W
3891	© 4822 051 30008	CHIP JUMPER 0603		
3892	© 4822 051 30008	CHIP JUMPER 0603		
3893	© 4822 051 30008	CHIP JUMPER 0603		
3894	© 4822 051 30008	CHIP JUMPER 0603		
3895	© 4822 051 30008	CHIP JUMPER 0603		
3896	© 4822 051 30008	CHIP JUMPER 0603		
3897	© 4822 051 30008	CHIP JUMPER 0603		
3898	© 4822 051 30008	CHIP JUMPER 0603		
3899	© 4822 051 30008	CHIP JUMPER 0603		
3900	© 4822 051 30008	CHIP JUMPER 0603		
3901	© 4822 051 30008	CHIP JUMPER 0603		

RESISTORS

3902	© 4822 051 30008	CHIP JUMPER 0603		
3903	© 4822 051 30008	CHIP JUMPER 0603		
3904	© 4822 051 30008	CHIP JUMPER 0603		
3905	© 4822 051 30008	CHIP JUMPER 0603		
3906	© 4822 051 30008	CHIP JUMPER 0603		
3907	© 4822 051 30008	CHIP JUMPER 0603		
3908	© 4822 051 30008	CHIP JUMPER 0603		
3909	© 4822 051 30103	10kΩ	5%	0,06W
3981	© 4822 101 11944	2kΩ	20%	0,5W
3997	© 4822 117 13632	100kΩ	1%	0,06W
3998	© 2322 704 61204	120kΩ	1%	0,06W
3999	© 4822 117 13634	390kΩ	1%	0,06W
4201	© 4822 051 30008	CHIP JUMPER 0603		

COILS

1403	2422 540 98516	CER. RES. 4,23MHz		
1840	© 4822 242 81546	CER. RES. 8,4672MHz		
5250	2422 536 00141	TRANSFORMER 6RG (40μH)		
5251	4822 157 51462	10μH 10%		
5800	© 4822 157 11781	FILTER, 100MHz		

DIODES

6251	© 4822 130 10654	BAT254		
6252	5322 130 81917	SB140		
6300	© 4822 130 10794	BZX284-C10		
6400	© 4822 130 83757	BAS216		
6401	© 4822 130 10654	BAT254		

TRANSISTORS

7250	4822 130 40855	BC337-40		
7251	5322 130 44647	BC368		
7252	© 4822 130 60142	BC869		
7255	5322 130 61569	BC868		
7258	© 3198 010 42310	BC847BW		
7259	© 5322 130 42756	BC857C		
7260	© 3198 010 42310	BC847BW		
7301	© 3198 010 42310	BC847BW		
7302	© 3198 010 42310	BC847BW		
7303	© 3198 010 42310	BC847BW		
7306	© 3198 010 42310	BC847BW		
7307	© 3198 010 42310	BC847BW		
7700	© 5322 130 42756	BC857C		
7701	© 3198 010 42310	BC847BW		
7702	© 3198 010 42310	BC847BW		
7801	© 3198 010 42310	BC847BW		
7882	© 3198 010 42310	BC847BW		

INTEGRATED CIRCUITS

7254	© 9322 142 72685	TC75W51FU		
7256	© 9322 160 31669	SC111259FTA (POWER MGR.)		
7300	© 9322 142 72685	TC75W51FU		
7305	© 4822 209 16083	BA3574BFS (HEADPHONE AMP.)		
7400	© 3103 308 84340	TMP86CH29AF-AX5000.2 (μP)		
7800	© 4822 209 17286	TZA1024T/N1 (HF-AMPLIFIER)		
7830	© 9352 641 80557	SAA7324H/M2B (CD10)		
7880	© 9322 142 87671	SM5903BF (DRAM CONTROLLER)		
7880	© 9322 142 46671	SM5904BF (DRAM CONTROLLER)		
7881	© 9322 138 25668	MSM514400D-60SJ (4Mbit DRAM)		
7881	© 9322 138 26668	MSM51V17405D-60TS-K (16Mbit DRAM)		