Portable compact disc player

Service
Service
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AX 2100 AX 5102 AX 5113 AX 5118
AX 2101 AX 5103 AX 5114 AX 7101
AX 2102 AX 5104 AX 5115 AX 7104
AX 5100 AX 5111 AX 5116 AX 7113
AX 5101 AX 5112 AX 5117 **all versions**

PRODUCT FAMILY FOCUS ESP

Service Manual

ReWritable CD COMPATIBLE COMPACT disc DIGITAL AUDIO

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CLASS 1 LASER PRODUCT

Published by YT 0150 Service Audio Printed in The Netherlands Subject to modification

GB 3140 785 22870

PHILIPS

TECHNICAL SPECIFICATION

General

Dimensions (WxHxD) : 129x26x140mm
Weight without batteries : 220g

Power supply modes

DC-in socket : 2.5-6.0V
Primary batteries (2xLR6) : 1.7-3.6V
Rechargable batteries (AY3362) : 1.7-3.6V

Battery lifetime

BATTERY TYPE	ESP ON	Power Save ON
Primary batteries 2 x LR6	22 hours	25 hours
Rechargable batteries AY3362 (1200mAh)	9 hours	10 hours

Battery level detection

DETECTION LEVEL	Primary batteries	Rechargable batteries
Battery empty	1.8V +100/-50mV	1.8V +100/-50mV
Battery weak 1	battery empty level + 0.9V ± 100mV	battery empty level + 0.7V ± 100mV
Battery weak 2	battery empty level + 0.6V ± 100mV	battery empty level + 0.5V ± 100mV
Battery weak 3	battery empty level + 0.3V ± 100mV	battery empty level + 0.3V ± 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 CDDA-playback

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.	300mA typ.
Charge-mode	400mA typ.		n/a	
Backlighting (additional)	50mA typ.		50mA 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	+8dB ±2dB	0dB ±2dB	0dB ±2dB

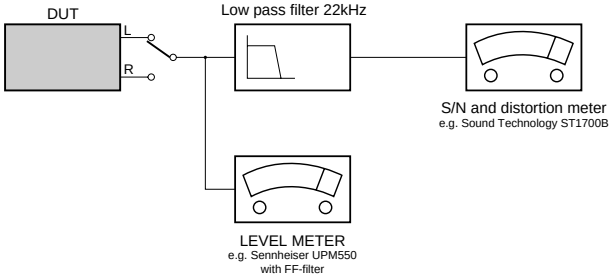
Laser

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

Measurement setup

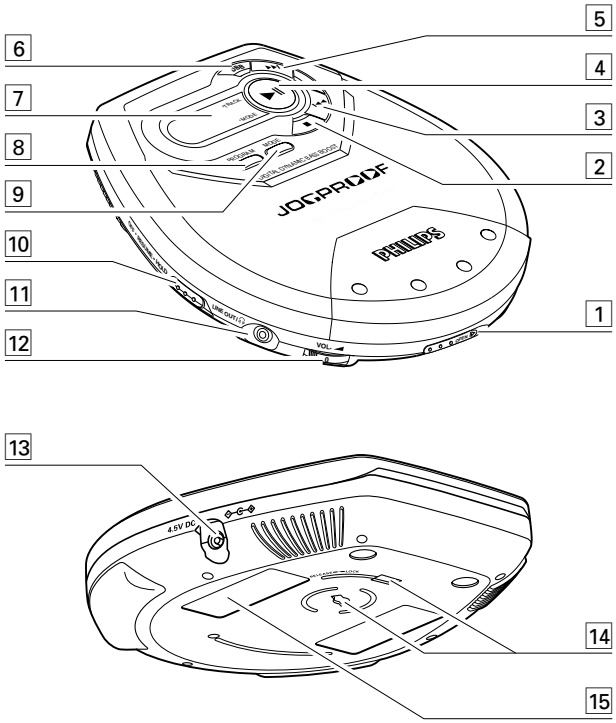
Use Audio Signal disc SBC429 4822 397 30184

Use Audio Signal Disc SBC429 4822 397 30184 (replaces test disc 3)
L.P.F. = 13 th order filter 4822 395 30204



CONNECTIONS AND CONTROLS

AX21.. & AX51..



1 OPEN ▶.....opens the CD lid

2 ■.....stops CD play, clears a program or switches the player off

3 ⏮.....skips and searches CD tracks backwards

4 ▶II.....switches the player on, starts or pauses CD play

5 ⏭.....skips and searches CD tracks forwards

6 DBB.....switches 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

7 .....display

8 PROGRAM.....programs tracks and reviews the program

9 MODE.....selects the different playing possibilities: **SHUFFLE**, **SHUFFLE REPEAT ALL**, **REPEAT**, **REPEAT ALL** and SCAN

10 RESUME.....stores the last position of a CD track played
HOLD .....locks all buttons
OFF .....switches RESUME and HOLD off

11 LINE OUT/🎧....3.5 mm headphone socket, socket to connect the player to another audio input of an additional appliance, remote control socket (not on all versions)

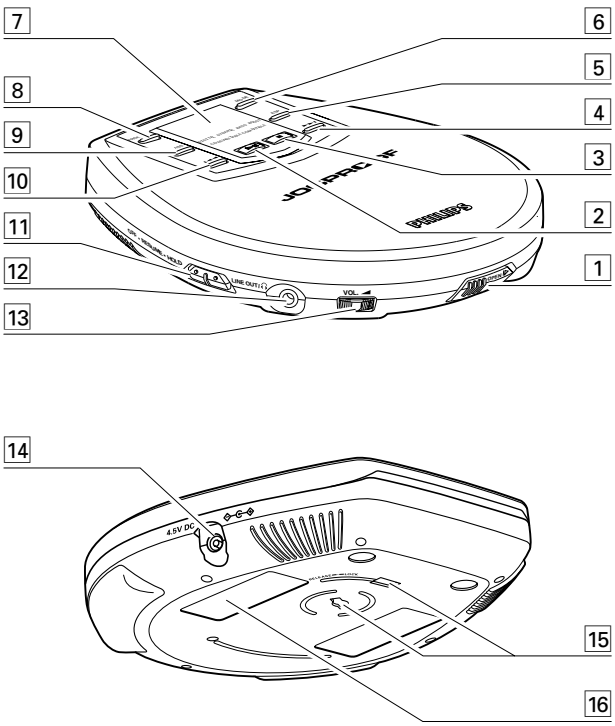
12 VOL ◢.....adjusts the volume

13 4.5V DC.....socket for external power supply

14 .....belt clip holder

15 .....typeplate

AX71..



1 OPEN ▶.....opens the CD lid

2 ▶II.....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 ESP .....**E**LECTRONIC **S**KIP **P**ROTECTION ensures continues CD playback regardless of vibrations and shocks

6 MODE.....selects the different playing possibilities: **SHUFFLE**, **SHUFFLE REPEAT ALL**, **REPEAT**, **REPEAT ALL** and SCAN

7 .....display

8 PROGRAM.....programs tracks and reviews the program

9 BASS.....switches 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 RESUME.....stores the last position of a CD track played
HOLD .....locks all buttons
OFF .....switches RESUME and HOLD off

12 LINE OUT/🎧....3.5 mm 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 DC.....socket for external power supply

15 .....belt clip holder

16 .....typeplate

For more information of operation instruction please visit Philips Audio internet site :
http://www.audio.philips.com

FEATURES

FEATURES OF CD-PORTABLE PRODUCT FAMILY FOCUS ESP	AX2100	AX2101	AX2102	AX5100	AX5101	AX5102	AX5103	AX5104	AX5111	AX5112	AX5113	AX5114	AX5115	AX5116	AX5117	AX5118	AX7101	AX7104	AX7113
CD-RW COMPATIBILITY	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
ELECTRONIC SKIP PROTECTION	12s	12s	12s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	45s	100s	100s	100s
ESP DRAM SIZE [Mbit]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	32	32	32
HOLD / RESUME FUNCTION	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●
DBB STAGES	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ACOUSTIC FEEDBACK	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PROGRAM MEMORY	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
RECHARGE NiCd / NiMH	--/--	--/--	●/●	--/--	--/--	●/●	--/--	●/●	--/--	●/●	--/--	--/--	--/--	--/--	--/--	--/--	--/--	●/●	--/--
BELT-CLIP	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CORD REMOTE CONTROL	--	--	--	--	--	--	--	●	--	--	--	●	--	--	--	●	●	●	●
LINE / OPT. DIGITAL OUTPUT	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--	--/--

ACCESSORIES

ACCESSORIES FOR CD-PORTABLE PRODUCT FAMILY FOCUS ESP		AX2100 /00c	AX2101 /00c	AX2002 /00	/05		AX5100 /00	AX5101 /00c	/11	AX5102 /00	AX5103 /01	/10	AX5104 /00c	/05	AX5111 /17	AX5112 /17	AX5113 /00	/17	AX5114 /17	AX5115 /17	AX5116 /17	AX5117 /17	AX5118 /17		AX7101 /17	AX7104 /00	AX7113 /17	
AY3170/00 AC/DC Adaptor	4822 219 10617	O	X	X			O	X		X			X				X			X						X		
AY3170/02 AC/DC Adaptor	4822 219 10676										X																	
AY3170/05 AC/DC Adaptor	4822 219 10672				X									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														O	O		O	O	O	O	O	O		O		O	
AY3266/00 Pouch (Neoprene)	3140 113 10360	O	O	O	O		O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O		O	O	O	
AY3362/00 Rechargable 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	
AY3501/00 Car Adaptor Cassette	4822 397 10059	O	O	O	O		O	O	O	O	X	X	O	O	O	O	O	O	O	X	X	X	X		O	O	X	
AY3545/00 Car DC/DC Converter	4822 219 10033	O	O	O	O		O	O	O	O	X	X	O	O			O									O		
AY3545/17 Car DC/DC Converter	3140 118 32970														O	O		O	O	X	X	X	X		O		X	
AY3768/00 Cord Remote Control	3140 118 50980												X	X					X				X		X	X	X	
HE205/77 Headphone	9082 100 00615	X	X	X	X		X	X	X	X	X	X					X											
HE205/77s Headphone (S-plug)	9082 100 00616												X	X														
HL351/77 Headphone	9082 100 00639														X	X		X		X	X	X						
HL351/77s Headphone (S-plug)	9082 100 00641																		X				X		X	X	X	
BELT-CLIP	3103 304 70250	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	

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

SAFETY & WARNINGS

ESD

(GB) 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.

(F) ATTENTION
Tous les IC et beaucoup d´autres semi-conducteurs sont sensibles aux décharges statiques (ESD). Leur longévite pourrait être considérablement écourtée par le fait qu´aucune précaution nést prise à leur manipulation.
Lors de réparations, s´assurer de bien être relié au même potentiel que la masse de l´appareil et enfileer le bracelet serti d´une résistance de sécurité.
Veiller à ce que les composants ainsi que les outils que l´on utilise soient également à ce potentiel.

(D) WARNUNG
Alle ICs und viele andere Halbleiter sind empfindlich gegenüber elektrostatischen Entladungen (ESD).
Unsorgfältige Behandlung im Reparaturfall kann die Lebensdauer drastisch reduzieren.
Sorgen Sie dafür, daß Sie im Reparaturfall über ein Puls-armband mit Widerstand mit dem Massepotential des Gerätes verbunden sind.
Halten Sie Bauteile und Hilfsmittel ebenfalls auf diesem Potential.

(NL) WAARSCHUWING
Alle IC´s en vele andere halfgeleiders zijn gevoelig voor electrostatische ontladingen (ESD).
Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen vermindern. 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.

(I) 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 riparationi occorre quindi essere collegato allo stesso potenziale che quello della massa delápparecchio tramite un braccialetto a resistenza.
Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

(GB) AVAILABLE 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

SAFETY

(GB)
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 ⚠

(F)
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 ⚠

(D)
Bei jeder Reparatur sind die geltenden Sicherheitsvor-schriften zu beachten. Der Originalzustand des Gerätes darf nicht verändert werden. Für Reparaturen sind Original-ersatzteile zu verwenden.
Sicherheitsbauteile sind durch das Symbol ⚠ markiert.

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

(I)
Le norme di sicurezza estigono che l´apparecchio venga rimesso nelle condizioni originali e che siano utilizzati i pezzi di ricambiago identici a quelli specificati.
Componenty di sicurezza sono marcati con ⚠

(GB) **DANGER**: Invisible laser radiation when open.
AVOID DIRECT EXPOSURE TO BEAM.

CLASS 1
LASER PRODUCT

(S) Varning !
Osynlig laserstrålning när apparaten är öppnad och spärren är urkopplad. Betrakta ej strålen.

(DK) Advarsel !
Usynlig laserstråling ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsaettelse for stråling.

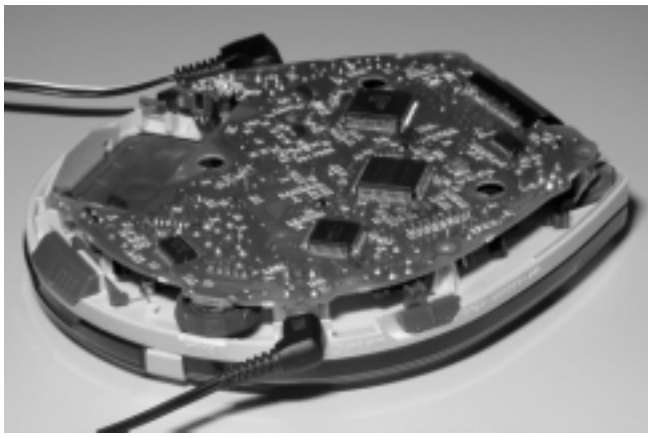
(FIN) Varoitus !
Avatussa laitteessa ja suojalukituksen ohitettaessa olet alttiina näkymättömälle laserisäteilylle. Älä katso säteeseen !

(GB)
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.

(F)
"Pour votre sécurite, 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:

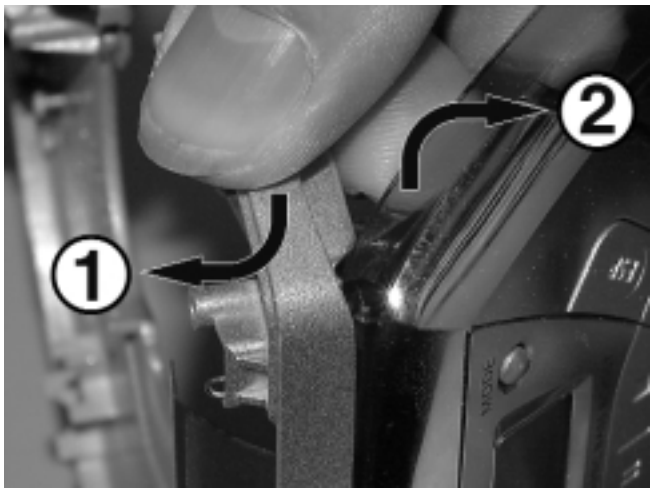
1. Remove the bottom screws (6x)
2. Lift the bottom-cabinet
3. Supply the unit via external DC-socket
4. Take care that the door switch is closed during measurements

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

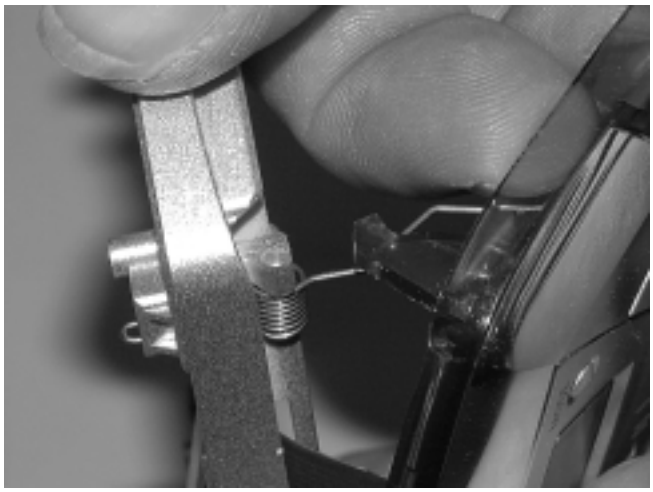
DISMANTLING THE CD-DOOR



To dismantle the CD-door proceed as follows:

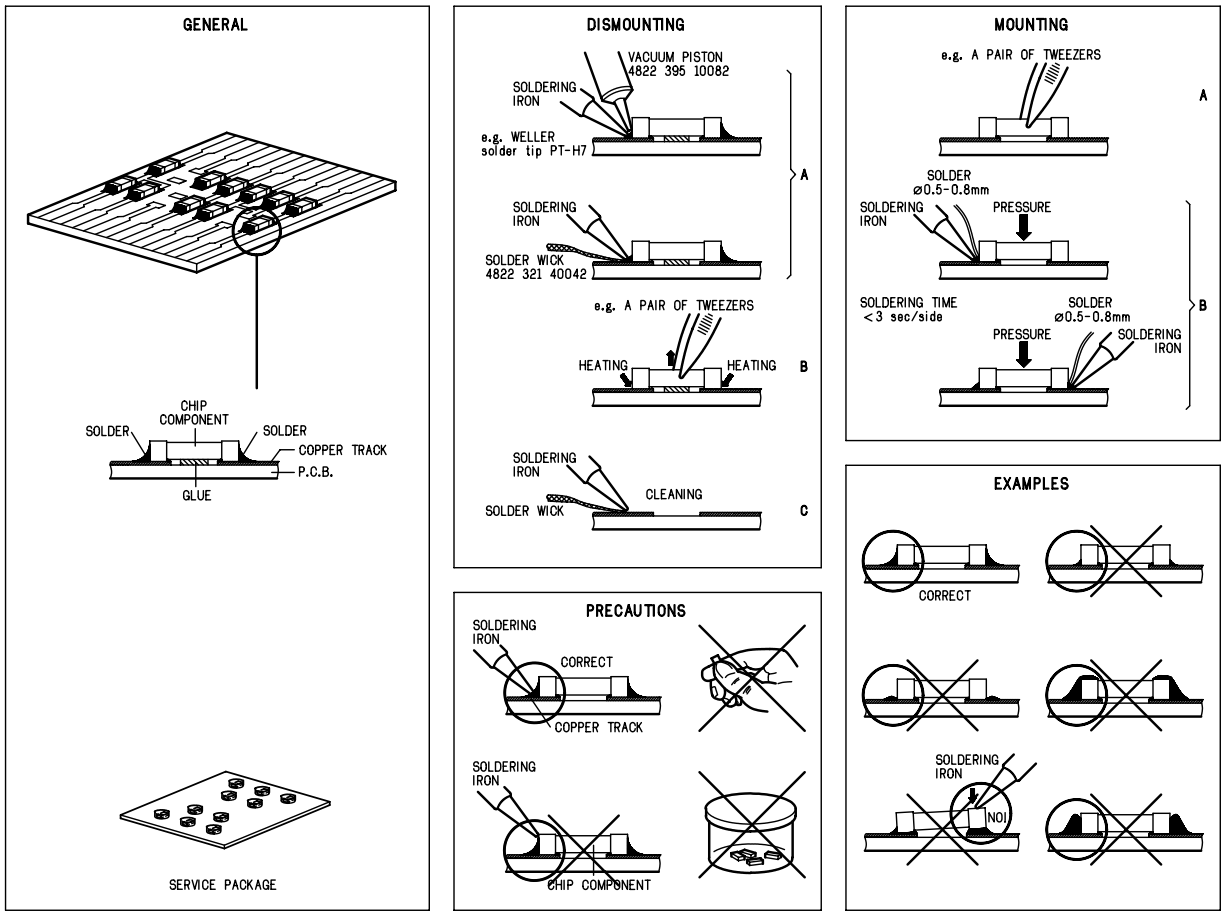
1. Dismantle bottom and printed board/drive assembly
2. Disconnect membrane keyboard (flex-foil connector on copperside of printed board)
3. Bend the cabinet leftwards downwards ①, while bending the CD-door rightwards upwards ②

   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

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Wristband tester	4822 344 13999

PIN DESCRIPTION OF INTEGRATED CIRCUITS

TZA1024 – HF-PREAMPLIFIER AND LASER SUPPLY CIRCUIT

Pin	*Name*	*Direction*	*Description*
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

Pin	*Name*	*Direction*	*Description*
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 →	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	→ servo driver	error amplifier inverting input
36	RF2	→ 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

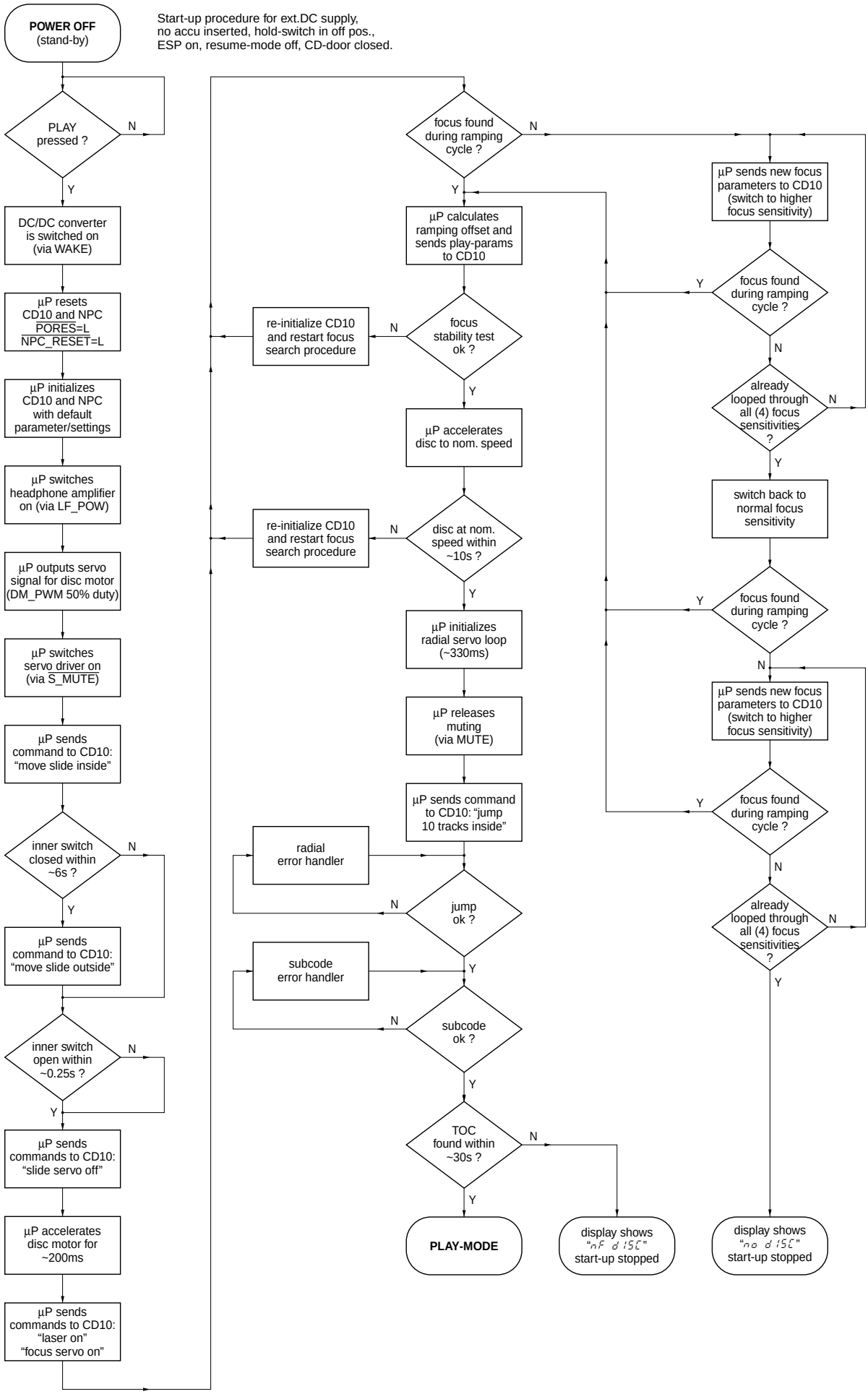
SAA7324 – DECODER, DIGITAL SERVO IC AND D/A-CONVERTER CD10 (low voltage version)

Pin	*Name*	*Direction*	*Description*
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 → DSP	16.9344 MHz system clock output
27	DATA	CD10 → NPC or CD10 → DSP	serial data output (3-state)
28	WCLK	CD10 → NPC or CD10 → DSP	word clock output (3-state)
29	SCLK	CD10 → NPC or CD10 → DSP	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 →	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 or DSP → CD10	word clock input (for data loopback to DAC)
36	SDI	NPC → CD10 or DSP → CD10	serial data input (for data loopback to DAC)
37	SCLI	NPC → CD10 or DSP → 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 → DSP	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)

SM5907AF – COMPRESSION-TYPE ANTI-SHOCK MEMORY CONTROLLER NPC

Pin	*Name*	*Direction*	*Description*
1	VDD2	+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	NACS3	NPC → DRAM	DRAM2 CAS control
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	VDD1	+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	A10/NCAS2	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. “S-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 “Ld xy”.
  “*x*” indicates state of door switch;
  “*y*” indicates state of inner switch.
  x,y = “0” means switch is closed; “1” 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 choosen automatically during start-up (see “Start-up procedure” on previous page).
> In the service test program, the sensitivity can be choosen 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 “ Fx”, else “-Fx”.
  “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.

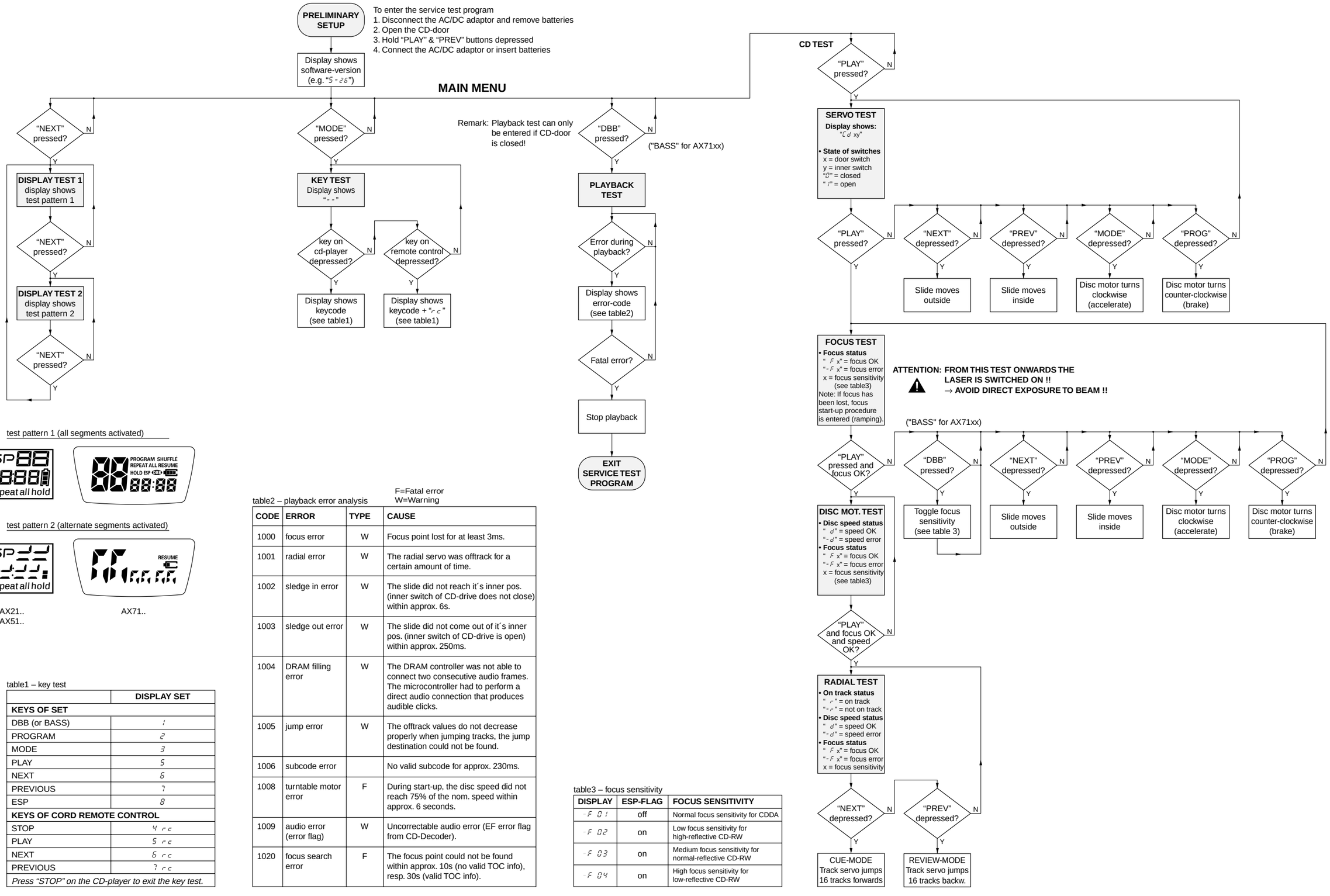
7. DISCMOTOR TEST
Purpose: Check speed regulation of discmotor.
- The speed regulation is switched on and the discmotor starts rotating. If the speed reaches 75% of the nom. speed the display shows “ d”, else “-d”.
- In parallel also the state of the focus is monitored continuously (display “ Fx” or “-Fx”).
- 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 “ Fx” or “-Fx”) are monitored continuously.
  Note: In case of radial errors the audio output is muted and muting 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.

3-6

SERVICE TEST PROGRAM – FLOW CHART



test pattern 1 (all segments activated)

test pattern 2 (alternate segments activated)

AX21..
AX51..

AX71..

table1 – key test

	DISPLAY SET
KEYS OF SET	
DBB (or BASS)	1
PROGRAM	2
MODE	3
PLAY	5
NEXT	6
PREVIOUS	7
ESP	8
KEYS OF CORD REMOTE CONTROL	
STOP	4 rc
PLAY	5 rc
NEXT	6 rc
PREVIOUS	7 rc
Press "STOP" on the CD-player to exit the key test.	

table2 – playback error analysis

F=Fatal error
W=Warning

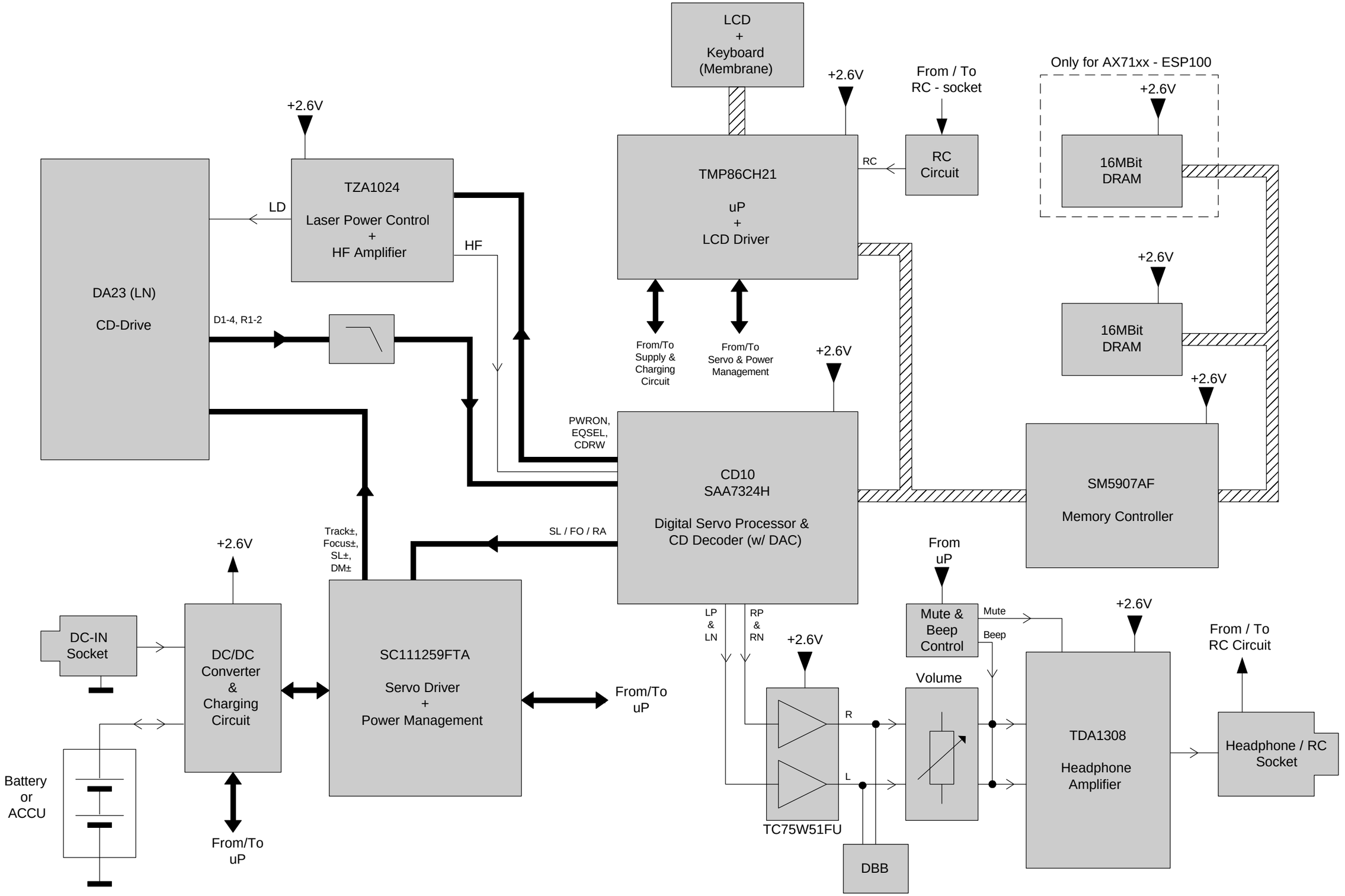
CODE	ERROR	TYPE	CAUSE
1000	focus error	W	Focus point lost for at least 3ms.
1001	radial error	W	The radial servo was offtrack for a certain amount of time.
1002	sledge in error	W	The slide did not reach it´s inner pos. (inner switch of CD-drive does not close) within approx. 6s.
1003	sledge out error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

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

3-7

BLOCKDIAGRAM



4-1

CIRCUIT DIAGRAM - CD PART

1830 B1 1840 E5 2800 A1 2801 B2 2802 B5
2803 C4 2804 C5 2805 C2 2830 D1 2831 E2
2832 E3 2833 E3 2834 E3 2835 E3 2836 E3
2837 E4 2838 E4 2839 E4 2840 E5 2841 E5
2842 E5 2843 C4 2844 C4 2845 C4 2846 B5
2847 B5 2848 B5 2849 C5 2850 A9 2851 A9
2852 A9 2853 A10 2854 A10 2855 A10 2856 D10
2857 F5 2858 F6 2859 F7 2860 F7 2861 B7
2862 B9 2880 E11 2881 H13 2882 G14 2885 C13
2886 D13 2887 C14 2888 F7 2889 H12 2890 B4
2891 C4 2892 C15 2893 C11 3800 A1 3801 B1
3802 B4 3803 B4 3804 A5 3805 B4 3806 C4
3807 C5 3808 C3 3809 B1 3830 C1 3831 C2
3832 C2 3833 C2 3834 C2 3835 E2 3836 E2
3837 D3 3838 D3 3839 D3 3840 D3 3841 D4
3842 D4 3843 D4 3844 D4 3845 E4 3846 E4
3847 C4 3848 C4 3849 B5 3850 C5 3851 B5
3852 A7 3853 A8 3854 A9 3855 A9 3856 A9
3857 A10 3858 A10 3859 A10 3860 C10 3861 C10
3862 C10 3863 C10 3864 C10 3865 F9 3867 F5
3868 F6 3869 G7 3871 F8 3872 F8 3873 F8
3874 C5 3875 B4 3876 C4 3877 F7 3878 F7
3880 D11 3881 E11 3882 G12 3883 G12 3884 G13
3885 H13 3886 H14 3887 G14 3888 G15 3889 G14
3890 D14 3909 E11 7800 A2 7801 C3 7830 B9
7880 D11 7881 C11 7882 H14 7883 C14
F830 B1 F831 B1 F832 B1 F833 B1 F834 C1
F835 C1 F836 D1 F837 D1 F838 D1 F839 D1
F840 E1 F841 D1 F842 D1 F843 E1 F844 C5
F845 F9 F846 B8 F847 G8 F848 A1 F849 A2
F850 B1 F851 B4 F852 B6 F854 C5 F855 G6
F856 G6 F857 G7 F858 F7 F859 D10 F860 E11
F861 G14 F862 F14 F863 C13 F864 F14

CD-PART

7800 TZA1024

7830 SAA7324

7880 SM5907

7881 7883A 7887A DRAM 16/4 BIT 16 MBit | 4 MBit

7882 BC847BW

7801 BC847BW

DRAM INTERFACE

ENCODER

DECODER

INPUT BUFFER

ATTENUATOR

INPUT INTERFACE

OUTPUT INTERFACE

SHOCK CONTROL

CONTROLLER I/F

I/O EXTENSION

CONTROL

VERSATILE INTERFACE

FRONT END

MOTOR CONTROL

DIG. PLL

EFM DEMOD

ADDR

SRAM

OUTPUT STAGES

EBU INTERF.

ERROR CORR.

PEAK DET.

SUBCODE PROCESSOR

MICROCONTROLLER INTERFACE

SER. DATA LOOPBACK INTERF.

VERSAT. INTERF.

ADC

PRE-PROCESSING

CONTROL FUNCTION

AUDIO PROCESSOR

VREF GEN.

TIMING

BITSTREAM DAC

SER. DATA INTERFACE

KILL

VSSD1

8.46MHz / 33.86MHz

16,9MHz

from/to CD-drive

FMN

from CONTROL / SUPPLY-PART

to CONTROL / SUPPLY-PART

to AUDIO-PART

DM
Sledge
Focus
Radial
MCU_XIN
SFSY
SILD
RAB
SCL
SDA
PORES
SCL
SDA
YMLD
NPC_RESET
WE
NCAS3
Track+
Focus+
Focus-
Track-

** Item 3881 ... only for ESP12
Item 3909 ... only for ESP100

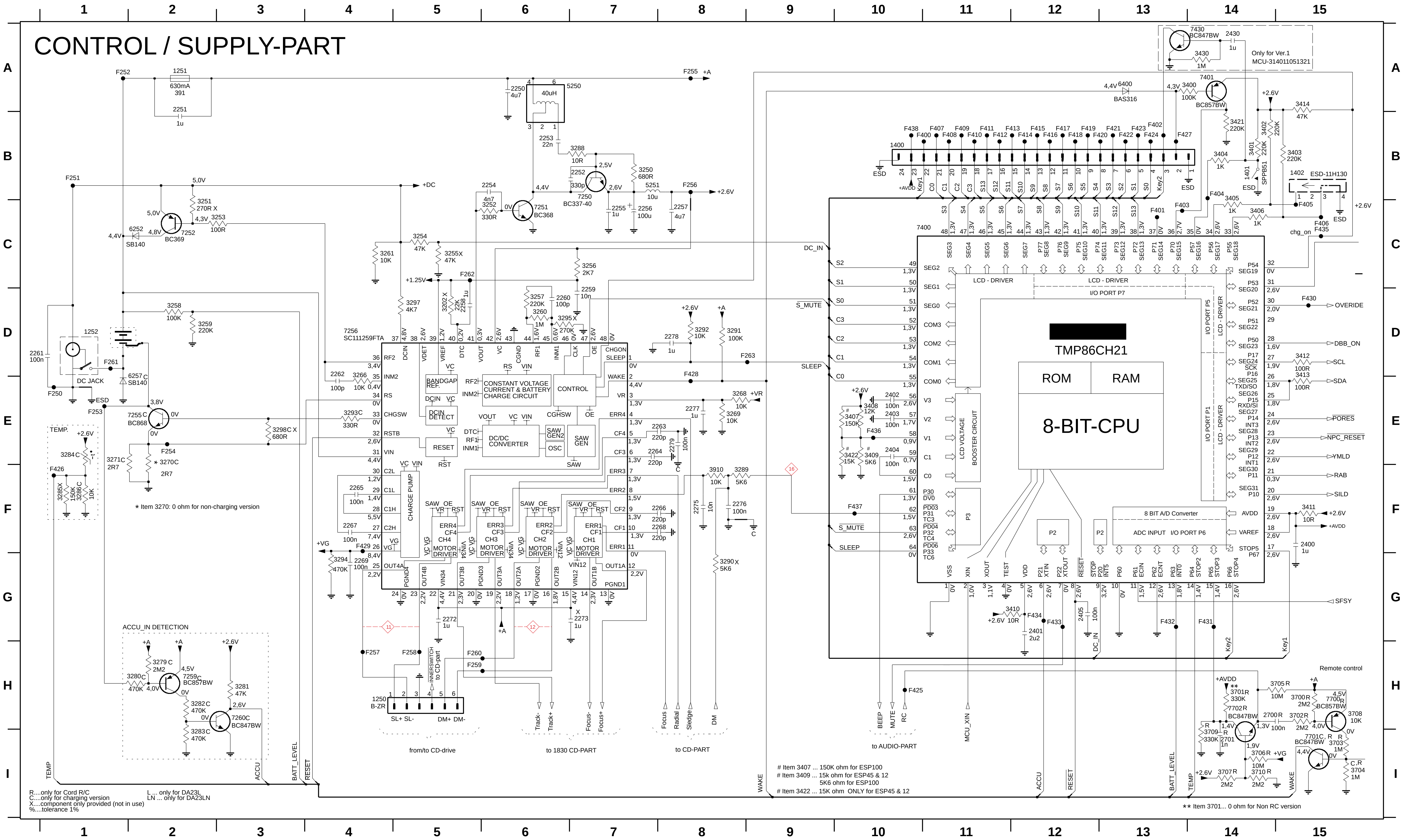
* Item 3877 ... only for 8.46MHz
Item 3878 ... only for 33.86MHz

A ... only for ESP100
X ... component only provided (not in use)

4-2

CIRCUIT DIAGRAM - CONTROL/SUPPLY PART

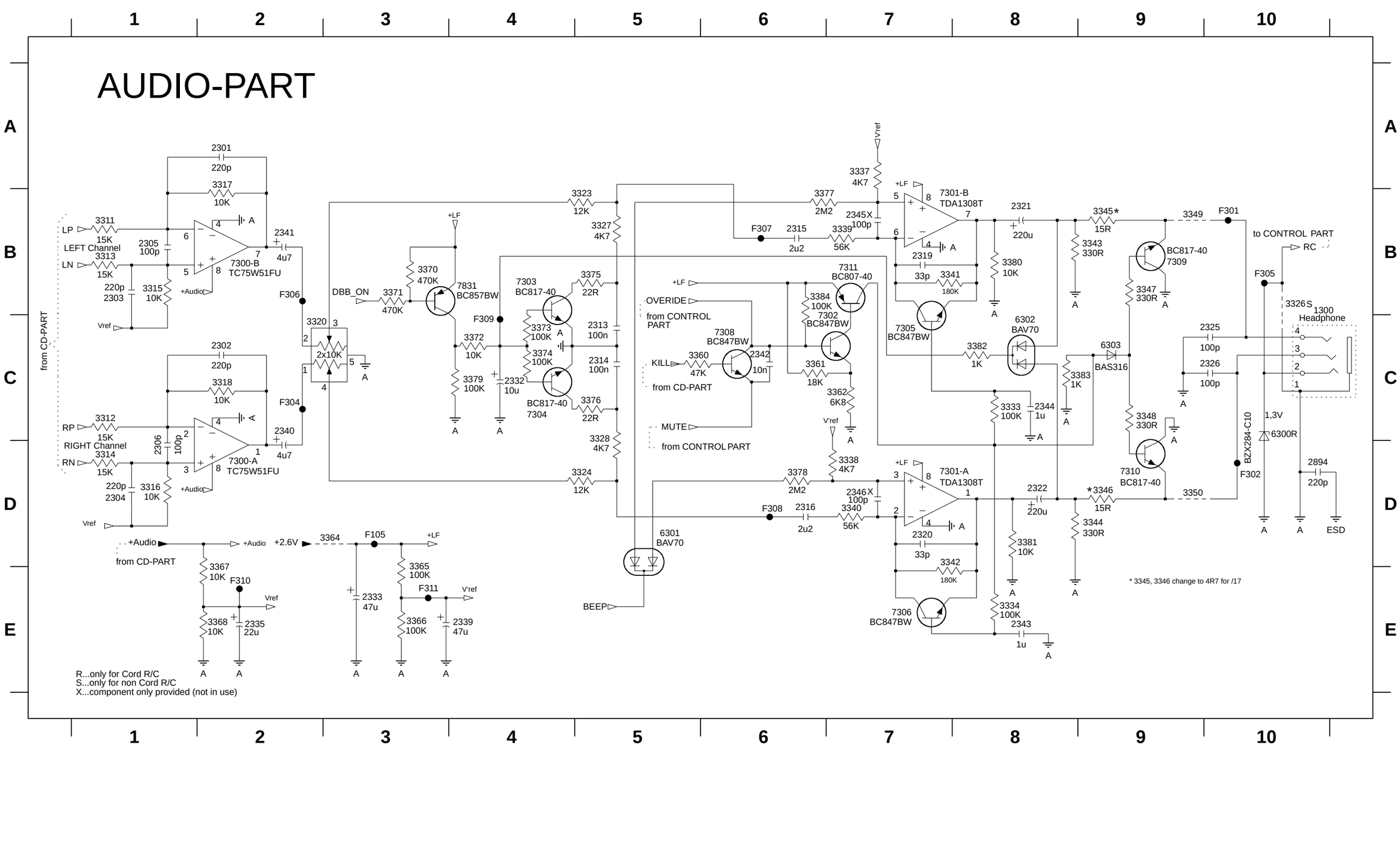
1250 H4	1402 B15	2254 B6	2259 D7	2264 E7	2269 G4	2277 E8	2402 E10	2701 I14	3252 C6	3257 D6	3266 E4	3279 H2	3284 E1	3290 G8	3295 D6	3402 B14	3407 E10	3412 D15	3421 B14	3703 I15	3708 H15	5251 B7	7251 C6	7260 H3	7702 H14	F254 E2	F259 H5	F400 B11	F405 C15	F410 B11	F415 B12	F420 B13	F425 H10	F430 D15
1251 A2	2250 A6	2255 C7	2260 D6	2265 F4	2272 G5	2278 D8	2403 E10	2702 I15	3253 C3	3258 D2	3268 E8	3280 H2	3285 F1	3291 D8	3297 D5	3403 B15	3408 E10	3413 E15	3422 E10	3704 I15	3709 I14	6252 C2	7252 C2	7400 C10	F250 E1	F255 A8	F260 H5	F401 C13	F406 C15	F411 B11	F416 B12	F421 B13	F426 F1	F431 G14
1252 D1	2251 A2	2256 C7	2261 D1	2266 F8	2273 G6	2279 E8	2404 E10	3202 D5	3254 C5	3259 D2	3269 E8	3281 H3	3286 F1	3292 D8	3298 E3	3404 B14	3409 E10	3414 A15	3700 H15	3705 H15	3710 I14	6257 E2	7255 E2	7401 A14	F251 B1	F256 B8	F261 D1	F402 B13	F407 B11	F412 B11	F417 B12	F422 B13	F427 B13	F432 G13
1400 B10	2252 B6	2257 C8	2262 D4	2267 F4	2275 F8	2400 F15	2405 G12	3250 B7	3255 C5	3260 D6	3270 E2	3282 H2	3288 B7	3293 E4	3400 A14	3405 C14	3410 G12	3418 C15	3701 H14	3706 I14	3910 F8	6400 A13	7256 D4	7700 H15	F252 A1	F257 H4	F262 C5	F403 C13	F408 B11	F413 B12	F418 B12	F423 B13	F428 D8	F433 G12
1401 B14	2253 B6	2258 D5	2263 E8	2268 F8	2276 F8	2401 G12	2700 H14	3251 C2	3256 C7	3261 C4	3271 E1	3283 I2	3289 F8	3294 G4	3401 B14	3406 C14	3411 F15	3419 C15	3702 H15	3707 I14	5250 B6	7250 B7	7259 H2	7701 I15	F253 E1	F258 H5	F263 D9	F404 B14	F409 B11	F414 B12	F419 B12	F424 B13	F429 F4	F434 G12



4-3

CIRCUIT DIAGRAM - AUDIO PART

1300 B10	2306 D1	2320 D7	2333 E3	2343 E8	3312 C1	3318 C2	3328 D5	3340 D7	3346 D9	3361 C6	3368 E2	3375 B5	3381 D8	6302 C8	7302 C7	7309 B9	F302 D10	F309 C4
2301 A2	2313 C5	2321 B8	2335 E2	2344 C8	3313 B1	3320 C3	3333 C8	3341 B7	3347 B9	3362 C7	3370 B3	3376 C5	3382 C8	6303 C9	7303 B4	7310 D9	F304 C2	F310 E2
2302 C2	2314 C5	2322 D8	2339 E3	2345 B7	3314 D1	3323 B5	3334 E8	3342 D7	3348 C9	3364 D3	3371 B3	3377 B6	3383 C8	7300-A D2	7304 C4	7311 B7	F305 B10	F311 E3
2303 B1	2315 B6	2325 C10	2340 C2	2346 D7	3315 B1	3324 D5	3337 A7	3343 B8	3349 B9	3365 E3	3372 C4	3378 D6	3384 B6	7300-B B2	7305 C7	7831 B4	F306 B2	
2304 D1	2316 D6	2326 C10	2341 B2	2894 D10	3316 D1	3326 B10	3338 D7	3344 D8	3350 D9	3366 E3	3373 C4	3379 C4	3380 B8	6300 C10	7301-A D7	7306 E7	F105 D3	F307 B6
2305 B1	2319 B7	2332 C4	2342 C6	3311 B1	3317 A2	3327 B5	3339 B7	3345 B9	3360 C5	3367 E2	3374 C4	3380 B8	6301 E5	7301-B B7	7308 C6	F301 B10	F308 D6	



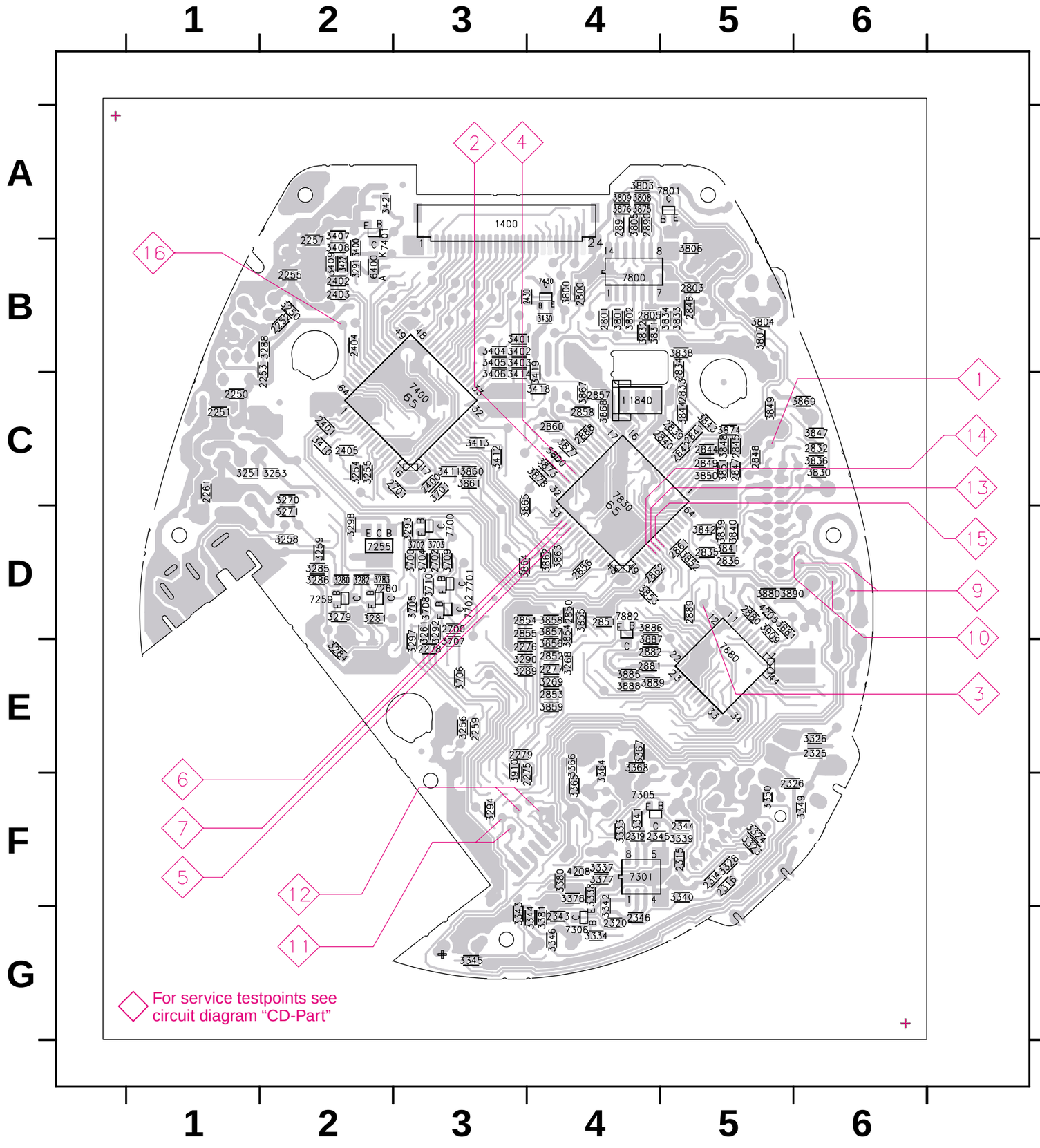
4-4

PCB LAYOUT DIAGRAM - COMPONENT SIDE

1250	F3	2887	D2	4210	D2
1251	C6	2892	E2	5250	B6
1252	C6	2893	D2	5251	A5
1300	F1	2894	E1	6252	C6
1401	B2	3202	E4	6257	C5
1402	D1	3252	E4	6300	E1
1830	C2	3257	E4	6301	G3
2254	E4	3260	E4	6302	G3
2256	B5	3266	F4	6303	G3
2258	E4	3295	E4	7250	B5
2260	E4	3311	F3	7251	B6
2262	F4	3312	F3	7252	C5
2263	E3	3313	F2	7256	F4
2264	E3	3314	F3	7300	F3
2265	F4	3315	F2	7302	G3
2266	E3	3316	F3	7303	F3
2267	F4	3317	F2	7304	F2
2268	E3	3318	F3	7308	G3
2269	F4	3320	F2	7309	G4
2272	F4	3327	F2	7310	G4
2273	F3	3347	G4	7311	G3
2301	F2	3348	G3	7831	F3
2302	F3	3360	F3	7881	E2
2303	F2	3361	G3	7883	E2
2304	F3	3362	F3		
2305	F2	3370	F3		
2306	F3	3371	F3		
2313	F2	3372	F3		
2321	G4	3373	F3		
2322	G4	3374	F3		
2332	F3	3375	F3		
2333	E3	3376	F2		
2335	F3	3379	F3		
2339	F3	3382	G3		
2340	F2	3383	G3		
2341	E2	3384	F3		
2342	F3	3835	C2		
2802	B2	3837	C2		
2804	A2	3845	C1		
2830	C1	3846	C2		
2831	C2	3871	D3		
2837	C2	3872	D3		
2838	C2	3882	D3		
2843	C1	3883	D3		
2859	E3	3884	D3		
2885	E1	4206	E2		
2886	D1	4207	D2		

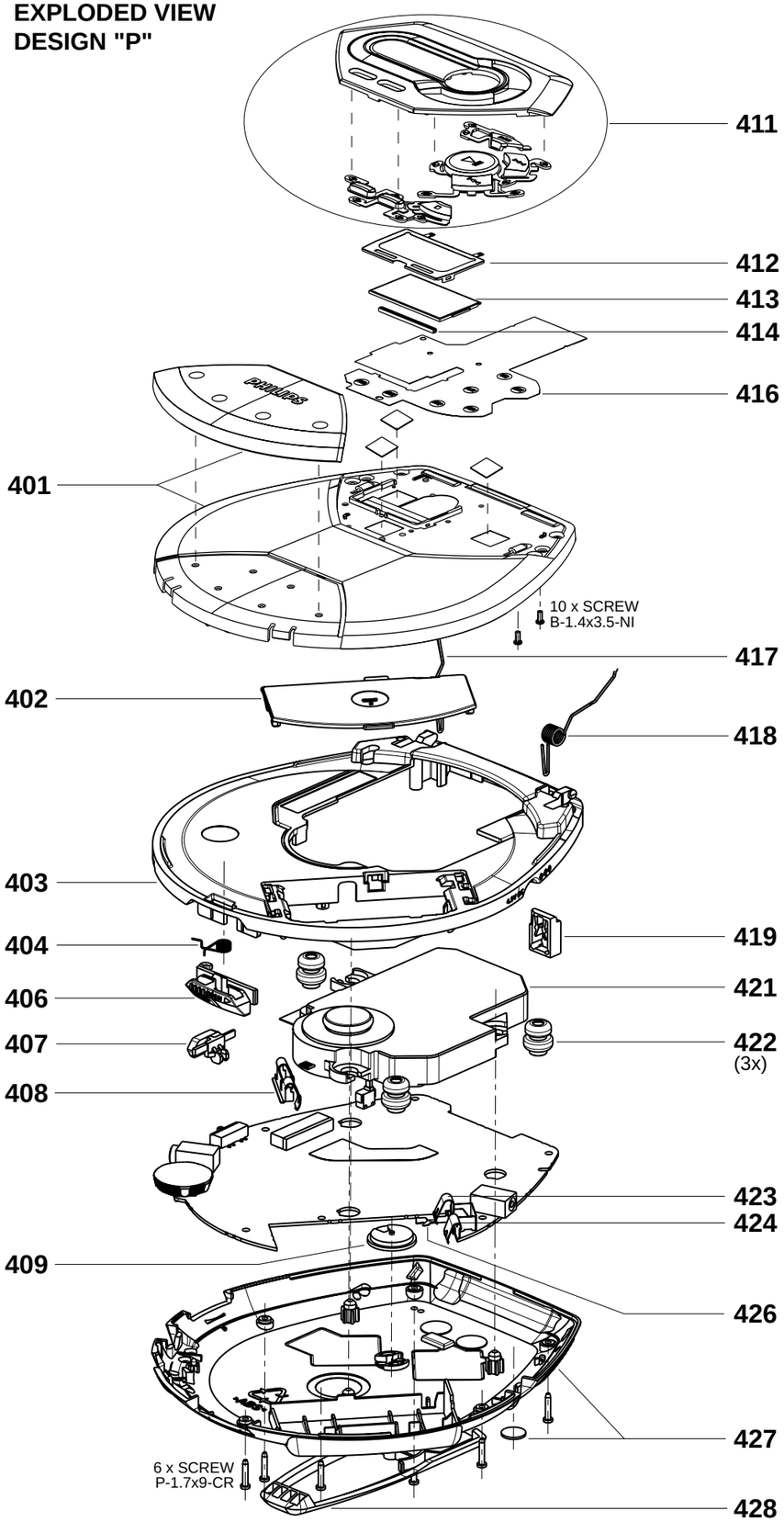
4-5

PCB LAYOUT DIAGRAM - COPPER SIDE



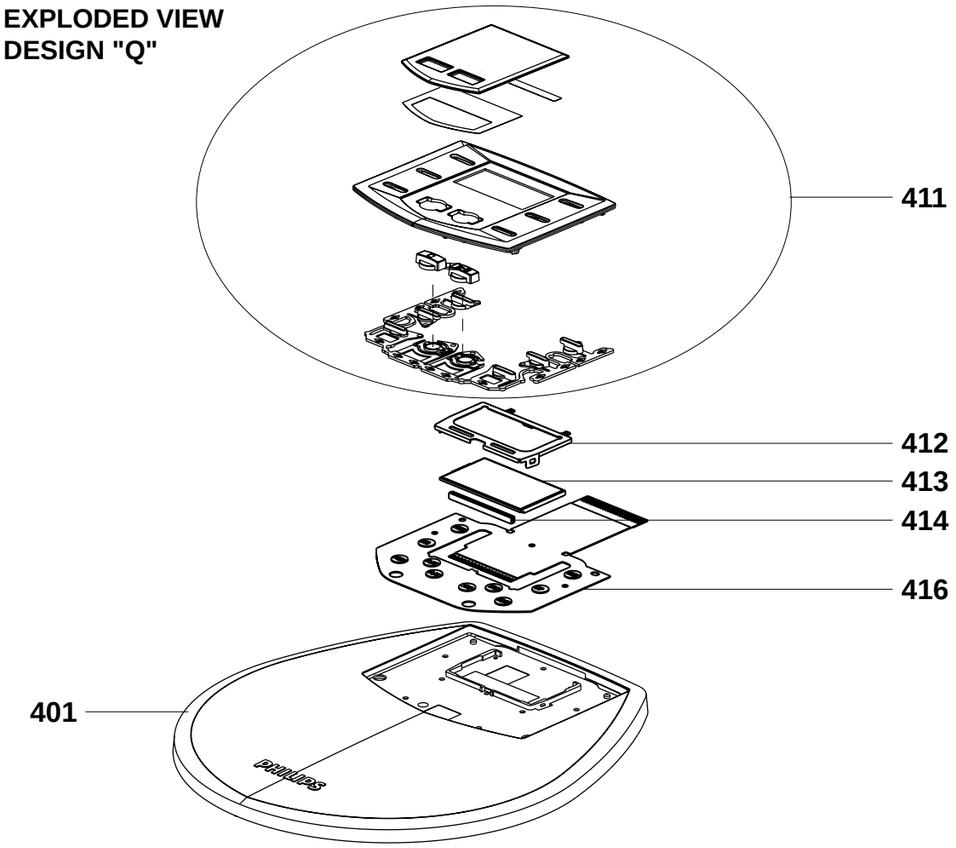
1400 A3	2841 C5	3286 D2	3410 C2	3850 C5	7430 B4
1840 C4	2842 C5	3288 B2	3411 C3	3851 C5	7700 D3
2250 C1	2844 C5	3289 E3	3412 C3	3852 D5	7701 D3
2251 C1	2845 C5	3290 E3	3413 C3	3853 D4	7702 D3
2252 B2	2846 B5	3291 B2	3414 C3	3854 D4	7800 B4
2253 B2	2847 C5	3292 D3	3418 C4	3855 D4	7801 A5
2255 B2	2848 C5	3293 D3	3419 C4	3856 E4	7830 C4
2257 B2	2849 C5	3294 F3	3421 A2	3857 D4	7880 E5
2259 E3	2850 D4	3297 E3	3422 B2	3858 D4	7882 D4
2261 C1	2851 D4	3298 D2	3430 B4	3859 E4	
2275 F4	2852 E4	3323 F5	3700 D3	3860 C3	
2276 E3	2853 E4	3324 F5	3701 C3	3861 C3	
2277 E4	2854 D3	3326 E6	3702 D3	3862 D4	
2278 E3	2855 D3	3328 F5	3703 D3	3863 D4	
2279 E3	2856 D4	3333 F4	3704 D3	3864 D3	
2314 F5	2857 C4	3334 G4	3705 D3	3865 D3	
2315 F5	2858 C4	3337 F4	3706 E3	3867 C4	
2316 F5	2860 C4	3338 F4	3707 E3	3868 C4	
2319 F4	2861 D5	3339 F5	3708 D3	3869 C6	
2320 G4	2862 D4	3340 F5	3709 D3	3873 C4	
2325 E6	2880 D5	3341 F4	3710 D3	3874 C5	
2326 F5	2881 E4	3342 F4	3800 B4	3875 A4	
2343 G4	2882 E4	3343 G3	3801 B4	3876 A4	
2344 F5	2888 C4	3344 G4	3802 B4	3877 C4	
2345 F4	2889 D5	3345 G3	3803 A4	3878 C4	
2346 G4	2890 A4	3346 G4	3804 B5	3880 D5	
2400 C3	2891 A4	3349 F6	3805 A4	3881 D5	
2401 C2	3250 B2	3350 F5	3806 B5	3885 E4	
2402 B2	3251 C1	3364 E4	3807 B5	3886 D4	
2403 B2	3253 C2	3365 F4	3808 A4	3887 E4	
2404 B2	3254 C2	3366 E4	3809 A4	3888 E4	
2405 C2	3255 C2	3367 E4	3830 C6	3889 E4	
2430 B3	3256 E3	3368 E4	3831 B4	3890 D5	
2700 D3	3258 D2	3377 F4	3832 B4	3909 D5	
2701 C3	3259 D2	3378 F4	3833 B5	3910 E3	
2702 D3	3261 D3	3380 F4	3834 B5	4205 D5	
2800 B4	3268 E4	3381 G4	3836 C6	4208 F4	
2801 B4	3269 E4	3400 B2	3838 B5	5800 C4	
2803 B5	3270 C2	3401 B3	3839 D5	6400 B2	
2805 B4	3271 D2	3402 B3	3840 D5	7255 D2	
2832 C6	3279 D2	3403 B3	3841 D5	7259 D2	
2833 C5	3280 D2	3404 B3	3842 D5	7260 D2	
2834 B5	3281 D2	3405 B3	3843 C5	7301 F4	
2835 D5	3282 D2	3406 C3	3844 C5	7305 F4	
2836 D5	3283 D2	3407 A2	3847 C6	7306 G4	
2839 C5	3284 E2	3408 B2	3848 C5	7400 C3	
2840 C5	3285 D2	3409 B2	3849 C5	7401 B2	

EXPLODED VIEW
DESIGN "P"



5-1

EXPLODED VIEW
DESIGN "Q"



MECHANICAL PARTSLIST

401	SEE TABLE	CD-DOOR-ASSY
402	3103 304 70320	DOOR-BATTERY-2
403	3103 307 99610	CABINET - ASSY - 1
403	3103 307 99710	CABINET - ASSY - 2
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
411	SEE TABLE	PANEL-ASSY
414	3103 304 69510	ZEBRASTRIP
416	3140 113 32640	MEMBRANE-KEYBOARD (AX21xx, AX51xx)
416	3103 304 69680	MEMBRANE-KEYBOARD (AX71xx)
417	3140 111 01110	CD-DOOR-SPRING-LEFT
418	3140 111 01150	CD-DOOR-SPRING-RIGHT
421	3103 309 05320	CD DA23LNPH DRIVE ASSY
422	3103 304 69590	SUSPENSION
423	3103 301 45410	SPRING-BATTERY-MINUS
424	3103 301 45420	SPRING-BATTERY-PLUS
426	3103 301 45430	SPRING-BATTERY-CHARGE
427	3103 307 99620	BOTTOM-ASSY-1 (not for /17)
427	3103 307 99860	BOTTOM-ASSY-1 (only for /17)
428	3103 304 70250	BELT CLIP
	4822 462 41819	RUBBER FOOT

TYPE NO.	COLOUR	401 DOOR-CD ASSY	403 CABINET ASSY	411 PANEL ASSY
AX2100 AX2101	Translucent blue	3140 117 62760	3103 307 99610	3140 117 62110
AX2102	Silver	3140 117 62770	3103 307 99710	3140 117 61730
AX5100 AX5101	Black	3140 117 62100	3103 307 99710	3140 117 61730
AX5102	Silver	3140 117 62880	3103 307 99710	3140 117 62110
AX5103	Red	3140 117 61720	3103 307 99710	3140 117 61730
AX5104	Silver	3140 117 62880	3103 307 99710	3140 117 62110
AX5111	Translucent blue	3140 117 62820	3103 307 99610	3140 117 62110
AX5112	Silver	3140 117 62830	3103 307 99710	3140 117 61730
AX5113	Red	3140 117 61720	3103 307 99710	3140 117 61730
AX5114	Red	3140 117 61720	3103 307 99710	3140 117 61730
AX5115	Translucent blue	3140 117 62820	3103 307 99610	3140 117 62110
AX5116	Red	3140 117 61720	3103 307 99710	3140 117 61730
AX5117	Green	3140 117 63340	3103 307 99710	3140 117 61730
AX5118	Black	3140 117 62100	3103 307 99710	3140 117 61730
AX7101 AX7104 AX7113	Black Rose	3140 117 61740	3103 307 99710	3140 117 61750

ELECTRICAL PARTSLIST

- MISCELLANEOUS -

1003		3140 110 51310	LCD PANEL (AX21../AX51..)
1003		3103 308 84250	LCD PANEL (AX71..)
1250		2422 025 12272	CONN. 6P, CD DRIVE
1251	⚠	2422 086 10946	FUSE 630MA 65VA
1252		2422 026 05086	DC SOCKET
1300		2422 026 05204	SOCKET-HEADPHONE
1300		2422 026 05203	SOCKET-H/P (RC)
1400		4822 265 11248	CONN. 24P, MEMBRANE
1401		4822 276 12889	SWITCH, CD DOOR
1402		2422 127 00545	SWITCH-SLIDE
1830		4822 267 11028	CONN. 16P, CD DRIVE

- CAPACITORS -

2250	2020 552 96305	4,7µF +80-20% Y5V 10V
2251	3198 017 41050	47nF 10% X7R 16V
2252	4822 126 14241	330pF 5% NPO 50V
2253	4822 126 14494	22nF 10% X7R 25V
2254	4822 126 13193	4,7nF 10% X7R 63V
2255	3198 017 41050	47nF 10% X7R 16V
2256	4822 124 12248	100µF 20% 4V
2257	2020 552 96305	4,7µF +80-20% Y5V 10V
2258	3198 017 41050	47nF 10% X7R 16V
2259	5322 126 11583	10nF 10% X7R 50V
2260	4822 122 31765	100pF 2% NP0 63V
2261	4822 126 14305	100nF 10% X7R 16V
2262	4822 122 31765	100pF 2% NP0 63V
2263	4822 126 13883	220pF 5% 50V
2264	4822 126 13883	220pF 5% 50V
2265	4822 126 14305	100nF 10% X7R 16V
2266	4822 126 13883	220pF 5% 50V
2267	4822 126 14305	100nF 10% X7R 16V
2268	4822 126 13883	220pF 5% 50V
2269	4822 126 14305	100nF 10% X7R 16V
2272	3198 017 41050	47nF 10% X7R 16V
2275	5322 126 11583	10nF 10% X7R 50V
2276	4822 126 14305	100nF 10% X7R 16V
2277	3198 017 41050	47nF 10% X7R 16V
2278	3198 017 41050	47nF 10% X7R 16V
2279	4822 126 14305	100nF 10% X7R 16V
2301	4822 126 13883	220pF 5% 50V
2302	4822 126 13883	220pF 5% 50V
2303	4822 126 13883	220pF 5% 50V
2304	4822 126 13883	220pF 5% 50V
2305	4822 122 31765	100pF 2% NP0 63V
2306	4822 122 31765	100pF 2% NP0 63V
2313	4822 126 14305	100nF 10% X7R 16V
2314	4822 126 14305	100nF 10% X7R 16V
2315	4822 126 14491	2.2µF 20% 10V

- CAPACITORS -

2316	4822 126 14491	2.2µF 20% 10V
2319	2222 867 15339	33pF 5% NP0 50V
2320	2222 867 15339	33pF 5% NP0 50V
2321	4822 124 12245	220µF 20% 10V
2322	4822 124 12245	220µF 20% 10V
2325	4822 122 31765	100pF 2% NP0 63V
2326	4822 122 31765	100pF 2% NP0 63V
2332	4822 124 11947	10µF 20% 16V
2333	4822 124 12362	47µF 20% 4V
2335	4822 124 40998	22µF 20% 6,3V
2339	4822 124 12362	47µF 20% 4V
2340	4822 124 22726	4,7µF 20% 35V
2341	4822 124 22726	4,7µF 20% 35V
2342	5322 126 11583	10nF 10% X7R 50V
2343	3198 017 41050	47nF 10% X7R 16V
2344	3198 017 41050	47nF 10% X7R 16V
2400	3198 017 41050	47nF 10% X7R 16V
2401	4822 126 14491	2.2µF 20% 10V
2402	4822 126 14305	100nF 10% X7R 16V
2403	4822 126 14305	100nF 10% X7R 16V
2404	4822 126 14305	100nF 10% X7R 16V
2405	4822 126 14305	100nF 10% X7R 16V
2700	4822 126 14305	100nF 10% X7R 16V
2701	5322 126 11578	1nF 10% X7R 50V
2702	5322 126 11583	10nF 10% X7R 50V
2800	4822 126 14491	2.2µF 20% 10V
2801	4822 126 13193	4,7nF 10% X7R 63V
2802	4822 124 40998	22µF 20% 6,3V
2803	4822 126 14305	100nF 10% X7R 16V
2804	4822 124 12362	47µF 20% 4V
2805	4822 126 14305	100nF 10% X7R 16V
2830	4822 124 40998	22µF 20% 6,3V
2831	4822 126 14508	180pF 5% 50V
2832	4822 126 14241	330pF 5% NPO 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% X7R 16V
2845	3198 017 34730	47nF 10% X7R 16V
2846	5322 126 11578	1nF 10% X7R 50V
2847	4822 126 14494	22nF 10% X7R 25V
2848	4822 126 11669	27pF 5% 50V

ELECTRICAL PARTSLIST

- CAPACITORS -

2849	5322 126 11583	10nF 10% X7R 50V
2850	5322 126 11579	3,3nF10% X7R 63V
2851	5322 126 11579	3,3nF10% X7R 63V
2852	5322 126 11579	3,3nF10% X7R 63V
2853	4822 126 14247	1,5nF 5% X7R 50V
2854	4822 126 14247	1,5nF 5% X7R 50V
2855	5322 126 11579	3,3nF10% X7R 63V
2856	4822 126 14549	33nF 5% 16V
2857	4822 126 14305	100nF 10% X7R 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	47nF 10% X7R 16V
2862	3198 017 41050	47nF 10% X7R 16V
2880	4822 126 14305	100nF 10% X7R 16V
2881	4822 126 14305	100nF 10% X7R 16V
2882	4822 126 14305	100nF 10% X7R 16V
2885	4822 126 14305	100nF 10% X7R 16V
2886	4822 124 40998	22µF 20% 6,3V
2887	4822 126 14549	33nF 5% 16V
2888	4822 126 14305	100nF 10% X7R 16V
2889	4822 122 33741	10pF 10% NP0 50V
2890	4822 126 13887	4,7pF 1% 50V
2892	4822 126 14305	100nF 10% X7R 16V
2893	4822 126 14549	33nF 5% 16V
2894	4822 126 13883	220pF 5% 50V

- RESISTORS -

3250	4822 051 30681	680R 5% 0,062W
3252	4822 051 30331	330R 5% 0,062W
3253	4822 051 30101	100R 5% 0,062W
3254	4822 117 12925	47K 1% 0,063W
3256	4822 051 30272	2,7K 5% 0,062W
3257	4822 117 12891	220K 1% ERJ3E
3258	4822 117 13632	100K 1% 0,062W
3259	4822 117 12891	220K 1% ERJ3E
3260	4822 051 30105	1M 5% 0,062W
3261	4822 051 30103	10K 5% 0,062W
3266	4822 051 30103	10K 5% 0,062W
3268	4822 051 30103	10K 5% 0,062W
3269	4822 051 30103	10K 5% 0,062W
3270	2322 702 70278	2,7R 5% RC21
3271	2322 702 70278	2,7R 5% RC21
3279	3198 021 32250	2,2M 5%
3280	4822 051 30474	470K 5% 0,062W
3281	4822 117 12925	47K 1% 0,063W
3282	4822 051 30474	470K 5% 0,062W
3283	4822 051 30474	470K 5% 0,062W

- RESISTORS -

3284	2322 615 13103	NTC 10K 5% 0,21W
3286	4822 051 30103	10K 5% 0,062W
3288	4822 051 30109	10R 5% 0,062W
3289	4822 051 30562	5,6K 5% 0,063W
3291	4822 117 13632	100K 1% 0,062W
3292	4822 051 30103	10K 5% 0,062W
3293	4822 051 30331	330R 5% 0,062W
3294	4822 051 30474	470K 5% 0,062W
3297	4822 051 30472	4,7K 5% 0,062W
3298	4822 051 30681	680R 5% 0,062W
3311	4822 051 30153	15K 5% 0,062W
3312	4822 051 30153	15K 5% 0,062W
3313	4822 051 30153	15K 5% 0,062W
3314	4822 051 30153	15K 5% 0,062W
3315	4822 051 30103	10K 5% 0,062W
3316	4822 051 30103	10K 5% 0,062W
3317	4822 051 30103	10K 5% 0,062W
3318	4822 051 30103	10K 5% 0,062W
3320	3103 308 53680	POTMETER 2X10K CX2
3323	4822 051 30123	12K 5% 0,062W
3324	4822 051 30123	12K 5% 0,062W
3326	4822 051 30008	0R JUMPER 0603
3327	4822 051 30472	4,7K 5% 0,062W
3328	4822 051 30472	4,7K 5% 0,062W
3333	4822 117 13632	100K 1% 0,062W
3334	4822 117 13632	100K 1% 0,062W
3337	4822 051 30472	4,7K 5% 0,062W
3338	4822 051 30472	4,7K 5% 0,062W
3339	4822 051 30563	56K 5% 0,062W
3340	4822 051 30563	56K 5% 0,062W
3341	4822 051 30184	180K 5% 0,062W
3342	4822 051 30184	180K 5% 0,062W
3343	4822 051 30331	330R 5% 0,062W
3344	4822 051 30331	330R 5% 0,062W
3345	4822 117 12971	15R 5% 0,062W
3346	4822 117 12971	15R 5% 0,062W
3347	4822 051 30331	330R 5% 0,062W
3348	4822 051 30331	330R 5% 0,062W
3349	4822 051 30008	0R JUMPER 0603
3350	4822 051 30008	0R JUMPER 0603
3360	4822 117 12925	47K 1% 0,063W
3361	4822 051 30183	18K 5% 0,062W
3362	4822 051 30682	6,8K 5% 0,062W
3364	4822 051 30008	0R JUMPER 0603
3365	4822 117 13632	100K 1% 0,062W
3366	4822 117 13632	100K 1% 0,062W
3367	4822 051 30103	10K 5% 0,062W
3368	4822 051 30103	10K 5% 0,062W
3370	4822 051 30474	470K 5% 0,062W
3371	4822 051 30474	470K 5% 0,062W

ELECTRICAL PARTSLIST

- RESISTORS -

3372		4822 051 30103	10K 5% 0,062W
3373		4822 117 13632	100K 1% 0,062W
3374		4822 117 13632	100K 1% 0,062W
3375		4822 117 12139	22R 5% 0,062W
3376		4822 117 12139	22R 5% 0,062W
3377		3198 021 32250	2,2M 5%
3378		3198 021 32250	2,2M 5%
3379		4822 117 13632	100K 1% 0,062W
3380		4822 051 30103	10K 5% 0,062W
3381		4822 051 30103	10K 5% 0,062W
3382		4822 051 30102	1K 5% 0,062W
3383		4822 051 30102	1K 5% 0,062W
3384		4822 117 13632	100K 1% 0,062W
3400		4822 117 13632	100K 1% 0,062W
3401		4822 117 12891	220K 1% ERJ3E
3402		4822 117 12891	220K 1% ERJ3E
3403		4822 117 12891	220K 1% ERJ3E
3404		4822 051 30102	1K 5% 0,062W
3405		4822 051 30102	1K 5% 0,062W
3406		4822 051 30102	1K 5% 0,062W
3407		4822 051 30154	150K 5% 0,062W
3408		4822 051 30123	12K 5% 0,062W
3409		4822 051 30153	15K 5% 0,062W
3409	#	4822 051 30562	5,6K 5% 0,062W
3410		4822 051 30109	10R 5% 0,062W
3411		4822 051 30109	10R 5% 0,062W
3412		4822 051 30101	100R 5% 0,062W
3413		4822 051 30101	100R 5% 0,062W
3414		4822 117 12925	47K 1% 0,063W
3418		4822 051 30008	0R JUMPER 0603
3421		4822 117 12891	220K 1% ERJ3E
3422		4822 051 30153	15K 5% 0,062W
3700		3198 021 32250	2,2M 5%
3701		4822 051 30334	330K 5% 0,062W
3702		3198 021 32250	2,2M 5%
3703		4822 051 30105	1M 5% 0,062W
3704		4822 051 30105	1M 5% 0,062W
3707		3198 021 32250	2,2M 5%
3708		4822 051 30103	10K 5% 0,062W
3709		4822 051 30334	330K 5% 0,062W
3710		3198 021 32250	2,2M 5%
3800		4822 117 13608	4,7R 5% 0,0016W
3801		4822 051 30153	15K 5% 0,062W
3802		4822 051 30683	68K 5% 0,062W
3803		4822 051 30332	3,3K 5% 0,062W
3804		4822 051 30479	47R 5% 0,062W
3805		4822 051 30472	4,7K 5% 0,062W
3806		4822 051 30332	3,3K 5% 0,062W
3807		4822 051 30471	470R 5% 0,062W
3808		4822 117 12891	220K 1% ERJ3E

- RESISTORS -

3809	4822 051 30563	56K 5% 0,062W
3830	4822 051 30109	10R 5% 0,062W
3831	4822 051 30562	5,6K 5% 0,063W
3832	4822 051 30562	5,6K 5% 0,063W
3833	4822 051 30562	5,6K 5% 0,063W
3834	4822 051 30562	5,6K 5% 0,063W
3835	4822 051 30273	27K 5% 0,062W
3836	4822 051 30273	27K 5% 0,062W
3837	4822 051 30333	33K 5% 0,062W
3838	4822 051 30333	33K 5% 0,062W
3839	4822 051 30333	33K 5% 0,062W
3840	4822 051 30333	33K 5% 0,062W
3841	4822 051 30103	10K 5% 0,062W
3842	4822 051 30103	10K 5% 0,062W
3843	4822 051 30103	10K 5% 0,062W
3844	4822 051 30103	10K 5% 0,062W
3845	4822 051 30103	10K 5% 0,062W
3846	4822 051 30103	10K 5% 0,062W
3847	4822 051 30339	33R 5% 0,062W
3848	4822 051 30333	33K 5% 0,062W
3849	4822 051 30102	1K 5% 0,062W
3850	4822 051 30223	22K 5% 0,062W
3851	4822 051 30102	1K 5% 0,062W
3852	4822 051 30109	10R 5% 0,062W
3853	4822 051 30109	10R 5% 0,062W
3854	4822 051 30222	2,2K 5% 0,062W
3855	4822 051 30222	2,2K 5% 0,062W
3856	4822 051 30222	2,2K 5% 0,062W
3857	4822 051 30222	2,2K 5% 0,062W
3858	4822 051 30222	2,2K 5% 0,062W
3859	4822 051 30222	2,2K 5% 0,062W
3860	4822 051 30103	10K 5% 0,062W
3861	4822 051 30103	10K 5% 0,062W
3862	4822 051 30103	10K 5% 0,062W
3863	4822 051 30103	10K 5% 0,062W
3864	4822 051 30103	10K 5% 0,062W
3865	4822 051 30332	3,3K 5% 0,062W
3867	4822 117 12139	22R 5% 0,062W
3868	4822 117 12139	22R 5% 0,062W
3869	4822 051 30479	47R 5% 0,062W
3871	4822 051 30008	0R JUMPER 0603
3872	4822 051 30008	0R JUMPER 0603
3873	4822 051 30008	0R JUMPER 0603
3874	4822 051 30105	1M 5% 0,062W
3875	4822 051 30472	4,7K 5% 0,062W
3878	4822 051 30008	0R JUMPER 0603
3880	4822 117 12139	22R 5% 0,062W
3882	4822 051 30008	0R JUMPER 0603
3883	4822 051 30008	0R JUMPER 0603
3884	4822 051 30008	0R JUMPER 0603

ELECTRICAL PARTSLIST

- RESISTORS -

3885	4822 051 30103	10K 5% 0,062W
3886	4822 051 30103	10K 5% 0,062W
3887	4822 117 12139	22R 5% 0,062W
3888	4822 117 13632	100K 1% 0,062W
3890	4822 117 12139	22R 5% 0,062W
3909	4822 051 30008	0R JUMPER 0603
3910	4822 051 30103	10K 5% 0,062W
4205	4822 051 30008	0R JUMPER 0603
4206	4822 051 30008	0R JUMPER 0603
4207	4822 051 30008	0R JUMPER 0603
4208	4822 051 30008	0R JUMPER 0603
4210	4822 051 10008	0R JUMPER 1206

- COILS & FILTERS -

5250	2422 536 00346	IND VAR 40µH
5251	4822 157 51462	10µH 10% LAL04T
5800	4822 157 11074	100µH
1840	2422 540 98555	RES CER 33.868MHz

- DIODES -

6252	5322 130 81917	SB140
6257	5322 130 81917	SB140
6300	4822 130 11551	UDZS10B
6301	5322 130 34331	BAV70
6302	5322 130 34331	BAV70
6303	4822 130 11397	BAS316
6400	4822 130 11397	BAS316

- IC & TRANSISTORS -

7250	9322 003 64676	TBC337-40
7251	5322 130 44647	BC368
7252	5322 130 44593	BC369
7255	5322 130 61569	BC868
7256	9322 171 12671	SC111259AFTA
7259	5322 130 42756	BC857C
7260	3198 010 42310	BC847BW
7300	9322 142 72685	TC75W51FU
7301	4822 209 33165	TDA1308T/N1
7302	3198 010 42310	BC847BW
7303	4822 130 42615	BC817-40
7304	4822 130 42615	BC817-40
7305	3198 010 42310	BC847BW
7306	3198 010 42310	BC847BW
7308	3198 010 42310	BC847BW
7309	4822 130 42615	BC817-40
7310	4822 130 42615	BC817-40
7311	5322 130 60123	BC807-40
7400	3140 110 51521	TMP86CH21F-FOCUS
7401	5322 130 42756	BC857C
7700	5322 130 42756	BC857C
7701	3198 010 42310	BC847BW
7702	3198 010 42310	BC847BW
7800	4822 209 17286	TZA1024T/N1
7801	3198 010 42310	BC847BW
7830	9352 641 80557	SAA7324H/M2B
7831	5322 130 42756	BC857C
7880	9322 169 78671	SM5907AF
7881	9322 175 89668	MSM51V17405F-60SJ
7882	3198 010 42310	BC847BW

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