

Service  
Service  
**Service**



**EXP210    EXP311**  
**EXP211    EXP313**  
**EXP212    EXP510**  
**EXP213    EXP511**  
 all versions

**For EXP212/17 and EXP313/17 only:**  
 This document is valid for sets with factory change code "KT01" onwards. For "KT00" refer to Service Manual 3103 785 25130.

PRODUCT FAMILY EXPANIUM 3

# Service Manual



**TABLE OF CONTENTS**

Technical specification .....1-1  
 Connections and controls .....1-2  
 Firmware upgrade .....1-3  
 Features .....1-4  
 Accessories .....1-4  
  
 Safety & Warnings .....1-5  
  
**Service hints**  
 Repair positions .....2-1  
 Dismantling CD-door .....2-1  
 Handling chip components .....2-2  
 Service tools .....2-2  
  
 Pin description of ICs .....3-1  
 Start-up procedure .....3-5  
 Service Test Program .....3-6  
 Blockdiagram .....3-7

**Circuit diagrams**

Supply part .....4-1  
 Control part .....4-2  
 CD part .....4-3  
 DSP part .....4-4  
 Audio part .....4-5

**Printed circuit board**

Componentside view .....4-6  
 Copperside view .....4-7  
  
 Exploded view .....5-1  
 Mechanical partslist .....5-4  
  
 Electrical partslist .....6-1  
  
 Document history .....7-1



© Copyright 2002 Philips Consumer Electronics B.V. Eindhoven, The Netherlands  
 All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior permission of Philips.

Published by PW 0234 Service Audio Printed in The Netherlands Subject to modification

GB 3103 785 25150

Version 1.0



**PHILIPS**

## TECHNICAL SPECIFICATION

### General

Dimensions (WxHxD) : 128x30x137.5mm  
 Weight without batteries : 212g

### Power supply modes

DC-in socket : 2.9..6.5V  
 Primary batteries (2xLR6) : 1.7..3.6V  
 Rechargeable batteries (AY3362) : 1.7..3.6V  
 Voltage protection DC-in socket : -14.0..+14.0V

### Battery lifetime

BATTERY LIFETIME	CDDA ESP=ON/OFF	CDDA ESP=LP	MP3 ESP=ON	MP3 ESP=LP
Primary batteries 2 x LR6	≥7h (10h typ.)	≥11h (15h typ.)	≥7h (10h typ.)	≥14h (20h typ.)
Rechargeable batteries AY3362 (1200mAh)	≥4h (5.5h typ.)	≥6h (8h typ.)	≥4h (5.5h typ.)	≥7.5h (11h 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 + 0.9V ±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

CURRENT CONSUMPTION	DC-IN SUPPLY (4.5V)		BATT. SUPPLY (2.25V)	
	ESP=ON/OFF	ESP=LP	ESP=ON/OFF	ESP=LP
Play-mode	140mA typ.	115mA typ.	170mA typ.	138mA typ.
Jump-mode	220mA typ.		300mA typ.	
Charge-mode	300mA typ.		n/a	
Stand-by (excl. recharge)	30mA typ.		45μA typ.	

### Current consumption MP3-playback

CURRENT CONSUMPTION	DC-IN SUPPLY (4.5V)		BATT. SUPPLY (2.25V)	
	ESP=ON/OFF	ESP=LP	ESP=ON/OFF	ESP=LP
Play-mode	140mA typ.	100mA typ.	170mA typ.	120mA typ.
Jump-mode	320mA typ.		400mA typ.	
Charge-mode	300mA typ.		n/a	
Stand-by (excl. recharge)	30mA typ.		45μA 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 : 2x10mW (+1/-3dB)  
 all other versions : 2x3mW (+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

### Sound presets

SOUND PRESET	Frequency response		
	63kHz	1kHz	10kHz
TREBLE ON	0dB ±2dB	0dB ±2dB	5dB ±2dB
BASS 1	+5dB ±2dB	0dB ±2dB	0dB ±2dB
BASS 2	+9dB ±2dB	0dB ±2dB	0dB ±2dB

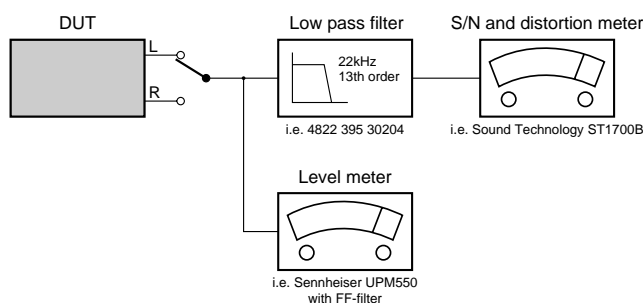
### Laser

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

### Measurement setup

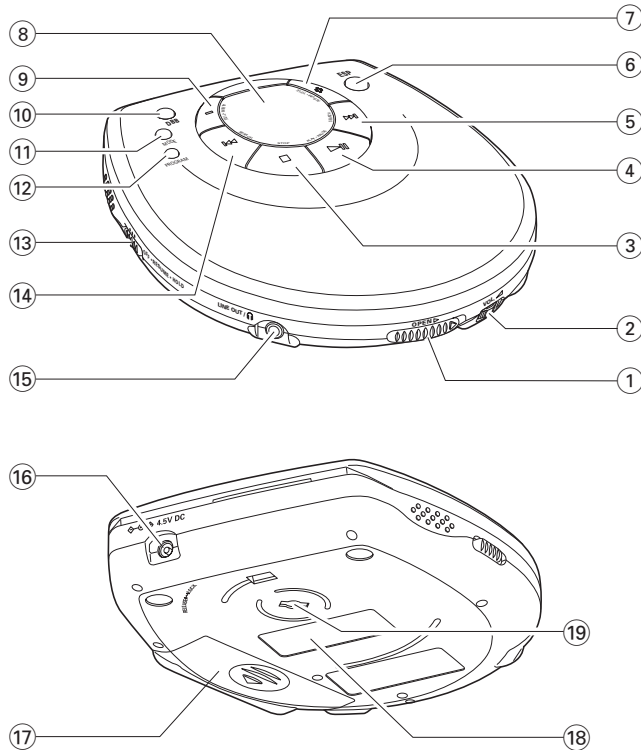
Use Audio Signal disc SBC429

4822 397 30184



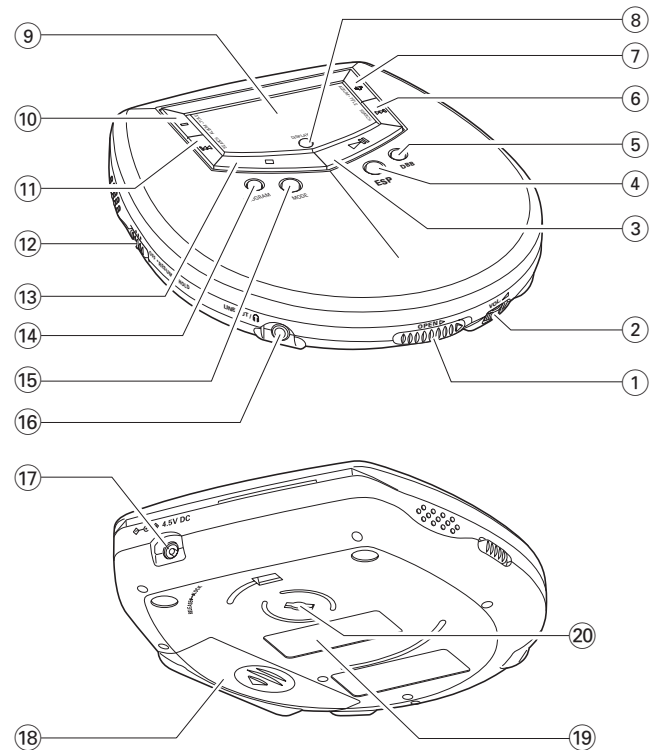
## CONNECTIONS AND CONTROLS

### EXP21x



- ① OPEN ► .....opens the CD lid
- ② VOL ▲ .....adjusts the volume
- ③ ■ .....stops playback, clears a programme and switches the set off
- ④ ►|| .....switches the set on, starts playback and interrupts playback
- ⑤ ►► .....skips forward and searches forward
- ⑥ ESP .....**E**lectronic **S**kip **P**rotection prevents music interruptions caused by shocks or vibrations
- ⑦ + .....MP3-CD only: selects the next album or skips forward
- ⑧ .....display
- ⑨ - .....MP3-CD only: selects the previous album or skips backward
- ⑩ DBB.....**D**ynamic **B**ass **B**oost, selects the bass enhancement
- ⑪ MODE .....selects playback options such as **SHUFFLE** and **REPEAT**
- ⑫ PROGRAM .....programs tracks and lets you review the programme
- ⑬ RESUME .....stores the last position played  
HOLD .....locks all buttons  
OFF .....switches RESUME and HOLD off
- ⑭ ◀◀ .....skips backward and searches backward
- ⑮ LINE OUT/🎧 .....3.5mm line out socket to connect  
- the headphones  
- this set to the audio input of your stereo equipment
- ⑯ 4.5V DC .....to connect the mains adapter (supplied or optionally available)
- ⑰ .....battery compartment
- ⑱ .....type plate
- ⑲ .....belt clip hole

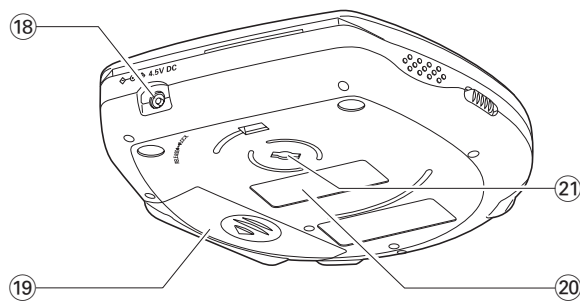
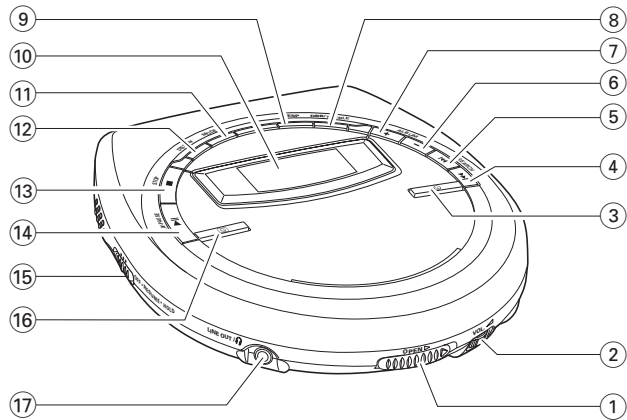
### EXP31x



- ① OPEN ► .....opens the CD lid
- ② VOL ▲ .....adjusts the volume
- ③ ►|| .....switches the set on, starts playback and interrupts playback
- ④ ESP .....**E**lectronic **S**kip **P**rotection prevents music interruptions caused by shocks or vibrations
- ⑤ DBB.....**D**ynamic **B**ass **B**oost, selects the bass enhancement
- ⑥ ►► .....skips forward and searches forward
- ⑦ + .....MP3-CD only: selects the next album or skips forward
- ⑧ DISPLAY .....selects the track and album information
- ⑨ .....display
- ⑩ - .....MP3-CD only: selects the previous album or skips backward
- ⑪ ◀◀ .....skips backward and searches backward
- ⑫ RESUME .....stores the last position played  
HOLD .....locks all buttons  
OFF .....switches RESUME and HOLD off
- ⑬ ■ .....stops playback, clears a programme and switches the set off
- ⑭ PROGRAM .....programs tracks and lets you review the programme
- ⑮ MODE .....selects playback options such as **SHUFFLE** and **REPEAT**
- ⑯ LINE OUT/🎧 .....3.5mm line out to connect  
- the headphones  
- this set to the audio input of your stereo equipment
- ⑰ 4.5V DC .....to connect the mains adapter (supplied or optionally available)
- ⑱ .....battery compartment
- ⑲ .....type plate
- ⑳ .....belt clip hole

## CONNECTIONS AND CONTROLS

### EXP51x



- ① OPEN ► .....opens the CD lid
- ② VOL ▲ .....adjusts the volume
- ③ ☺ .....marks and unmarks a favourite
- ④ ◀◀ .....skips backward and searches backward
- ⑤ ▶▶ .....skips forward and searches forward
- ⑥ - .....MP3-CD only: selects the previous album or skips backward
- ⑦ + .....MP3-CD only: selects the next album or skips forward
- ⑧ DBB/TREBLE..selects the bass and treble adjustment
- ⑨ ESP .....**E**lectronic **S**kip **P**rotection prevents music interruptions caused by shocks or vibrations
- ⑩ .....display
- ⑪ MODE .....selects playback options such as **SHUFFLE** and **REPEAT**
- ⑫ DISPLAY .....selects the track and album information
- ⑬ ■ .....stops playback and switches the set off
- ⑭ ▶|| .....switches the set on, starts playback and interrupts playback
- ⑮ RESUME.....stores the last position played  
HOLD .....locks all buttons  
OFF .....switches RESUME and HOLD off
- ⑯ ☺ .....selects playback of favourites
- ⑰ LINE OUT/🔊....3.5mm line out to connect
  - the headphones
  - the remote control
  - this set to the audio input of your stereo equipment
- ⑱ 4.5V DC .....to connect the external power supply
- ⑲ .....battery compartment
- ⑳ .....type plate
- ㉑ .....belt clip hole

## FIRMWARE UPGRADE (EXP51x only)

Occasionally, Philips releases new software ("firmware") for your set.

- 1 Connect the mains adapter to 4.5V DC on the set and to the wall socket.
- 2 Keep MODE pressed for 3 seconds.  
→ The type of your set and the current version of the firmware are displayed. **Upgrade?** is displayed.
- 3 Press ■.
- 4 Visit the Philips Audio homepage [www.audio.philips.com](http://www.audio.philips.com). Check if there is a firmware file for your set and if the firmware version is higher than the current version of your set. Download the file and burn it on a CD-ROM.
- 5 Insert the CD-ROM into the set and keep MODE pressed for 3 seconds.  
→ **Upgrade?** is displayed.
- 6 Press ▶||:
  - **Upgrading** is displayed and upgrading starts. This may take some minutes. After upgrading is finished, **Upgrade complete** is scrolled.
  - **Wrong upgrade file** is scrolled: Your set already has the latest firmware or the downloaded file does not correspond to your set.
  - **Upgrade file defect** is scrolled: The upgrade file has been damaged during the download or when burning the CD-ROM. Download the file again, burn a new CD-ROM and try again.
  - **No upgrade file** is scrolled: No upgrade file was found on the inserted CD-ROM.

*Note: If upgrading is interrupted accidentally, repeat step 6 until upgrading is completed successfully.*

## FEATURES

FEATURES OF CD-PORTABLE PRODUCT FAMILY "EXPANIUM 3"	EXP210 (all versions)	EXP211 (all versions)	EXP212 (all versions)	EXP213 (all versions)	EXP311 (all versions)	EXP313 (all versions)	EXP510 (all versions)	EXP511 (all versions)
AAC / MP3 / WMA PLAYBACK	- / ● / -	- / ● / -	- / ● / -	- / ● / -	- / ● / -	- / ● / -	- / ● / -	- / ● / -
CD-REWRITABLE COMPATIBILITY	●	●	●	●	●	●	●	●
ELECTRONIC SKIP PROTECTION CDDA	180s	180s	180s	180s	180s	180s	180s	180s
ELECTRONIC SKIP PROTECTION MP3	495s	495s	495s	495s	495s	495s	495s	495s
ESP DRAM SIZE	64Mbit	64Mbit	64Mbit	64Mbit	64Mbit	64Mbit	64Mbit	64Mbit
LONG PLAY MODE	●	●	●	●	●	●	●	●
HOLD / RESUME FUNCTION	● / ●	● / ●	● / ●	● / ●	● / ●	● / ●	● / ●	● / ●
DBB STAGES	2	2	2	2	2	2	2	2
ACOUSTIC FEEDBACK	●	●	●	●	●	●	●	●
PROGRAM MEMORY	99	99	99	99	99	99	99	99
RECHARGE FUNCTION NiCd / NiMH	- / -	- / -	- / -	- / -	- / -	- / -	- / -	● / ● <sup>1)</sup>
BELT CLIP	●	●	●	●	●	●	●	●
CORD REMOTE CONTROL PREPARED	-	-	-	-	-	-	-	●
DISPLAY BACKLIGHT	-	-	-	-	-	-	-	-
LINE / DIGITAL OUTPUT	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -

<sup>1)</sup> Except for /17

## ACCESSORIES

ACCESSORIES FOR CD-PORTABLE PRODUCT FAMILY "EXPANIUM 3"		EXP210	EXP211		EXP212	EXP213	EXP311	EXP313	EXP510	EXP511			
		/00	/00c	/01	/17	/10	/00	/17	/17	/00c	/01	/05z	/17
AY3170/00 AC/DC Adaptor	4822 219 10617	O	X				X			X			
AY3170/02 AC/DC Adaptor	4822 219 10676			X							X		
AY3170/05 AC/DC Adaptor	4822 219 10672											X	
AY3170/10 AC/DC Adaptor	4822 219 10681					X							
AY3170/17 AC/DC Adaptor	4822 219 10616				O			X	X				X
AY3362/00 Rechargeable battery NiMH	3103 308 84120									X	X	X	
AY3464 HIFI CORD (3.5mm → cinch, L-plug)	4822 320 11881	O	O	O	O	O	O	O	O	O	O	O	O
AY3501/00 Car Adaptor Cassette	4822 397 10059	O	O	O	O	X	O	X	O	O	O	O	O
AY3545/00 Car DC/DC Converter	4822 219 10033	O	O	O	O	X	O	X	O	O	O	O	O
AY3769/00 Cord LCD Remote Control	3140 118 51081									X	X	X	X
SBC HE205/77 Earphone (L-plug)	9082 100 00615	X	X	X		X	X						
SBC HE351/77 Headphone (L-plug)	9082 100 00639				X			X					
SBC HE545/77s Earphone (S-plug)	9082 100 00269								X	X	X	X	X
BELT-CLIP	3103 304 70250	X	X	X	X	X	X	X	X	X	X	X	X

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

## SAFETY & WARNINGS

### (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 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 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 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.

### (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 riparazioni occorre quindi essere collegato allo stesso potenziale che quello della massa dell'apparecchio tramite un braccialetto a resistenza.

Assicursarsi 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  
small 600x650x1.25mm

**anti-static wristband**

**connection box** (3 press stud connections, 1MΩ)

**extendible cable** (2m, 2MΩ, to connect wristband to connection box)

**connecting cable** (3m, 2MΩ, to connect table mat to connection box)

**earth cable** (1MΩ, 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


### (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 Sicherheitsvorschriften zu beachten. Der Originalzustand des Gerätes darf nicht verändert werden. Für Reparaturen sind Originalersatzteile zu verwenden.

Sicherheitsbauteile sind durch das Symbol  markiert.

### (I)

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.

Componenty di sicurezza sono marcati con 

### (NL)

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 

### (S)

Osnylnig laserstråling nár apparaten är öppnad och spårren är urkopplad. Betrakta ej strålen.

### (DK)

Usynlig laserstråling ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for stråling.

### (FIN)

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

## SAFETY



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

### (S) Varning !

Osnylnig laserstråling nár apparaten är öppnad och spårren är urkopplad. Betrakta ej strålen.

### (DK) Advarsel !

Usynlig laserstråling ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse 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.

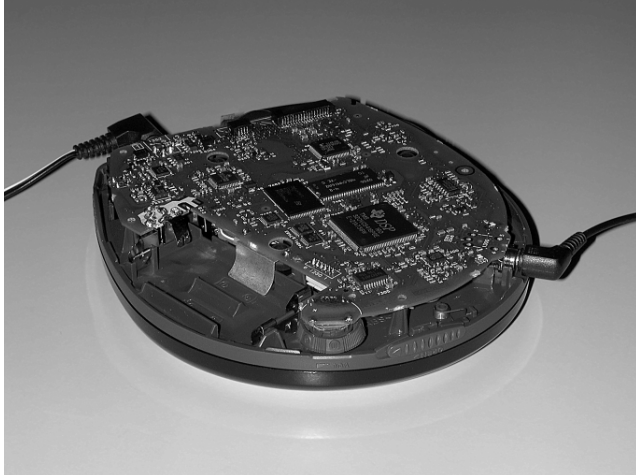
The leakage current must not exceed 0.5mA.

### (F)

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

## SERVICE HINTS

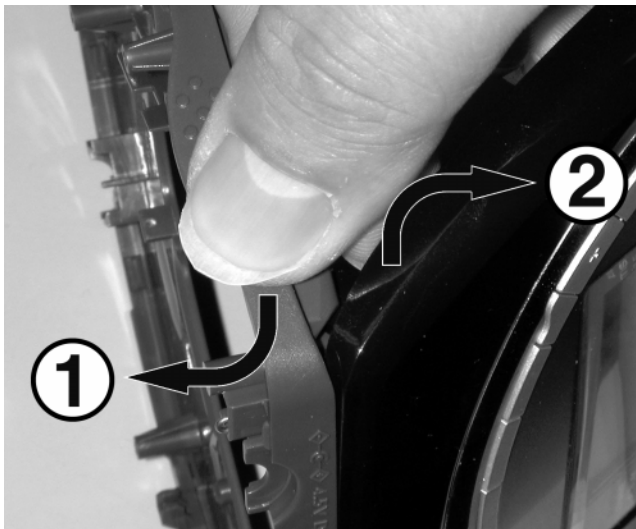
### REPAIR POSITION COPPERSIDE



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

### DISMANTLING THE CD-DOOR

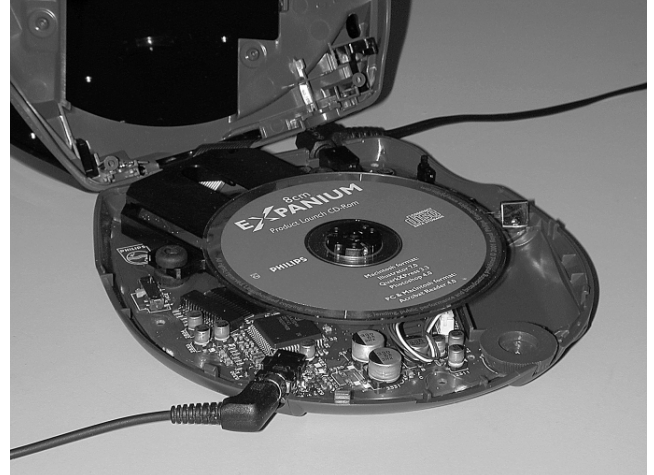


To dismantle the CD-door proceed as follows:

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

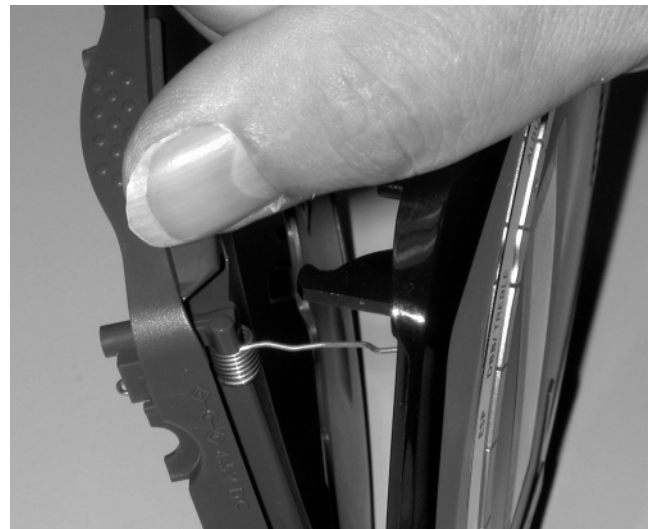
The procedure appears to be tricky at first, but force needs to be applied with thumb and middle finger only. It's just like snapping one's fingers.

### REPAIR POSITION COMPONENTSIDE



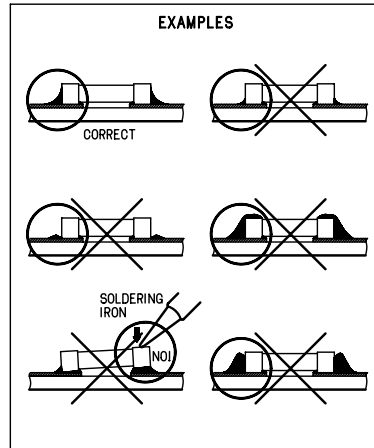
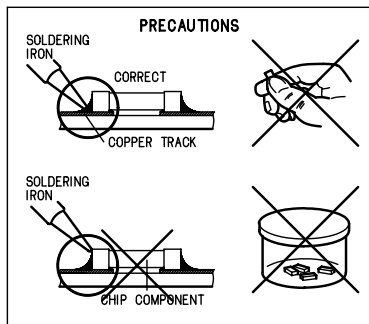
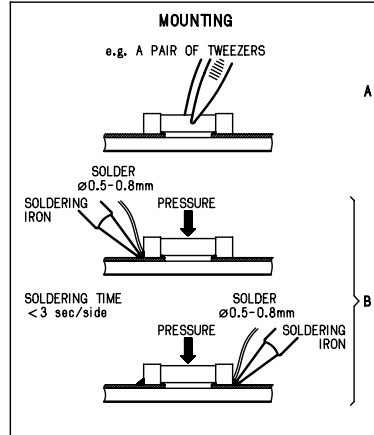
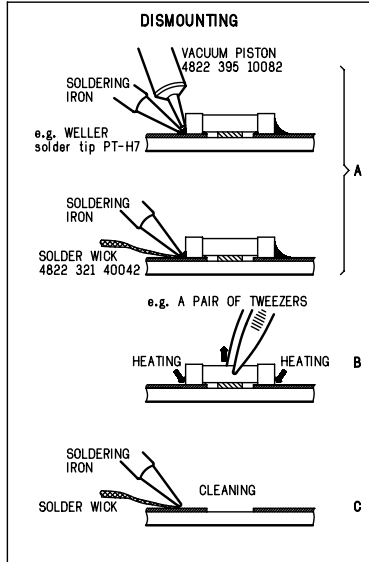
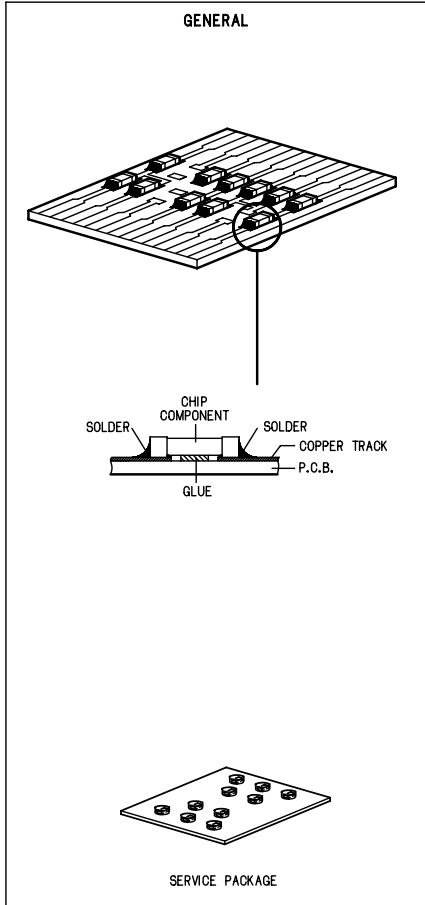
To get access to the componentside of the printed board assembly proceed as follows:

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



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**

Playability test disc **SBC444**

Test disc 5 (disc without errors) + Test disc 5A (disc with dropout errors, black spots and fingerprints) **SBC426/SBC426A**

4822 397 30184

4822 397 30245

4822 397 30096

**ESD PROTECTION EQUIPMENT**

Anti-static table mat large 1200x650x1.25mm

small 600x650x1.25mm

Anti-static wristband

Connection box (3 press stud connections, 1MΩ)

Extendible cable (2m, 2MΩ, to connect wristband to connection box)

Connecting cable (3m, 2MΩ, to connect table mat to connection box)

Earth cable (1MΩ, 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



## 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

### SC111259AFTA – 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	WAKE	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	DSP/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	servo driver →	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	DSP → 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)

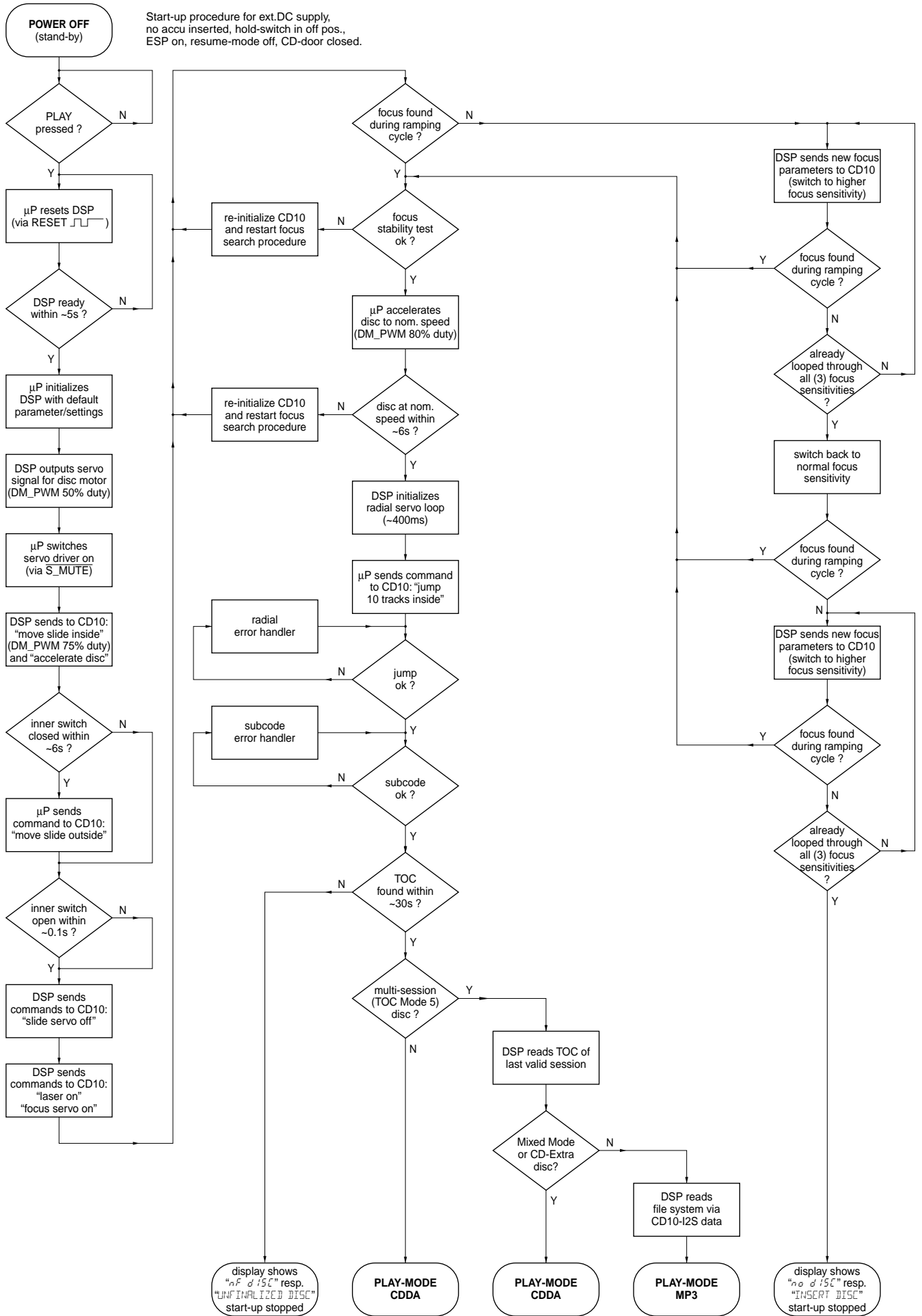
<i>Pin</i>	<i>Name</i>	<i>Direction</i>	<i>Description</i>
1	HFREF	→ CD10	comparator common mode input
2	HFIN	→ CD10	comparator signal input
3	ISLICE	CD10 →	current feedback from data slicer
4	VSSA1	GND	analog ground 1
5	VDDA1	+2.6V	analog supply voltage 1
6	IREF	CD10 →	reference current output pin
7	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 →	16.9344 MHz system clock output
27	DATA	CD10 → DSP	serial data output (3-state)
28	WCLK	CD10 → DSP	word clock output (3-state)
29	SCLK	CD10 → DSP	serial bit clock output (3-state)
30	EF	CD10 → DSP	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 →	versatile I/O: input versatile pin 2 or output versatile pin 3 (open-drain)
35	WCLI	DSP → CD10	word clock input (for data loopback to DAC)
36	SDI	DSP → CD10	serial data input (for data loopback to DAC)
37	SCLI	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	DSP → CD10	subcode clock input
46	SUB	CD10 → DSP	P-to-W subcode bits output (3-state)
47	SFSY	CD10 → DSP	subcode frame sync output (3-state)
48	SBSY	CD10 → DSP	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 (+VR)	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)

## TMS320DA150PGE160 – DIGITAL SIGNAL PROCESSOR DSP

<i>Pin</i>	<i>Name</i>	<i>Direction</i>	<i>Description</i>
1	CVSS1	GND	ground for core CPU
2	A22	DSP ↔	parallel address bus
3	CVSS2	GND	ground for core CPU
4	DVDD1	+3.3V	power supply for I/O pins
5	A10	DSP ↔	parallel address bus
6	HD7	CD10 → MUTE	reference current output pin
7	A11	DSP ↔	parallel address bus
8	A12	DSP ↔	parallel address bus
9	A13	DSP ↔	parallel address bus
10	A14	DSP ↔	parallel address bus
11	A15	DSP ↔	parallel address bus
12	CVDD1	+core	power supply for core CPU
13	HAS	→ DSP	address strobe input
14	DVSS1	GND	ground for I/O pins
15	CVSS3	GND	ground for core CPU
16	CVDD2	+core	power supply for core CPU
17	HCS	→ DSP	chip select input
18	HR/W	→ DSP	read/write input
19	READY	→ DSP	data ready input, indicates that an external device is prepared for a bus transaction to be completed
20	PS	DSP → EPROM	program space select output, always high unless driven low for communicating to a particular external space
21	DS	DSP →	data space select output, always high unless driven low for communicating to a particular external space
22	IS	DSP →	I/O space select output, always high unless driven low for communicating to a particular external space
23	R/W	DSP → DRAM	read/write signal output, indicates transfer direction during communication to an external device
24	MSTRB	DSP →	memory strobe signal output
25	IOSTRB	DSP →	I/O strobe signal output
26	MSC	DSP →	microstate complete output, indicates completion of all software wait states
27	XF	DSP → CD10	external flag output, latched software programmable signal
28	HOLDA	DSP →	Hold acknowledge, indicates that the processor is in a hold state
29	IAQ	DSP →	instruction acquisition signal output
30	HOLD	→ DSP	hold input, asserted to request control of address, data and control lines
31	BIO	→ DSP	branch control input
32	MP/MC	→ DSP	microprocessor/microcomputer mode select
33	DVDD2	+3.3V	power supply for I/O pins
34	CVSS4	GND	ground for core CPU
35	BDR1	CD10 →	serial data receive input
36	BFSR1	CD10 → DSP	frame synchronization pulse for receive input
37	CVSS5	GND	ground for core CPU
38	BCLKR1	→ DSP	serial shift clock
39	HCNTL0	→ DSP	control input
40	DVSS2	GND	ground for I/O pins
41	BCLKR0	CD10 → DSP	serial shift clock
42	BCLKR2	μP → DSP	serial shift clock
43	BFSR0	CD10 → DSP	frame synchronization pulse for receive input
44	BFSR2	CD10 → DSP	frame synchronization pulse for receive input
45	BDR0	CD10 → DSP	serial data receive input
46	HCNTL1	→ DSP	control input
47	BDR2	μP → DSP	serial data receive input
48	BCLKX0	DSP → CD10	transmit clock
49	BCLKX2	μP → CD10	transmit clock
50	CVSS6	GND	ground for core CPU
51	HINT	DSP →	interrupt output, used to interrupt the host
52	CVDD3	+core	power supply for core CPU
53	BFSX0	DSP → CD10	frame synchronization pulse for transmit input/output
54	BFSX2	μP → DSP	frame synchronization pulse for transmit input/output
55	HRDY	DSP →	ready output, informs the host when the HPI is ready for the next transfer
56	DVDD3	+3.3V	power supply for I/O pins
57	DVSS3	GND	ground for I/O pins
58	HD0	DSP ↔ CD10	parallel bidirectional data bus
59	BDX0	DSP → CD10	serial data transmit output
60	BDX2	DSP → μP	serial data transmit output
61	IACK	DSP →	interrupt acknowledge signal output
62	HBIL	→ DSP	byte identification, identifies the first or second byte of transfer
63	NMI	→ DSP	nonmaskable interrupt input
64	INT0	CD10 → DSP	external user interrupt input
65	INT1	CD10 → DSP	external user interrupt input
66	INT2	CD10 → DSP	external user interrupt input
67	INT3	μP → DSP	external user interrupt input
68	CVDD4	+core	power supply for core CPU
69	HD1	DSP ↔ CD10	parallel bidirectional data bus

70	CVSS7	GND	ground for core CPU
71	BCLKX1	DSP ↔	transmit clock
72	DVSS4	GND	ground for I/O pins
73	BFSX1	DSP →	frame synchronization pulse for transmit input/output
74	BDX1	DSP → servo driver	serial data transmit output
75	DVDD4	+3.3V	power supply for I/O pins
76	DVSS5	GND	ground for I/O pins
77	CLKMD1	→ DSP	clock mode select signal input, allow selection of different clock modes
78	CLKMD2	→ DSP	clock mode select signal input, allow selection of different clock modes
79	CLKMD3	→ DSP	clock mode select signal input, allow selection of different clock modes
80	HPI16	→ DSP	HPI16 mode selection
81	HD2	DSP ↔ CD10	parallel bidirectional data bus
82	TOUT	DSP →	timer output, signals a pulse when the on-chip timer counts down past zero
83	EMU0	DSP ↔	emulator 0 pin
84	EMU1/OFF	DSP ↔	emulator 1 pin / disable all outputs, used as an interrupt to or from the emulator system
85	TDO	DSP →	IEEE standard 1149.1 test data output
86	TDI	→ DSP	IEEE standard 1149.1 test data input
87	TRST	→ DSP	IEEE standard 1149.1 test reset
88	TCK	→ DSP	IEEE standard 1149.1 test clock
89	TMS	→ DSP	IEEE standard 1149.1 test mode select
90	CVSS8	GND	ground for core CPU
91	CVDD5	+core	power supply for core CPU
92	HPIENA	→ DSP	HPI module select
93	DVSS6	GND	ground for I/O pins
94	CLKOUT	DSP → DRAM/FLASH	clock output signal
95	HD3	DSP ↔ CD10	parallel bidirectional data bus
96	X1	DSP →	output pin from an internal oscillator for the crystal
97	X2/CLKIN	CD10 → DSP	clock/oscillator input
98	RS	μP → DSP	reset input
99	D0	DSP ↔ DRAM/FLASH	parallel data bus
100	D1	DSP ↔ DRAM/FLASH	parallel data bus
101	D2	DSP ↔ DRAM/FLASH	parallel data bus
102	D3	DSP ↔ DRAM/FLASH	parallel data bus
103	D4	DSP ↔ DRAM/FLASH	parallel data bus
104	D5	DSP ↔ DRAM/FLASH	parallel data bus
105	A16	DSP ↔ DRAM/FLASH	parallel address bus
106	DVSS7	GND	ground for I/O pins
107	A17	DSP ↔ DRAM/FLASH	parallel address bus
108	A18	DSP ↔ DRAM/FLASH	parallel address bus
109	A19	DSP ↔ DRAM/FLASH	parallel address bus
110	A20	DSP ↔ DRAM/FLASH	parallel address bus
111	CVSS9	GND	ground for core CPU
112	DVDD5	+3.3V	power supply for I/O pins
113	D6	DSP ↔ DRAM/FLASH	parallel data bus
114	D7	DSP ↔ DRAM/FLASH	parallel data bus
115	D8	DSP ↔ DRAM/FLASH	parallel data bus
116	D9	DSP ↔ DRAM/FLASH	parallel data bus
117	D10	DSP ↔ DRAM/FLASH	parallel data bus
118	D11	DSP ↔ DRAM/FLASH	parallel data bus
119	D12	DSP ↔ DRAM/FLASH	parallel data bus
120	HD4	DSP → servo driver	parallel bidirectional data bus
121	D13	DSP ↔ DRAM/FLASH	parallel data bus
122	D14	DSP ↔ DRAM/FLASH	parallel data bus
123	D15	DSP ↔ DRAM/FLASH	parallel data bus
124	HD5	DSP ↔	parallel bidirectional data bus
125	CVDD6	+core	power supply for core CPU
126	CVSS10	GND	ground for I/O pins
127	HDS1	→ DSP	data strobe input
128	DVSS8	GND	ground for I/O pins
129	HDS1	→ DSP	data strobe input
130	DVDD6	+3.3V	power supply for I/O pins
131	A0	DSP ↔ DRAM/FLASH	parallel address bus
132	A1	DSP ↔ DRAM/FLASH	parallel address bus
133	A2	DSP ↔ DRAM/FLASH	parallel address bus
134	A3	DSP ↔ DRAM/FLASH	parallel address bus
135	HD6	DSP ↔	parallel bidirectional data bus
136	A4	DSP ↔ DRAM/FLASH	parallel address bus
137	A5	DSP ↔ DRAM/FLASH	parallel address bus
138	A6	DSP ↔ DRAM/FLASH	parallel address bus
139	A7	DSP ↔ DRAM/FLASH	parallel address bus
140	A8	DSP ↔ DRAM/FLASH	parallel address bus
141	A9	DSP ↔ DRAM/FLASH	parallel address bus
142	CVDD7	+core	power supply for core CPU
143	A21	DSP ↔ DRAM/FLASH	parallel address bus
144	DVSS9	GND	ground for I/O pins

# START-UP PROCEDURE



# SERVICE TEST PROGRAM

- To enter the service test program
1. Disconnect the AC/DC adaptor and remove batteries
  2. Open the CD-door
  3. Hold "STOP" & "ESP" buttons depressed
  4. Connect the AC/DC adaptor or insert batteries

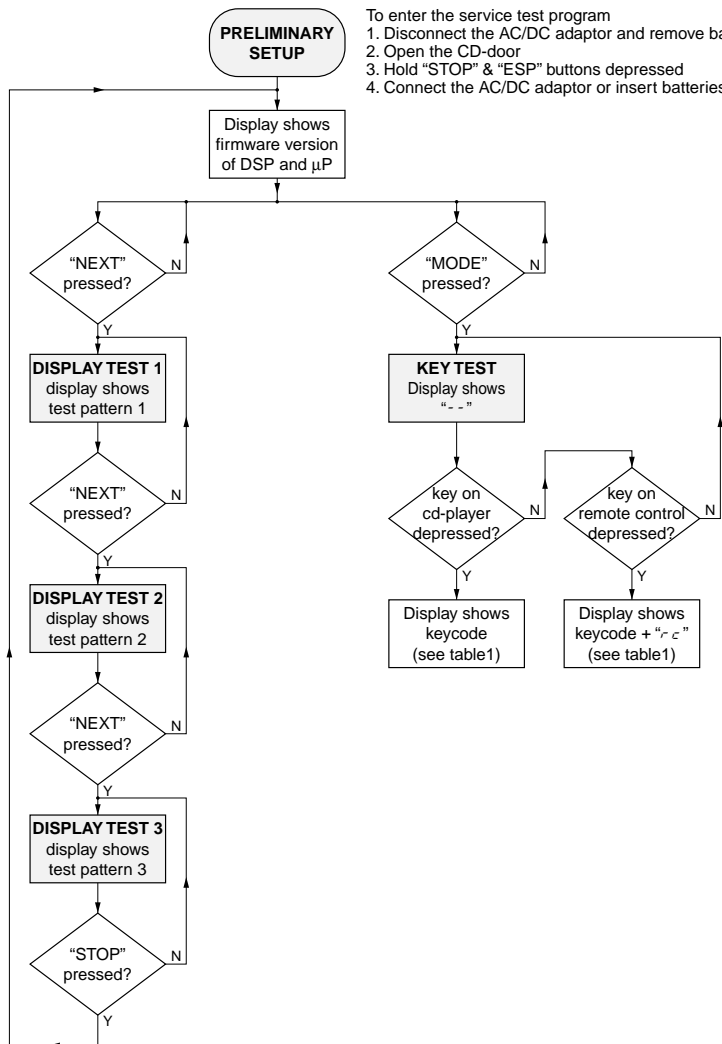
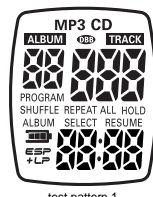


table1 – key test

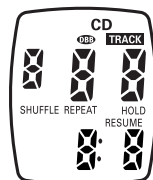
KEY	DISPLAY
PLAY	00
ALBUM +	02
ALBUM -	03
NEXT	04
PREVIOUS	05
MODE	06
DISPLAY	07
PLAY FAVOURITES	08
DBB	09
ESP	10
MARK FAVOURITES	11

Press "STOP" to exit key test.

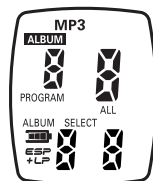
Test patterns EXP21x



test pattern 1



test pattern 2

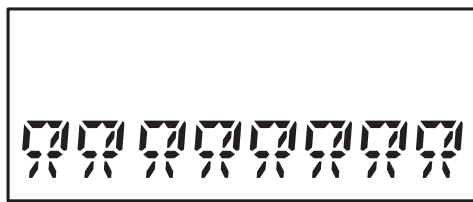


test pattern 3

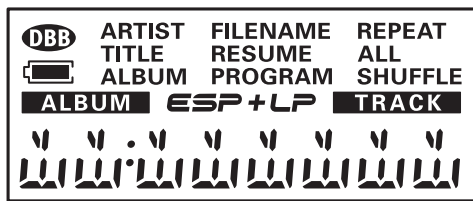
Test patterns EXP31x



test pattern 1

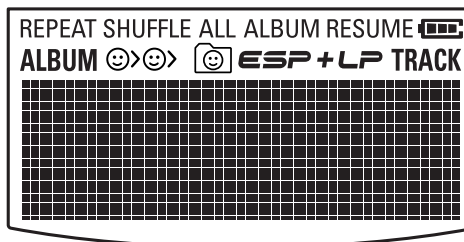


test pattern 2

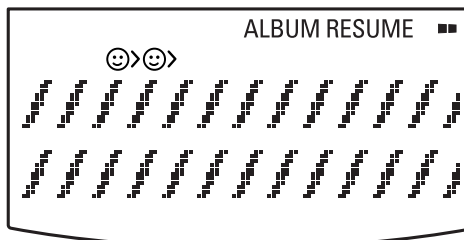


test pattern 3

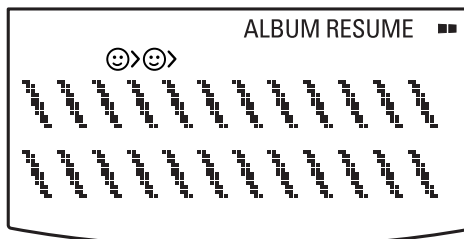
Test patterns EXP51x



test pattern 1

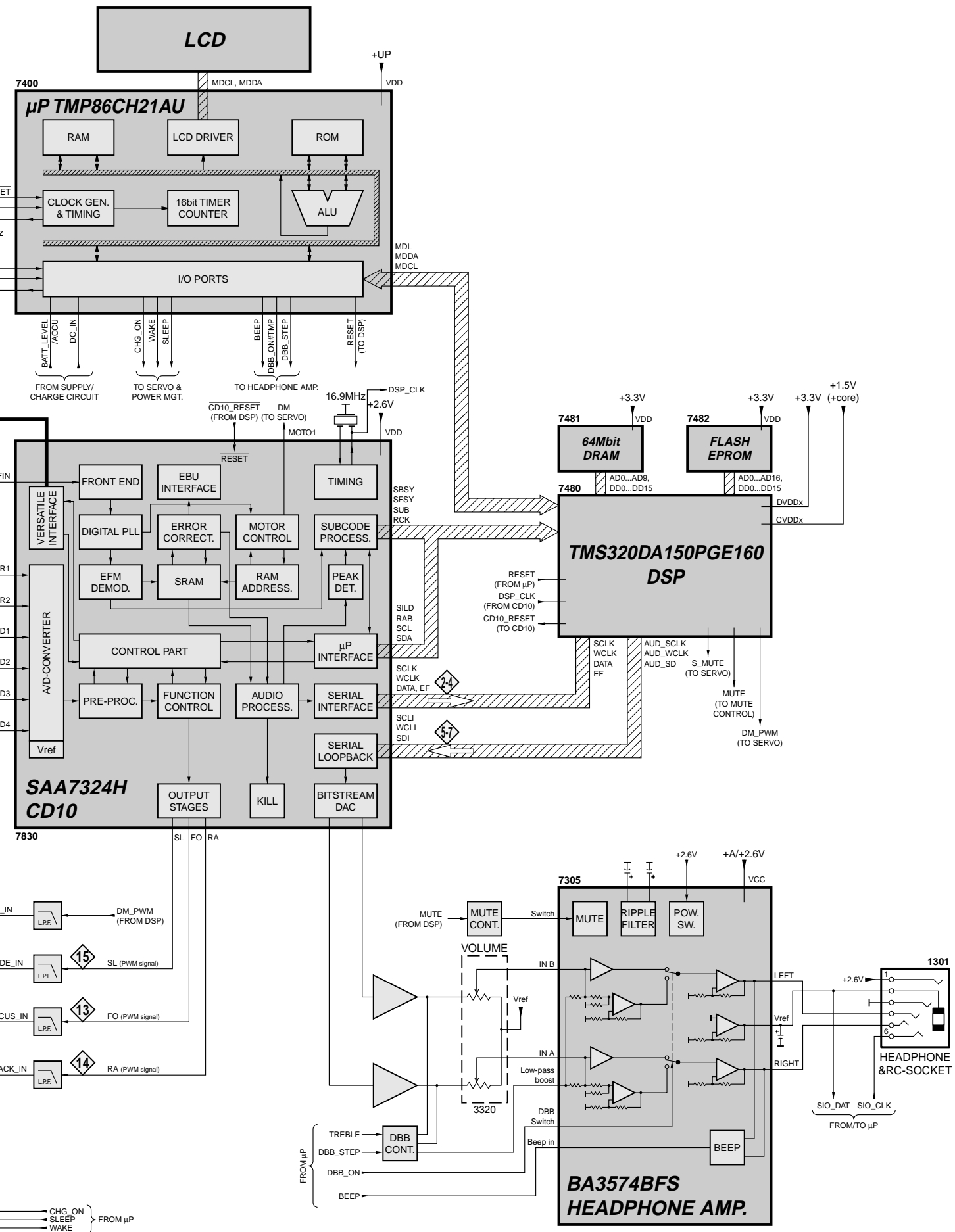
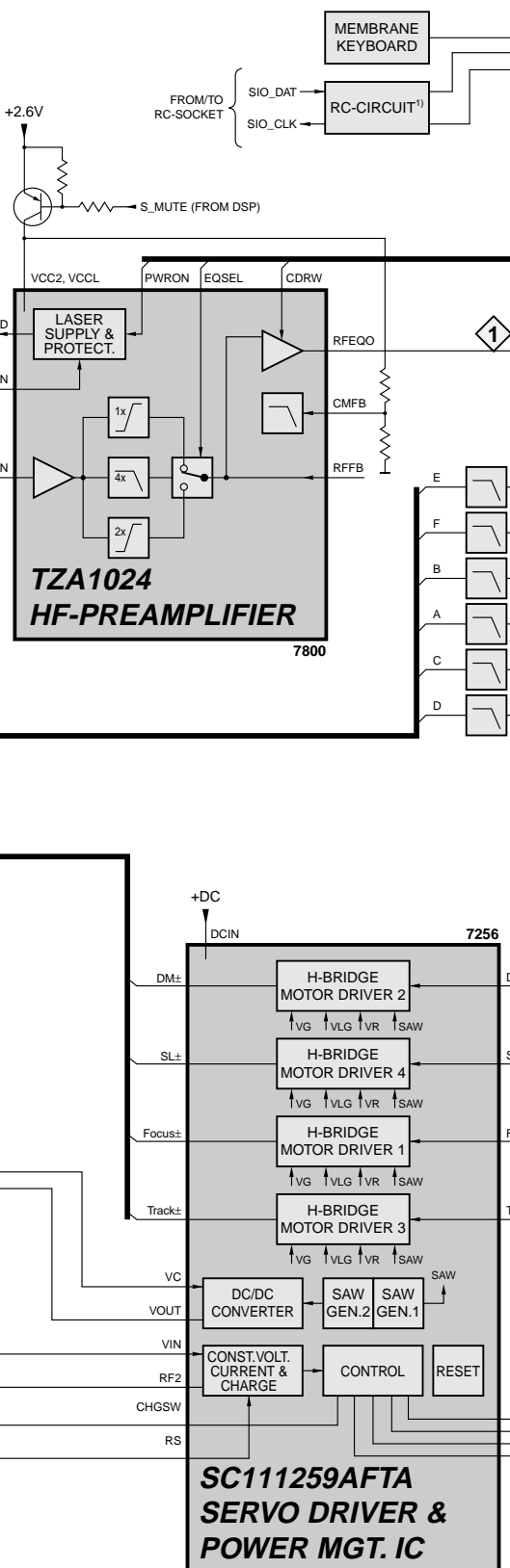
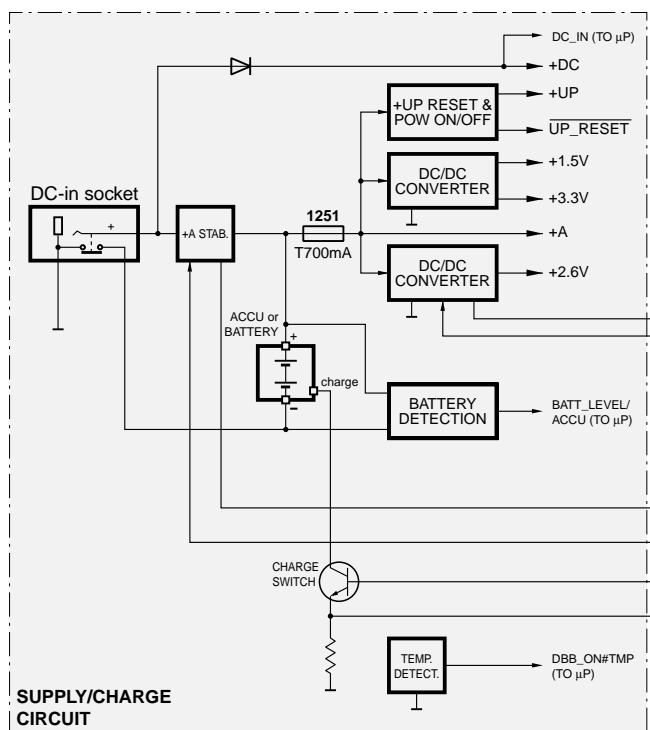
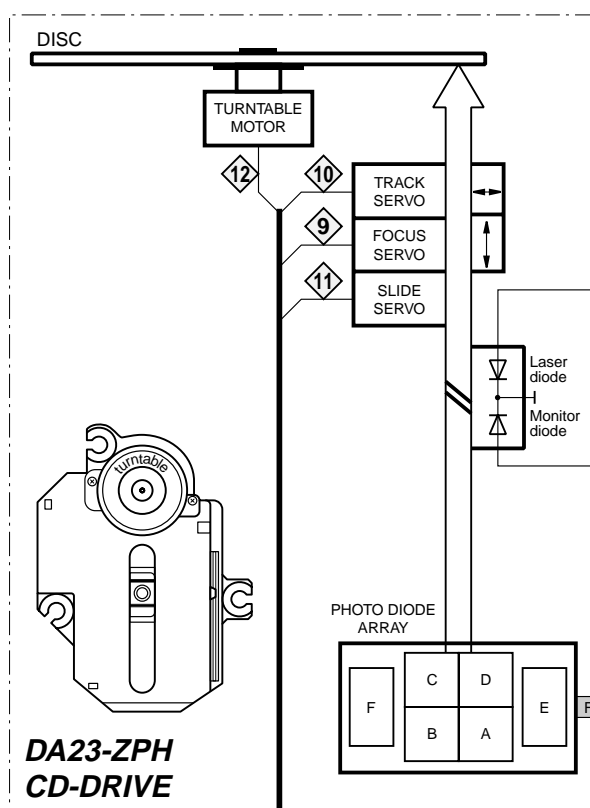
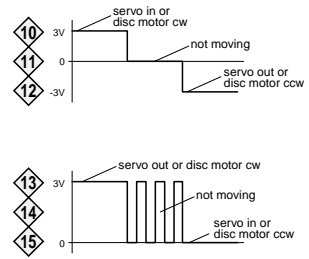
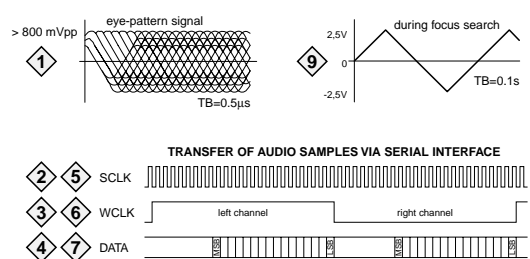


test pattern 2



test pattern 3

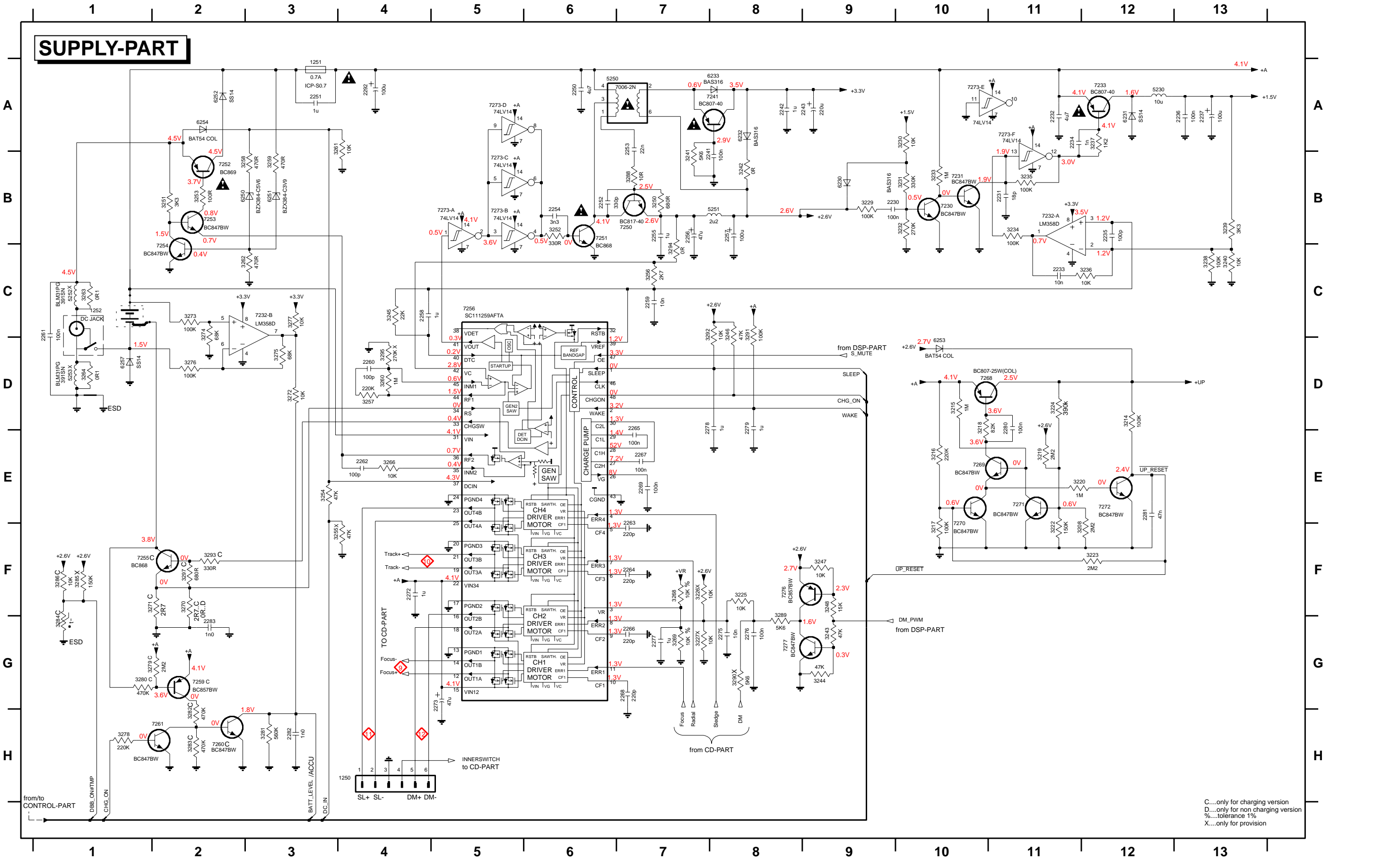
# BLOCKDIAGRAM



<sup>1)</sup> not on all versions

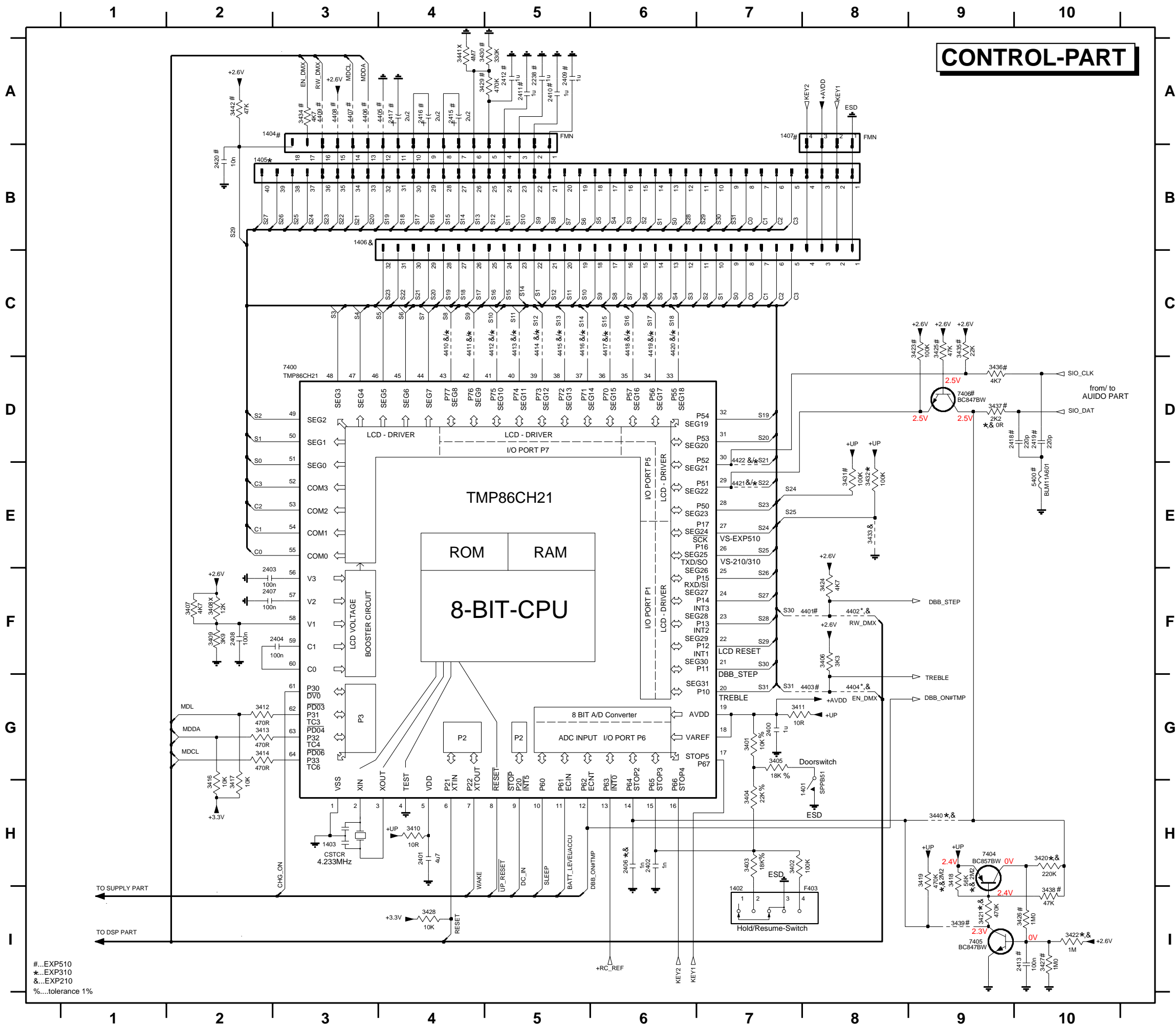
1250 H4	2235 B12	2252 B6	2260 D4	2268 G7	2279 D8	3215 D10	3224 D11	3233 B10	3241 B7	3250 B7	3258 B2	3268 F7	3276 D2	3284 G1	3293 F2	5253 D1	6253 D10	7241 A7	7259 G2	7273-A B5
1251 A3	2236 A13	2253 A7	2261 C1	2269 E7	2280 D11	3216 E10	3225 F8	3234 B11	3242 B8	3251 B2	3259 B3	3269 F7	3277 C3	3285 F1	3294 C7	6230 B9	6254 A2	7250 B7	7260 H2	7273-B B5
1252 C1	2237 A13	2254 B6	2262 E4	2272 F4	2281 E12	3217 F10	3226 F7	3235 B11	3243 G9	3252 B6	3260 D4	3270 F2	3278 H1	3286 F1	3295 D4	6231 A12	6257 D1	7251 B6	7261 H1	7273-C B5
2230 B9	2241 B8	2255 B7	2263 F7	2273 G5	2282 H3	3218 D10	3227 G7	3236 C12	3244 G9	3253 B2	3261 A3	3271 F1	3279 G1	3288 B7	3297 F2	6232 A8	7230 B10	7252 B2	7268 D11	7273-D A5
2231 B11	2242 A8	2256 B7	2264 A7	2275 G8	2283 G2	3219 E11	3228 B9	3237 A12	3245 C4	3254 E3	3262 C2	3272 D3	3280 G1	3289 G8	5230 A12	6233 A8	7231 B10	7253 B2	7269 E10	7273-E A10
2232 A11	2243 A9	2257 B8	2265 D7	2276 G8	2292 A4	3220 E11	3230 A10	3238 C13	3246 C8	3255 F3	3263 C1	3273 C2	3281 H3	3290 G8	5250 A6	6250 B2	7232-A B11	7254 C2	7270 F10	7273-F A11
2233 C11	2250 A6	2258 C4	2266 G7	2277 G7	3208 F11	3227 F11	3231 B10	3239 B13	3247 F9	3256 C7	3264 D1	3274 C2	3282 H2	3291 C8	5251 B8	6251 B3	7232-B C3	7255 F1	7271 E11	7273-G B5
2234 A11	2251 A3	2259 C7	2267 E7	2278 D7	3214 D12	3223 F12	3232 B10	3240 C13	3248 F9	3257 D4	3266 E4	3275 D3	3283 H2	3292 C7	5252 C1	6252 A2	7233 A12	7256 C5	7272 E12	7277 G8

# SUPPLY-PART



C....only for charging version  
D....only for non charging version  
%....tolerance 1%  
X....only for provision





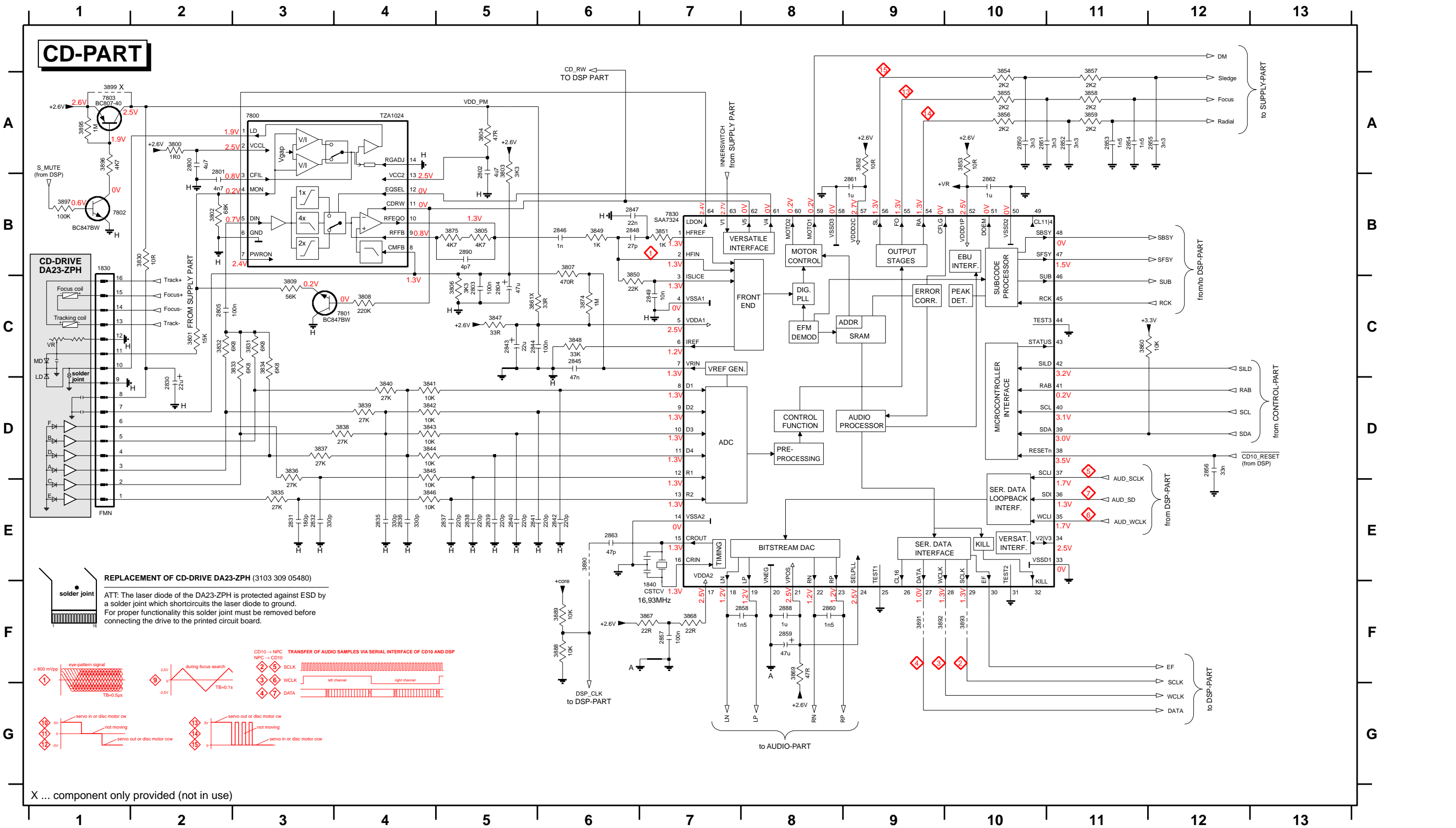
# CONTROL-PART

- 1401 H8
- 1402 H7
- 1403 H3
- 1404 A2
- 1405 B2
- 1406 B3
- 1407 A7
- 2238 A5
- 2400 G7
- 2401 H4
- 2402 H6
- 2403 E2
- 2404 F3
- 2406 H6
- 2407 F2
- 2408 F2
- 2409 A5
- 2410 A5
- 2411 A5
- 2412 A5
- 2413 I10
- 2415 A4
- 2416 A4
- 2417 A4
- 2418 D9
- 2419 D10
- 2420 B2
- 3401 G7
- 3402 H7
- 3403 H7
- 3404 H7
- 3405 G7
- 3406 F8
- 3407 F2
- 3408 F2
- 3409 F2
- 3410 H4
- 3411 G7
- 3412 G2
- 3413 G2
- 3414 G2
- 3416 H2
- 3417 H2
- 3418 H9
- 3419 H9
- 3420 H10
- 3421 I9
- 3422 I10
- 3423 C9
- 3424 F8
- 3425 C9
- 3426 I10
- 3427 I10
- 3428 I4
- 3429 A4
- 3430 A4
- 3431 E8
- 3432 E8
- 3433 E8
- 3434 A3
- 3435 C9
- 3436 D9
- 3437 D9
- 3438 I10
- 3439 I9
- 3440 H9
- 3441 A4
- 3442 A2
- 4401 F8
- 4402 F8
- 4403 G8
- 4404 G8
- 4405 A4
- 4406 A3
- 4407 A3
- 4408 A3
- 4409 A3
- 4410 C4
- 4411 C4
- 4412 C5
- 4413 C5
- 4414 C5
- 4415 C5
- 4416 C5
- 4417 C6
- 4418 C6
- 4419 C6
- 4420 C6
- 4421 E7
- 4422 D7
- 5400 E10
- 7400 D3
- 7404 H9
- 7405 I9
- 7406 D9

#...EXP510  
 \*...EXP310  
 &...EXP210  
 %...tolerance 1%

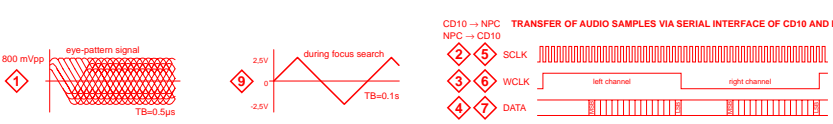
1830 B1	2802 A5	2830 D2	2836 E4	2840 E5	2844 C5	2848 B6	2852 A11	2856 D12	2860 F8	2888 F8	3802 B2	3806 C5	3830 B2	3834 C3	3838 D4	3842 D4	3846 E4	3850 C6	3854 A10	3858 A11	3867 F7	3875 B5	3891 F9	3899 A1	7801 C4
1840 F7	2803 C5	2831 E3	2837 E5	2841 E5	2845 C6	2849 C7	2853 A11	2857 F7	2861 B9	2890 B5	3803 A5	3807 B6	3831 C3	3835 E3	3839 D4	3843 D4	3847 C5	3851 B7	3855 A10	3859 A11	3868 F7	3888 F6	3892 F9	7800 A3	7802 B1
2800 A2	2804 C5	2832 E3	2838 E5	2842 E6	2846 B6	2850 A10	2854 A11	2858 F8	2862 B10	3800 A2	3804 A5	3808 C4	3832 C2	3836 D3	3840 D4	3844 D4	3848 C6	3852 A9	3856 A10	3860 C11	3869 F8	3889 F6	3893 F10	3896 A1	7803 A1
2801 B2	2805 C2	2835 E4	2839 E5	2843 C5	2847 B6	2851 A10	2855 A12	2859 F8	2863 E6	3801 C2	3805 B5	3809 C3	3833 C3	3837 D3	3841 D4	3845 D4	3849 B6	3853 A10	3857 A11	3861 C5	3874 C6	3890 E6	3895 A1	3897 B1	7830 B7

# CD-PART

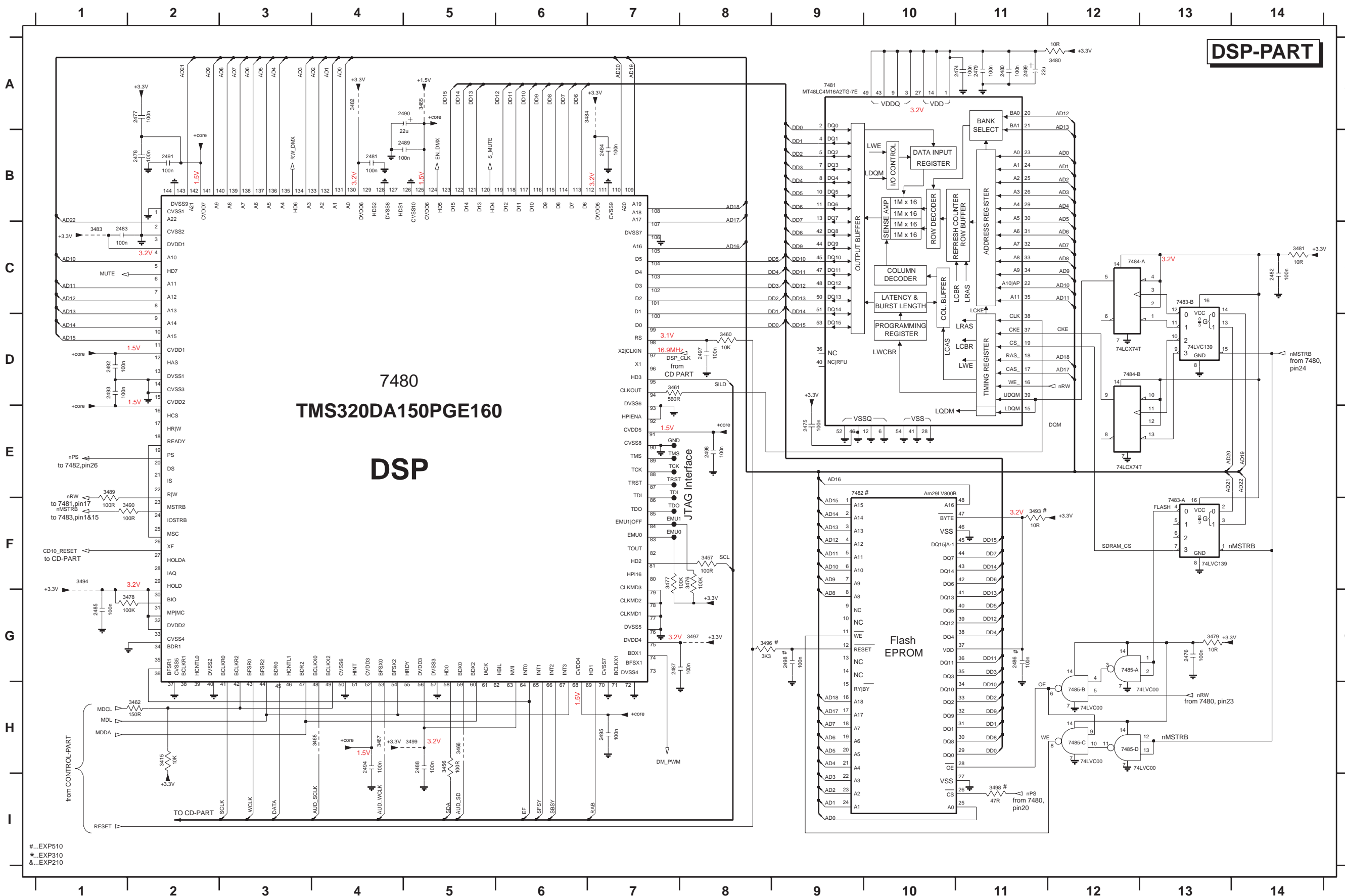


### REPLACEMENT OF CD-DRIVE DA23-ZPH (3103 309 05480)

ATT: The laser diode of the DA23-ZPH is protected against ESD by a solder joint which shortcircuits the laser diode to ground. For proper functionality this solder joint must be removed before connecting the drive to the printed circuit board.



X ... component only provided (not in use)



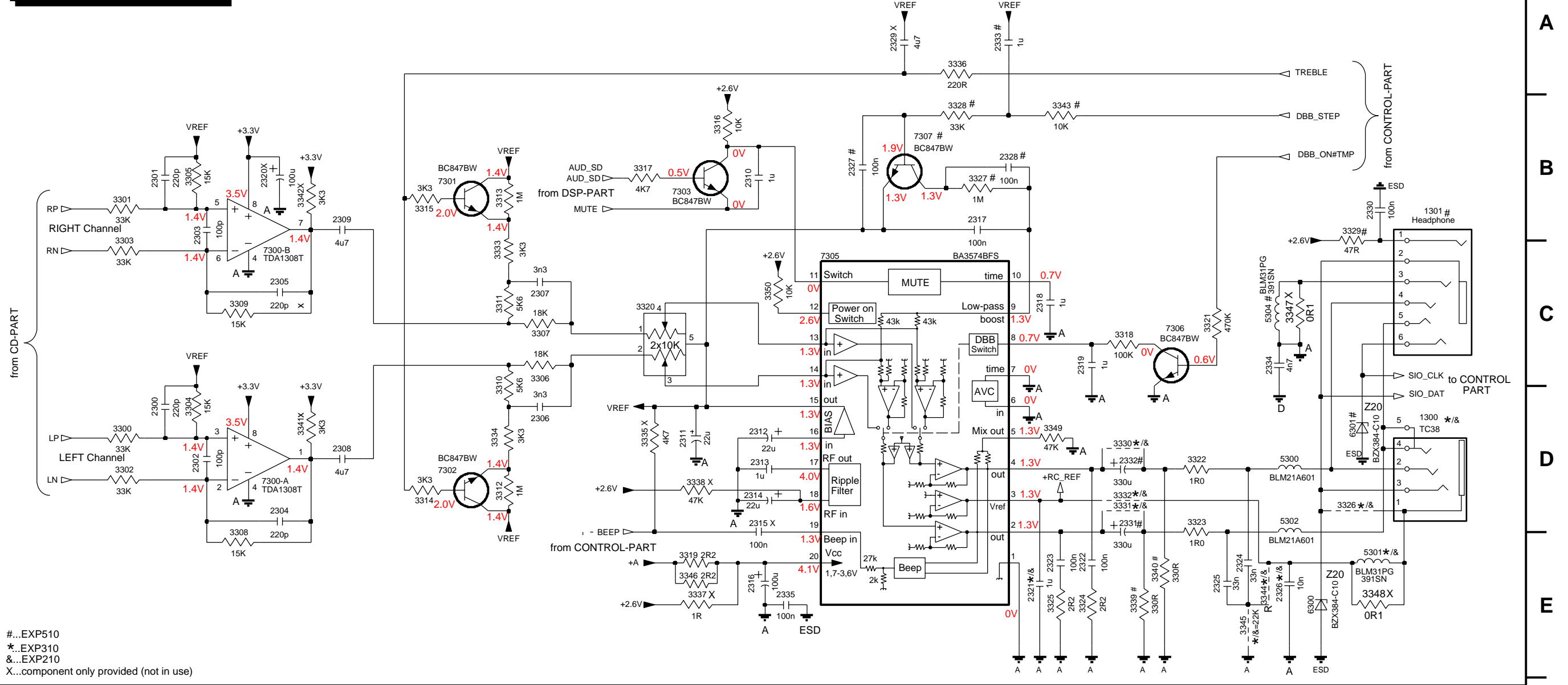
**DSP-PART**

- 2474 A11
- 2475 E9
- 2476 G13
- 2477 A2
- 2478 B2
- 2479 A11
- 2480 A11
- 2481 B4
- 2482 C14
- 2483 C1
- 2484 B7
- 2485 G1
- 2486 G11
- 2487 G7
- 2488 H5
- 2489 B5
- 2490 A5
- 2491 B2
- 2492 D1
- 2493 H4
- 2494 H4
- 2495 H7
- 2496 E8
- 2497 D8
- 2498 G9
- 2499 A11
- 3415 H2
- 3455 H5
- 3457 F8
- 3460 D8
- 3461 D7
- 3462 H2
- 3466 H5
- 3467 H4
- 3468 H4
- 3476 F8
- 3477 F7
- 3478 G2
- 3479 G13
- 3480 A12
- 3481 C14
- 3482 A4
- 3483 C1
- 3484 A6
- 3485 A5
- 3489 E1
- 3490 F2
- 3493 F11
- 3494 F1
- 3496 G8
- 3497 G8
- 3498 I11
- 3499 H5
- 7480 B2
- 7481 A9
- 7482 E10
- 7483-A F13
- 7483-B C13
- 7484-A C13
- 7484-B D13
- 7485-A H12
- 7485-B H12
- 7485-C H12
- 7485-D H12

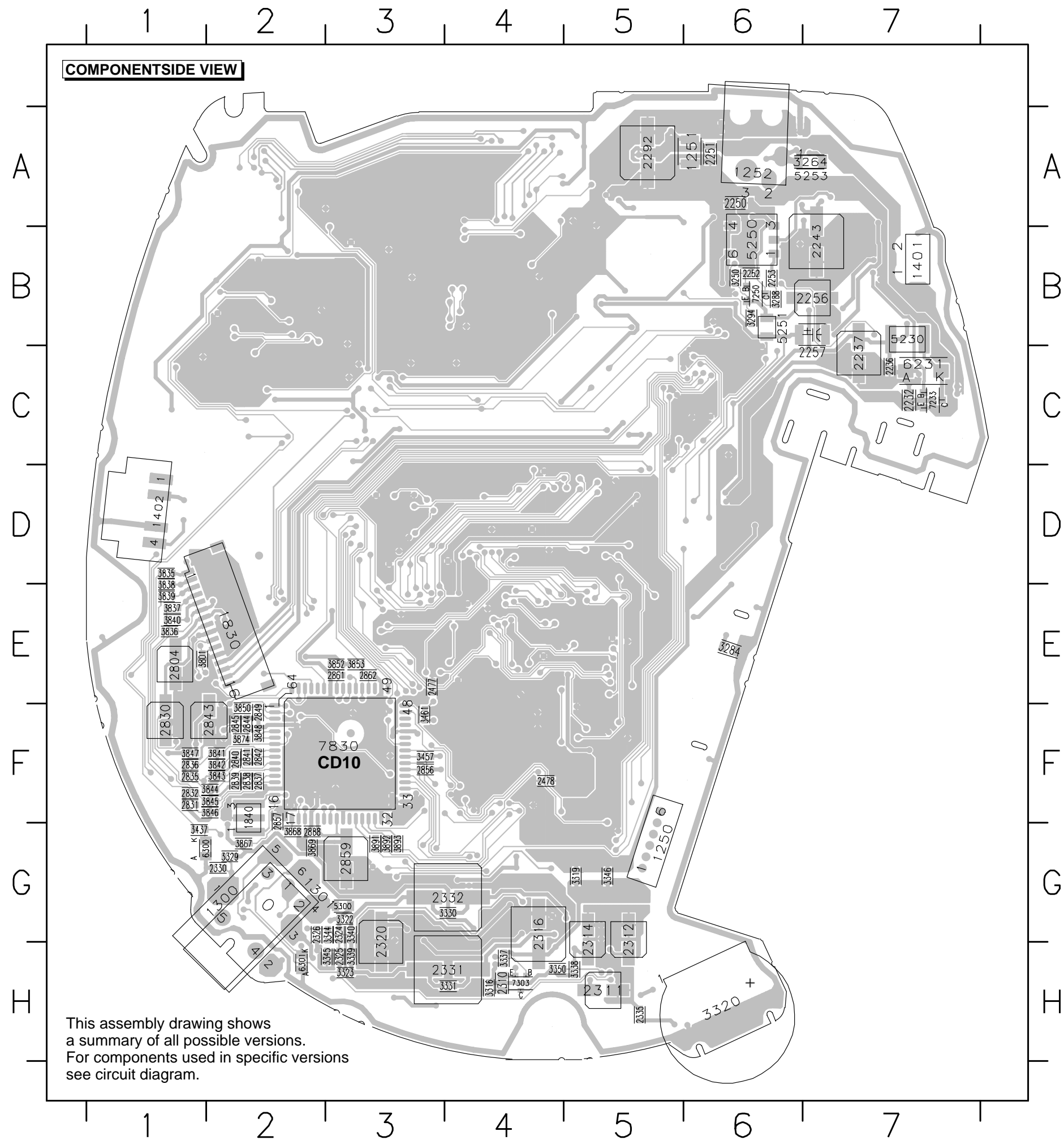
#...EXP510  
 \*...EXP310  
 &...EXP210

1300 D10	2304 D2	2310 B6	2316 E6	2322 E8	2328 B7	2334 C9	3304 D2	3310 C4	3316 B5	3322 D9	3328 B7	3334 D4	3340 E8	3346 E5	5301 E10	7300-B C2	7307 B7
1301 B10	2305 C2	2311 D5	2317 B7	2323 E8	2329 A7	2335 E6	3305 B2	3311 C4	3317 B5	3323 D9	3329 B10	3335 D5	3341 D2	3347 C9	5302 D9	7301 B3	
2300 D1	2306 D4	2312 D6	2318 C8	2324 E9	2330 B10	3300 D1	3306 C4	3312 D4	3318 C8	3324 E8	3330 D8	3336 A7	3342 B2	3348 E10	5304 C9	7302 D3	
2301 B1	2307 C4	2313 D6	2319 C8	2325 E9	2331 D8	3301 B1	3307 C4	3313 B4	3319 E5	3325 E8	3331 D8	3337 E5	3343 B8	3349 D8	5306 E9	7303 B5	
2302 D2	2308 D3	2314 D6	2320 B2	2326 E9	2332 D8	3302 D1	3308 E2	3314 D3	3320 C5	3326 D10	3332 D8	3338 D5	3344 E9	3350 C6	6301 D10	7305 C6	
2303 B2	2309 B3	2315 D6	2321 E7	2327 B6	2333 A7	3303 C1	3309 C2	3315 B3	3321 C9	3327 B7	3333 C4	3339 E8	3345 E9	5300 D9	7300-A D2	7306 C9	

# AUDIO-PART

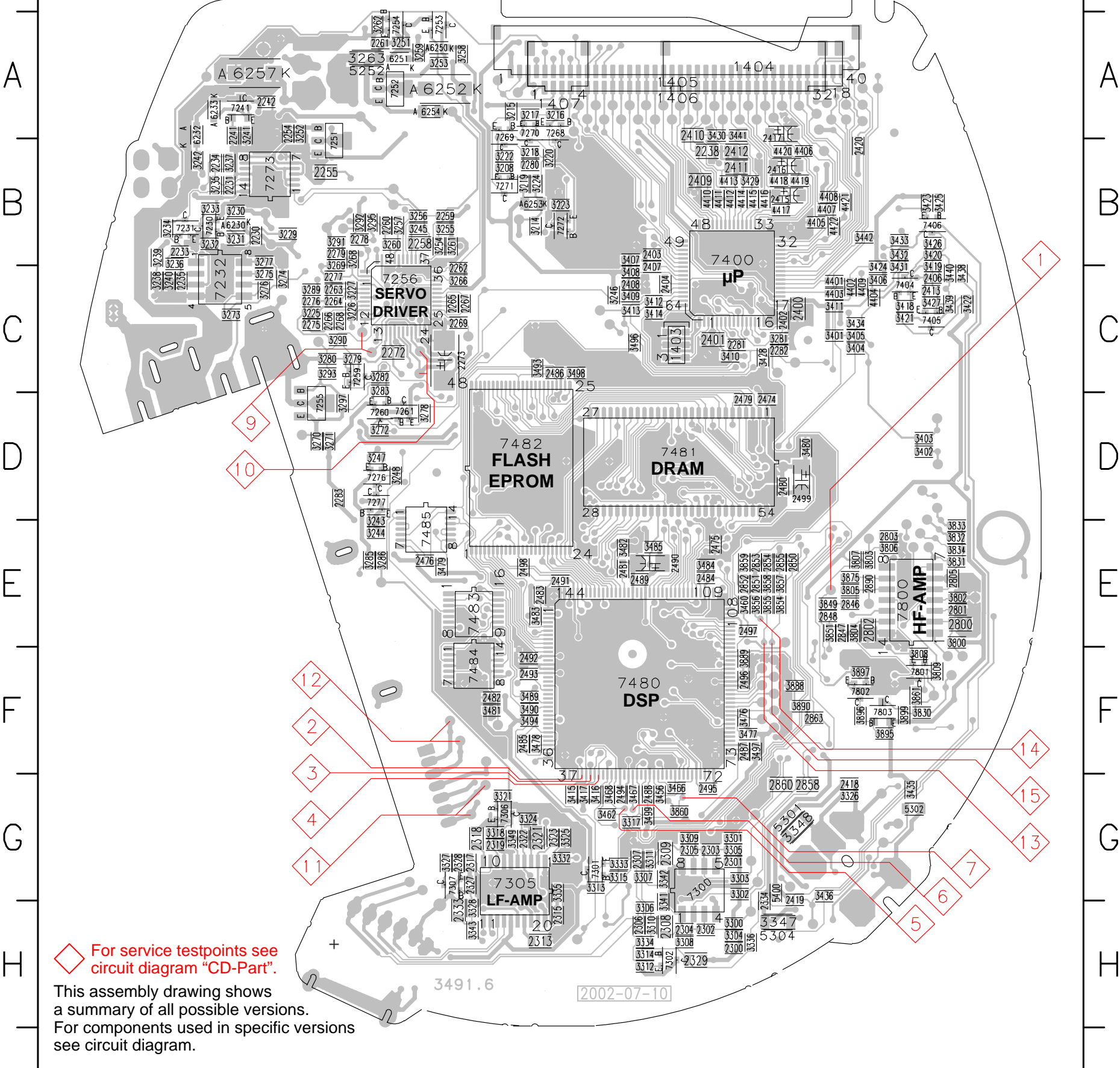


#...EXP510  
 \*...EXP310  
 &...EXP210  
 X...component only provided (not in use)



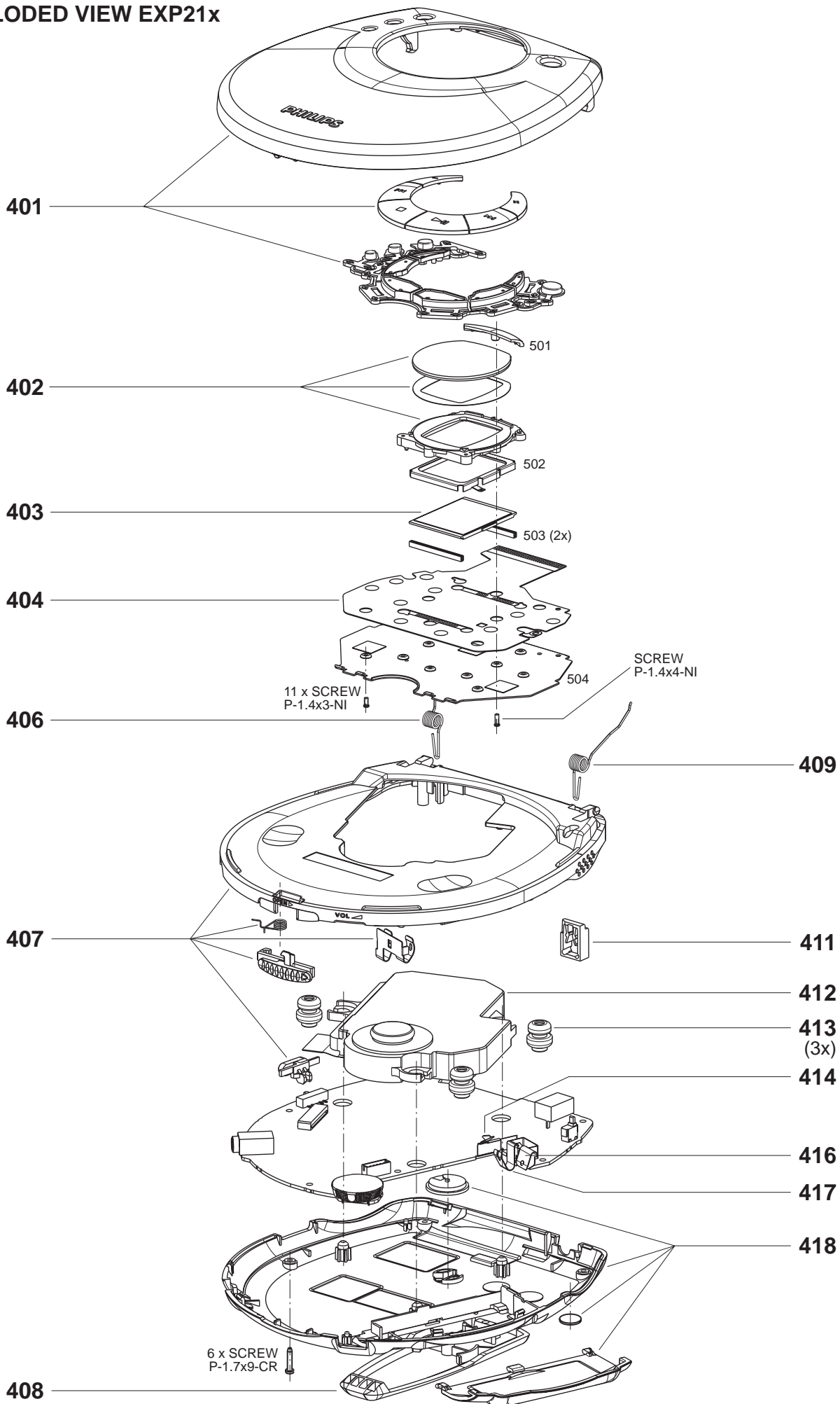
- |         |         |
|---------|---------|
| 1250 G5 | 3345 H3 |
| 1251 A6 | 3346 G5 |
| 1252 A6 | 3350 H4 |
| 1300 G2 | 3437 G1 |
| 1301 G2 | 3457 F3 |
| 1401 B7 | 3461 F3 |
| 1402 D1 | 3801 E1 |
| 1830 E2 | 3835 D1 |
| 1840 F2 | 3836 E1 |
| 2232 C7 | 3837 E1 |
| 2236 C7 | 3838 E1 |
| 2237 C7 | 3839 E1 |
| 2243 B7 | 3840 E1 |
| 2250 A6 | 3841 F2 |
| 2251 A6 | 3842 F2 |
| 2252 B6 | 3843 F2 |
| 2253 B6 | 3844 F2 |
| 2256 B7 | 3845 F2 |
| 2257 C7 | 3846 F2 |
| 2292 A5 | 3847 F1 |
| 2310 H4 | 3848 F2 |
| 2311 H5 | 3850 F2 |
| 2312 G5 | 3852 E3 |
| 2314 G5 | 3853 E3 |
| 2316 G4 | 3867 G2 |
| 2320 G3 | 3868 G2 |
| 2324 G3 | 3869 G2 |
| 2325 H3 | 3874 F2 |
| 2326 G2 | 3891 G3 |
| 2330 G2 | 3892 G3 |
| 2331 H4 | 3893 G3 |
| 2332 G4 | 5230 B7 |
| 2335 H5 | 5250 B6 |
| 2477 E3 | 5251 B6 |
| 2478 F4 | 5253 A7 |
| 2804 E1 | 5300 G3 |
| 2830 F1 | 6231 C7 |
| 2831 F1 | 6300 G1 |
| 2832 F1 | 6301 H2 |
| 2835 F1 | 7233 C7 |
| 2836 F1 | 7250 B6 |
| 2837 F2 | 7303 H4 |
| 2838 F2 | 7830 F3 |
| 2839 F2 |         |
| 2840 F2 |         |
| 2841 F2 |         |
| 2842 F2 |         |
| 2843 F2 |         |
| 2844 F2 |         |
| 2845 F2 |         |
| 2849 F2 |         |
| 2856 F3 |         |
| 2857 F2 |         |
| 2859 G3 |         |
| 2861 E3 |         |
| 2862 E3 |         |
| 2888 G2 |         |
| 3250 B6 |         |
| 3264 A7 |         |
| 3284 E6 |         |
| 3288 B6 |         |
| 3294 B6 |         |
| 3316 H4 |         |
| 3319 G5 |         |
| 3320 H6 |         |
| 3322 G3 |         |
| 3323 H3 |         |
| 3329 G2 |         |
| 3330 G4 |         |
| 3331 H4 |         |
| 3337 H4 |         |
| 3338 H5 |         |
| 3339 H3 |         |
| 3340 G3 |         |
| 3344 G3 |         |

**COPPERSIDE VIEW**

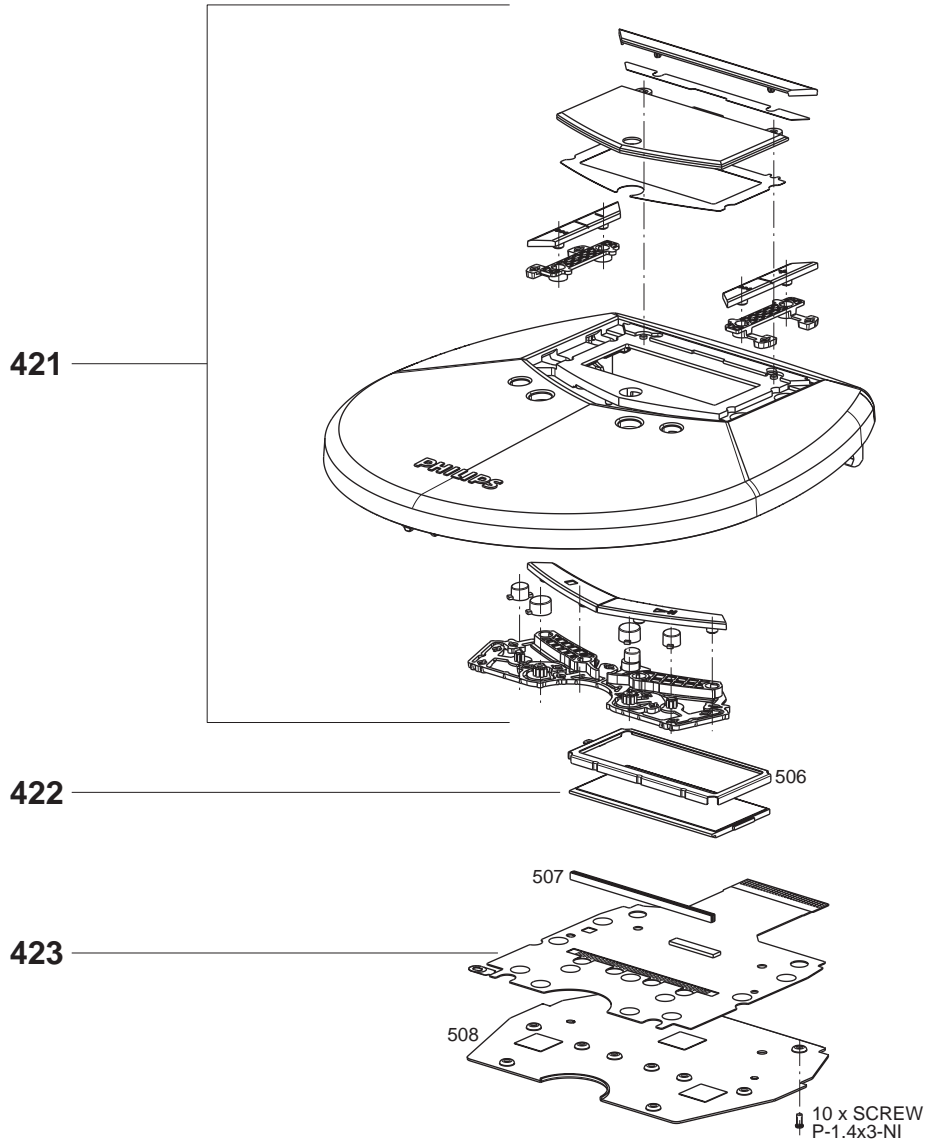


1403 C5	2416 B5	3243 E2	3342 G5	3806 E6	7261 D2
1404 A5	2417 A5	3244 E2	3343 H3	3807 E6	7268 A4
1405 A5	2418 G6	3245 B3	3347 H5	3808 F7	7269 A3
1406 A5	2419 G6	3246 C4	3348 G6	3809 F7	7270 A3
1407 A4	2420 B6	3247 D2	3349 G3	3830 F7	7271 B3
2230 B1	2474 D5	3248 D2	3401 C6	3831 E7	7272 B4
2231 B1	2475 E5	3251 A2	3402 D7	3832 E7	7273 B1
2233 B1	2476 E3	3252 A2	3403 D7	3833 E7	7276 D2
2234 B1	2479 D5	3253 A3	3404 C6	3834 E7	7277 D2
2235 C1	2480 D5	3254 B3	3405 C6	3835 E6	7300 G5
2238 B5	2481 E4	3255 B3	3406 C6	3851 E6	7301 G4
2241 A1	2482 F3	3256 B3	3407 B4	3854 E5	7302 H5
2242 A1	2483 E4	3257 B2	3408 C4	3855 E5	7305 G3
2254 A2	2484 E5	3258 A3	3409 C4	3856 E5	7306 G3
2255 B2	2485 F3	3259 A3	3410 C5	3857 E5	7307 G3
2258 B3	2486 C4	3260 B2	3411 C6	3858 E5	7400 C5
2259 B3	2487 F5	3261 B3	3412 C4	3859 E5	7404 C6
2260 B2	2488 G4	3262 A2	3413 C4	3860 G5	7405 C7
2261 A2	2489 E4	3263 A2	3414 C4	3861 F7	7406 B7
2262 C3	2490 E5	3266 C3	3415 G4	3875 E6	7480 F4
2263 C2	2491 E4	3268 B2	3416 G4	3888 F6	7481 D5
2264 C2	2492 F3	3269 B2	3417 G4	3889 F5	7482 D3
2265 C3	2493 F3	3270 D2	3418 C6	3890 F6	7483 E3
2266 C2	2494 G4	3271 D2	3419 C7	3895 F6	7484 F3
2267 C3	2495 G5	3272 D2	3420 B7	3896 F6	7485 E3
2268 C2	2496 F5	3273 C1	3421 C6	3897 F6	7800 E7
2269 C3	2497 E5	3274 C2	3422 C7	3899 F6	7801 F7
2272 C2	2498 E3	3275 C1	3423 B7	4401 C6	7802 F6
2273 C3	2499 D6	3276 C1	3424 C6	4402 C6	7803 F6
2275 C2	2800 E7	3277 B1	3425 B7	4403 C6	
2276 C2	2801 E7	3278 D3	3426 B7	4404 C6	
2277 C2	2802 E6	3279 C2	3427 C7	4405 B6	
2278 B2	2803 E6	3280 C2	3428 C5	4406 B6	
2279 B2	2805 E7	3281 C5	3429 B5	4407 B6	
2280 B3	2846 E6	3282 C2	3430 A5	4408 B6	
2281 C5	2847 E6	3283 C2	3431 C6	4409 C6	
2282 C5	2848 E6	3285 E2	3432 B6	4410 B5	
2283 D2	2850 E6	3286 E2	3433 B6	4411 B5	
2300 H5	2851 E5	3289 C2	3434 C6	4412 B5	
2301 G5	2852 E5	3290 C2	3435 G6	4413 B5	
2302 H5	2853 E5	3291 B2	3436 G6	4414 B5	
2303 G5	2854 E5	3292 B2	3438 C7	4415 B5	
2304 H5	2855 E5	3293 C2	3439 C7	4416 B5	
2305 G5	2858 G6	3295 B2	3440 C7	4417 B5	
2306 H4	2860 G5	3297 D2	3441 A5	4418 B5	
2307 G4	2863 F6	3300 H5	3442 B6	4419 B6	
2308 H5	2890 E6	3301 G5	3456 G4	4420 B5	
2309 G5	3208 B3	3302 G5	3460 E5	4421 B6	
2313 H4	3214 B4	3303 G5	3462 G4	4422 B6	
2315 H4	3215 A3	3304 H5	3466 G5	5252 A2	
2317 G3	3216 A4	3305 G5	3467 G4	5301 G6	
2318 G3	3217 A3	3306 H4	3468 G4	5302 G7	
2319 G3	3218 B3	3307 G4	3476 F5	5304 H5	
2321 G4	3219 B3	3308 H5	3477 F5	5400 G5	
2322 G3	3220 B4	3309 G5	3478 F4	6230 B1	
2323 G4	3222 B3	3310 H4	3479 E3	6232 A1	
2327 G3	3223 B4	3311 G4	3480 D6	6233 A1	
2328 G3	3224 B4	3312 H4	3481 F3	6250 A3	
2329 H5	3225 C2	3313 G4	3482 E4	6251 A2	
2333 H3	3226 C2	3314 H4	3483 E4	6252 A3	
2334 H5	3227 C2	3315 G4	3484 E5	6253 B4	
2400 C6	3229 B2	3317 G4	3485 E4	6254 A3	
2401 C5	3230 B1	3318 G3	3489 F3	6257 A1	
2402 C5	3231 B1	3321 G3	3490 F3	7230 B1	
2403 B4	3232 B1	3324 G3	3493 C4	7231 B1	
2404 C5	3233 B1	3325 G4	3494 F3	7232 C1	
2406 C7	3234 B1	3326 G6	3496 C4	7241 A1	
2407 C4	3235 B1	3327 G3	3497 F5	7251 B2	
2408 C4	3236 B1	3328 H3	3498 C4	7252 A2	
2409 B5	3237 B1	3332 G4	3499 G4	7253 A3	
2410 A5	3238 C1	3333 G4	3800 E7	7254 A2	
2411 B5	3239 B1	3334 H4	3802 E7	7255 D2	
2412 B5	3240 C1	3335 G4	3803 E6	7256 C3	
2413 C7	3241 A1	3336 H5	3804 E6	7259 C2	
2415 B5	3242 B1	3341 H5	3805 E6	7260 D2	

# EXPLODED VIEW EXP21x

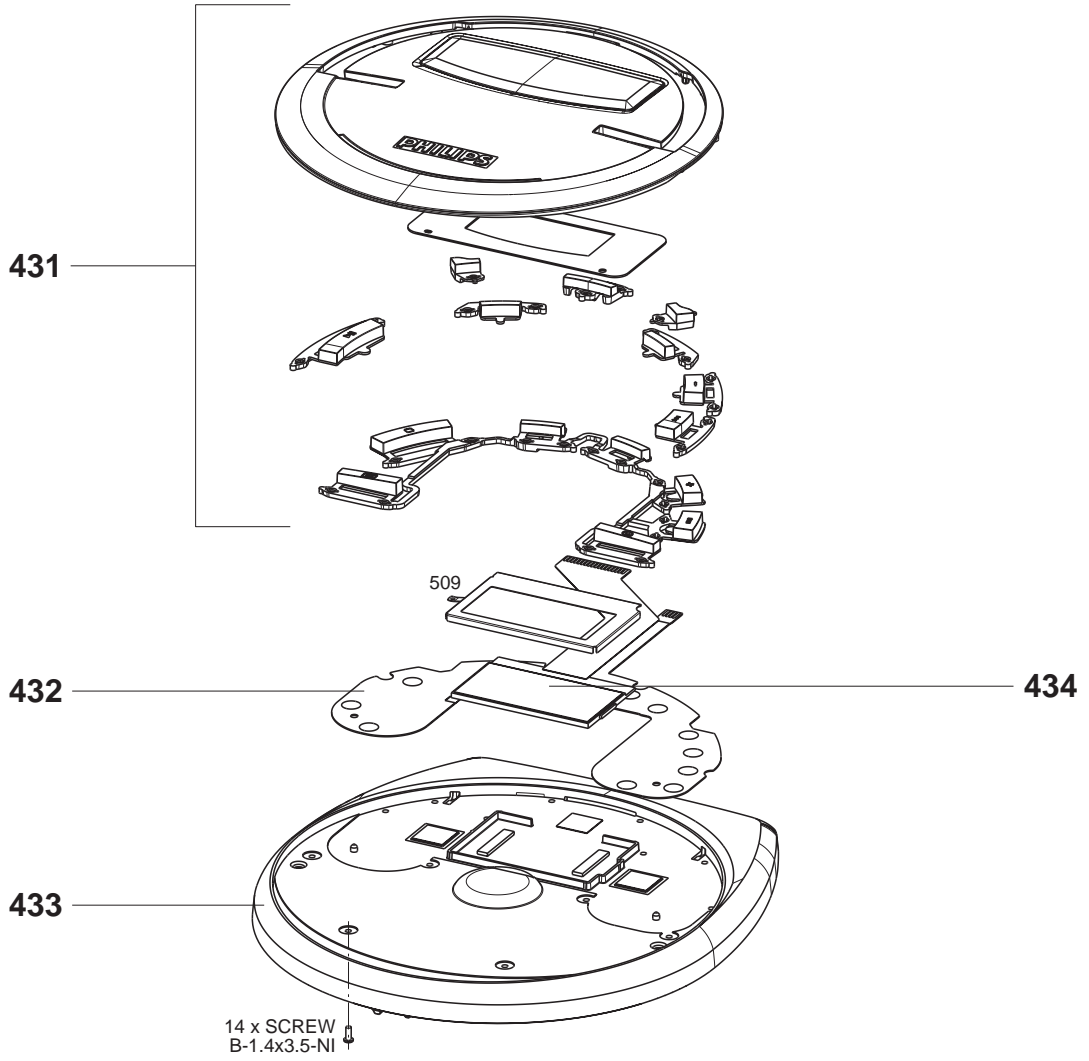


EXPLODED VIEW EXP31x





# EXPLODED VIEW EXP51x



**MECHANICAL PARTSLIST**

401	3103 308 13200	CD-DOOR-ASSEMBLY EXP21x
402	3103 308 13220	FRAME-ASSEMBLY EXP21x
403	3103 308 84500	LCD EXP21x
404	3103 304 71530	MEMBRANE-KEYBOARD EXP21x
406	3103 301 06640	SPRING-OPEN-LEFT EXP21x, EXP31x
406	3103 301 06670	SPRING-OPEN-LEFT EXP51x
407	3103 308 11810	CABINET ASSEMBLY EXP21x, EXP31x
407	3103 308 12650	CABINET ASSEMBLY EXP51x
408	3103 304 70250	BELT CLIP
409	3103 301 06650	SPRING-OPEN-RIGHT EXP21x, EXP31x
409	3103 301 06680	SPRING-OPEN-RIGHT EXP51x
411	3103 304 69560	BRAKE
412	3103 309 05480	CD-DRIVE DA23-ZPH
413	3103 304 69590	SUSPENSION
414	3103 301 45630	SPRING-BATTERY-CHARGE
416	3103 301 45610	SPRING-BATTERY-MINUS
417	3103 301 45620	SPRING-BATTERY-PLUS
418	3103 308 11960	BOTTOM-ASSEMBLY EXP21x, EXP31x
418	3103 308 12660	BOTTOM-ASSEMBLY EXP51x
421	3103 308 13210	CD-DOOR-ASSEMBLY EXP31x
422	3103 308 84430	LCD EXP31x
423	3103 304 71540	MEMBRANE-KEYBOARD EXP31x
431	3103 308 12250	INSERT-DOOR-ASSEMBLY EXP51x
432	3103 304 72420	MEMBRANE-KEYBOARD EXP51x
433	3103 308 12240	CD-DOOR-ASSEMBLY EXP51x
434	3103 308 84420	LCD EXP51x

## ELECTRICAL PARTSLIST

## MISCELLANEOUS

403	3103 308 84500	LCD EXP21x
404	3103 304 71530	MEMBRANE-KEYBOARD EXP21x
422	3103 308 84430	LCD EXP31x
423	3103 304 71540	MEMBRANE-KEYBOARD EXP31x
432	3103 304 72420	MEMBRANE-KEYBOARD EXP51x
434	3103 308 84420	LCD EXP51x
412	3103 309 05480	CD-DRIVE DA23-ZPH
1250	2422 025 12272	CONNECTOR, CD-DRIVE, 6 pins
1251 ▲	2422 086 11012	FUSE 0,7A 50V UL
1252	2422 026 05086	EXT. DC-JACK
1300	2422 026 05204	SOCKET, HEADPHONE
1301	2422 026 05311	SOCKET, HEADPHONE/RC
1401	4822 276 12889	SWITCH, CD-DOOR
1402	4822 277 21705	SLIDE SWITCH, HOLD/RESUME
1404	2422 025 17567	CONNECTOR, FLEXFOIL, 18 pins
1405	2422 025 16693	CONNECTOR, FLEXFOIL, 40 pins
1406	2422 025 17133	CONNECTOR, FLEXFOIL, 32 pins
1407	2422 025 16728	CONNECTOR, FLEXFOIL, 4 pins
1830	4822 267 11027	CONNECTOR, CD-DRIVE, 16 pins

## CAPACITORS

2230 ©	2238 586 59812	100nF	10%	50V
2231 ©	4822 126 14507	18pF	5%	50V
2232 ©	2020 552 96305	4,7µF	20%	10V
2233 ©	5322 126 11583	10nF	10%	63V
2234 ©	5322 126 11578	1nF	10%	63V
2235 ©	2020 552 94427	100pF	5%	50V
2236 ©	2238 586 59812	100nF	10%	50V
2237 ©	4822 124 12108	100µF	20%	4V
2238 ©	4822 126 14472	1µF	10%	10V
2241 ©	2238 586 59812	100nF	10%	50V
2242 ©	3198 017 41050	1µF	20%	10V
2243 ©	4822 124 81059	220µF	20%	4V
2250 ©	2020 552 96305	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 ©	5322 126 11579	3,3nF	10%	63V
2255 ©	4822 126 14472	1µF	10%	10V
2256 ©	2022 009 00656	47µF	20%	6,3V
2257 ©	3198 032 15190	100µF	20%	4V
2258 ©	4822 126 14472	1µF	10%	10V
2259 ©	5322 126 11583	10nF	10%	63V
2260 ©	2020 552 94427	100pF	5%	50V
2261 ©	2238 586 59812	100nF	10%	50V
2262 ©	2020 552 94427	100pF	5%	50V
2263 ©	4822 126 13883	220pF	5%	50V
2264 ©	4822 126 13883	220pF	5%	50V
2265 ©	2238 586 59812	100nF	10%	50V
2266 ©	4822 126 13883	220pF	5%	50V
2267 ©	2238 586 59812	100nF	10%	50V
2268 ©	4822 126 13883	220pF	5%	50V
2269 ©	2238 586 59812	100nF	10%	50V
2272 ©	4822 126 14472	1µF	10%	10V
2273 ©	2022 009 00656	47µF	20%	6,3V
2275 ©	5322 126 11583	10nF	10%	63V
2276 ©	2238 586 59812	100nF	10%	50V
2277 ©	3198 017 41050	1µF	20%	10V
2278 ©	3198 017 41050	1µF	20%	10V
2279 ©	4822 126 14472	1µF	10%	10V
2280 ©	2238 586 59812	100nF	10%	50V

## CAPACITORS

2281 ©	3198 017 34730	47nF	10%	16V
2282 ©	5322 126 11578	1nF	10%	63V
2283 ©	5322 126 11578	1nF	10%	63V
2292 ©	4822 124 12095	100µF	20%	16V
2300 ©	4822 126 13883	220pF	5%	50V
2301 ©	4822 126 13883	220pF	5%	50V
2302 ©	2020 552 94427	100pF	5%	50V
2303 ©	2020 552 94427	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 ©	2020 552 96305	4,7µF	20%	10V
2309 ©	2020 552 96305	4,7µF	20%	10V
2310 ©	4822 126 14472	1µF	10%	10V
2311 ©	4822 124 23237	22µF	20%	6,3V
2312 ©	4822 124 23237	22µF	20%	6,3V
2313 ©	4822 126 14472	1µF	10%	10V
2314 ©	4822 124 23237	22µF	20%	6,3V
2316 ©	4822 124 12095	100µF	20%	16V
2317 ©	2238 586 59812	100nF	10%	50V
2318 ©	4822 126 14472	1µF	10%	10V
2319 ©	3198 017 41050	1µF	20%	10V
2321 ©	4822 126 14472	1µF	10%	10V
2322 ©	2238 586 59812	100nF	10%	50V
2323 ©	2238 586 59812	100nF	10%	50V
2324 ©	4822 126 14549	33nF	10%	16V
2325 ©	4822 126 14549	33nF	10%	16V
2326 ©	5322 126 11583	10nF	10%	63V
2327 ©	2238 586 59812	100nF	10%	50V
2328 ©	2238 586 59812	100nF	10%	50V
2330 ©	2238 586 59812	100nF	10%	50V
2331 ©	4822 124 80352	330µF	20%	6,3V
2332 ©	4822 124 80352	330µF	20%	6,3V
2333 ©	3198 017 41050	1µF	20%	10V
2334 ©	4822 126 13193	4,7nF	10%	63V
2335 ©	2238 586 59812	100nF	10%	50V
2400 ©	4822 126 14472	1µF	10%	10V
2401 ©	2020 552 96305	4,7µF	20%	10V
2402 ©	5322 126 11578	1nF	10%	63V
2403 ©	2238 586 59812	100nF	10%	50V
2404 ©	2238 586 59812	100nF	10%	50V
2406 ©	5322 126 11578	1nF	10%	63V
2407 ©	2238 586 59812	100nF	10%	50V
2408 ©	2238 586 59812	100nF	10%	50V
2409 ©	4822 126 14472	1µF	10%	10V
2410 ©	4822 126 14472	1µF	10%	10V
2411 ©	4822 126 14472	1µF	10%	10V
2412 ©	4822 126 14472	1µF	10%	10V
2413 ©	2238 586 59812	100nF	10%	50V
2415 ©	3198 032 64090	2,2µF	20%	25V
2416 ©	3198 032 64090	2,2µF	20%	25V
2417 ©	3198 032 64090	2,2µF	20%	25V
2418 ©	4822 126 13883	220pF	5%	50V
2419 ©	4822 126 13883	220pF	5%	50V
2420 ©	5322 126 11583	10nF	10%	63V
2474 ©	2238 586 59812	100nF	10%	50V
2475 ©	2238 586 59812	100nF	10%	50V
2476 ©	2238 586 59812	100nF	10%	50V
2477 ©	2238 586 59812	100nF	10%	50V
2478 ©	2238 586 59812	100nF	10%	50V
2479 ©	2238 586 59812	100nF	10%	50V
2480 ©	2238 586 59812	100nF	10%	50V
2481 ©	2238 586 59812	100nF	10%	50V

## CAPACITORS

2482	2238 586 59812	100nF	10%	50V
2483	2238 586 59812	100nF	10%	50V
2484	2238 586 59812	100nF	10%	50V
2485	2238 586 59812	100nF	10%	50V
2486	2238 586 59812	100nF	10%	50V
2487	2238 586 59812	100nF	10%	50V
2488	2238 586 59812	100nF	10%	50V
2489	2238 586 59812	100nF	10%	50V
2490	4822 124 11946	22μF	20%	16V
2491	2238 586 59812	100nF	10%	50V
2492	2238 586 59812	100nF	10%	50V
2493	2238 586 59812	100nF	10%	50V
2494	2238 586 59812	100nF	10%	50V
2495	2238 586 59812	100nF	10%	50V
2496	2238 586 59812	100nF	10%	50V
2497	2238 586 59812	100nF	10%	50V
2498	2238 586 59812	100nF	10%	50V
2499	4822 124 11946	22μF	20%	16V
2800	2020 552 96305	4,7μF	20%	10V
2801	4822 126 13193	4,7nF	10%	63V
2802	2020 552 96305	4,7μF	20%	10V
2803	2238 586 59812	100nF	10%	50V
2804	4822 124 81058	47μF	20%	4V
2805	2238 586 59812	100nF	10%	50V
2830	4822 124 23237	22μF	20%	6,3V
2831	4822 126 14508	180pF	5%	50V
2832	4822 126 14241	330pF		50V
2835	4822 126 14241	330pF		50V
2836	4822 126 14241	330pF		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 23237	22μF	20%	6,3V
2844	2238 586 59812	100nF	10%	50V
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	2238 586 59812	100nF	10%	50V
2858	4822 126 13344	1,5nF	5%	63V
2859	4822 124 81058	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
2863	4822 126 11785	47pF	5%	50V
2888	3198 017 41050	1μF	20%	10V
2890	4822 126 13887	4,7pF	5%	50V

## RESISTORS

3208	3198 021 32250	2,2MΩ	5%	0,06W
3214	4822 117 13632	100kΩ	1%	0,06W
3215	4822 051 30105	1MΩ	5%	0,06W
3216	4822 117 12891	220kΩ	1%	0,06W

## RESISTORS

3217	4822 117 13632	100kΩ	1%	0,06W
3218	4822 117 12864	82kΩ	5%	0,06W
3219	3198 021 32250	2,2MΩ	5%	0,06W
3220	4822 051 30105	1MΩ	5%	0,06W
3222	4822 051 30154	150kΩ	5%	0,06W
3223	3198 021 32250	2,2MΩ	5%	0,06W
3224	4822 117 12567	390kΩ	5%	0,06W
3225	4822 051 30103	10kΩ	5%	0,06W
3229	4822 117 13632	100kΩ	1%	0,06W
3230	4822 051 30103	10kΩ	5%	0,06W
3231	4822 051 30334	330kΩ	5%	0,06W
3232	4822 117 12889	270kΩ	1%	0,06W
3233	4822 051 30105	1MΩ	5%	0,06W
3234	4822 117 13632	100kΩ	1%	0,06W
3235	4822 117 13632	100kΩ	1%	0,06W
3236	4822 051 30103	10kΩ	5%	0,06W
3237	4822 117 11817	1,2kΩ	1%	0,06W
3238	4822 117 13632	100kΩ	1%	0,06W
3239	4822 051 30332	3,3kΩ	5%	0,06W
3240	4822 051 30103	10kΩ	5%	0,06W
3241	4822 051 30562	5,6kΩ	5%	0,06W
3242	4822 051 30008	CHIP JUMPER	0603	
3243	4822 117 12925	47kΩ	1%	0,06W
3244	4822 117 12925	47kΩ	1%	0,06W
3245	4822 051 30223	22kΩ	5%	0,06W
3246	4822 117 12925	47kΩ	1%	0,06W
3247	4822 051 30103	10kΩ	5%	0,06W
3248	4822 051 30153	15kΩ	5%	0,06W
3250	4822 051 30681	680Ω	5%	0,06W
3251	4822 051 30332	3,3kΩ	5%	0,06W
3252	4822 051 30331	330Ω	5%	0,06W
3253	4822 051 30101	100Ω	5%	0,06W
3254	4822 117 12925	47kΩ	1%	0,06W
3256	4822 051 30272	2,7kΩ	5%	0,06W
3257	4822 117 12891	220kΩ	1%	0,06W
3258	4822 051 30471	470Ω	5%	0,06W
3259	4822 051 30471	470Ω	5%	0,06W
3260	4822 051 30105	1MΩ	5%	0,06W
3261	4822 051 30103	10kΩ	5%	0,06W
3262	4822 051 30471	470Ω	5%	0,06W
3266	4822 051 30103	10kΩ	5%	0,06W
3268	2120 108 93942	10kΩ	1%	0,06W
3269	2120 108 93942	10kΩ	1%	0,06W
3270	2322 702 70278	2,7Ω	5%	0,06W
3270	4822 051 30008	CHIP JUMPER	0603	
3271	2322 702 70278	2,7Ω	5%	0,06W
3272	4822 051 30103	10kΩ	5%	0,06W
3273	4822 117 13632	100kΩ	1%	0,06W
3274	2120 108 93057	68kΩ	1%	0,06W
3275	2120 108 93057	68kΩ	1%	0,06W
3276	4822 117 13632	100kΩ	1%	0,06W
3277	2120 108 93942	10kΩ	1%	0,06W
3278	4822 117 12891	220kΩ	1%	0,06W
3279	3198 021 32250	2,2MΩ	5%	0,06W
3280	4822 051 30474	470kΩ	5%	0,06W
3281	2322 704 65604	560kΩ	1%	0,06W
3282	4822 051 30474	470kΩ	5%	0,06W
3283	4822 051 30474	470kΩ	5%	0,06W
3284	4822 116 30467	10kΩ	5%	NTC
3286	4822 051 30103	10kΩ	5%	0,06W
3288	4822 051 30109	10Ω	5%	0,06W
3289	4822 051 30562	5,6kΩ	5%	0,06W
3291	4822 117 13632	100kΩ	1%	0,06W
3292	4822 051 30103	10kΩ	5%	0,06W

## RESISTORS

3293	© 4822 051 30331	330Ω	5%	0,06W
3294	© 4822 051 30008	CHIP JUMPER 0603		
3297	© 4822 051 30681	680Ω	5%	0,06W
3300	© 4822 051 30333	33kΩ	5%	0,06W
3301	© 4822 051 30333	33kΩ	5%	0,06W
3302	© 4822 051 30333	33kΩ	5%	0,06W
3303	© 4822 051 30333	33kΩ	5%	0,06W
3304	© 4822 051 30153	15kΩ	5%	0,06W
3305	© 4822 051 30153	15kΩ	5%	0,06W
3306	© 4822 051 30183	18kΩ	5%	0,06W
3307	© 4822 051 30183	18kΩ	5%	0,06W
3308	© 4822 051 30153	15kΩ	5%	0,06W
3309	© 4822 051 30153	15kΩ	5%	0,06W
3310	© 4822 051 30562	5,6kΩ	5%	0,06W
3311	© 4822 051 30562	5,6kΩ	5%	0,06W
3312	© 4822 051 30105	1MΩ	5%	0,06W
3313	© 4822 051 30105	1MΩ	5%	0,06W
3314	© 4822 051 30332	3,3kΩ	5%	0,06W
3315	© 4822 051 30332	3,3kΩ	5%	0,06W
3316	© 4822 051 30103	10kΩ	5%	0,06W
3317	© 4822 051 30472	4,7kΩ	5%	0,06W
3318	© 4822 117 13632	100kΩ	1%	0,06W
3319	© 4822 117 13613	2,2Ω	5%	0,06W
3320	3103 308 53680	2x10kΩ POTMETER (CX2)		
3321	© 4822 051 30474	470kΩ	5%	0,06W
3322	© 4822 117 12917	1Ω	5%	0,06W
3323	© 4822 117 12917	1Ω	5%	0,06W
3324	© 4822 117 13613	2,2Ω	5%	0,06W
3325	© 4822 117 13613	2,2Ω	5%	0,06W
3326	© 4822 051 30008	CHIP JUMPER 0603		
3327	© 4822 051 30105	1MΩ	5%	0,06W
3328	© 4822 051 30333	33kΩ	5%	0,06W
3329	© 4822 051 30479	47Ω	5%	0,06W
3330	© 4822 051 30008	CHIP JUMPER 0603		
3331	© 4822 051 30008	CHIP JUMPER 0603		
3332	© 4822 051 30008	CHIP JUMPER 0603		
3333	© 4822 051 30332	3,3kΩ	5%	0,06W
3334	© 4822 051 30332	3,3kΩ	5%	0,06W
3336	© 4822 051 30221	220Ω	5%	0,06W
3339	© 4822 051 30331	330Ω	5%	0,06W
3340	© 4822 051 30331	330Ω	5%	0,06W
3343	© 4822 051 30103	10kΩ	5%	0,06W
3344	© 4822 051 30008	CHIP JUMPER 0603		
3345	© 4822 051 30223	22kΩ	5%	0,06W
3345	© 4822 051 30008	CHIP JUMPER 0603		
3346	© 4822 117 13613	2,2Ω	5%	0,06W
3349	© 4822 117 12925	47kΩ	1%	0,06W
3350	© 4822 051 30103	10kΩ	5%	0,06W
3401	© 2120 108 93942	10kΩ	1%	0,06W
3402	© 4822 117 13632	100kΩ	1%	0,06W
3403	© 2120 108 93943	18kΩ	1%	0,06W
3404	© 2120 108 93944	22kΩ	1%	0,06W
3405	© 2120 108 93943	18kΩ	1%	0,06W
3406	© 4822 051 30332	3,3kΩ	5%	0,06W
3407	© 4822 051 30472	4,7kΩ	5%	0,06W
3409	© 4822 051 30392	3,9kΩ	5%	0,06W
3410	© 4822 051 30109	10Ω	5%	0,06W
3411	© 4822 051 30109	10Ω	5%	0,06W
3412	© 4822 051 30471	470Ω	5%	0,06W
3413	© 4822 051 30471	470Ω	5%	0,06W
3414	© 4822 051 30471	470Ω	5%	0,06W
3415	© 4822 051 30103	10kΩ	5%	0,06W
3416	© 4822 051 30103	10kΩ	5%	0,06W
3417	© 4822 051 30103	10kΩ	5%	0,06W

## RESISTORS

3418	© 4822 051 30563	56kΩ	5%	0,06W
3419	© 4822 051 30474	470kΩ	5%	0,06W
3420	© 4822 117 12891	220kΩ	1%	0,06W
3421	© 4822 051 30474	470kΩ	5%	0,06W
3422	© 4822 051 30105	1MΩ	5%	0,06W
3423	© 4822 117 13632	100kΩ	1%	0,06W
3424	© 4822 051 30472	4,7kΩ	5%	0,06W
3425	© 4822 117 12925	47kΩ	1%	0,06W
3426	© 4822 051 30105	1MΩ	5%	0,06W
3427	© 4822 051 30105	1MΩ	5%	0,06W
3428	© 4822 051 30103	10kΩ	5%	0,06W
3429	© 4822 051 30474	470kΩ	5%	0,06W
3430	© 4822 051 30334	330kΩ	5%	0,06W
3431	© 4822 117 13632	100kΩ	1%	0,06W
3432	© 4822 117 13632	100kΩ	1%	0,06W
3433	© 4822 051 30008	CHIP JUMPER 0603		
3434	© 4822 051 30472	4,7kΩ	5%	0,06W
3435	© 4822 051 30223	22kΩ	5%	0,06W
3436	© 4822 051 30472	4,7kΩ	5%	0,06W
3437	© 4822 051 30222	2,2kΩ	5%	0,06W
3438	© 4822 117 12925	47kΩ	1%	0,06W
3439	© 4822 051 30008	CHIP JUMPER 0603		
3442	© 4822 117 12925	47kΩ	1%	0,06W
3456	© 4822 051 30101	100Ω	5%	0,06W
3457	© 4822 051 30101	100Ω	5%	0,06W
3460	© 4822 051 30103	10kΩ	5%	0,06W
3461	© 4822 051 30561	560Ω	5%	0,06W
3462	© 4822 051 30151	150Ω	5%	0,06W
3466	© 4822 051 30008	CHIP JUMPER 0603		
3467	© 4822 051 30008	CHIP JUMPER 0603		
3468	© 4822 051 30008	CHIP JUMPER 0603		
3476	© 4822 117 13632	100kΩ	1%	0,06W
3477	© 4822 117 13632	100kΩ	1%	0,06W
3478	© 4822 117 13632	100kΩ	1%	0,06W
3479	© 4822 051 30109	10Ω	5%	0,06W
3480	© 4822 051 30109	10Ω	5%	0,06W
3481	© 4822 051 30109	10Ω	5%	0,06W
3482	© 4822 051 30008	CHIP JUMPER 0603		
3483	© 4822 051 30008	CHIP JUMPER 0603		
3484	© 4822 051 30008	CHIP JUMPER 0603		
3485	© 4822 051 30008	CHIP JUMPER 0603		
3489	© 4822 051 30101	100Ω	5%	0,06W
3490	© 4822 051 30101	100Ω	5%	0,06W
3493	© 4822 051 30109	10Ω	5%	0,06W
3494	© 4822 051 30008	CHIP JUMPER 0603		
3496	© 4822 051 30332	3,3kΩ	5%	0,06W
3497	© 4822 051 30008	CHIP JUMPER 0603		
3498	© 4822 051 30479	47Ω	5%	0,06W
3499	© 4822 051 30008	CHIP JUMPER 0603		
3800	© 4822 117 12917	1Ω	5%	0,06W
3801	© 4822 051 30153	15kΩ	5%	0,06W
3802	© 4822 051 30683	68kΩ	5%	0,06W
3803	© 4822 051 30332	3,3kΩ	5%	0,06W
3804	© 4822 051 30479	47Ω	5%	0,06W
3805	© 4822 051 30472	4,7kΩ	5%	0,06W
3806	© 4822 051 30332	3,3kΩ	5%	0,06W
3807	© 4822 051 30471	470Ω	5%	0,06W
3808	© 4822 117 12891	220kΩ	1%	0,06W
3809	© 4822 051 30563	56kΩ	5%	0,06W
3830	© 4822 051 30109	10Ω	5%	0,06W
3831	© 3198 021 36821	6,8kΩ	5%	0,06W
3832	© 3198 021 36821	6,8kΩ	5%	0,06W
3833	© 3198 021 36821	6,8kΩ	5%	0,06W
3834	© 3198 021 36821	6,8kΩ	5%	0,06W

## RESISTORS

3835	⊙	4822 051 30273	27kΩ	5%	0,06W
3836	⊙	4822 051 30273	27kΩ	5%	0,06W
3837	⊙	4822 051 30273	27kΩ	5%	0,06W
3838	⊙	4822 051 30273	27kΩ	5%	0,06W
3839	⊙	4822 051 30273	27kΩ	5%	0,06W
3840	⊙	4822 051 30273	27kΩ	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
3867	⊙	4822 117 12139	22Ω	5%	0,06W
3868	⊙	4822 117 12139	22Ω	5%	0,06W
3869	⊙	4822 051 30479	47Ω	5%	0,06W
3874	⊙	4822 051 30105	1MΩ	5%	0,06W
3875	⊙	4822 051 30472	4,7kΩ	5%	0,06W
3888	⊙	4822 051 30103	10kΩ	5%	0,06W
3889	⊙	4822 051 30103	10kΩ	5%	0,06W
3890	⊙	4822 051 30008	CHIP JUMPER 0603		
3891	⊙	4822 051 30008	CHIP JUMPER 0603		
3892	⊙	4822 051 30008	CHIP JUMPER 0603		
3893	⊙	4822 051 30008	CHIP JUMPER 0603		
3895	⊙	4822 051 30105	1MΩ	5%	0,06W
3896	⊙	4822 051 30472	4,7kΩ	5%	0,06W
3897	⊙	4822 117 13632	100kΩ	1%	0,06W
4401	⊙	4822 051 30008	CHIP JUMPER 0603		
4402	⊙	4822 051 30008	CHIP JUMPER 0603		
4403	⊙	4822 051 30008	CHIP JUMPER 0603		
4404	⊙	4822 051 30008	CHIP JUMPER 0603		
4405	⊙	4822 051 30008	CHIP JUMPER 0603		
4406	⊙	4822 051 30008	CHIP JUMPER 0603		
4407	⊙	4822 051 30008	CHIP JUMPER 0603		
4408	⊙	4822 051 30008	CHIP JUMPER 0603		
4409	⊙	4822 051 30008	CHIP JUMPER 0603		
4410	⊙	4822 051 30008	CHIP JUMPER 0603		
4411	⊙	4822 051 30008	CHIP JUMPER 0603		
4412	⊙	4822 051 30008	CHIP JUMPER 0603		
4413	⊙	4822 051 30008	CHIP JUMPER 0603		
4414	⊙	4822 051 30008	CHIP JUMPER 0603		
4415	⊙	4822 051 30008	CHIP JUMPER 0603		
4416	⊙	4822 051 30008	CHIP JUMPER 0603		
4417	⊙	4822 051 30008	CHIP JUMPER 0603		
4418	⊙	4822 051 30008	CHIP JUMPER 0603		
4419	⊙	4822 051 30008	CHIP JUMPER 0603		
4420	⊙	4822 051 30008	CHIP JUMPER 0603		
4421	⊙	4822 051 30008	CHIP JUMPER 0603		
4422	⊙	4822 051 30008	CHIP JUMPER 0603		

## COILS

1403		2422 540 98536	CER.RES. 4,2MHz
1840		4822 242 10989	CER.RES. 16,9MHz
5230	⊙	4822 157 11705	10μH 10%
5250	▲	2422 536 00438	TRANSFORMER 7006-2N
5251	⊙	2422 536 00058	2,2μH 20%
5252	⊙	2422 549 45355	COIL BLM31PG391SN
5253	⊙	2422 549 45355	COIL BLM31PG391SN
5300	⊙	4822 157 71206	COIL BLM21A601
5301	⊙	2422 549 45355	COIL BLM31PG391SN
5302	⊙	4822 157 71206	COIL BLM21A601
5304	⊙	4822 157 71206	COIL BLM21A601
5400	⊙	3198 018 90041	COIL BLM11A601

## DIODES

6230	⊙	4822 130 11397	BAS316
6231	⊙	9322 128 70685	SS14
6232	⊙	4822 130 11397	BAS316
6233	⊙	4822 130 11397	BAS316
6250	⊙	3198 020 55680	BZX384-C5V6
6251	⊙	4822 130 11564	BZX384-C3V9
6252	⊙	9322 128 70685	SS14
6253	⊙	4822 130 80622	BAT54
6254	⊙	4822 130 80622	BAT54
6257	⊙	9322 128 70685	SS14
6300	⊙	4822 130 11551	BZX384-C10
6301	⊙	4822 130 11551	BZX384-C10

## TRANSISTORS

7230	⊙	3198 010 42310	BC847BW
7231	⊙	3198 010 42310	BC847BW
7233	▲	5322 130 60123	BC807-40
7241	▲	5322 130 60123	BC807-40
7250	⊙	4822 130 42615	BC817-40
7251	▲	5322 130 61569	BC868
7252	▲	4822 130 60142	BC869
7253	⊙	3198 010 42310	BC847BW
7254	⊙	3198 010 42310	BC847BW
7255	⊙	5322 130 61569	BC868
7259	⊙	3198 010 42320	BC857BW
7260	⊙	3198 010 42310	BC847BW
7261	⊙	3198 010 42310	BC847BW
7268	⊙	3198 010 44350	BC807-25W
7269	⊙	3198 010 42310	BC847BW
7270	⊙	3198 010 42310	BC847BW
7271	⊙	3198 010 42310	BC847BW
7272	⊙	3198 010 42310	BC847BW
7276	⊙	3198 010 42320	BC857BW
7277	⊙	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
7404	⊙	3198 010 42320	BC857BW
7405	⊙	3198 010 42310	BC847BW
7406	⊙	3198 010 42310	BC847BW
7801	⊙	3198 010 42310	BC847BW
7802	⊙	3198 010 42310	BC847BW
7803	⊙	5322 130 60123	BC807-40

INTEGRATED CIRCUITS

---

7232©	5322 209 82941	LM358D (DUAL OPAMP)
7256©	9322 171 12671	SC111259AFTA (SERVO DRIVER)
7273©	4822 209 17289	74LV14PW
7300©	4822 209 33165	TDA1308T/N1 (DUAL OPAMP)
7305©	4822 209 16083	BA3574BFS (HEADPHONE AMP.)
7400©	3103 308 84611	TMP86CH21AU EXP310 (µP)
7400©	3103 308 84521	TMP86CH21AU EXP510 (µP)
7480©	9322 170 91671	TMS320DA150PGE160 (DSP)
7481©	9322 166 67668	MT48LC4M16A2TG-7E (DRAM)
7482©	3103 308 84631	FLASH EPROM EXP210
7482©	3103 308 84621	FLASH EPROM EXP310
7482©	3103 308 84460	FLASH EPROM EXP510
7483©	9351 960 10118	74LVC139PW
7484©	9322 158 50668	74LCX74T
7485©	9352 499 80118	74LVC00APW
7800©	4822 209 17286	TZA1024T/N1 (HF-AMPLIFIER)
7830©	9352 641 80557	SAA7324H/M2B (SIGN.PROC. CD10)

## DOCUMENT HISTORY

### Version 1.0

- Initial release