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Compact disc interactive player CDI 220/00

Interactive Media Systems

CD-I

Service
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Service

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Service Manual

COMPACT disc Interactive

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2 Product information
3 Service information
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5 Descriptions
6 Electrical drawings and partslist
7 Diagnostics, measurements and adjustments

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

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

CLASS 1
LASER PRODUCT
3122 110 03420

Published by Service & Support Interactive Media Systems Printed in The Netherlands ©Copyright reserved Subject to modification 4822 725 24137

PHILIPS

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2 PRODUCT INFORMATION

2.1 TECHNICAL SPECIFICATION

Physical
Dimensions (w x h x d)
420 x 90 x 400 mm
(16.5 x 3.5 x 15.7 inch)

Weight (approx.)
7 kg
(15.4 lbs)

Power supply
220/240 V ; 50-60Hz
220V range 198V to 264V

Power consumption
Approx. 35W

Approvals
FCC, UL
Conforms with VDE, FTZ, CSA, Nordic, US and GERMAN laser safety regulations

Audio L+R:
Connector
Type Cinch connector gold plated 2x
Colour Left : white
Right red

Output quality in case of CD-DA
Measurements acc. to IEC TC 60 Subcan. 60A

Output level	: 2Vrms +/− 3 dB
Frequency range	: 20 HZ to 20 kHz
Frequency linearity	: +0.2 dB/ −0.2 dB
Cross talk (1kHz)	: − 86 dB
Harmonic dist.	
+ noise at 1kHz	: − 86 dB
S/N ratio	: 87 dB (typ >90)
Dynamic range	: 86 dB

Output quality in case of ADPCM to be specified

Headphone output:

Connector type	: Phone socket
Output control	: Manual volume control

Output quality in case of CD-DA

Load impedance range	: 8 Ohm - 2 kOhm
Output power	: 30 mW at 1kHz, 32 Ohm
Frequency range	: 20 Hz - 20 kHz +/− 3 dB
Harmonic distortion (1kHz)	: − 83 dB
S/N ratio	: 84 dB
Dynamic range	: 83 dB
Cross talke Ri=600E (1kHz)	: − 75 dB

Video specifications
625 lines: RGB (PAL, SECAM) for /00/05

Connector type : Euroconnector (SCART)
Pinning:

No.	Function
1.	Audio R (analogue)
2.	NC
3.	Audio L (analogue)
4.	Audio ground
5.	Blue ground
6.	NC
7.	Blue
8.	Slow switching(0=TV, 1=Euroconn.)
9.	Green ground
10.	NC
11.	Green
12.	NC
13.	Red ground
14.	NC
15.	Red
16.	Fast switching (RGB/CVBS)
17.	CVBS ground
18.	Fast switching ground
19.	CVBS/RGB sync
20.	NC
21	Shield

Video interface
General information:

TABEL 1 Encoded RGB	
General information	: PAL Environment
Resolution normal H*V	: 384*280
	384*560
Line period	: 64.00 us
Active line period	: 51.20 us
VSC clock	: 30.0000 MHz
Display format	
non-interlace	: 312 lines
interlace	: 625 lines
(2 different frames)	
interleaved	: 625 lines
(2 identical frames)	

PAL

Amplitude	: 700mVpp +/− 10% (max. white level)
Line time	: 64. uS
Sync. output	: 300 mVpp +/− 0.1V into 75 Ohm
S/N on RGB output	: > 50 dB (40 Hz - 5 MHz)
S/N on RGB output	: > 45 dB (40 Hz - 10 MHz)
Bandwidth on RGB out	: − 3 dB at 7.5 MHz

CVBS output:
Connector : Cinch connector, colour Yellow

PAL

Amplitude	: 1Vpp +15%/−10%
White bar	: 700 mVpp +110 mV/−70 mV
Sync amplitude	: 300 mVpp +/−40 mV
Burst amplitude	: 300 mV +/−30 mV
S/N lum. (40Hz-10MHz)	: fsc notch >45dB
S/N chrom. in red	: AM (*) > 48 dB
	PM (**) > 43 dB
Video bandwidth	: 4.5 MHz (−6dB)
Chroma subc. freq.	: = 4.433661 MHz X-tal locked +/−50Hz
* AM noise	: output of measured value in dB referred to the average amplitude of the colour subcarrier burst applied
** PM noise	: output of measured value in dB referred to the constant phase of a reference oscillator

Y/C (S-Video) output:
Type of connector : Mini-Din 4 (female)
Pinning:

No.	Function
1.	Gnd Y
2.	Gnd C
3.	Y
4.	C

PAL

amplitude	: Y= 1Vpp +15%/−10% into 75 Ohm
amplitude	: C= 300 mVpp +/− 10% (burst)
bandwidth Y	: = 5 MHz (−3dB)
bandwidth C	: = 1.6 MHz
S/N on Y output	
(10KHz-5MHz)	: > 48 dB
(10KHz-10MHz)	: > 45 dB
S/N on C output	: AM (*)> 55 dB PM (**)> 50 dB
* AM noise	: output of measured value in dB referred to the average amplitude of the colour subcarrier burst applied
** PM noise	: output of measured value in dB referred to the constant phase of a reference oscillator

Laser Detector Grating Unit (LDGU)

Laser type	: semi conductor AlGaAs
Wave length	: 780 nm
Output power	: 3.3 mW typical

RS232-1 (port 1) communication:

Connector type	: 8 pins miniDIN (female)
Location	: front
Internal device	: MMC slave proc. (68HC05, SCI+ports)
Baudrates	: 1200 and 9600
Dataformat	: 1 startbit 7 databits 2 stopbits no parity
Handshake	: hardware: only RTS software: not available

Signals & Pinning:

pin	signal	description	Inp/Outp
1	n.c.	Not Connected	
2	RXD	Received Data	Input
3	TXD	Transmitted Data	Output
4	DTR (*)	Data Terminal Ready	Output
5	GND	Signal Ground	
6	n.c.	Not Connected	
7	RTS	Request To Send	Output
8	+5V	Power supply for the device	

RS232-2 (port 2) communication:

Connector type	: 8 pins miniDIN (female)
Location	: rear
Internal device	: on chip UART (SCC68070)
Baudrates	: 75, 150, 300, 1200, 2400, 4800, 9600 and 19200
Dataformat	: character length: 7 or 8 bits
stopbit length	: 1 or 2 bits
parity	: odd, even or no
Handshake	: hardware: 2 control lines; RTS and CTS.
software	: XON/XOFF.

Signals & Pinning:

pin	signal	description	Inp/Outp
1	n.c.	Not Connected	
2	RXD	Received Data	Input
3	TXD	Transmitted Data	Output
4	DTR (*)	Data Terminal Ready	Output
5	GND	Signal Ground	
6	CTS	Clear To send	Input
7	RTS	Request To Send	Output
8	+5V	Power supply for the device	

Input : this is an input signal for the CD-I player
Output: this is an output signal for the CD-I player.

(*) DTR is not an active handshake signal. It serves as a power supply for some input devices.

All signal levels and current ratings, except +5V and DTR are according EIA RS-232-C standard.

RATINGS	: +5V +/−10% max. 200mA
DTR	: +12V +/−10% max. 10mA (Ri = 1kΩ)

IR interface:
The IR (infra red) receiver for use with the CD-I remote control.
Specification according UAW-0422

characteristics

Data format	: RC-5 extended format infrared transmission data.
Distance	: 20 - 800 cm.
Sampling time	: =< 50 ms
Receive angle	: 45 degree out of the centre line

Infrared receiver control
Device : GP1U501X SHARP

Mains socket:
Connector : 2-pol.

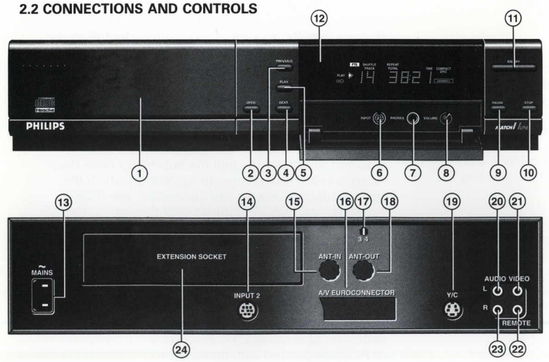
The player has to be Class I equipment.

Modifications without notice

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2.2 CONNECTIONS AND CONTROLS



Front panel control functions and rear connections



22ER9051 Infra red remote control

CDI front panel controls

1. Disc loading tray
2. Open/close key
3. "Previous" key for instant track skip
4. "Next" key for instant track skip
5. "Play" key
6. I/O port for CD-I pointing devices or keyboard
7. Headphone socket
8. Headphone volume control
9. Pause key
10. Stop key
11. Power "On/Off" key
12. Soft tone multifunction display with infra-red remote control receiver

CDI rear panel connections

13. Power input socket
14. I/O port for CD-I pointing devices, keyboard or other RS232 connection
15. Antenna in*
16. Euroconnector
17. Channel selector*
18. Antenna out*
19. Y/C (S-video) output
20. Audio output L
21. CVBS (video) output
22. Remote control in
23. Audio output R
24. Extension socket (for 22ER9141 Digital Audio/Video module)

*depending on version

The "Thumbstick" remote control

The shape and layout of the "Thumbstick" control were the subject of careful ergonomic studies to ensure that it can be used left-handed or right-handed, in big or small hands.

1/3. Action keys
2. Thumbstick
4. "Play" key
5. "Pause" key
6. "Previous" key for instant track skip
7. Mute or TV/CDI selector key*
8. Volume control down key
9. Volume control up key
10. "Next" key for instant track skip
11. "Stop" key

*depending on version

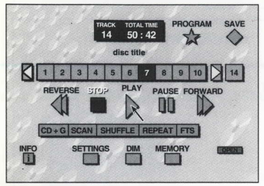
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The control sits conveniently in the hand, and the thumbstick and action keys, which are by far the most-used controls, are easily operated one-handed.

The user shell

With just the one "point and click" operation, player functions can be controlled so easily that the actions become intuitive. This is because of the player's specially designed "user shell" program, which presents a series of screen displays that not only allow you a complete choice of play functions, but also guide you in selecting them.



User shell screen

When the player is switched on, the first "user shell" screen invites you to load a disc. Playing a CD-I disc is a simple matter of loading the disc and selecting "Start" on the "CD-I start" screen which then automatically appears. The CD-I program starts to run, and you select options from the screen according to choice.

For CD-Digital Audio discs, the "user shell" presents a play control screen. This offers more than just the functions fitted as standard on CD players (and also provided on the front panel and remote control). It offers all the features found only on top-of-the-range players. These include Program, Favorite Track Selection, Title, Shuffle, Repeat, Play and Scan.

Another "user shell" screen offers "Personal Preference" settings. These include date and time display, Scan time, Auto Shuffle, and Repeat. When "Personal Preference" settings have been made, the player automatically adopts them when starting up.

Further "user shell" screens provide information, CD-DA programming (FTS) facilities, a list of stored programs and other information, and control for CD Graphics.

User Shell Functions

General screens:

- "Personal Preference" settings screen: Auto Shuffle, Auto FTS, Display Time/Date, Scan Time, Repeat (Disc or Track).
- Open/Close (on player start-up screen).
- Info screens (depending on version with language choice).
- Memory screen (manages CD-I stored data, as well as FTS programs and titles).
- Dim Screen (adjusts screen brightness).

CD-I start-up screen:

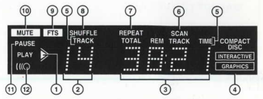
- Start CD-I (starts CD-I or Photo-CD application).

CD-Digital Audio screen:

- While Playing : Play, Stop and Pause.
- Play Modes: Scan, Shuffle, Repeat and FTS.
- Control: Fast Forward, Fast Rewind, Next Track (directly selectable), Previous Track (directly selectable), Program (programming of selected tracks in any order), Save (stores your favorite track programme and allows manual input of titles related to discs or FTS programs).

Soft-tone fluorescent tube display (FTD)

The multifunction FTD supplies complete and continuously up-dated information on the player status.



1. Disc playing
2. Track
3. Minutes and seconds.
4. Type of disc : Compact Disc Interactive, Compact Disc Digital Audio, Compact Disc Digital Audio with Graphics
5. Time indicators: show that the time displayed is Track Time, Total Time, Remaining Track Time, or Remain.
6. Scan active
7. Repeat active
8. Shuffle active
9. FTS active
10. Mute*
11. Pause active
12. Remote activity indicator

*depending on version

Input Port



Pin	Signal	Function	I/O
1	NC	Not connected	
2	RXD	Received Data	I
3	TXD	Transmitted Data	O
4	DTR	Data Terminal Ready	O
5	GND	Signal Ground	
6	CTS	Clear to Send	I
7	RTS	Request to Send	O
8	+5V	Power supply to device	

A/V Connections

CVBS output (cinch):	1 Vpp into 75 Ohm
Audio output (2 x cinch) :	2 Vrms into 75 Ohm
Remote in (cinch):	2 Vpp at 2.2 kOhm
Antenna input:	75 Ohm*
RF output:	75 Ohm*
Headphone (6.3 mm socket) :	8 Ohm - 2 kOhm

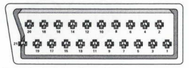
Y/C (S-Video) Connector



Pin	Function
1	Ground Y
2	Ground C
3	Y
4	C

Euroconnector*

Pin	Function
1	Audio R (analogue)
2	NC



3	Audio L (analogue)
4	Audio ground
5	Blue ground
6	NC
7	Blue
8	Slow switching (0 = TV, 1 = Euroconnector)
9	Green ground
10	NC
11	Green
12	NC
13	Red ground
14	NC
15	Red
16	Fast switching (RGB/CVBS)
17	CVBS ground
18	Fast switching ground
19	CVBS/RGB sync
20	NC
21	Shield

*depending on version

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3.1 SAFETY INSTRUCTIONS

- Safety regulations demand that the set be restored to its original condition and that components identical with the original types be used.
  Safety components are marked by the symbol ⚠.
- **ESD**

  All IC's and many other semi-conductors are susceptible to electrostatic discharges (ESD).
  Careless handling during repair can reduce life drastically.
  When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
  Keep components and tools also at this potential.
  For detailed information see "Handling ESD-sensitive components".
- A set to be repaired should always be connected to the mains via a suitable isolating transformer.
- never replace any modules or any other parts while the set is switched on.
- Use plastic instead of metal alignment tools. This in order to prelude short-circuit or to prevent a specific circuit form being rendered unstable.

3.2 SERVICING OF SMDs (Surface Mounted Devices)

3.2.1 General cautions on handling and storage

a. Oxidation on the SMDs terminals results in poor soldering. Do not handle SMDs with bare hand.
b. Avoid for storage places that are sensitive to oxidation such as places with sulfur or chlorine gas, direct sunlight, high temperatures or a high degree of humidity.
   As a result the capacitance or resistance value of the SMDs may be affected.
c. Rough handling of circuit boards containing SMDs may cause damage to the components as well as the circuit boards. Circuit boards containing SMDs should never be bent or flexed. Different circuit board materials expand and contract at different rates when heated or cooled and the components and/or solder connections may be damaged due to the stress.
   Never rub or scrape chip components as this may cause the value of the component to change. Similary, do not slide the circuit board across any surface.

3.2.2 Removal of SMDs

a. Heat the solder (for 2-3 seconds) at each terminal of the chip. Small components can, by means of litz wire and a limited horizontal force, be removed with the soldering iron. They can also be removed with a solder sucker (see Fig. 1a) or
b. While holding the SMD with a pair of tweezers take it off gently using th soldering iron's heat applied to each terminal (see Fig. 1b).
c. Remove the excess solder on the solder lands by means of litz wire or a solder sucker (see Fig. 1c).

3.2.2.1 Caution on removal:

a. When handling the soldering iron, use suitable pressure and be careful.
b. When removing the chip, do not use undue force with the pair of tweezers.
c. The soldering iron to be used (approx. 30 W), must preferably be provided with a thermal control (soldering temperature about 225 to 250°C).
d The chip, once removed, must **never** be used again.

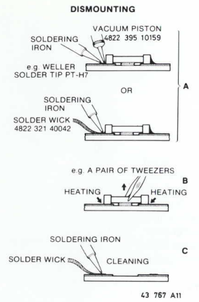


Fig. 1

3.2.3 Attachment of SMDs

a. Locate the SMD on the solder lands by means of tweezers and solder the component at one side. Ensure that the component is positioned well on the solder lands (see Fig. 2a).
b. Next complete te soldering of the terminals of the component (see Fig. 2b).

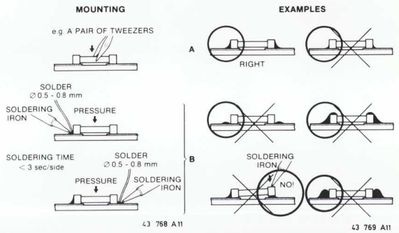


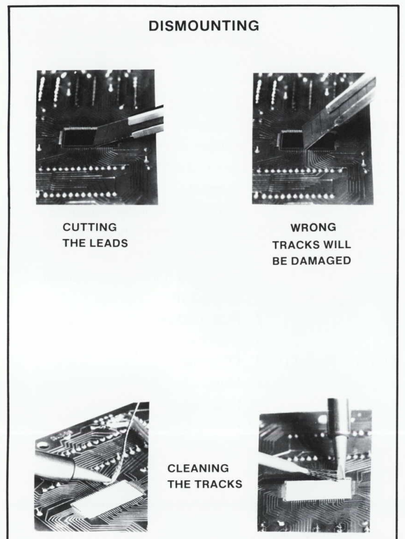
Fig. 2

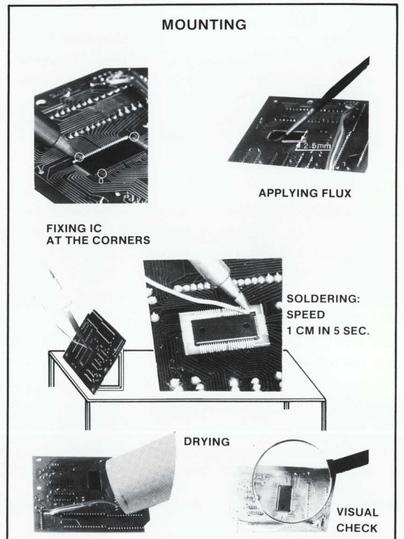
Fig. 3

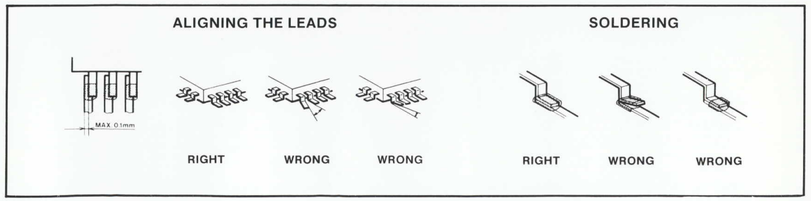
3.2.3.1 Caution on attachment:

a. When soldering the SMD terminals, do not touch them directly with the soldering iron. The soldering must be as quick as possible; care must be taken to avoid damage to the terminals and the body itself.
b. Keep the SMD's body in contact with the printed board when soldering.
c. The soldering iron to be used (approx. 30 W) must preferably be provided with a thermal control (soldering temperature about 225 to 250°C).
d. Soldering should not be done outside the solder land.
e. Soldering flux (of rosin) may be used but should not be acidic.
f. After soldering, let the SMD cool down gradually at room temperature.
g. The quantity of solder must be proportional with the size of the solder land. If the quantity is too great, the SMD might crack or the solder lands might be torn loose from the printed board (see Fig. 3).









3.3 HANDLING ESD-SENSITIVE COMPONENTS

3.3.1 Personal safety

The testing, handling and replacing of ESD-sensitve components requires special attention for personal safety. A person dealing with ESD-sensitive components should, normally speaking, be connected via a resistance to the same potential as the chassis of the set to protect him against direct contact with the supply voltage.
This resistance is often applied in the connection lead of wrist wraps. If necessary, make use of an isolating transformer.

3.3.2 Storage and transport

Transport and store the circuits and PCBs in their original packages.
As an alternative to the original package one may use a conductive material or special IC package which short-circuits all the pins of the component with one another.
Always discharge the package before opening it.

3.3.3 Testing or handling

Work on a conductive surface when testing loose circuits and components or when transferring components and circuits from one package to another.
Use a conductive wrist wrap with lead to make an electrical connection between the conductive surface and yourself via a resistance in the connection lead of the wrist wrap.
Connect equipment and tools also with this conductive surface.
Do not connect any signals to inputs as long as the power supply of the set to be tested is off.
All the inputs that are not used should be connected either to ground or to the supply voltage. When testing, do not use any freon sprays for under-cooling of sensitive components.

3.3.4 Mounting ESD-sensitive components

Mount ESD-sensitive components only after all other components have been mounted.
Make sure that the components themselves, the metal parts of the PCB, mounting equipment and mounting operator are at the same potential level as the chassis of the set.
If it is impossible to ground the PCB, the mounting operator should pick the PCB up before bringing it into contact with the components to be replaced.

3.3.5 Soldering

Soldering iron tips, also those of low-voltage soldering stations, should be kept at the same potential as the components and the PCB.
It is better to use solder-removing braid than solder suckers.

3.3.6 Electrostatic charges

One should stick to the precautionary measures also after the ESD-sensitive components have been mounted on the PCB. Until the sub-PCBs have been incorporated into a complete system on which the correct supply voltages are connected, the PCB is nothing more than an extension of the conductors of the components on this PCB. To prevent electrostatic discharges from passing to the components via the terminals, we recommend that you apply conductive clips or conductive tape on the terminals of the PCB.

3.3.7 Transients (switch-on phenomena)

To prevent permanent damages as a result of switch-on phenomena, no ESD-sensitive components, or PCBs populated with these components, should be inserted in or removed from test-sockets or systems with the supply voltage on.
Prevent switching peeks on the mains as a consequence of switching electric equipment, relay and DC lines on and off.

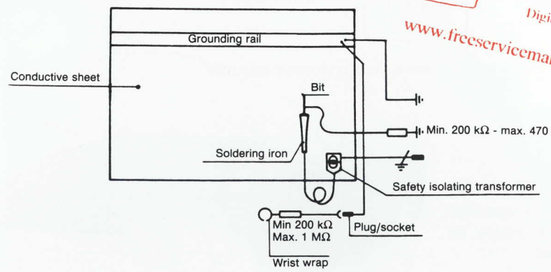
3.3.8 Working environment

The work bench for the service technician should look like the one shown in the figure.

3.3.9 Replacement of the Flat Pack IC's

For replacing a component see Fig. 6 Dismounting and Mounting. Also a number of precautions and examples is given.
When replacing a flat pack, rosin flux applied to the device leads will ensure a good soldered joint.
Since rosin flux, when not properly heated by the soldering process, is sticky, it will attract dust which will result in component degeneration over a period of time.
The removal of excess flux with a cleaner will not solve this problem because the flux is then even spread over a greater area by the cleaner. Drying of the flux can be accomplished by blowing the area with a common hair dryer for 1 or 2 minutes at a distance of approx. 10 centimeters.

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Special attention should be paid in regions having a dry atmosphere and when the floor is covered with a nylon carpet or such.

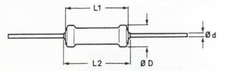
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3.4 CODENUMBERS FOR STANDARDIZED RESISTORS

Unless otherwise specified, all defective resistors in the circuits of the set can be replaced by standardizes types, mentioned in this chapter.

VR25, VR37 high-ohmic/high -voltage resistors



type	D_{max}	L_1 max	L_2 max	d
VR25	2,5	6,5	7,5	0,6

type	D_{max}	L_1 max	L_2 max	d
VR37	3.7	9.0	10.0	0.7

Range VR25 : 100 KΩ to 22 MΩ
Range VR37 : 100 KΩ to 33 MΩ

Composition of the service number for the VR25 and VR37
Main subgroup: 4822 053 20... and 4822 053 21...

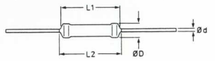
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

4 for R = 100K to 910 KΩ
5 for R = 1M to 9.1 MΩ
6 for R = or > 10M

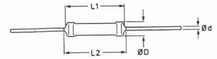
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ is 4822 053 21336

PR01, PR02 and PR03 power metal film resistors

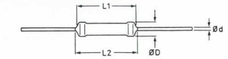
ϕD_{max}	L_1	L_{2max}	ϕd
2.5	6,5	8.0	0.6



ϕD_{max}	L_{1max}	L_{2max}	ϕd
3.9	10	11	0.8



ϕD_{max}	L_{1max}	L_{2max}	ϕd
5.2	16.7	17.9	0.8



Rated dissipation at T(amb) = 70 degrees :
PR01 = 1 Watt, PR02 = 2 Watt, PR03 = 3Watt

Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

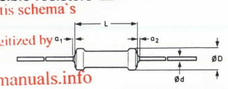
The codenumber above is completed by inserting the first two figures (resistance code)followed by the multiplier.

8 for R= 1 to 9,1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9,1 KΩ
3 for R= 10 to 91 KΩ
4 for R= 100 to 910 KΩ
5 for R= or > 1 MΩ

Example:
The serv.nbr. of a PR01 resistor of 47 Ω is: 4822 053 10479
The serv.nbr. of a PR03 resistor of 1 MΩ is: 4822 053 12105

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NFR25 fusible resistors ⚠



D_{max}	L_{max}	d	$a_1 + a_2$
2.5	6.5	0.6	≤ 1

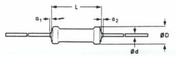
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

The codenumber above is completed by inserting the first two figures (resistance code)followed by the multiplier.

8 for R= 1 to 9,1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9,1 KΩ
3 for R= 10 to 91 KΩ

Example:
The service number of a resistor of 47 Ω is: 4822 052 10479

NFR25H fusible resistors ⚠



$D_{max.}$	$L_{max.}$	d	$a_1 + a_2$
2,5	6,5	0,6	≤ 1

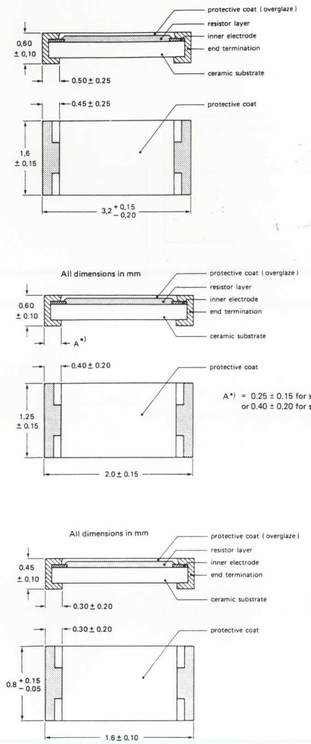
Composition of the service number for the NFR25H
Main subgroup: 4822 052 11...

The codenumber above is completed by inserting the first two figures (resistance code)followed by the multiplier.

8 for R= 1 to 9,1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9,1 KΩ
3 for R= 10 to 91 KΩ

Example:
The service number of a resistor of 47 Ω is: 4822 052 11479

RC-01, RC-11 AND RC-21 chip resistors



Absolute max. dissipation :
RC-01 : 0,25 W, RC-11 : 0,10 W, RC-21 :0,062 W.

Range: RC-01 0 Ω TO 10 MΩ
RC-11 0 Ω TO 10 MΩ
RC-21 0 Ω TO 6,8 MΩ

Composition of the service number for the RC-01,RC-11 and RC-21
Main subgroup: 4822 051 10... , 4822 051 20... and 4822 051 30...
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

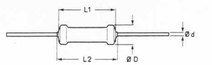
8 for R= 0 to 9.1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9.1 KΩ
3 for R= 10 to 91 KΩ
4 for R= 100 to 910 KΩ
5 for R= 1 to 9.1 MΩ
6 for R= or > 10 MΩ

Example's:
The serv.nbr. for a RC-01 resistor of

0 Ω is 4822 051 10008
The serv.nbr. for a RC-11 resistor of 0 Ω is 4822 051 20008
The serv.nbr. for a RC-21 resistor of 0 Ω is 4822 051 30008

The serv.nbr. for a RC-01 resistor of 10 Ω is 4822 051 10109
The serv.nbr. for a RC-11 resistor of 10 Ω is 4822 051 20109
The serv.nbr. for a RC-21 resistor of 10 Ω is 4822 051 30109

MRS16T metal film resistors with low-inductance



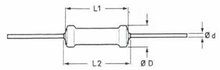
D	L	L2 max.	d
1,7 +0,2 −0,1	3,5 +0,2 −0,15	3,7	0,5 −0,04

Composition of the service number for the MRS16T
Main subgroup: 4822 050 1....
The codenumber above is completed by inserting the first three figures (resistance code)followed by the multiplier.

8 for R= 4,99 to 9,76 Ω
9 for R= 10 to 97,6 Ω
1 for R= 100 to 976 Ω
2 for R= 1 to 9,76 KΩ
3 for R= 10 to 97,6 KΩ
4 for R= 100 to 976 KΩ
5 for R= or > 1 MΩ

Example:
The service number of a resistor of 487 Ω is: 4822 050 14871

MRS25 metal film resistors (0,5%)



D	L1	L2 max	d
2,5	6,5	7,0	0,6 ± 0,03

Composition of the service number for the MRS25
Main subgroup: 4822 050 2....

The codenumber above is completed by inserting the first three figures (resistance code)followed by the multiplier.

8 for R= 1 to 9,76 Ω
9 for R= 10 to 97,6 Ω
1 for R= 100 to 976 Ω
2 for R= 1 to 9,76 KΩ
3 for R= 10 to 97,6 KΩ
4 for R= 100 to 976 KΩ
5 for R= 1 to 9,76 MΩ
6 for R= or > 10 MΩ

Example:
The service number of a resistor of 976 Ω is: 4822 050 29761

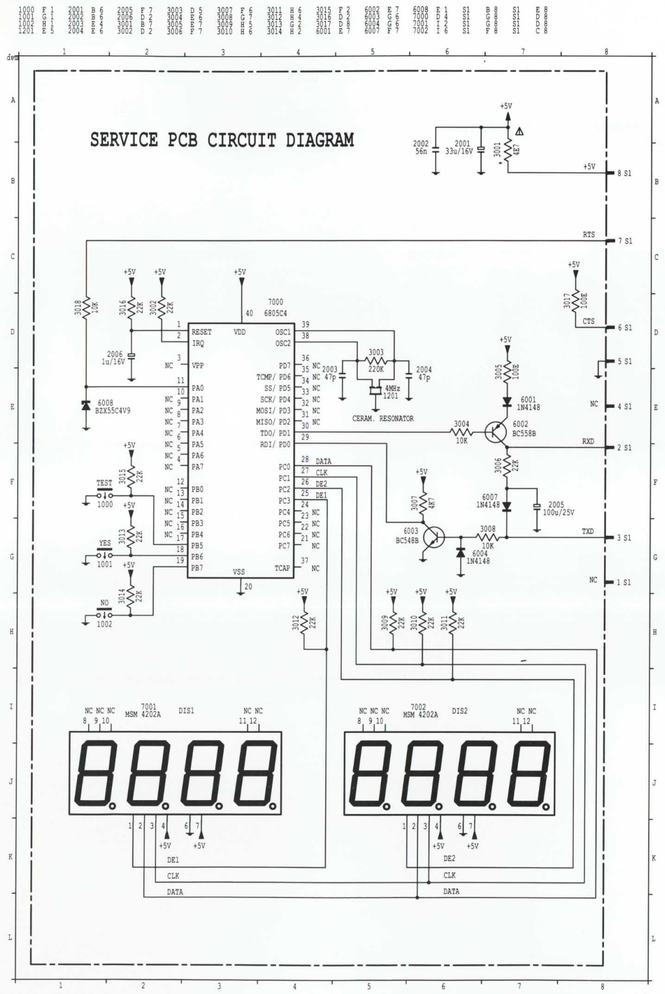
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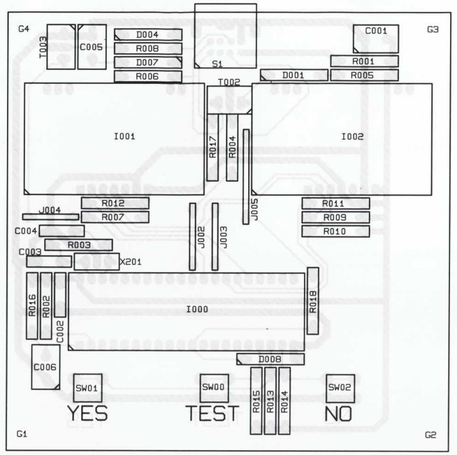
3.5 SERVICE TOOLS

3.5.1 Service PCB

3.5.1.1 Circuit diagram



3.5.1.2 Layout



3.5.1.3 Parts list

ITEM	DESCRIPTION		CODENUMBER
1000	Tact switch		4822 276 10974
1001	Tact switch		4822 276 10974
1002	Tact switch		4822 276 10974
1201	Ceram.resonator		4822 242 72527
2001	33	IF/16V	4822 124 20688
2002	56	nF	4822 121 41154
2003	47	pF	4822 122 31072
2004	47	pF	4822 122 31072
2005	100	IF/25V	4822 124 20701
2006	1	IF/63V	4822 124 20722
3001	4,7	Ω	See standardized list
3002	22	KΩ	chapter 3.4
3003	220	KΩ	
3004	10	KΩ	
3005	100	Ω	
3006	22	KΩ	
3007	4,7	KΩ	
3008	10	KΩ	
3009	22	KΩ	

ITEM	DESCRIPTION	CODENUMBER
3010	22	KΩ
3011	22	KΩ
3012	22	KΩ
3013	22	KΩ
3014	22	KΩ
3015	22	KΩ
3016	22	KΩ
3017	100	Ω
6001	1N4148	4822 130 30621
6002	BC558B	4822 130 44197
6003	BC548B	4822 130 40937
6004	1N1448	4822 130 30621
6005	BZX55 C4V7	4822 130 34174
6006	BAT85	4822 130 31983
6007	1N1448	4822 130 30621
7000	MC68HC705C4	4822 900 10272
7001	MSM 4202A	4822 130 90474
7002	MSM 4202A	4822 130 90474
S1	miniDIN 8pins	4822 267 31289

3.5.2 Test discs

CODE-NUMBER	NAME/ DESCRIPTION	APPLICATION
4822 397 30096	Testdisc 5 (music) Testdisc 5A (music + dropouts and fingerprints)	Reference disc for playability and adjustments of CDM
4822 397 30155	test disc with 1 KHz continous signal, 70 minutes.	life test in case of intermittent faults
4822 397 30184	Audio signals	Measure specs.
4822 701 11922	Skew disc 0,6	Reference disc for playability
4822 701 11923	Excentricity disc 150 l	Reference disc for playability

3.5.3 Extension connectors

CODE-NUMBER	NAME/ DESCRIPTION	APPLICATION
4822 321 22267	10 poles ext.	For measuring Encoder panel
4822 321 22268	6 poles ext.	For measuring APU panel

3.5.4 Measurement equipment

Electronic Digital Multimeter
Digital oscilloscope
Analog oscilloscope
Timer/counter

3.5.5 Pointing devices

CODE-NUMBER	NAME/ DESCRIPTION	APPLICATION
4822 218 10401	RV6701/00	Remotecntrl. /05
4822 218 10438	RV6703/00	Remotecntrl. /00
4822 691 30244	22ER9011/00	Mouse

3.5.6 (de)Mounting tool

Torx screw drivers 4822 395 50145

3.6 THE MMC CENTRAL REPAIR PROCEDURE

In case of a defect on the MMC part, the complete panel must be sent back to PCS for repair.
Below a brief description is given, a more detailed procedure is available at P.C.S Logistics Management, systems and Procedure Office.

CODENUMBER MMC:

Version	Codenumber
/00,/05	4822 214 51981
/11	4822 214 51979
/17P	4822 214 51933
/17T	4822 214 51938

- NSO or Customer: send telex or on-line MSH system info to PCS customer relations officer with indicated number(s) and service 12NC for a repair reference number.
- PCS: send telex or MSH info with repair reference number and return invoice price. Also the same number(s) of new/repaired items are sent with invoice.
- NSO or customer: send defective item(s) to PCS at SDM1 by standard address label with repair reference number and return invoice to PCS -price center.
- Remark: the difference between the invoice price and return invoice price gives the 'repair price' for the NSO
- PCS: send defective item to factory and stock.
- Experience has learned that the status of the particular products and packaging needs your local attention. Products will be returned in case of unacceptable conditions.

REPAIR PROCEDURE CONDITIONS :

- HANDLE WITH CARE IN AN ESD PROTETECTED ENVIRONMENT.
- Defective items must be sent back to PHILPS CONSUMER SERVICE for repair forwarded by Address sticker.
- Put the address sticker properly on a free area of the box.
- Boards must not be reworked or damaged.
- Re-use original package order new package in case of damages.
- Remove additional stickers and labeling if re-using the original box.
  Service codenumber on sticker must be equal to codenumber on repairable item.

!!! If the above conditions are not fulfilled, hen boards are not accepted and the return price will not be credited !!!

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4 MECHANICAL DRAWINGS AND PARTS LIST

4.1 DEMOUNTING INSTRUCTIONS OF CABINET

NOTE: Numbers in parenthesis () refer to the Exploded View reference numbers.

4.1.1 Top Cover Removal (216)
Remove the four Top Cover screws on both sides of the unit.

4.1.2 Front Assembly Removal (202)
Remove the Top Cover, refer to section 4.1.1.
Remove the CDM Tray Front assembly (203) by opening the CDM Drawer and lifting the CDM Tray Front Assembly up. Remove the three front screws on the top of the Front Assembly and the three front screws on the bottom of the front assembly. Remove the two top front frame corner screws located directly behind the FrontAssembly tpo corner screws.
Note: By removing the two top front frame corner screws, the two bottom Front assembly clips will disengage from the bottom of the Front Frame Bracket (502)
Carefully angle the the top of the Front Assembly and slide the Front Assembly Cover off of the unit. Remove the two screws of the the HP Panel (1007) mounting bracket. Disconnect the two connectors on the Display panel (1005).
Note: Connectors are removed from connector sockets by releasing the socket connector clips.
Remove the Power Switch Connector Shaft (522) by pulling it forward out of Front Frame Bracket (502).

4.1.3 Display Panel Removal (1005)
Remove the Top Cover, refer to section 4.1.1.
Remove the Front Assembly, refer to section 4.1.2.
Remove the seven screws attaching the Display Panel to the Front Assembly (202)

4.1.4 Power Supply Panel Removal (1006)
Remove the Top Cover, refer to section 4.1.1.
Remove the Rear Textplate (513) by removing the four screws. Remove the two Power Supply mounting screws on the Rear Frame Bracket (514).
Remove the two Power Supply mounting screws on the Right Frame Bracket (518).
Note: The two Power Supply screws secured to the Right Frame Bracket are mounted to a heatsink on the Power Supply Panel. Be carefull not to damage the Power Supply Panel when disassembling or assembling.
Remove the Power Supply mounting screw located on the top front of the Power Supply Bracket (517). Remove the power switch connecting cable from the Cord Clamps (504, 508). Lift the front of the Power Supply Panel up two inches and remove the two connectors. Slide the power Supply Panel out toward the front of the unit. Disconnect the remaining connector.

4.1.5 APU panel & Encoder Panel (1002, 1003).
Remove the Top Cover, refer to section 4.1.1.
Note: The APU Panel and Encoder Panel are attached to the CD Panel (1004) by two PCB connectors for each Panel. Both panels are also secured in place by guides that protude from both the Left Frame Bracket (506).
Remove all wire connectors attached to the Panels and carefully lift each panel up out of the PCB connectors.

4.1.6 CDM Loader Assembly Removal (212)
Note: The laser diode is extremely sensitive to static electricity.
Before Removing the CDM Loader Assembly, properly ground yourself using a Wrist Grounding Strap.
Remove the Top Cover, refer to section 4.1.1.
Remove the Front Assembly, refer to section 4.1.2.
Open the CDM Drawer and remove the two front mounting screws. Remove the rear mounting screw. Lift the front of the CDM Loader Assembly one inch and locate the CDM flat cable and flat cable socket. Lift the top of the socket to release the cable, pull the cable up from the connector and immediately attach a paper clip to the bare ends of the flat cable. This procedure will insure against static electicity damage. Remove the two remaining connectors.
Note: The following numbers in parenthesis () refer to the reference numbers of the Loader Exploded View.

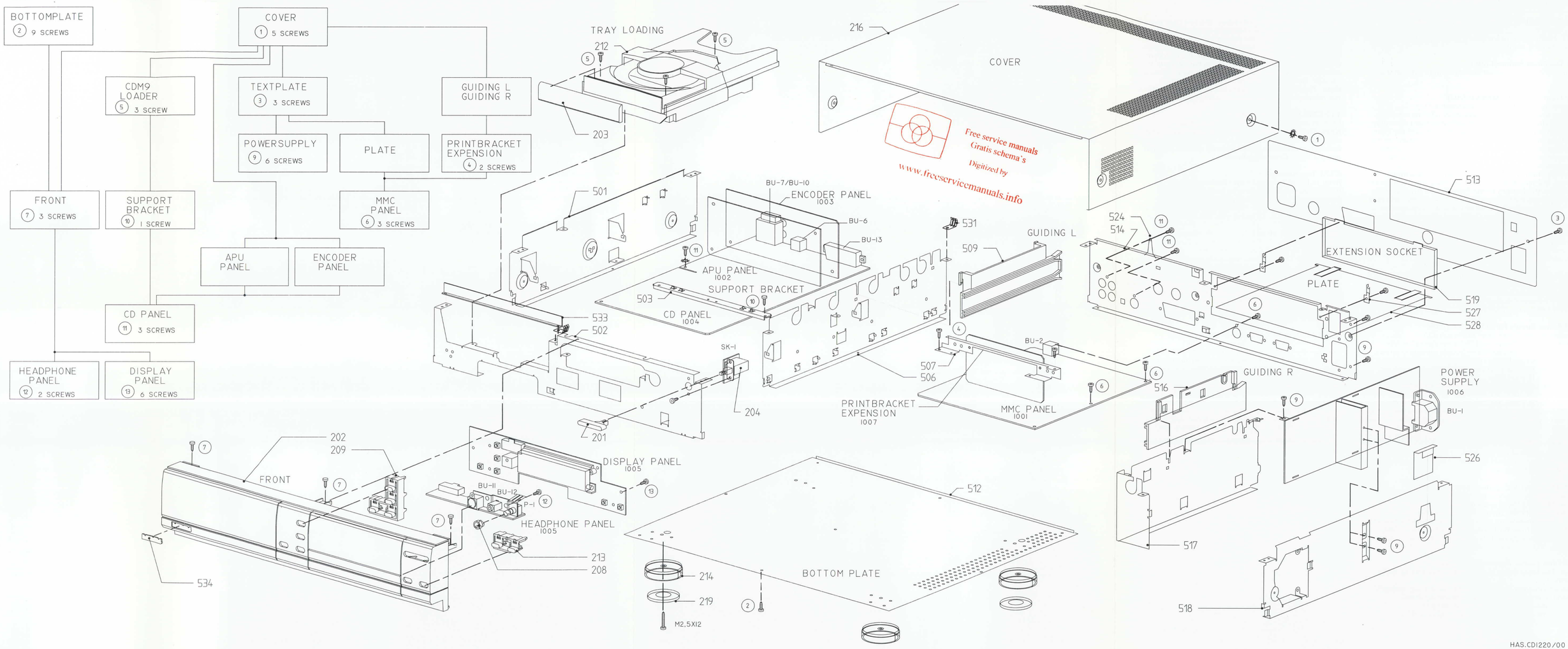
4.1.7 CDM Loader Disassembly.
Refer to detail 1 of the Loader Exploded View.
Note: The laser diode is extremely sensitive to static electricity.
Before removing the CDM, properly ground yourself using a Wrist Grounding Strap.

4.1.7.1 Tray Removal.
Refer to Detail 2 on the Loader Exploded View.
Remove the Top Cover, refer to section 4.1.2
Remove the Front Assembly, refer to section 4.1.6
Position the CDM Loader Assembly (1) upside down with the front of the Tray (2) facing you. Pull the Tray (2) out of its full extension.
Locate the Cover (4) and the tab protruding from the CDM Loader Assembly (1). Carefully press the Cover (4) down so that the lip on the Cover slides beneath the tab protruding from the Chassis Assembly. Slide the Cover (4) away from the tab.
Position the CDM Loader Chassis Assembly face up with the front of the Tray (2) facing you. Locate the clip and tab on the CDM Loader Chassis Assembly (1). With a small flat screwdriver, gently press the clip away from the tab protruding from the CDM Loader Tray (2). Pull the Tray (2) out of the CDM Loader Chassis Assembly.

4.1.7.2 CDM Assembly Removal (20)
Remove the Top Cover, refer to section 4.1.1
Remove the Front Assembly, refer to section 4.1.2
Remove the CDM Loader Assembly, refer to section 4.1.6
Remove the Tray, refer to section 4.1.7.1
Position the CDM Loader Chassis Assembly (1) with the Motor Assembly (11) facing away from you.
Note: The CDM Assembly (20) is positioned within the CDM Loader Assembly (1) on slide tracks.
Pull the CDM Assembly (20) toward you until it reaches its slide stops. Gently lift the CDM Assembly until the slide tab is out of the slide and pull the CDM Assembly out.

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4.1.8 EXPLODED VIEW OF THE CABINET



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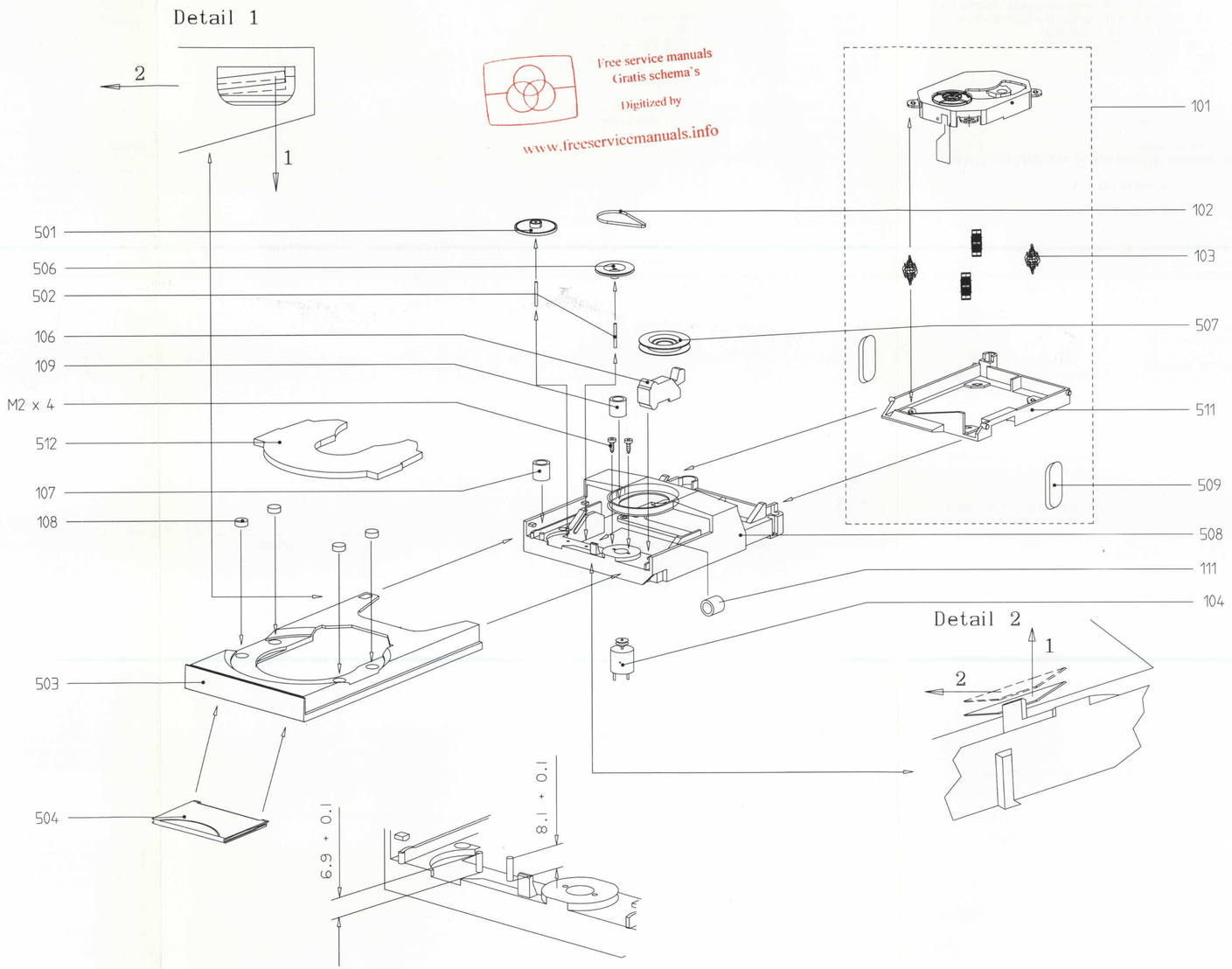
4.1.8.1 PARTS LIST OF CABINET

Item	Code	Codenummer
201	4822 410 62316	POWER KNOB
202	4822 444 40608	FRONT ASSY
203	4822 444 40607	TRAYFRONT
208	4822 413 51434	VOLUME KNOB
214	4822 462 41971	FOOT
216	4822 443 63757	COVER ASSY
219	4822 462 40683	PLATE FOR FOOT
	4822 321 10844	MAINS CORSET /00
RC	4822 218 10401	REMOTE CONTROL FOR /05
RC	4822 218 10438	REMOTE CONTROL FOR /00
SK1	4822 276 11309	MAINS POWER SWITCH
BU-2	4822 267 31289	PORT2 SOCKET
BU-6	4822 267 40857	MINIDIN VIDEO SOCKET
BU-7/BU-10	4822 267 20414	4P CINCH SOCKET
BU-11	4822 267 31289	PORT1 SOCKET
BU-12	4822 267 30743	HEADPHONE SOCKET
1007	4822 214 51994	FMV EXPANSION INTERFACE-PANEL
	4822 736 21575	DIRECTION FOR USE

POINTINGDEVICES;

4822 691 30293	ROLLER CONTROLLER
4822 691 30297	BLACK MOUSE
4822 691 30298	TRACKER BALL
4822 691 30299	JOY STICK

4.2 EXPLODED VIEW OF LOADER



4.2.1 Parts list of LOADER

103	4822 466 93065	SUSPENSION
106	4822 276 13222	SWITCH ASSY
104	4822 361 21492	MOTOR ASSY
506	4822 528 81465	PULLEY
507	4822 528 81464	DRIVE PULLEY
102	4822 358 31168	DRIVE BELT
512	4822 466 62109	TRANSPORT PROTECTION
108	4822 462 41902	ORNAMENTAL TULE
107	4822 325 80491	TULE
109	4822 325 60379	DAMPING GROMMET
109	4822 325 60379	DAMPING GROMMET
101	4822 691 30277	CDM9 ON MOUNT.CHASSY

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5 SERVICE SOFTWARE

5.1 THE LOW LEVEL MMC TEST

Scope
This test is standard implemented in the boot software of CD-RTOS. It doesn't need a lot of hardware to run. When debugging or servicing an MMC panel this test is very useful.

General
This test is developed for service and low level hardware debugging purposes only. It is meant to be used with the service pcb as described in TOOLS (please refer to section 3.5 SERVICE TOOLS). The test executed with the service pcb is called the **"pcb low level test".**
The test executed with the VT100 terminal is called the **"terminal low level test".** Since this service pcb display has just 8 digits, only the most important information will be displayed to the user. For the VT100 terminal this is never a problem.
This test consists out of the following items:

a. Display header and release number.
b. VSC
c. ROM
d. NVRAM
e. DRAM
f. CDIC
g. SLAVE processor (68HC05)

5.1.1 Tools
In this test the service pcb acts as some kind of a 'micro terminal'. This means that the service pcb is able to display some alphabetical and numerical characters. Some characters because it uses 7-segment displays

The three keys available are:
TEST ; test all display leds.
Yes ; Send an ASCII 'Y'.
No ; Send an ASCII 'N'.

The communication parameters are fixed at: 9600 baud
8 data bits
1 stopbit
no parity

The microcontroller is programmed with software available at IMS CDI software group.
The circuit diagram is on section 3.5.1.1

5.1.2 Testsquence
Table 1 below shows all the steps of the testprogram and what kind of tests are performed.

STEP	ACTION/TEST PERFORMED
00	VSC master/slave init
01	ROM
05	NVRAM
06	DRAM BANK0 & BANK1
07	DRAM BANK0
08	DRAM BANK1
09	CDIC
10	SLAVE
11	CLOCK CALIBRATION

Table 1: teststeps low level test

5.1.3 Low level test implementation
The low level test (short: lltest) is implemented in the boot part of the CD-RTOS software. The whole test occupies about 10k of ROM memory and is written in assembler.

The test runs without the use of any external RAM. It only uses internal CPU registers. As communication channel the 68070's UART is used. Before starting the normal player boot the following sequence is executed:
1. Initialize the 68070's UART : 9600 baud
   1 startbit
   8 databits
   1 stopbit
   no parity
   no handshake !
2. Clear the RXD buffer.
3. Wait 5 ms.
4. Read the RXD buffer.
5. If the character received was an ACK ($06) the start the pcb lltest

The UART is connected to I/O port 2

5.1.4 How to start up the low level test

With service pcb
To startup **the pcb low level testsoftware** the next sequence should be followed:
- Switch off the player.
- Connect service pcb to port 2 at the rear of the player.
- Switch on the player.
- The service pcb display should now show 'CDI RLxx'. (with xx the release number)
- The pcb lltest is now ready to go.

With VT100 terminal
To startup **the terminal low level testsoftware** one should follow the next sequence:
- Switch off the player.
- Connect the terminal to the 68070's UART of the player.
- Switch on the player while pressing the SPACE-bar of the terminal.
- The terminal should now show the title of the terminal lltest.

5.1.5 PCB low level test
If the service pcb is connected to port 2 the pcb low level test is executed after power on. In table 1 a survey is given for all tests executed.

Display lltest release number:
When this lltest is entered, first the release number of the pcb lltest will be displayed.

Example: CDI RLxx

(RL stands for RELEASE, xx stands for release x.x).
The lltest is now waiting for an action from the user. The user should now press either the'Y' or 'N' button to continue the test.

STEP 0: VSC

STEP 0A: VSC MASTER

display: 0A

In this step some registers of the VSC MASTER are initialized. These registers are :

DCR2 register(set to independant
DCR register (disable display)
CSR register (set DTACK delay and DRAM type)

STEP 0B: VSC SLAVE

display: 0B

In this step some registers of the VSC SLAVE are initialized. These registers are:

DCR2 register(set to independant DCA)
DCR register (disable display)
CSR register (set DTACK delay and DRAM type)

STEP 1: ROM

In this step the contents of the ROM is checked.
Following tests are done on the ROM:
1. Display release number of this ROM. (test A)
3. Check if the parity of the ROM is OK. (test C)

Address range:
- The ROM chips used for this memory map are :
  1 X 4Mbit.
  On the MINI MMC the clock and calendar chip used is the SGS-Thomson MK48T08B. It is visible in the memory map.

Nr.of Bytes Words	UPPER — — — LOWER	MAPPED ADDRESS SPACE	UNMAPPED ADDRESS SPACE	FUNCTION
512kB	UP&LO	00 0000 - 07 FFFF	00 0000 - 07 FFFF	DRAM BANK1
512kB	UP&LO	08 0000 - 0F FFFF	08 0000 - 0F FFFF	DRAM BANK2
512kB	UNDEF	10 0000 - 17 FFFF	10 0000 - 17 FFFF	RESERVED
512kB	UP&LO	18 0000 - 1F FBFF	18 0000 - 1F FBFF	SYSTEM ROM
16B	LO	1F FC00 - 1F FFBF	1F FC01 - 1F FC1F	DUART (4)
16B*	UP&LO	1F FFC0 - 1F FFDF	1F FFC0 - 1F FFDF	VCS REGS SLAVE
16B*	UP&LO	1F FFE0 - 1F FFFF	1F FFE0 - 1F FFFF	VSC REGS MASTER
4B	LO	20 0000 - 20 7FFF	20 0001 - 20 0007	SLAVE
500kB	UNDEF	20 8000 - 27 FFFF	20 8000 - 27 FFFF	FREE SPACE
64kB	LO	28 0000 - 28 FFFF	28 0001 - 28 FFFF	FLOPPY (4)
460kB	UNDEF	28 0000 - 2F FFFF	28 0000 - 2F FFFF	FREE SPACE
8kW	UP&LO	30 0000 - 30 FFFF	30 0000 - 30 3FFE	CDI
910kB	UNDEF	31 0000 - 3E FFFF	31 0000 - 3E FFFF	FREE SPACE
2B	LO	3F 0000 - 3F 7FFF	3F 0001 - 3F 0003	KILLME/DMAMEM
8kB-8	UP	3F 8000 - 3F FBFF	3F 8000 - 3F BFEE	NVRAM (2)
8B	UP	3F BFF0 - 3F FBFF	3F BFF0 - 3F BFFE	CLOCK&CAL REGS
1kB	UNDEF	3F FC00 - 3F FFFF	3F FC00 - 3F FFFF	DO NOT ACCESS(3)
13MB	UNDEF	40 0000 - FF FFFF	40 0000 - FF FFFF	EXTENSION SPACE

Table of the memory map

(1) The effective memory space for SYSTEM ROM is 512kB-1k.
(2) The maximum available NVRAM space in this configuration is 31 kByte.
(3) This part of the memory map should not be accessed. The VSC registers are mapped here.
(4) When used.

I.. Explanation of items in tables
Nbr. of Bytes/Words :
The total available bytes or words. Words in this case means the part of the memory map is only accessable as a word.
kB = kilobytes
B = bytes
B* = bytes, but some addresses are only accessible as words.
kW = kilowords, only accessible as a word!

UPPER - LOWER:
This column gives an indication of how the device is accessible.
UP = only accessible as byte via the UPPER byte of the databus. (DATA8-DATA15)
LO = only accessible as byte via the LOWER byte of the databus. (DATA0-DATA7)
UP&LO = accessible via LOWER as well as UPPER byte of the databus. (the device uses the complete databus.
UNDEF = not defined.

MAPPED ADDRESS SPACE:
This column gives the total address range where the device described in FUNCTION is accessible. In this range the device can occur several times.

UNMAPPED ADDRESS SPACE:
Analogous as mapped address space, only the device can occur only ONE time.

FUNCTION: This column describes the device or register

STEP 1: ROM 10

STEP 1A: ID AND RELEASE NUMBER DISPLAY

display: 1A
IDxxRLyy

In this step the release number of this ROM is displayed for a moment.
(ID stands for IDentification, xx is the id number.
RL stands for RELEASE, yy stands for y.y)

STEP 1C: CHECKSUM

display: 1C

In this step the checksum of this ROM is calculated as described in " how is the checksum calculated ". If the checksum is not ok an error will be displayed.

display: 1C Er05

STEP 5: NVRAM
The nvram test is a non destructive test. This means that the original nvram contents is restored again.
Address range: Full nvram address range (see product spec)

display: 5

The following actions take place in the nvram test:
1. read byte from nvram and save it in a register
2. write a pattern (from ROM) to nvram
3. read byte from nvram and compare with pattern
4. if byte read is ok then continue with action 5 else give error message and stop testing

If error,

display: 5 Er09

5. write inverted pattern to nvram
6. read byte from nvram and compare with pattern
7. if byte read is ok then restore original byte else give error message and stop testing

If error,

display: 5 Er10

8. repeat this for every possible nvram address

STEP 6-8 :DRAM
The dram test is always a destructive test. The test is performed for both ram bank0 and bank1 as one large memory followed by a test for each bank separately. On the displays following, the 'x' is a memory counter. The counter is incremented every 128k. So for the full range it counts from 1 to 8.

Address range: full address range (see table)
Bank0 = lower RAM bank
Bank1 = upper RAM bank

STEP 6A : TEST THE FULL DRAM MEMORY
The following actions take place in this test:
1. fill the memory with the long word address as data.

   display: 6Afx

2. read the memory contents and compare with the address.

   display: 6Arx

3. if the long word read is ok then continue else give error message and stop testing.
   If error,

   display: 6ArxEr11

STEP 6B : TEST THE FULL DRAM MEMORY WITH INVERTED DATA
The following actions take place in this test:
1. fill the memory with the inverted long word address as data.

   display: 6Bfx

2. read the memory contents and compare with the inverted address.

   display: 6Brx

3. if the long word read is ok then continue else give error message and stop testing.
   If error,

   display: 6BrxEr12

STEP 7A : TEST DRAM BANK0
The following actions take place in this test:
1. fill the memory with the long word address as data.

   display: 7Afx

2. read the memory contents and compare with the address.

   display: 7Arx

3. if the long word read is ok then continue else give error message and stop testing.
   If error,

   display: 7ArxEr13

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STEP 7B : TEST DRAM BANK0 WITH INVERTED DATA
The following actions take place in this test:
1. fill the memory with the inverted long word address as data.

   display: 7Bfx

2. read the memory contents and compare with the inverted address.

   display: 7Brx

3. if the long word read is ok then continue else give error message and stop testing.
   If error,

   display: 7BrxEr14

STEP 8A : TEST DRAM BANK1
The following actions take place in this test:
1. fill the memory with the long word address as data.

   display: 8Afx

2. read the memory contents and compare with the address.

   display: 8Arx

3. if the long word read is ok then continue else give error message and stop testing.
   If error,

   display: 8ArxEr15

STEP 8B : TEST DRAM BANK1 WITH INVERTED DATA
The following actions take place in this test:
1. fill the memory with the inverted long word address as data.

   display: 8Bfx

2. read the memory contents and compare with the inverted address.

   display: 8Brx

3. if the long word read is ok then continue else give error message and stop testing.
   If error,

   display: 8BrxEr16

STEP 9: CDIC
This test only checks part of the CDIC ram, mainly because it is possible that during the test the CDIC destroys part of the ram contents.
address range: CDIC base address + $1400 to CDIC base address + $3C7F.
cdic register2: CDIC base address + $3FFA
register2 contents after reset: $C7FE

See table for base address.

STEP 9A :CDIC RAM TEST WITH ADDRESS AS DATA

display: 9A

The following actions take place in the CDIC RAM test:
1. Fill the memory with long word address as data.
2. Read and compare the data with the address.
3. If the long word read is ok then continue else give an error and stop testing.
   If error,

   display: 9A Er17

STEP 9B :CDIC RAM TEST WITH INVERTED ADDRESS AS DATA

display: 9B

The following actions take place in the CDIC RAM test:
1. Fill the memory with inverted long word address as data.
2. Read and compare the data with the inverted address.
3. If the long word read is ok then continue else give an error and stop testing.
   If error,

   display: 9A Er18

STEP 9C :CDIC REGISTER 2 TEST

display: 9C

The following actions take place in the CDIC REGISTER test:
1. Read register 2 and compare with fixed pattern. (Register 2 has a defined pattern after reset.)
2. If the register is ok then continue with next step else give an error and stop testing.
   If error,

   display: 9C Er19

STEP 10 SLAVE processor (68HC05)
This test checks the communication with the slave processor.
Additionally it displays the slave and cd processor release numbers. If the communication with the cd processor via SPI does not function, the cd release number will give a 0.0.

Address range: Slave base address + 6 (See table).

STEP 10A : WRITE REQUEST BYTE TO THE SLAVE

display: 10A

In this step a $F0 (request) is written to the slave.

STEP 10B : READ ACKNOWLEDGE FROM THE SLAVE

display: 10B

In this step the following actions take place:
1. wait about 2 sec to give the slave the time to acknowledge.
2. read the acknowledge.
3. if the acknowledge is $F0 then continue else give an error and stop testing.
   If error,

   display: 10B Er20

STEP 10C : READ AND DISPLAY SLAVE RELEASE NUMBER

display: 10C

In this step the following actions take place:
1. read the next byte from the slave
2. if the byte «gd› $00 then continue with step 3 else give an error and stop testing.
   If error,

   display: 10C Er21

3. wait until a key is pressed.
4. continue with next step

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STEP 10D : READ AND DISPLAY CD RELEASE NUMBER

display: 10D

In this step the following actions take place:
1. read the next byte from the slave
2. if the byte < > $00 then continue with step 3 else give an error and stop testing
   If error,

   display: 10D Er22

3. wait until a key is pressed.
4. read the next byte: this is a dummy read.

STEP	DESCRIPTION
0a	VSC master initialization
0b	VSC slave initialization
1a	ROM10 release number
1c	ROM10 checksum check
5	NVRAM test with rom data as data
6af	DRAM fill bank0&bank1 with address as data
6ar	DRAM read and compare data
6bf	DRAM fill bank0&bank1 with inverted add. as data
6br	DRAM read and compare data
7af	DRAM fill bank0 with address as data
7ar	DRAM read and compare
7bf	DRAM fill bank0 with inverted address as data
7br	DRAM read and compare data
8af	DRAM fill bank1 with address as data
8ar	DRAM read and compare
8bf	DRAM fill bank1 with inverted address as data
8br	DRAM read and compare data
9a	CDIC RAM test with address as data
9b	CDIC RAM test with inverted address as data
9c	CDIC register test
10a	SLAVE test: write request to slave
10b	SLAVE test: read echo from slave
10c	SLAVE test: read SLAVE release number from slave
10d	SLAVE test: read CD release number from slave

Table 1: PCB LLTEST steps overview

5.1.6 Terminal low level test

If a VT100 or compatible terminal is connected to the 68070's UART of the CDI player one is able to execute the terminal low level test. Due to the fact that almost every test is self explanatory only the major steps are described below. In this test it is possible to skip every major step.

Display lltest header and release number

STEP 0: VSC
Both master and slave vsc are low level initialized sequentially. This is done the same as in the pcb low level test.

STEP 0: Writing to a user definable ram address
This test writes the powers of 2 to a (word) address. The result is read again and will be displayed. The address can be selected by the user (only word adresses). Pressing 'ESC' stops the test.
If one trys to write to unused space in the memory map, the program will NOT generate an error message.

STEP 01: ROM
For the ROM the following information is displayed and checked:
- Display the identification code for this ROM (ROM ID)
- Display the release number of this ROM
- Display the checksum of this ROM. The upper word of the checksum displayed is always '0000'.
  If the checksum is not ok then a specific error will be displayed. This error is the same as in the pcb low level test.

STEP 05: NVRAM
For the NVRAM test three different tests can be selected:
- The first is a non destructive nvram test as in the pcb low level test.
- The second test is a destructive nvram test with ROM data as test data.
- The third test is also a destructive test with the address as data.
- The third test has also some hidden functions. Pressing:
  w: writes continu the address as data to the nvram.
  r: reads continu the complete nvram (no display).
  d: displays the contents of 421 succeeding ram locations. The start address is given by the user.
  ESC stops these functions.

Remark: The error message is different from the pcb lltest.

See error table for more information.

Address range: Full nvram address range (see table of memory map)

STEP 06-08: DRAM
The dram test is always a destructive test. The test is performed for both ram bank0 and bank1 as one large memory followed by a test for each bank separately.
The following actions take place in the dram test:
1. fill the memory with the long word address as data.
2. read the memory contents and compare with the address.
3. if the long word read is ok then continue else give error message and stop testing.
4. write the inverted long word address as data to memory.
5. read the memory contents and compare with the inverted address.
6. if the long word read is ok then continue else give error message and stop testing.

This test has also some hidden functions. Pressing:
w: writes continu the long address as data to the dram.
r: reads continu the dram (no display).
d: displays the contents of 421 succeeding ram locations.
The start address is given by the user.
ESC stops these functions.

Remark: the error message is different from the pcb lltest.

See error table for more information.

Address range: full address range (see product spec)
Bank0 = lower RAM bank
Bank1 = upper RAM bank

STEP 09: CDIC
cdic register2:
CDIC base address + $3FFA ; register2 contents after reset: $D7FE

See table of memory map for base address.

The cdic test consists out of three main parts:
1 test cdic ram with long word address as pattern
2 test cdic ram with inverted long word address as pattern
3 display cdic register and compare

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If in one of these tests an error occurs the test will be stopped and the error displayed.

This test has also some hidden functions. Pressing:
w: writes continu the long address as data to the cdic.
r: reads continu the complete cdic (no display).
d: displays the contents of 421 succeeding ram locations.
The start address is given by the user.
ESC stops these functions.

Address range:
CDIC base address + $1400 to CDIC base address + $3C80.

STEP 10: SLAVE processor (68HC05)
This lltest for the slave performs following actions:
1 Write $F0 to the slave processor.
2 Read byte from same address, the slave should respond with $F0.
3 If data is not $F0 then stop testing and display error code else continue with next action.
4 Read the next byte: this byte is the release number of the slave processor firmware. Display the release number. If the release number is $00 then an error will be displayed.
5 Read the next byte: this byte is the release number of the CD processor firmware. Display the release number. If the release number is $00 then an error will be displayed.
6 Read the next byte: this is a dummy read.

Address range: Slave base address + what is read in 6.

See table of memory map for base address.

STEP 11: CLOCK CALIBRATION
This step is not really a test. it is a software tool that can be used to trim the clock&calendar chip so that it runs within 1 minute acc. per month. If calibration is not needed, this step should be executed since a frequency counter is needed to complete this test successfully. If this test is entered accidently, just switch off the power and restart the lltest.
The clock calibration should be performed with an external frequency counter.

- Connect the probe of the counter to pin21 of IC7205 the signalis called CSCDICN.
- Start the test with the gate time of the frequency counter set to minimum 5 sec.
- The counter display should now show a frequency near to 512 Hz.
  If not, the chek if everything is set and connected properly.
  (range : 511,96724 to 512,03276)
- Press a key on the terminal to stop the measurement.
- Now fill in the measured value of the frequency. The lltest software will now calculate the proper value to be filled into the calibration register of the clock&calendar IC.
  The value of the frequency at pin21 of IC7205 will not be changed or influenced.
- The calibration is done now.

5.1.7 Error codes

When during a test an error occurs the user should be aware of following conventions:
- For the pcb low level test the error is displayed on the outermost righthand side of the display.

  Example: 1 Er11

  An survey for all error codes is given in table 2.

- For the terminal low level test the error is displayed on the outermost lefthand side of the terminal. In some cases (memory tests) the error code is replaced by a more meaningful error output.

  Example: ADDRESS DATA READ EXPECTED
  ERROR:00080000 F0080000 00080000 RETURN to continue,ESC to STOP

  Meaning: (assuming long word data is used); On address
  $80000 the data was $F0080000 and not $80000 as it should be. If the RETURN button is pressed, the next address will be read and checked. With this output it will be easier to debug the MMC board

- When an error has occurred the program will wait for a user intervention with following question:
  RESTART the test Yes or No?
  If the answer was 'Y' then the lltest software is executed again from the beginning.
  If the answer was 'N' then the next test is executed as if nothing happened.

ERROR	DESCRIPTION	DISPLAY
05	ROM checksum error	Er05
09	NVRAM error	Er09
10	NVRAM error (for inverted data)	Er10
11	DRAM error (bank0 & bank1)	Er11
12	DRAM error (bank0 & bank1, inverted data)	Er12
13	DRAM bank0 error	Er13
14	DRAM bank0 error (inverted data)	Er14
15	DRAM bank1 error	Er15
16	DRAM bank1 error (inverted data)	Er16
17	CDIC RAM error	Er17
18	CDIC RAM error (inverted data)	Er18
19	CDIC register error	Er19
20	SLAVE error (wrong echo from slave)	Er20
21	Invalid release number from slave	Er21
22	Invalid release number from cd proc	Er22

Table 2. Error codes overview

5.1.8 Release number, position and checksum storage

The release number,ID and checksum are always stored in the CDI ROM. Step 1 of the pcb lltest as well as the terminal lltest uses all this information to check if the ROM is ok.

Where are these bytes stored in the ROM's, where in the memory?
(ROM address range for the 4Mb: $00000-$7FBFF)
(MMC address range for the 1Mb: $180000-$1FFBFF)

ROM address $7FBFF = LSByte of the checksum
$7FBFE = MSByte of the checksum
$7FBFD = Release number of this ROM (BCD coded)
$7FBFC = Player ID (BCD coded)
MMC address $1FFBFF = LSByte of the checksum of the ROM
$1FFBFE = MSByte of the checksum of the ROM
$1FFBFD = Release number of the ROM (BCD coded)
$1FFBFC = Player ID (BCD coded)

Remark: The total ROM space is 512k minus 1k. This 1k can never be accessed in the MMC address space. It is used for the VSC's registers and chip selects.

5.1.9 How is the checksum calculated?

The checksum is calculated for every ROM separately. The checksum is the algebraic sum of all bytes in that ROM except the 2 bytes where the checksum is written. Only the LSWord of the sum is used. To calculate the real checksum of the ROM just add these 2 bytes to the LSWord of the sum.
The last 1024 bytes are always assumed to be all $FF.

ROM checksum = sum of all bytes of the address range $180000 to $1FFBFD + $FC00
ROM checksum displayed in STEP 1=
ROM checksum + (LSB + MSB) of this checksum.
This is also equal to the checksum of the complete ROM.

5.2 THE SERVICE SHELL

Introduction.
For service purposes the CD-I set has built-in software modules. These modules can be activated via the service shell by menu.
The modules are for the testing of :
- Video circuitry, by means of a colorbar testpatern
- CDM and servo circuitry
- Input / Output ports
- Audio circuitry

Testing the CDM, servo and audio cicuitry in the service shell is only possible with a CD-DA disc.

5.2.1 Starting the service shell

The service shell can be started by connecting the RXD and TXD lines of port 1 (pin2 and pin3) during start up (insert testplug before power on or reset).

5.2.2 Layout info

SELECTABLE/NON SELECTABLE ITEMS
Each menu of the service shell consist of a number of boxes and text strings. Some of these boxes can be selected by moving the screen cursor above the box and clicking on one of the joystick buttons. Only the colored boxes can be selected. Clicking on one of the other boxes will have no effect.

(ERROR) MESSAGES ON THE SCREEN
The service shell will provide information and errors in a box at the top of the screen. To remove such a message and continue with the test a button must be clicked on the remote control joystick.

MENU STRUCTURE
When the service shell is started, the main menu appears with a number of boxes on it. Selecting some boxes will result in a submenu being displayed, other boxes may result in immediate action. Selecting the EXIT box will stop the service shell and restart the player. Selecting EXIT in a submenu will return you to the previous menu.

5.2.3 Subject dependent information

MAIN MENU
The main menu contains four test item boxes and the EXIT box. Selecting TEST IMAGE will give immediate action, the other three test items will display a submenu.

CD TEST
This menu has two information boxes at the top of the screen. Below it are three test items for the CD player and below these are three buttons that can be selected only during the CD drive test. When the menu is first entered, only the three test item boxes can be selected. Subjects of the CD test are the cd drive itself, the X bus and a test on Digital Out.
When this menu is selected in the main menu, the communication channel with the CD processor will be checked first. A message will be displayed giving the result of this check (either O.K. or No response). After pressing one of the buttons (to remove the message) the cd menu will be displayed.

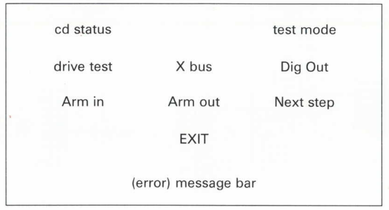


fig 3.2 CD test menu

The X bus test will result in immediate action. It checks the communication channel between the CDIC and CD processor that is normally used to send commands (seek, read etc) to the CD processor. The result is either O.K or No response.
The Dig. Out test will also give immediate action. It's purpose is to check wether the CDIC receives a Digital Out signal or not. The result of this test is O.K. or No Digital Out.
The CD drive test uses a different menu and will therefore be described in a separate paragraph.

CD DRIVE TEST
The CD drive test will perform the service loop as implemented in the Philips CD audio players. A disc is needed for this test. Results of this test will be displayed on the screen instead of a display. When the cd drive test is selected, the same screen will appear, but with other buttons highlighted. You cannot select the X bus and Dig Out test anymore. Selecting the EXIT button will return you to the cd menu. (X bus and Dig Out button highlighted again). The drive test consist of the following steps:

Mode 0
Software release number of the CD micro processor is displayed in the button at the left top of the screen (cd status button).Mode 0 is displayed in the button at the right top of the screen (mode button). During the cd drive test this button will display the current mode.
In mode 0, the ARM IN and ARM OUT buttons can be selected to move the cd lense inwards and outwards.
Selecting NEXT STEP will bring the player in mode 1.

Mode 1
In mode 1 the cd driveprocessor will try to focus. If it manages to do so (a disc must be present!), the message IN FOCUS will appear in the status button. Otherwise, the message NO FOCUS will appear in the status button after the cd driveprocessor has tried to focus 16 times (this may take a while). In that case (no focus found) the test will return to mode 0.
Selecting NEXT STEP will bring the player in mode 2.

Mode 2
The turntablemotor is rotating and controlled by the rough HF, moving the cd lense outside (by hand) will slow the disc down.
If an error occurs, the test will return to mode 0.
Selecting NEXT STEP in mode 2 will bring the player in mode 3.

Mode 3
You can select ARM IN and ARM OUT to make the cd lense jump inside or outside (small jumps). The laser will keep jumping while a button is pressed on the remote control.
If an error occurs, the test will return to mode 0.
NEXT STEP in mode 3 will bring the player in normal playing mode.

Normal playing mode
The player shell will be started and errors sent by the cd processor will be displayed in a box on the screen. You cannot return to the service shell otherwise than by resetting the player.

ERROR MESSAGES

display: A5 xx0000

xx = 2 : focus error
xx = 3 : radial error
xx = 5 : off error (TL stays low for 50 msec.)
xx = 6 : jump error
xx = 7 : subcode error, no valid subcode in 3 sec.
xx = 8 : TOC error: out of lead-in area while reading the TOC
xx = 30 : to many grooves to jump
xx = 31 : search time out
xx = 32 : bin. search error
xx = 33 : search index error
xx = 34 : search time error
xx = 37 : selection error

DUART TEST
This test is not relevant for the CDI205

APU/KEY TEST
This is a combined menu, the attenuation can be changed via this menu and the keys on remote control and player can be tested with it. There are three buttons for every attenuation path on the screen. Two of them can be selected (to increment/decrement) and one is used to display the current attenuation value for the path. There is also a MONO/STEREO button on the screen. In STEREO, two attenuation paths are disabled (left to right and right to left), in MONO all attenuation paths are enabled. Maximum attenuation is reached at the value 47 (no sound). A CD audio disc is needed for the attenuation test. The test routine will start playing the disc at initializiation.
When a key is pressed, a text will appear on the key button on the right side of the screen describing the button pressed. The text will disappear when the key is released.

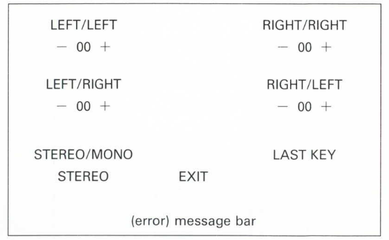


fig 3.4 APU test menu

VIDEO TEST IMAGE
A colorbar will be displayed on the screen. Pressing a button after the screen has been filled completely will return you to the main menu. There are no error messages for this test.

What could be wrong if...
This paragraph will describe the meaning of the error messages given by the service shell and contains suggestions about possible errors. This paragraph must be updated with new information from testing and debugging players.

Service shell cannot be started with the testplug. Connections between port 1 and slave may be bad. Testplug could be wrong. Maybe the slave processor is defect. If the playershell cannot be started either, try the low level test first.

The key test will display the text ERROR if an unknown key code is received.

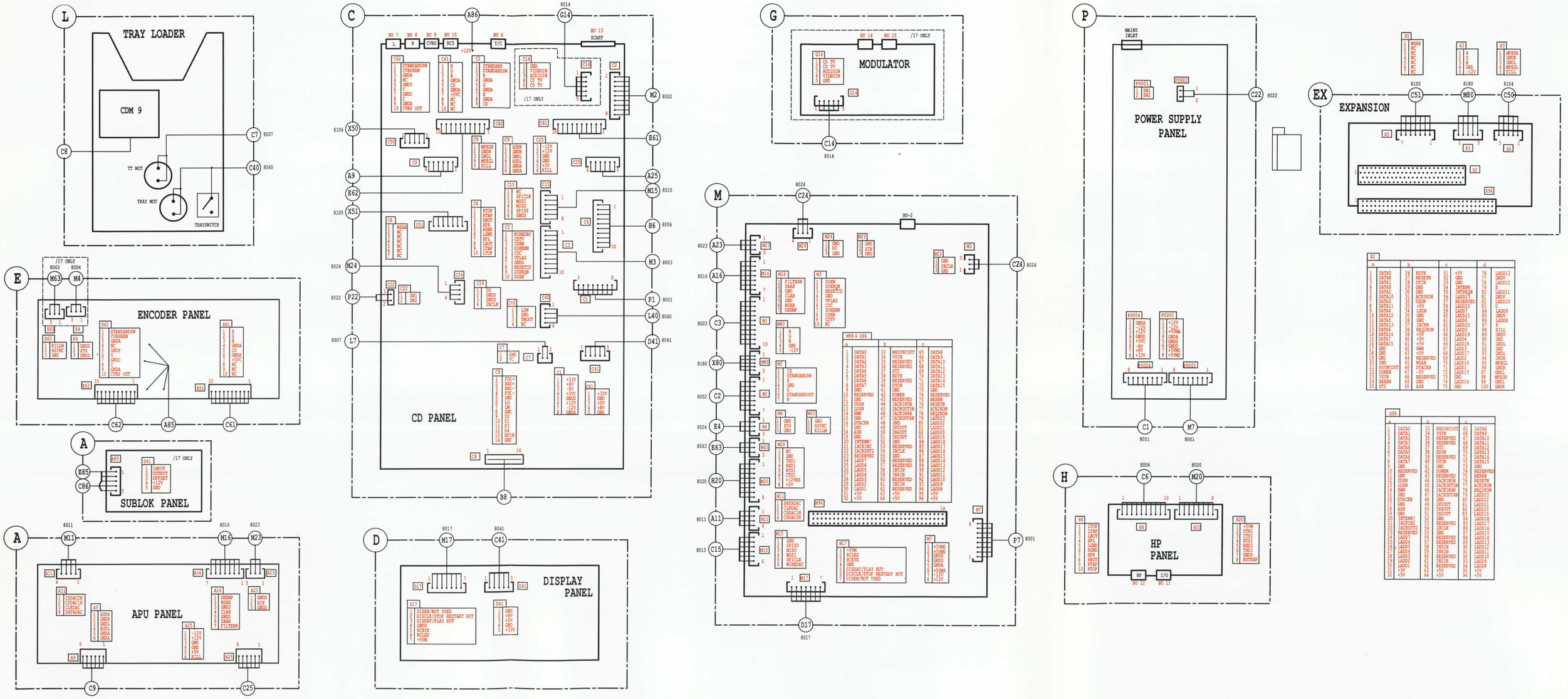
Disconnecting the clock from MMC to CD processor will make the CD player turn as fast as it can.

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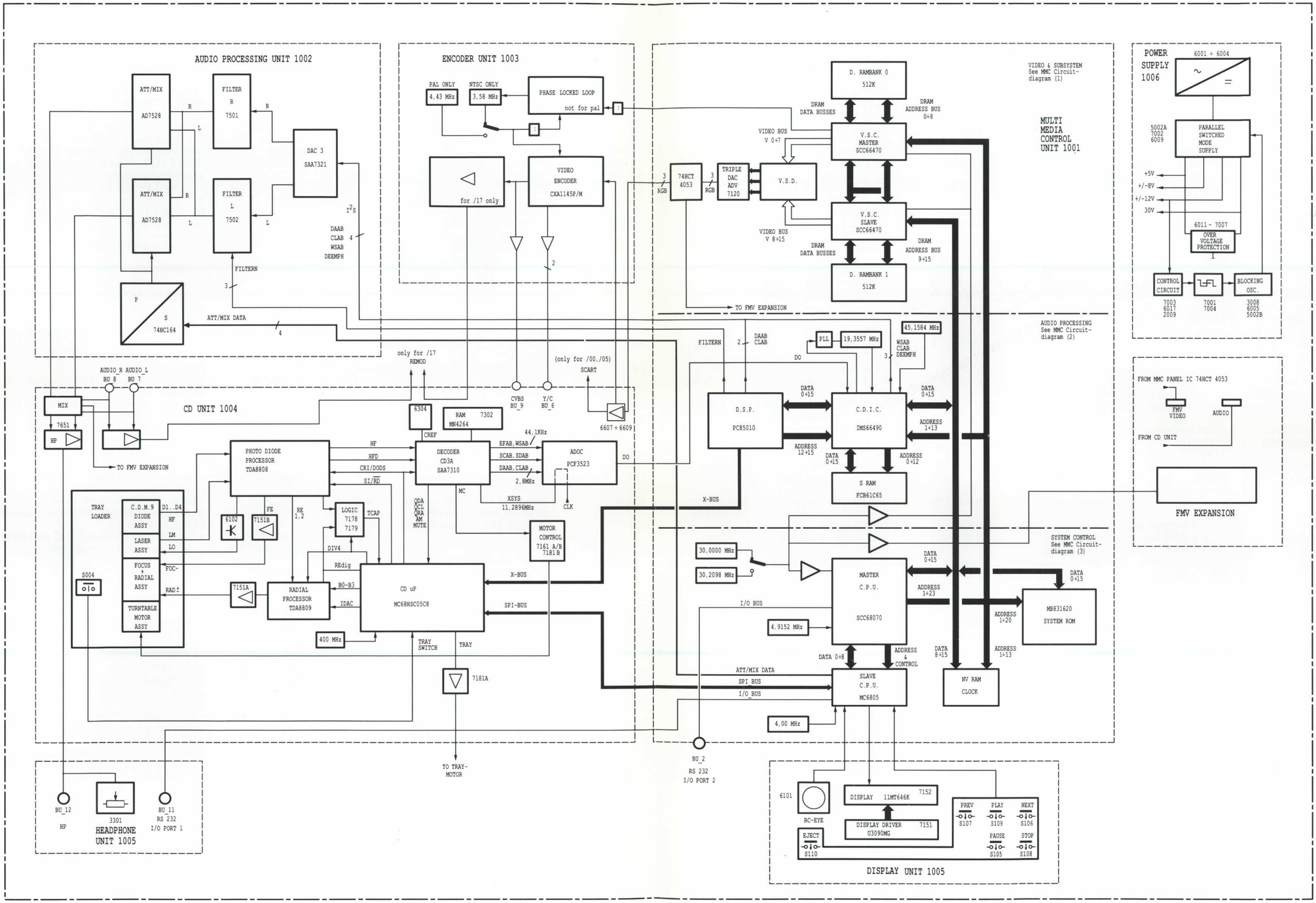
6.1 WIRING DIAGRAM



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6.2 BLOCK DIAGRAM



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6.2.1 Alphabetical signal listing

A,B,C + : >> control signals for brushless DC-motor
A,B,C - : >>
ACK2N : DMA REQUEST ACKNOWLEDGE (active low) (of channel 2)
ACM : output AC-motor
ADEN : (=ADENA) ADDRESS ENABLE NOT. When low,the address ADENA coming from the bus (68070) will be put through to CDIC
AM : ADDITIONAL MUTE
ASN : ADDRESS STROBE (active low,tristate) indicates when an address is valid on the bus for the system
AUDL : >> AUDIO LEFT
AUDIOL : >>
AUDR : >> AUDIO RIGHT
AUDIOR : >>
AVN : AUTOVECTORED INTERRUPTS (active low),can be used by an extension
B0..3 : input control bits for off-, catch-, play status and DAC output current for radial motor
B,G,R, : Output colours of the VSR
BERRN : >> BUS ERROR (active low,open drain)
BERR : >>
BLANI : (=BLAN1M) BLANKING OUTPUT (active low,tristate)of the VSC
CADDYIN : high when reading data
CADDYSWITCH : control signal for position tray
CASN : COLUMN ADDRESS STROBE (active low)
CBA,CBAA : 68070 bus transiever latch (rising edge)
CDICDACKN : (=ACK1N) DMA REQUEST ACKNOWLEDGE (active low)
CDICREQN : (=REQ1N) DMA REQUEST (active low)
CDTV : to change by remote control between TV or CDI (only used by CDI 2XX)
CLAB : (=CLAB2) bitclock for the SAA 7220 chip
CLK : CLOCK (11,2896 Mc)
CLKDAC : CLOCK DAC,the clock used to send serial data to the volume adjustment
CLK1 : the clock on which the DSP operates (7,5264 Mc)
CRI : COUNTER RESET INHIBIT (low during a real trackloss or during excention of a jump command
COC : COMMAND COMPLETED signal
COXN : serial output clock for the X-bus
CPUASN : the address strobe of the 68070 microprocessor
CPULDSN : the lower data strobe of the 68070 microprocessor
CPUUDSN : the upper data strobe of the 68070 microprocessor
CS : CHIP SELECT
CSCDICN : CHIP SELECT CDIC (active low) bus information is intended for or coming from CDIC
CSDAC1N : (=CSDAC2N) (if selected,low) it means that data will be adjusted on that channel
CSNVRAMN : CHIP SELECT NVRAM (active low) bus information is intended for or coming from the NVRAM
CSROMN : >>
CSROM1N : CHIP SELECT ROM (active low) bus information is coming from the ROM'S
CSROM2N : >>
CSSLAVEN : CHIP SELECT SLAVES (active low)
CSON : (=CSONA) CHIP SELECT (active low) for the 8Kx8 SRAM'S
CSVSCMSN : CHIP SELECT VSC MASTER AND SLAVE. When low the coming information is intended for the VSC'S

CSYN : COMPOSITE SYNCHRONIZATION input from the VSC's (active low)
CTS1...4 : CLEAR TO SEND (active low) it indicates that the remote recieving device is ready
CTS 2 : >>
CVBS : CVBS output
D1..4 : fotodiode currents
DAAB : (DAAB2) serial data output of the X-bus I^2S standard
DATA 0..15 : DATA LINES
DATADAC : Data which will be send to the DAC('S) for volume adjustment
DDTACK : DATA TRANSFER ACKNOWLEDGE to the 68070 bus
DEEMP : DEEMPHASIS
DIG OUT : DIGITAL OUTPUT
DIRN : DIRECTION CONTROL. Indecates the direction of data transfer through the transcievers
DISCLK : DISPLAY CLOCK >>
DISDAT : DISPLAY DATA >> only for CDI 2XX
DISEN : DISPLAY ENABE >>
DIV4 : DIVIDE BY 4 signal
DO : DIGITAL OUT
DODS : DROP-OUT DETECTOR SUPPRESSION
DONEN : DONE (active low,open drain), operates in the DMA-mode
DOXN : serial data output of the X-bus
DPSRWN : Read (high) or write (low) from or to the Digital Signal Processor
DSN2N : DATA STROBE (active low) of the DSP
DTACKN : DATA TRANSFER ACKNOWLEDGE asserted by a peripheral
DTACKSLAVEN : DATA TRANSFER ACKNOWLEDGE of the SLAVE processor (68HC05)
DTCN : DATA TRANSFER COMPLETE (active low, open drain) operates in the DMA-mode
DUARTCSN : DUART CHIP SELECT,when low businfo is coming from or going to the DUART
EFAB : ERROR FLAG
FILTERN : filter select when high:level C, when low:level A
FOC- : >> focus out to CDM 9
FOC+ : >>
GN : >>
GNA : >> When low:the outputs and inputs of the trancievers (646) are enabled
GNB : >>
HALTN : active low,open drain,biderectional. If low together whith the resetn it couses the 68070 to enter the reset state.
HFin : HF current input
HPL : HEADPHONE LEFT
HPR : HEADPHONE RIGHT
HSYN : (active low) horizontal synchronisation input from the VSC
HSYNCOUT : (active low) horizontal synchronisation output for monitor or tv
HVID 0 IN.
..HVID 7 IN : >> 8 bit pixel bus for channel 1
HVID 0 OUT..
.HVID 7 OUT : >> (VSC-master)
IACKIN2N : >>
IACKIN4N : >> Decoded interupt acknowledge (active low).
IACKIN5N : >> Asserted during an interupt acknowledge
IACKOUT2N : >> sequence to indicate to a peripheral that
IACKOUT4N : >> this interupt request is being serviced
IACKOUT5N : >>
IACKOUT2 : >>
IACKOUT4 : >>
IACKOUT5 : >>

IACKOUT22 : >>
IACKOUT23 : >>
IACKOUT42 : >>
IACKOUT52 : >>
IDAC : 1/2 bit DAC
IDTACKN : data transfer acknowledge from 68070
IFDN2 : main channel word-flag to the DSP
INTENN : >> when low,no extensions use the interupts,when high interrupt devices are daisy chained
INTENN2 : >>
INTENN3 : >>
INTENN4 : >>
IN2IN : (=IN2OUT) >>
IN4IN : (=IN4UT) >> Decoder interrupt priority inputs
IN5IN : (=IN5OUT) >> (active low) IN2IN has the lower
IN2OUT : >> and IN5IN has the higher priority
IN4OUT : >> IN2IN = SLAVEPROCESSOR (6805),IN4IN =
IN5OUT : >> CDIC (IMS66490),IN5IN = DUART (68681)
IN4OUT2 : >>
IN5OUT2 : >>
IN2OUT3 : >>
KILL : to mute audio outputs by power on and off
LA1 : >> control signals for brushless DC-motor
LB1 : >>
LC1 : >>
LADD1..23 : ADDRESS-BUS (active high,tristate) for direct addressing of 16 Mbyte of memory
LBOT : for HPL volume control
LDSN : LOWER DATA STROBE of the bus
LM : LASER MONITOR diode input
LO : LASER amplifier current OUTPUT
LRDN : when low select,the ROM'S or NVRAM read the lower data byte
LTAP : >> for HPL volume control
LTOP : >>
LVID0IN..
..LVID7IN : >> 8 bit pixel-bus for channel 2 (VSC-SLAVE)
LVID0OUT..
..LVID7OUT : >>
MC : MOTOR CONTROL signal
MISO : MASTER IN SLAVE OUT
MOSI : MASTER OUT SLAVE IN
MSMA0..8 : ADDRESS BUS between the DRAM'S of the VSC' MASTER and the VSC MASTER
MSMD0..15 : DATA BUS between the DRAM'S of the VSC' MASTER and the VSC MASTER
NRESET : when low the video synthesizer (VSR) is in reset
NVDS : digital output to control an external switch for TV overlays (active low)
PCLK1IN : >> PIXEL CLOCK for channel 1
PCLK1OUT : >>
PCLK2IN : >> PIXEL CLOCK for channel 2
PCLK2OUT : >>
PLOIN1 : input clock for CDIC (22,5792 Mc)
PLOIN2 : input clock for CDIC (19,3536 Mc)
QCL : Q-channel CLOCK
QDA : Q-channel DATA
QRA : Q-channel REQUEST INPUT/ ACKNOWLEDGE OUTPUT
Q22 : output to PLL (22,5792 Mc) devided by 14
Q21 : output to PLL (19,3536 Mc) devided by 12
RAD+ : >> RADIAL OUT to CDM 9
RAD- : >>
RASN : ROW ADDRESS STROBE (active low)

RBOT : for HPR volume control
RCEYE : REMOTE CONTROL EYE
RCLED : REMOTE CONTROL LED
RD : READY signal,starting up procedure finished
RDYN : READY (active low) of the DMA channel
REDIG : RADIAL ERROR DIGITAL
RESETCD : when low resetsequence starts
RESETINN : when low VSC is in reset
RESETN : this is the reset for all other ic's
REQ2N : DMA-request of the second channel
RSTOUT : RESET OUT of the slave processor when high resetsequence starts
RTAP : >> for HPR volume control
RTOP : >>
RTSUART : REQUEST TO SEND from the slave processor to the UART of the 68070 processor
RTS1..4 : >> REQUEST TO SEND (active low)
RTS 1..2 : >>
RWN : READ - WRITE (low is write) signal
RWN2 : READ - WRITE (low is write) signal from CDIC to the DSP
RWRAM : READ - WRITE signal from the CDIC to the S-RAM'S
RXD1..4 : >> RECIEVE DATA RXD is data input
RXD 1..2 : >>
SI : on - off control for laser supply and focus circuit
SLMA0..8 : VSC-slave memory address bus to the DRAM'S
SLMD0..15 : VSC-slave memory data bus to the DRAM'S
SOXENN : SERIAL OUTPUT ENABLE FOR THE X-BUS (enabled when low)
SOXRQN : SERIAL OUTPUT REQUEST FOR THE X-BUS (when low)
SOYENN2 : SERIAL OUTPUT ENABLE FOR THE Y-BUS (when low)
SPICLK : SERIAL PERIPHERAL INTERFACE CLOCK
SPISS : SERIAL PERIPHERAL INTERFACE SLAVE SELECT
STANDARD : software choise between PAL and NTSC
STANDARDSW : handware choise between PAL and NTSC
SSM : START/STOP MOTOR
SWAB : SUBCODING WORD CLOCK INPUT
SYSCLK : >> SYSTEM CLOCK
SYSCLK1 : >>
TCAP : input capture feature for the on-chip timer
TCMP : output for the output compare feature of the on chip timer
TMOUT : TRAY MOTOR OUT
TXD1..4 : >> TRANSMIT DATA TXD is data output
TXD 1..2 : >>
UDSN : UPPER DATA STROBE (active when low)
URDN : READ UPPER DATA BYTE (active when low)
UWRMN : READ - WRITE (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-MASTER
UWRN : WRITE UPPER DATA BYTE (active when low)
UWRSN : READ - WRITE (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-SLAVE
VC : output DC-motor (VOLTAGE CONTROL)
V-FLAG : output to the DSP
VSCM-INTN : when low,interrupt from VSC master to 68070 processor
VSCS-INTN : when low,interrupt from VSC slave to 68070 processor
VSYN : (active when low) VERTICAL SYNCHRONISATION INPUT from the VSC

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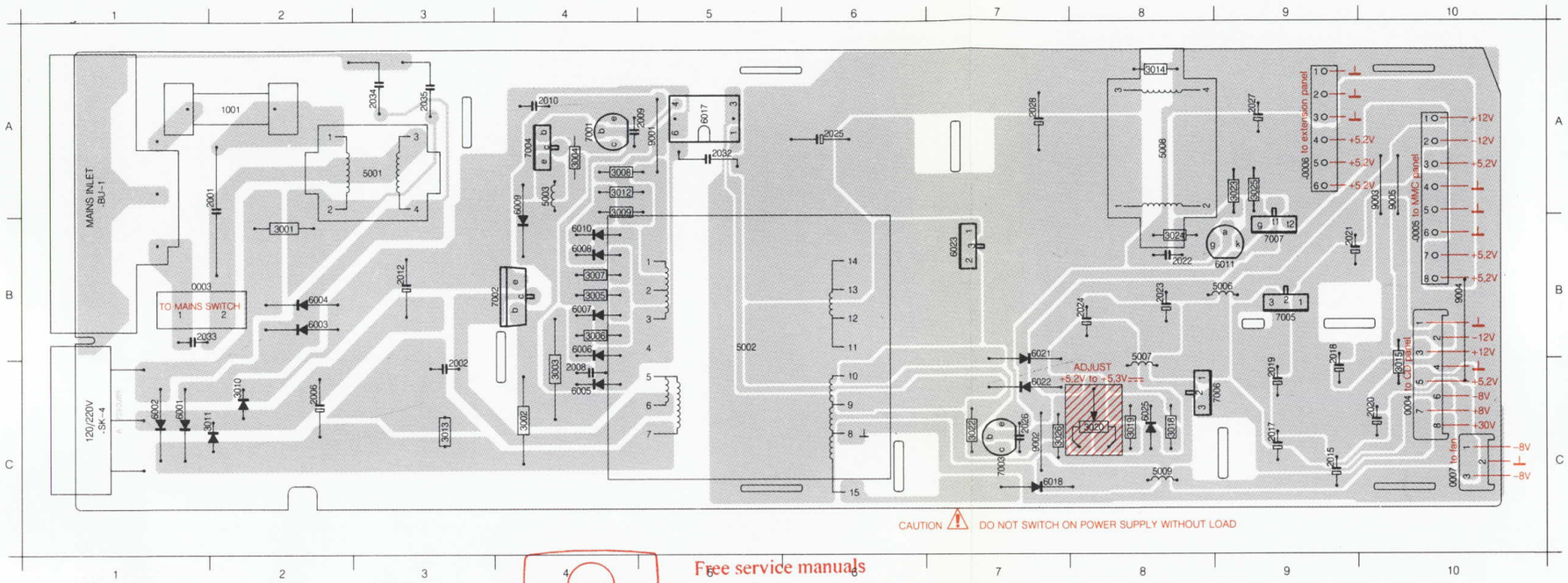
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WRPN1IN..2 : >> control input for channel 1 or 2 (active low)
WRPN1OUT.2 : >>
WSAB : >> WORD SELECT FOR AB CHIP
WSAB2 : >>
XIN : >> 11,2896/9,6768/4,8384 symmetrical clock
XIN2 : >>
X-TAL2 : the same as the system clock,coming out of the VSC'S
XT2 : the system clock devided by two
XT4 : >> the system clock devided by four
XT4IN : >>
0AD..12AD : >> ADDRESS BUS,between CDIC-SRAM'S and SYSTEM ADDRESS BUS BUFFERS
10ADA..
..12ADA : >>
0D..15D : DATA BUS between CDIC and DSP
0DA..15DA : DATA BUS between CDIC-SRAM'S and SYSTEM DATA BUS TRANCIEVERS
2BCLK : CLOCK for the 2B-chip
12A..15A : ADDRESS BUS between CDIC and DSP

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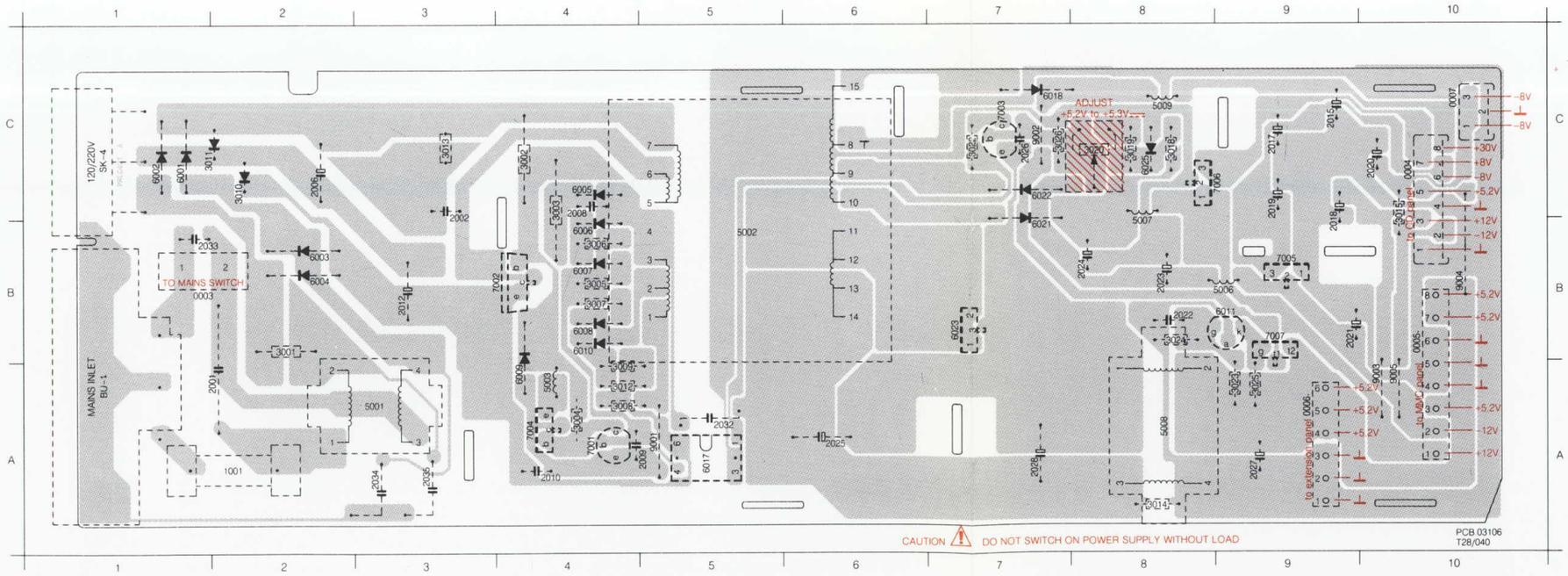
6.3.1 POWER SUPPLY PCB, COMPONENT SIDE VIEW



0003	B1	3011	C2	7004	A4
0004	C10	3012	A4	7005	B9
0005	B10	3013	C3	7006	C9
0006	A9	3014	A8	7007	B9
0007	C10	3015	C10	9001	A5
1001	A2	3018	C8	9002	C7
2001	A2	3019	C8	9003	A10
2002	C3	3020	C8	9004	B10
2006	C2	3022	C7	9005	A10
2008	C4	3023	A9	BU-1	A1
2009	A5	3024	B8	SK-4	C1
2010	A4	3025	A9		
2012	B3	3026	C7		
2015	C9	5001	A3		
2017	C9	5002	B5		
2018	C9	5003	A4		
2019	C9	5006	B8		
2020	C10	5007	C8		
2021	B9	5008	A8		
2022	B8	5009	C8		
2023	B8	6001	C1		
2024	B8	6002	C1		
2025	A6	6003	B2		
2026	C7	6004	B2		
2027	A9	6005	C4		
2028	A7	6006	B4		
2032	A5	6007	B4		
2033	B1	6008	B4		
2034	A3	6009	A4		
2035	A3	6010	B4		
3001	B2	6011	B9		
3002	C4	6017	A5		
3003	C4	6018	C7		
3004	A4	6021	B7		
3005	B4	6022	C7		
3006	B4	6023	B7		
3007	B4	6025	C8		
3008	A4	7001	A4		
3009	A4	7002	B4		
3010	C2	7003	C7		

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6.3.1 POWER SUPPLY PCB, COPPER TRACK SIDE VIEW



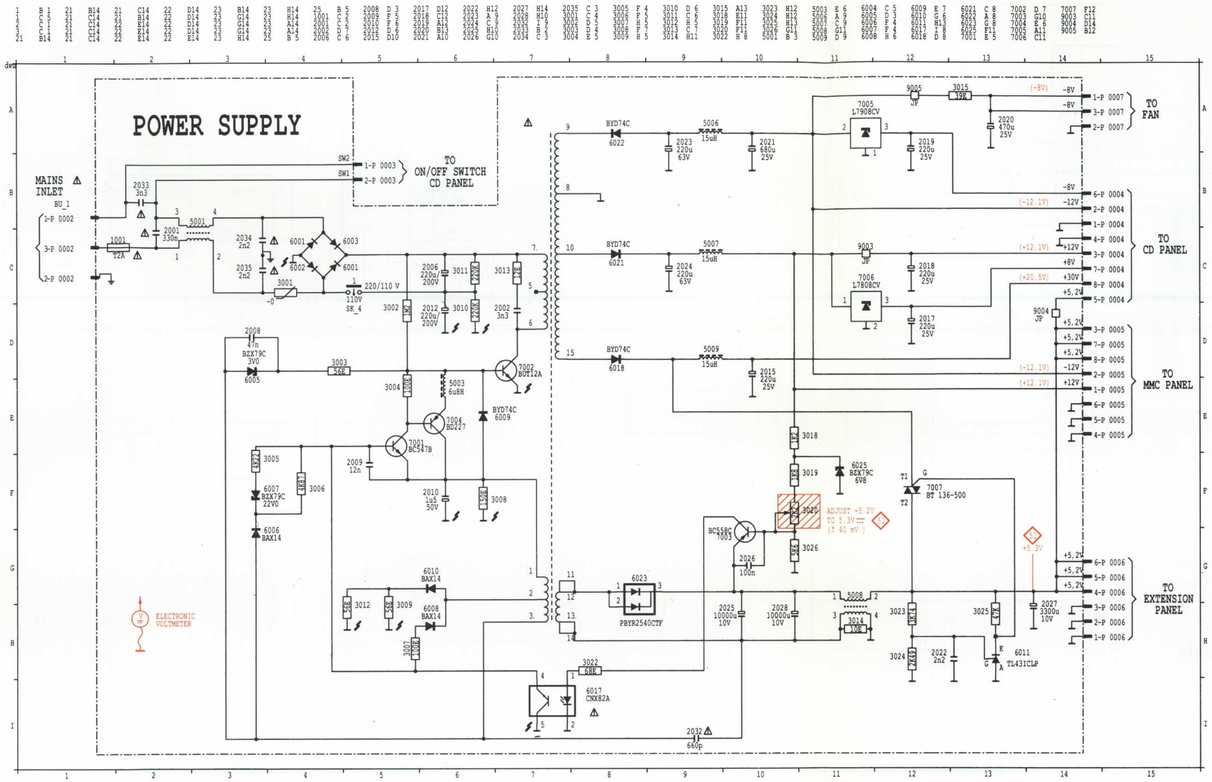
0003	B1	3011	C2	7004	A4
0004	C10	3012	A4	7005	B9
0005	B10	3013	C3	7006	C9
0006	A9	3014	A8	7007	B9
0007	C10	3015	C10	9001	A5
1001	A2	3018	C8	9002	C7
2001	A2	3019	C8	9003	A10
2002	C3	3020	C8	9004	B10
2006	C2	3022	C7	9005	A10
2008	C4	3023	A9	BU-1	A1
2009	A5	3024	B8	SK-4	C1
2010	A4	3025	A9		
2012	B3	3026	C7		
2015	C9	5001	A3		
2017	C9	5002	B5		
2018	C9	5003	A4		
2019	C9	5006	B8		
2020	C10	5007	C8		
2021	B9	5008	A8		
2022	B8	5009	C8		
2023	B8	6001	C1		
2024	B8	6002	C1		
2025	A6	6003	B2		
2026	C7	6004	B2		
2027	A9	6005	C4		
2028	A7	6006	B4		
2032	A5	6007	B4		
2033	B1	6008	B4		
2034	A3	6009	A4		
2035	A3	6010	B4		
3001	B2	6011	B9		
3002	C4	6017	A5		
3003	C4	6018	C7		
3004	A4	6021	B7		
3005	B4	6022	C7		
3006	B4	6023	B7		
3007	B4	6025	C8		
3008	A4	7001	A4		
3009	A4	7002	B4		
3010	C2	7003	C7		

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6.3.2 POWER SUPPLY CIRCUIT DIAGRAM



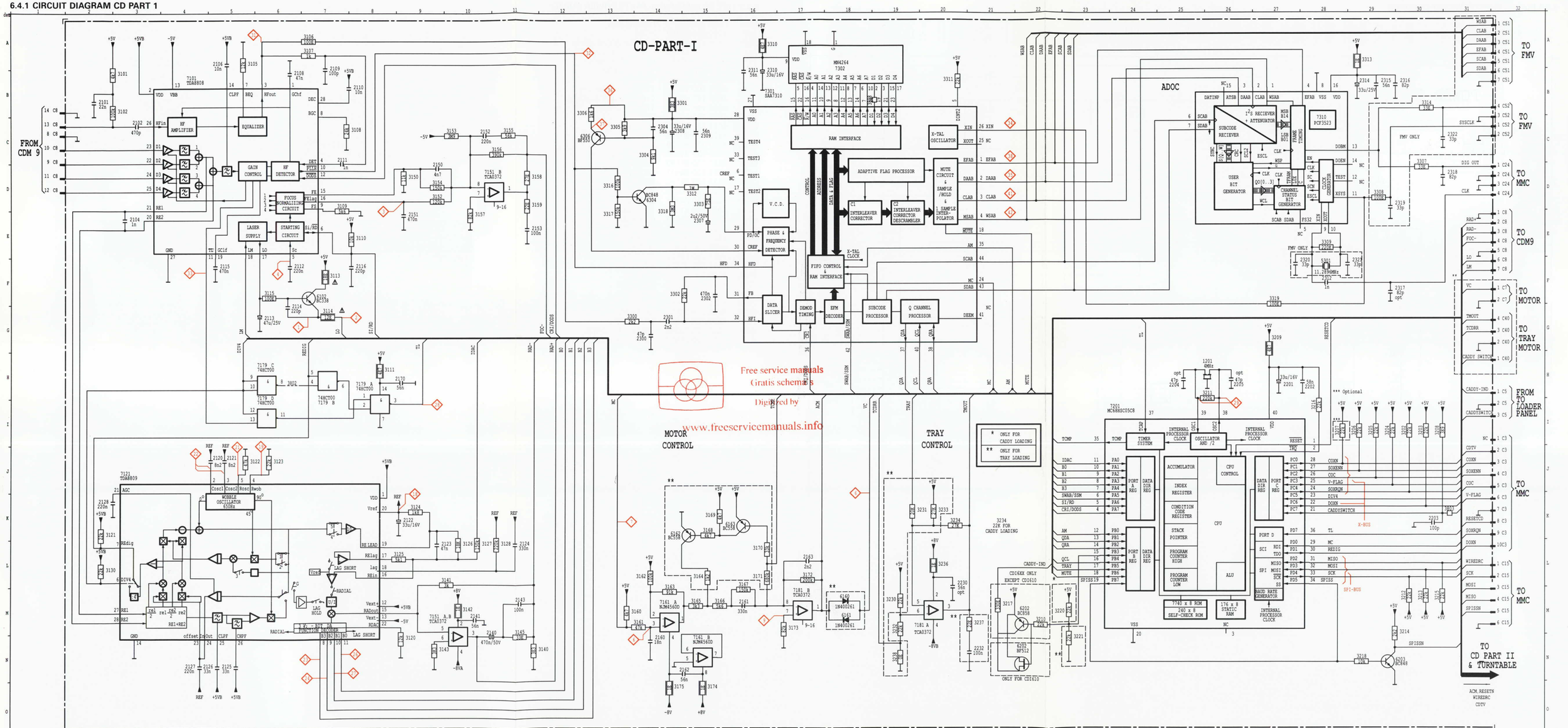
6.3.3 LIST OF ELECTRICAL PARTS POWER SUPPLY

Item	Codenumber	Description
1001	4822 070 32002	FUSE
2001	5322 121 44271	POLCAP 330NF 250V
2032	4822 126 12056	CER. CAP 470PF 125V
2032	4822 121 70112	CAPACITOR ASSY
3001	4822 116 30069	THERMISTOR
3015	4822 116 21208	VDR
3020	4822 100 10019	TRIM 2K2 OHM LIN
5001	4822 157 63913	CHOKE ASSY CU15D3
5002	4822 146 30956	TRANSFORMER
6001	4822 130 80229	BYD14J
6002	4822 130 80229	BYD14J
6003	4822 130 80229	BYD14J
6004	4822 130 80229	BYD14J
6005	4822 130 31881	BZX79-C3V0
6006	4822 130 34193	BAX14
6007	4822 130 34441	BZX79-C22
6008	4822 130 34193	BAX14
6009	4822 130 80915	BYD74C
6010	4822 130 34193	BAX14
6011	4822 209 81397	TL431CLP
6017	4822 130 10025	CNX82A
6018	4822 130 80915	BYD74C
6021	4822 130 80915	BYD74C
6022	4822 130 80915	BYD74C
6023	4822 130 82553	DIODE PBYR 2540 CTF
6025	4822 130 34278	BZX79-C6V8
7001	4822 130 40959	BC547B
7002	4822 130 62735	BUT12AF
7003	5322 130 60068	BC558C
7004	5322 130 44661	BD227
7005	4822 209 82112	MC7908CT
7006	4822 209 72554	MC7808CT
7007	4822 130 20248	TRIAC BT136-500
A	5322 390 20019	HEATSINK COMPOUND

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6.4.1 CIRCUIT DIAGRAM CD PART 1



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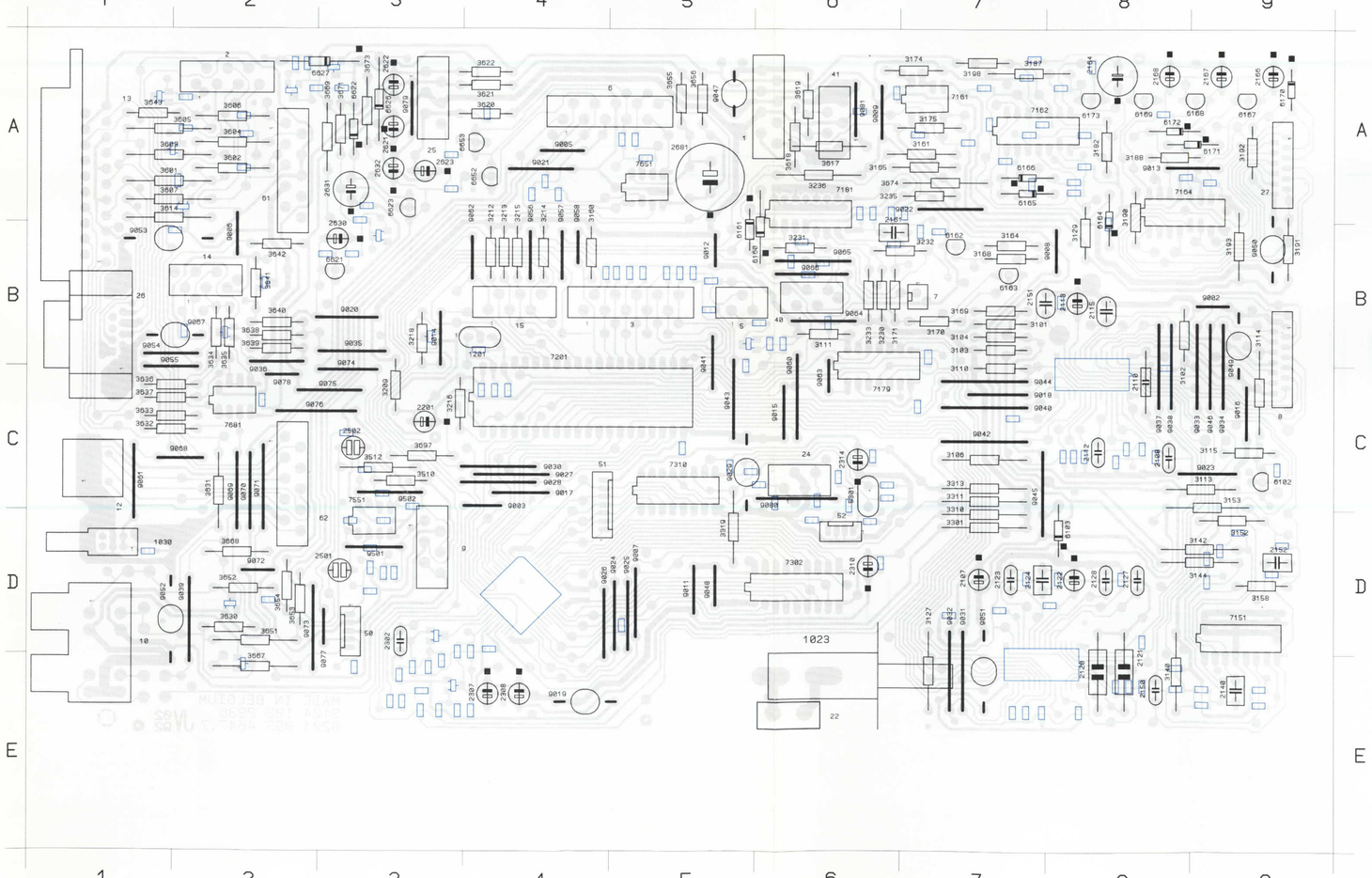
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6.4.2 LIST OF ELECTRICAL PARTS CD PANEL

Item	Codenumber	Description
BU-6	4822 267 40857	CS7927-24-401
BU-7	4822 267 20414	CINCH SOCKET 4P
BU-8	4822 267 20414	CINCH SOCKET 4P
BU-9	4822 267 20414	CINCH SOCKET 4P
BU-10	4822 267 20414	CINCH SOCKET 4P
SK-1	4822 276 11309	MAINS-POWER SWITCH
1013	4822 267 60326	SCART CONN. 7087D
1201	4822 242 72527	CRYSTAL 4,000MHZ
3103	4822 052 10478	NFR25 4R7
3111	4822 052 10478	NFR25 4R7
3113	4822 052 10189	NFR25 18R
3114	4822 052 10129	NFR25 12R
3142	4822 052 10108	NFR25 1R0
3144	4822 052 10108	NFR25 1R0
3174	4822 052 10108	NFR25 1R0
3175	4822 052 10108	NFR25 1R0
3187	4822 052 10158	NFR25 1R5
3209	4822 052 10478	NFR25 4R7
3236	4822 052 10108	NFR25 1R0
3235	4822 052 10108	NFR25 1R0
3301	4822 052 10338	NFR25 3R3
3310	4822 052 10478	NFR25 4R7
3313	4822 052 10108	NFR25 1R0
3620	4822 052 10158	NFR25 1R5
3621	4822 052 10228	NFR25 2R2
3622	4822 052 10228	NFR25 2R2
3655	4822 052 10229	NFR25 22R
3656	4822 052 10229	NFR25 22R
3900	4822 052 10339	NFR25 33R PM5
6102	4822 130 44121	BC338
6161	5322 130 30684	1N4002
6162	4822 130 40941	BC558
6163	4822 130 40941	BC558
6203	4822 130 61207	BC848
6304	4822 130 61207	BC848
6306	4822 130 42131	BF550
6607	4822 130 61207	BC848
6608	4822 130 61207	BC848
6609	4822 130 61207	BC848
6620	4822 130 61207	BC848
6621	4822 130 40941	BC558
6622	5322 130 30684	1N4002
6623	4822 130 40941	BC558
6624	5322 130 41982	BC848B
6625	5322 130 41982	BC848B
6626	4822 130 30621	1N4148
6627	4822 130 30621	1N4148
6640	5322 130 41983	BC858B
6641	5322 130 41982	SMTRANS BC848B
6652	4822 130 40958	BC338-25
6653	4822 130 40958	BC338-25
6654	4822 130 42675	BC818
6655	4822 130 42675	BC818
7101	4822 209 73234	TDA8808T/C3
7121	4822 209 73235	TDA8809T/C2
7151	4822 209 72587	TCA0372DP2
7161	4822 209 83274	NJM4560D
7179	5322 209 11105	PC74HCT00P
7181	4822 209 72587	TCA0372DP2
7201	4822 209 30995	MC68HC05C8/SERVO PROC/2.1
7202	4822 209 70422	MN4264-15
7301	4822 209 61759	SAA7310GP/H5
7302	4822 209 70422	MN4264-15
7310	4822 209 62588	PCF3523P
7551	5322 209 86234	NE5532N
7651	4822 209 82362	NJM4556D
7681	4822 209 83163	LM833N

6.4.3 CD PANEL PCB, COMPONENT SIDE VIEW

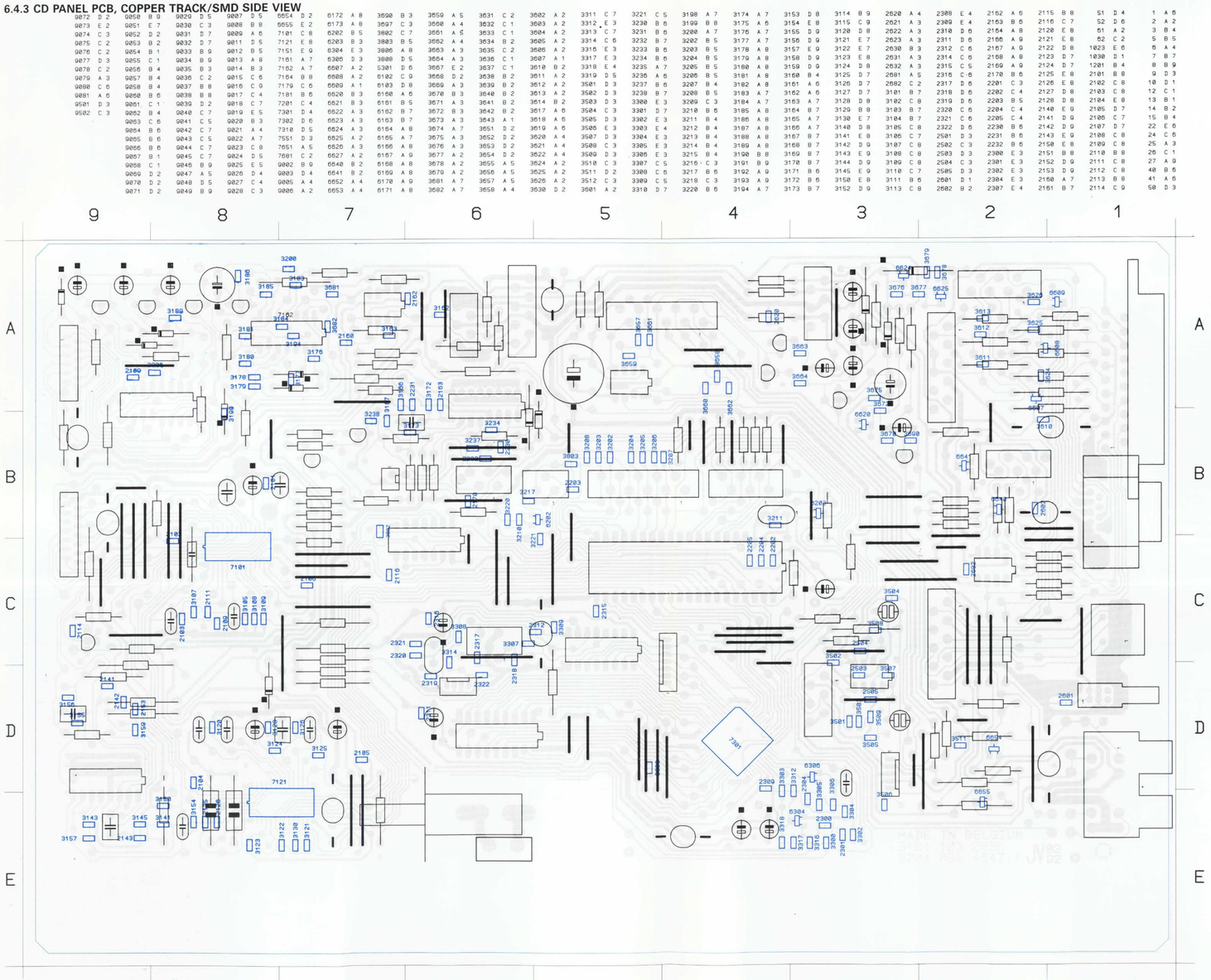


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6.4.3 CD PANEL PCB, COPPER TRACK/SMD SIDE VIEW



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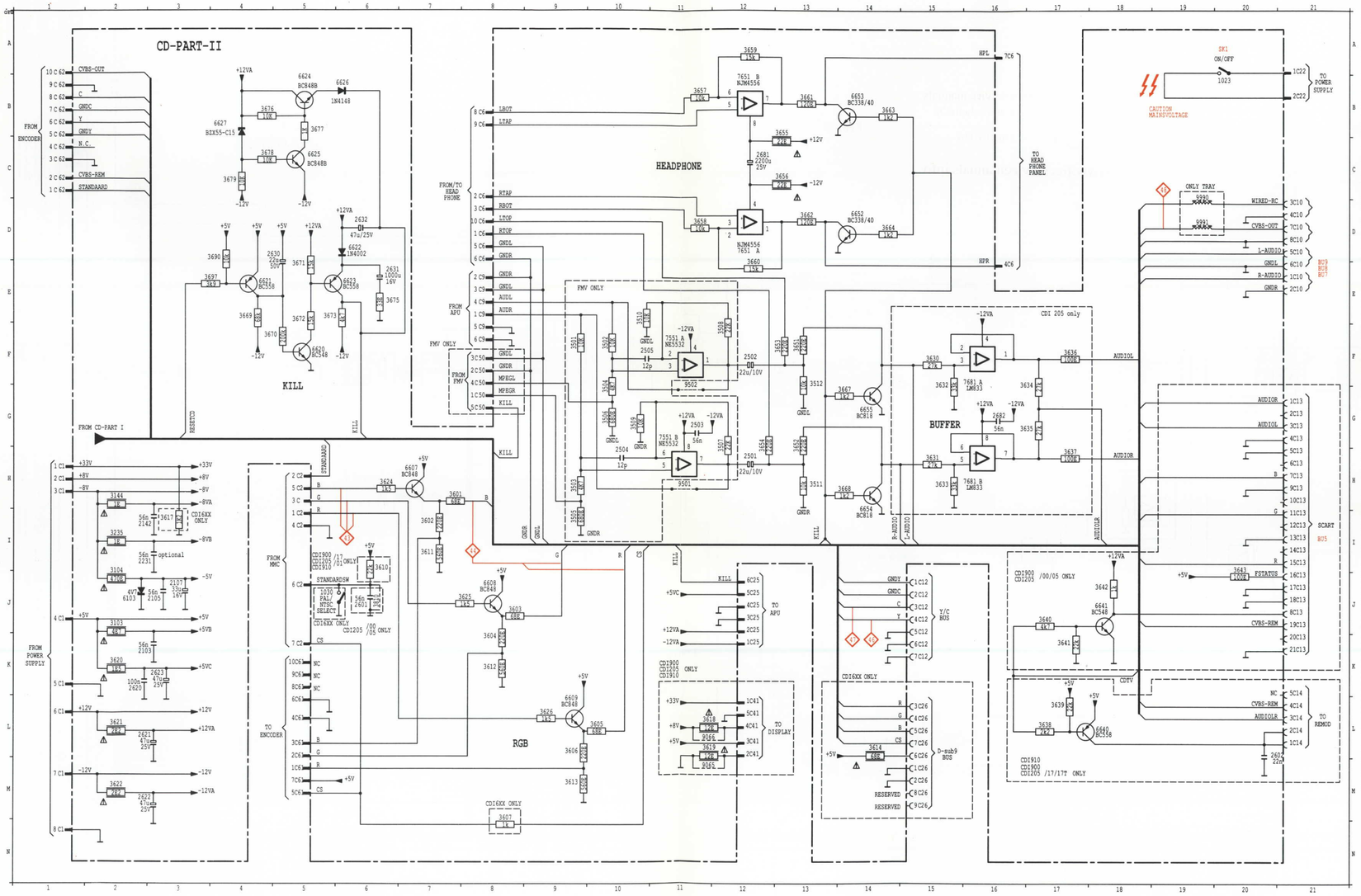
6.4.2 LIST OF ELECTRICAL PARTS CD PANEL

Item	Codenumber	Description
BU-6	4822 267 40857	CS7927-24-401
BU-7	4822 267 20414	CINCH SOCKET 4P
BU-8	4822 267 20414	CINCH SOCKET 4P
BU-9	4822 267 20414	CINCH SOCKET 4P
BU-10	4822 267 20414	CINCH SOCKET 4P
SK-1	4822 276 11309	MAINS-POWER SWITCH
1013	4822 267 60326	SCART CONN. 7087D
1201	4822 242 72527	CRYSTAL 4,000MHZ
3103	4822 052 10478	NFR25 4R7
3111	4822 052 10478	NFR25 4R7
3113	4822 052 10189	NFR25 18R
3114	4822 052 10129	NFR25 12R
3142	4822 052 10108	NFR25 1R0
3144	4822 052 10108	NFR25 1R0
3174	4822 052 10108	NFR25 1R0
3175	4822 052 10108	NFR25 1R0
3187	4822 052 10158	NFR25 1R5
3209	4822 052 10478	NFR25 4R7
3236	4822 052 10108	NFR25 1R0
3235	4822 052 10108	NFR25 1R0
3301	4822 052 10338	NFR25 3R3
3310	4822 052 10478	NFR25 4R7
3313	4822 052 10108	NFR25 1R0
3620	4822 052 10158	NFR25 1R5
3621	4822 052 10228	NFR25 2R2
3622	4822 052 10228	NFR25 2R2
3655	4822 052 10229	NFR25 22R
3656	4822 052 10229	NFR25 22R
3900	4822 052 10339	NFR25 33R PM5
6102	4822 130 44121	BC338
6161	5322 130 30684	1N4002
6162	4822 130 40941	BC558
6163	4822 130 40941	BC558
6203	4822 130 61207	BC848
6304	4822 130 61207	BC848
6306	4822 130 42131	BF550
6607	4822 130 61207	BC848
6608	4822 130 61207	BC848
6609	4822 130 61207	BC848
6620	4822 130 61207	BC848
6621	4822 130 40941	BC558
6622	5322 130 30684	1N4002
6623	4822 130 40941	BC558
6624	5322 130 41982	BC848B
6625	5322 130 41982	BC848B
6626	4822 130 30621	1N4148
6627	4822 130 30621	1N4148
6640	5322 130 41983	BC858B
6641	5322 130 41982	SMTRANS BC848B
6652	4822 130 40958	BC338-25
6653	4822 130 40958	BC338-25
6654	4822 130 42675	BC818
6655	4822 130 42675	BC818
7101	4822 209 73234	TDA8808T/C3
7121	4822 209 73235	TDA8809T/C2
7151	4822 209 72587	TCA0372DP2
7161	4822 209 83274	NJM4560D
7179	5322 209 11105	PC74HCT00P
7181	4822 209 72587	TCA0372DP2
7201	4822 209 30995	MC68HC05C8/SERVO PROC/2.1
7202	4822 209 70422	MN4264-15
7301	4822 209 61759	SAA7310GP/H5
7302	4822 209 70422	MN4264-15
7310	4822 209 62588	PCF3523P
7551	5322 209 86234	NE5532N
7651	4822 209 82362	NJM4556D
7681	4822 209 83163	LM833N

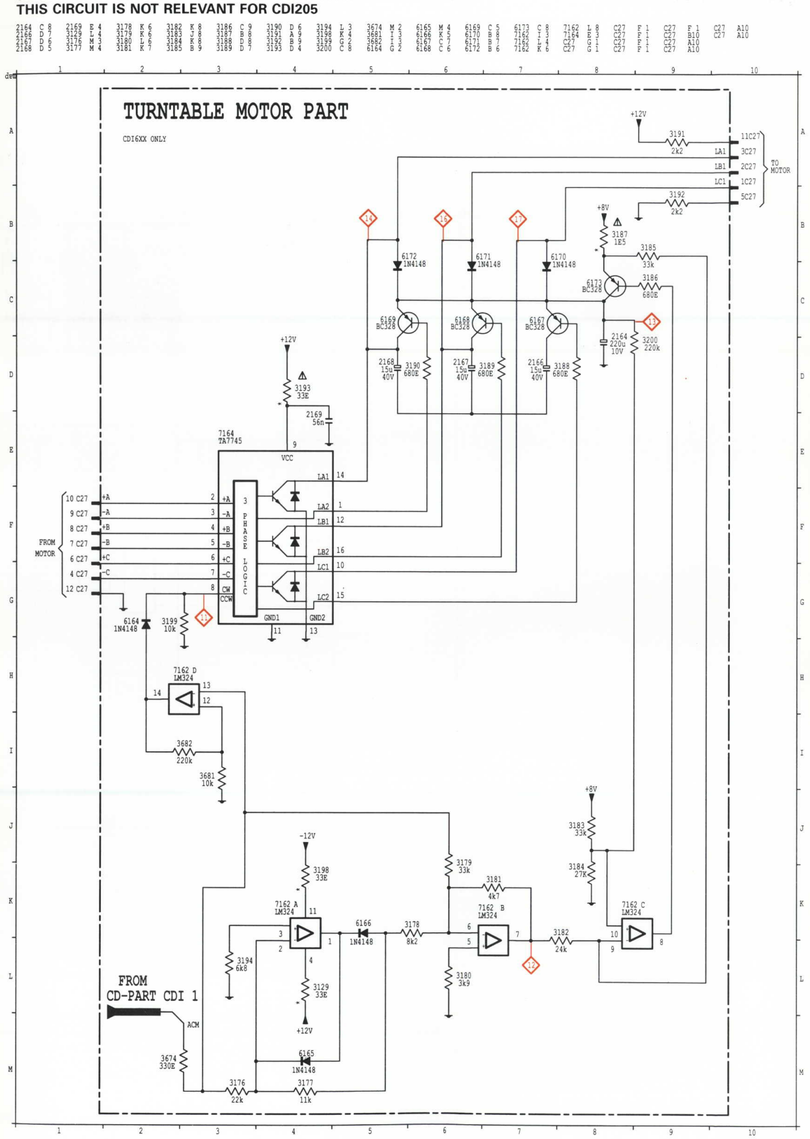
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6.4.4 CIRCUIT DIAGRAM CD PART 2



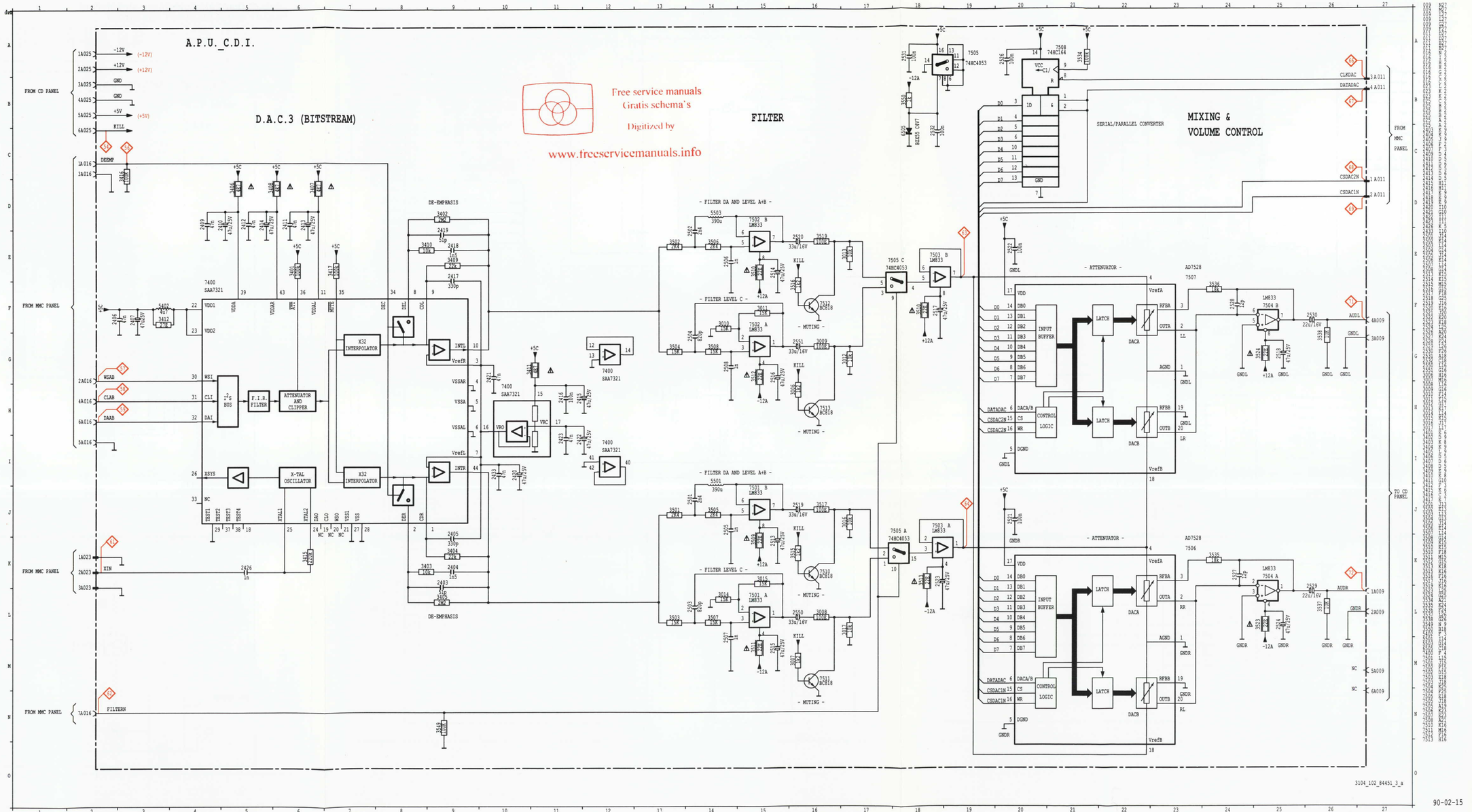
6.4.5. CIRCUIT DIAGRAM TURNTABLE MOTOR PART
THIS CIRCUIT IS NOT RELEVANT FOR CDI205



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6.5.1 APU CIRCUIT DIAGRAM

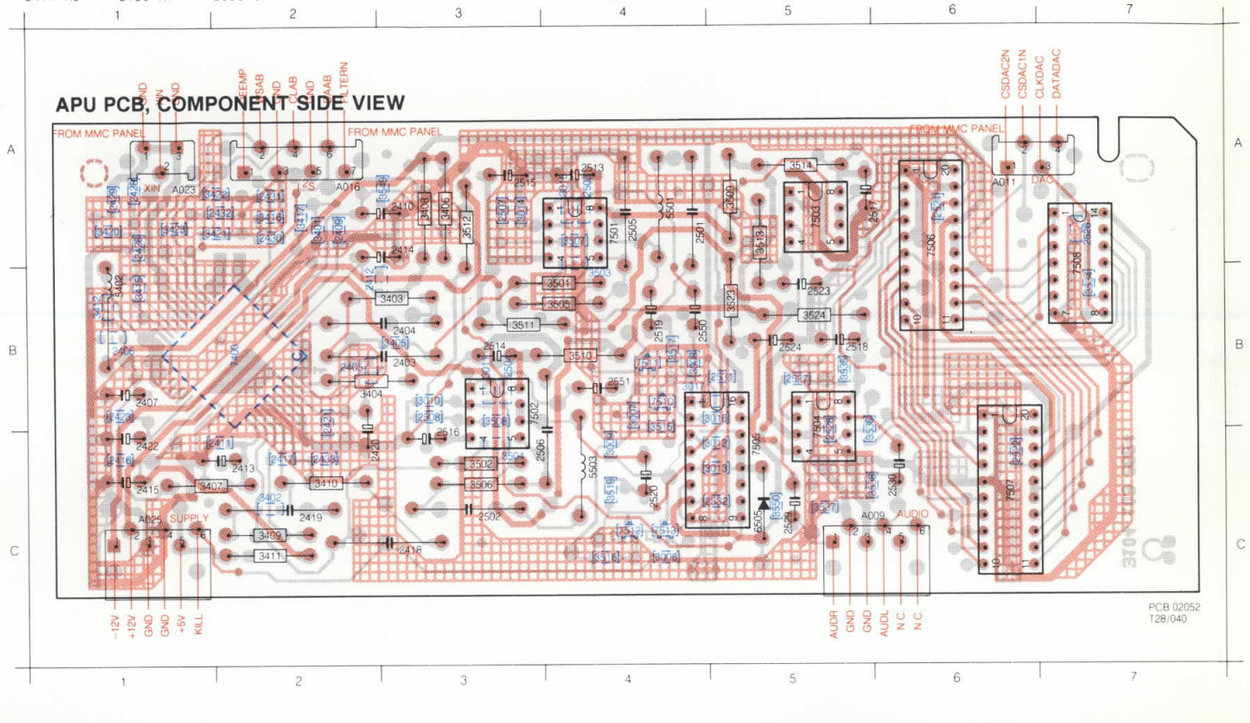


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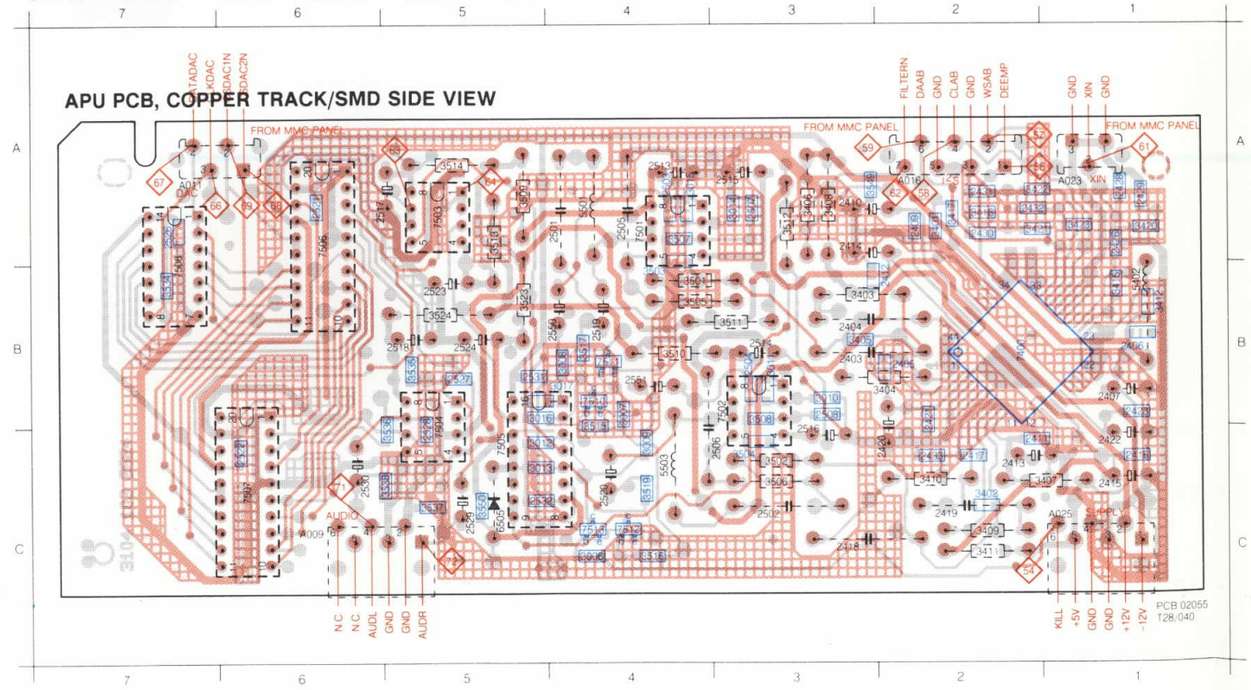
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6.5.2 APU PCB, COMPONENT SIDE VIEW AND COPPER TRACK/SMD SIDE VIEW

2403 B3 2404 B3 2405 B2 2406 B1 2407 B1 2409 A2 2410 A3 2411 C1 2412 B2 2413 C2 2414 A3
2415 C1 2416 C1 2417 C2 2418 C3 2419 C2 2420 C2 2421 C2 2422 C1 2423 B1 2426 A1 2428 A1
2429 A1 2430 A2 2431 A2 2432 A1 2433 C2 2501 A4 2502 C3 2503 A4 2504 B3 2505 A4 2506 C4
2507 A3 2508 B3 2513 A4 2514 B3 2515 A3 2516 C3 2517 A6 2518 B5 2519 B4 2520 C4 2521 A6
2522 C6 2523 B5 2524 B5 2526 A7 2527 B5 2528 C5 2529 C5 2530 C6 2531 B5 2532 C4 2550 B4
2551 B4 3006 C4 3007 B4 3008 B4 3009 C4 3010 B3 3011 B3 3012 C4 3013 C4 3014 A3 3015 A4
3016 B4 3017 B4 3401 A2 3402 C2 3403 B3 3404 B2 3405 B3 3406 A3 3407 C1 3408 A3 3409 C2
3410 C2 3411 C2 3412 B1 3415 B1 3416 A2 3417 A2 3420 A1 3421 A1 3422 A1 3423 A1 3501 B4
3502 C3 3503 B4 3504 C3 3505 B4 3506 C3 3507 A4 3508 B3 3509 A5 3510 B4 3511 B3 3512 A3
3513 A5 3514 A5 3515 C4 3516 C4 3517 B4 3519 C4 3523 B5 3524 B5 3534 B7 3535 B5 3536 C6
3537 C5 3538 C6 3549 A3 3550 C5 5402 B1 5501 A4 5503 C4 6505 C5 7400 B2 7501 A4 7502 B3
7503 A5 7504 C5 7505 C5 7506 A6 7507 C6 7508 B7 7510 B4 7511 B4 7512 C4 7513 C4 A009 C5
A011 A6 A016 A2 A023 A1 A025 C1



2403 B3 2404 B3 2405 B2 2406 B1 2407 B1 2409 A2 2410 A3 2411 C1 2412 B2 2413 C2 2414 A3
2415 C1 2416 C1 2417 C2 2418 C3 2419 C2 2420 C2 2421 C2 2422 C1 2423 B1 2426 A1 2428 A1
2429 A1 2430 A2 2431 A2 2432 A1 2433 C2 2501 A4 2502 C3 2503 A4 2504 B3 2505 A4 2506 C4
2507 A3 2508 B3 2513 A4 2514 B3 2515 A3 2516 C3 2517 A6 2518 B5 2519 B4 2520 C4 2521 A6
2522 C6 2523 B5 2524 B5 2526 A7 2527 B5 2528 C5 2529 C5 2530 C6 2531 B5 2532 C4 2550 B4
2551 B4 3006 C4 3007 B4 3008 B4 3009 C4 3010 B3 3011 B3 3012 C4 3013 C4 3014 A3 3015 A4
3016 B4 3017 B4 3401 A2 3402 C2 3403 B3 3404 B2 3405 B3 3406 A3 3407 C1 3408 A3 3409 C2
3410 C2 3411 C2 3412 B1 3415 B1 3416 A2 3417 A2 3420 A1 3421 A1 3422 A1 3423 A1 3501 B4
3502 C3 3503 B4 3504 C3 3505 B4 3506 C3 3507 A4 3508 B3 3509 A5 3510 B4 3511 B3 3512 A3
3513 A5 3514 A5 3515 C4 3516 C4 3517 B4 3519 C4 3523 B5 3524 B5 3534 B7 3535 B5 3536 C6
3537 C5 3538 C6 3549 A3 3550 C5 5402 B1 5501 A4 5503 C4 6505 C5 7400 B2 7501 A4 7502 B3
7503 A5 7504 C5 7505 C5 7506 A6 7507 C6 7508 B7 7510 B4 7511 B4 7512 C4 7513 C4 A009 C5
A011 A6 A016 A2 A023 A1 A025 C1



6.5.3 LIST OF ELECTRICAL PARTS APU

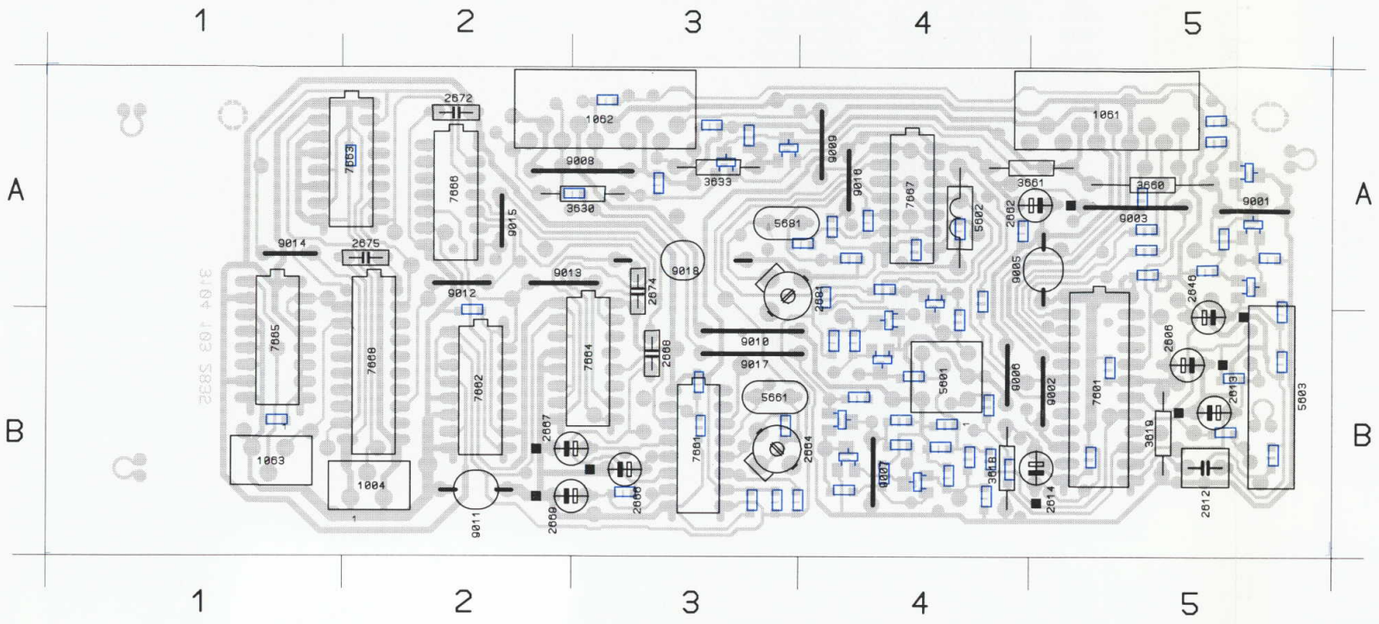
Item	Codenumber	Description
2529	4822 124 41738	BIP. 22MU10V
2530	4822 124 41738	BIP. 22MU10V
3406	4822 052 10478	NFR25 4R7
3407	4822 052 10478	NFR25 4R7
3408	4822 052 10478	NFR25 4R7
3411	4822 052 10478	NFR25 4R7
3509	4822 052 10229	NFR25 22R
3510	4822 052 10229	NFR25 22R
3511	4822 052 10229	NFR25 22R
3512	4822 052 10229	NFR25 22R
3513	4822 052 10229	NFR25 22R
3514	4822 052 10229	NFR25 22R
3523	4822 052 10229	NFR25 22R
6505	4822 130 34174	BZX55-C4V7
7400	4822 209 61708	SAA7321GP
7501	4822 209 83163	LM833N
7502	4822 209 83163	LM833N
7503	4822 209 83163	LM833N
7504	4822 209 83163	LM833N
7505	4822 209 71584	74HCT4053P
7506	4822 209 63496	AD7528JN
7507	4822 209 63496	AD7528JN
7508	5322 209 11268	74HCT164P
7510	4822 130 42675	BC818
7511	4822 130 42675	BC818
7512	4822 130 42675	BC818
7512	4822 130 42675	BC818

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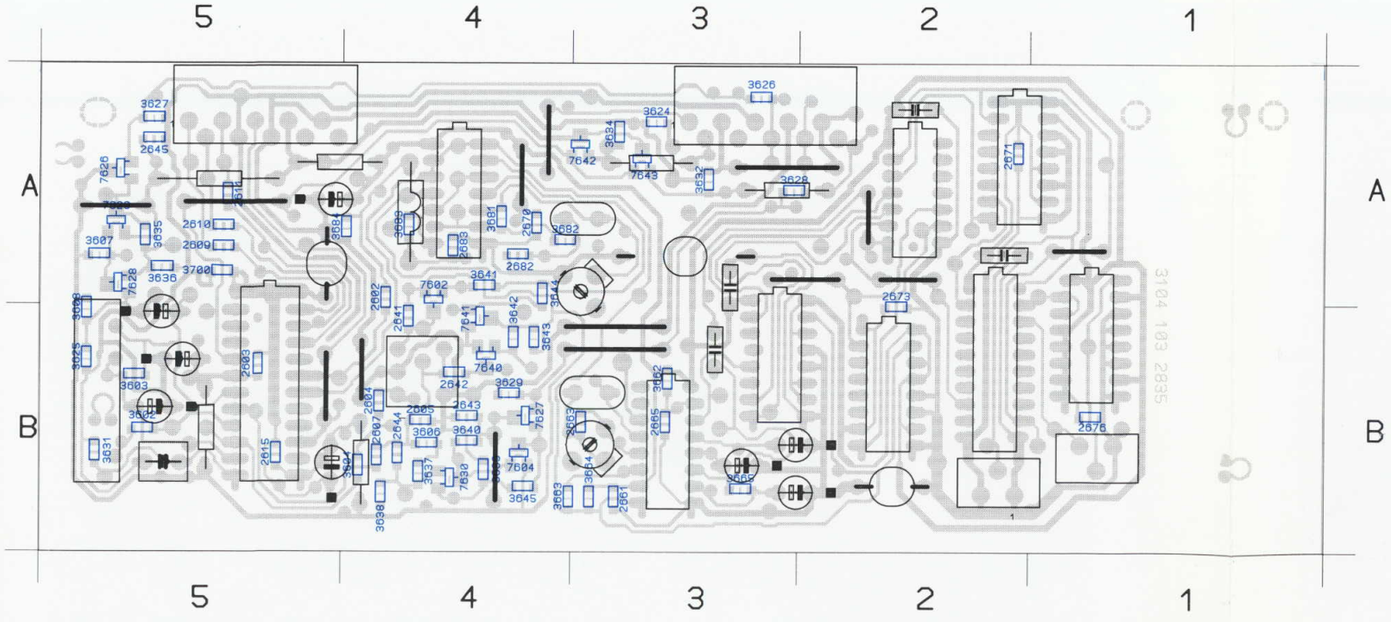
6.6.1 VIDEO ENCODER PCB, COMPONENT SIDE VIEW

1004 B 2	2606 B 5	2615 B 5	2662 A 4	2670 A 4	2682 A 4	3618 B 4	3630 A 3	3638 B 4	3650 A 5	3683 A 4	7601 A 5	7640 B 4	7665 A 1	9006 B 4	9014 A 1
1061 A 5	2607 B 4	2641 B 4	2663 B 3	2671 A 2	2683 A 4	3619 B 5	3631 B 5	3639 B 4	3651 A 5	3684 A 4	7602 A 4	7641 B 4	7666 A 2	9007 B 4	9015 A 2
1062 A 3	2609 A 5	2642 B 4	2664 B 3	2672 A 2	3602 B 5	3624 A 3	3632 A 3	3640 B 4	3662 B 3	3700 A 5	7604 B 4	7642 A 3	7667 A 4	9008 A 2	9016 A 4
1063 B 1	2610 A 5	2643 B 4	2665 B 3	2673 B 2	3603 B 5	3625 B 5	3633 A 3	3641 A 4	3663 B 3	5601 B 4	7626 A 5	7643 A 3	7668 A 2	9009 A 4	9017 B 4
2602 A 4	2611 A 5	2644 B 4	2666 B 3	2674 A 3	3604 B 4	3626 A 3	3634 A 3	3642 B 4	3664 B 3	5602 A 4	7627 B 4	7661 B 3	9001 A 5	9010 B 4	9018 A 3
2603 B 5	2612 B 5	2645 A 5	2667 B 3	2675 A 2	3606 B 4	3627 A 5	3635 A 5	3643 B 4	3665 B 3	5603 B 5	7628 A 5	7662 B 2	9002 B 5	9011 B 2	
2604 B 4	2613 B 5	2646 B 5	2668 B 3	2676 B 1	3607 A 5	3628 A 3	3636 A 5	3644 B 4	3681 A 4	5661 B 3	7629 A 5	7663 A 1	9003 A 5	9012 A 2	
2605 B 4	2614 B 5	2661 B 3	2669 B 3	2681 A 3	3608 B 5	3629 B 4	3637 B 4	3645 B 4	3682 A 4	5681 A 4	7630 B 4	7664 A 2	9005 A 5	9013 A 3	



6.6.1 VIDEO ENCODER PCB, COPPER TRACK/SMD SIDE VIEW

9014 A 1	9006 B 4	7665 A 1	7640 B 4	7601 A 5	3683 A 4	3650 A 5	3638 B 4	3630 A 3	3618 B 4	2682 A 4	2670 A 4	2662 A 4	2615 B 5	2606 B 5	1004 B 2
9015 A 2	9007 B 4	7666 A 2	7641 B 4	7602 A 4	3684 A 4	3651 A 5	3639 B 4	3631 B 5	3619 B 5	2683 A 4	2671 A 2	2663 B 3	2641 B 4	2607 B 4	1061 A 5
9016 A 4	9008 A 2	7667 A 4	7642 A 3	7604 B 4	3700 A 5	3662 B 3	3640 B 4	3632 A 3	3624 A 3	3602 B 5	2672 A 2	2664 B 3	2642 B 4	2609 A 5	1062 A 3
9017 B 4	9009 A 4	7668 A 2	7643 A 3	7626 A 5	5601 B 4	3663 B 3	3641 A 4	3633 A 3	3625 B 5	3603 B 5	2673 B 2	2665 B 3	2643 B 4	2610 A 5	1063 B 1
9018 A 3	9010 B 4	9001 A 5	7661 B 3	7627 B 4	5602 A 4	3664 B 3	3642 B 4	3634 A 3	3626 A 3	3604 B 4	2674 A 3	2666 B 3	2644 B 4	2611 A 5	2602 A 4
	9011 B 2	9002 B 5	7662 B 2	7628 A 5	5603 B 5	3665 B 3	3643 B 4	3635 A 5	3627 A 5	3606 B 4	2675 A 2	2667 B 3	2645 A 5	2612 B 5	2603 B 5
	9012 A 2	9003 A 5	7663 A 1	7629 A 5	5661 B 3	3681 A 4	3644 B 4	3636 A 5	3628 A 3	3607 A 5	2676 B 1	2668 B 3	2646 B 5	2613 B 5	2604 B 4
	9013 A 3	9005 A 5	7664 A 2	7630 B 4	5681 A 4	3682 A 4	3645 B 4	3637 B 4	3629 B 4	3608 B 5	2681 A 3	2669 B 3	2661 B 3	2614 B 5	2605 B 4



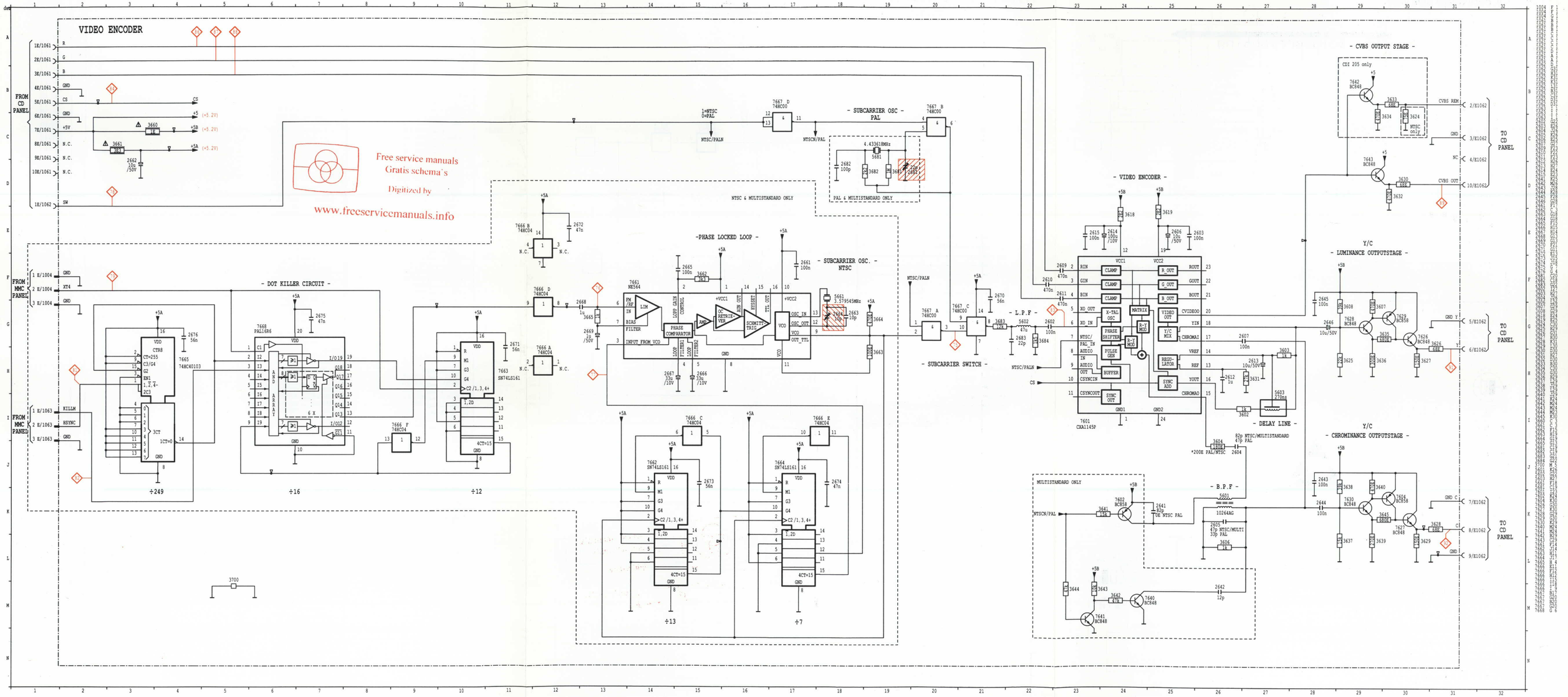
6.6.2 LIST OF ELECTRICIAL PARTS VIDEO ENCODER

Item	Codenumber	Description
2681	4822 125 50045	TRIM 1P8-22P
3618	4822 052 10228	NFR25 2R2
3619	4822 052 10228	NFR25 2R2
3660	4822 052 10108	NFR25 1R0
3661	4822 052 10108	NFR25 1R0
5681	4822 242 70933	X-TAL 4MHZ433
7601	4822 209 63497	CXA1145P
7604	5322 130 41983	BC858BT
7626	4822 130 61207	BC848
7627	4822 130 61207	BC848
7628	4822 130 61207	BC848
7629	5322 130 41983	BC858BT
7630	4822 130 61207	BC848
7642	4822 130 61207	BC848
7643	4822 130 61207	BC848
7667	5322 209 83218	PC74HC00P

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6.6.3 VIDEO ENCODER CIRCUIT DIAGRAM

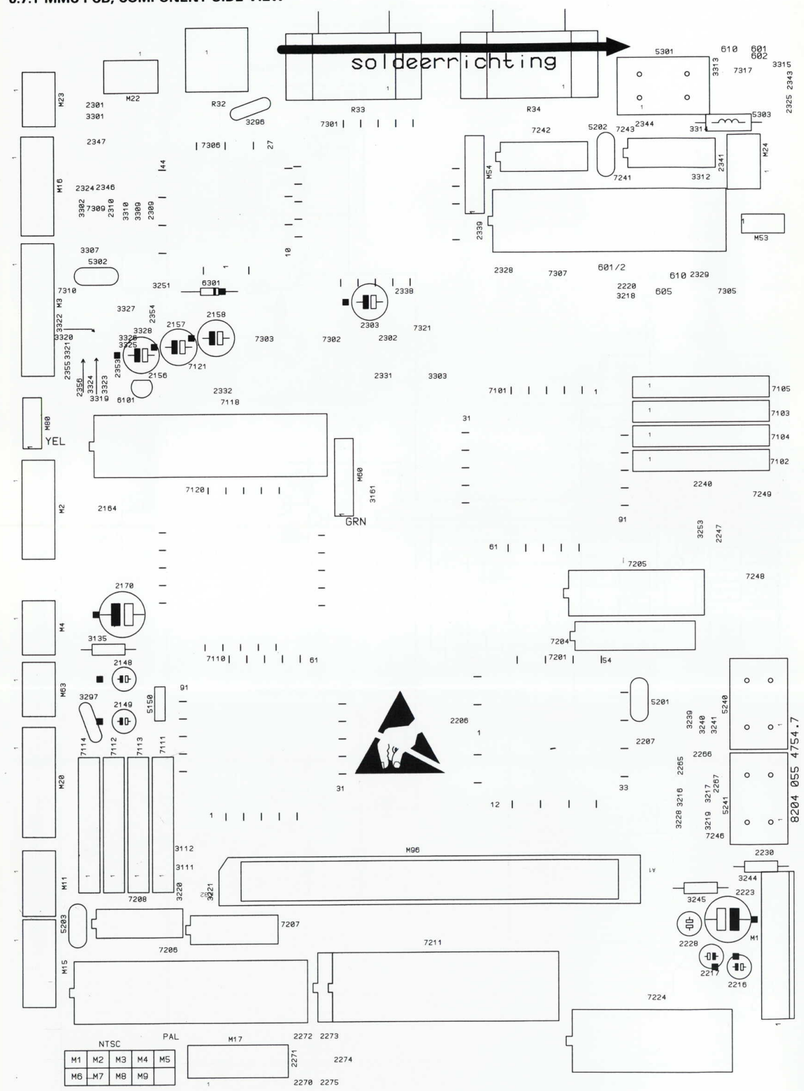


PCS 61872

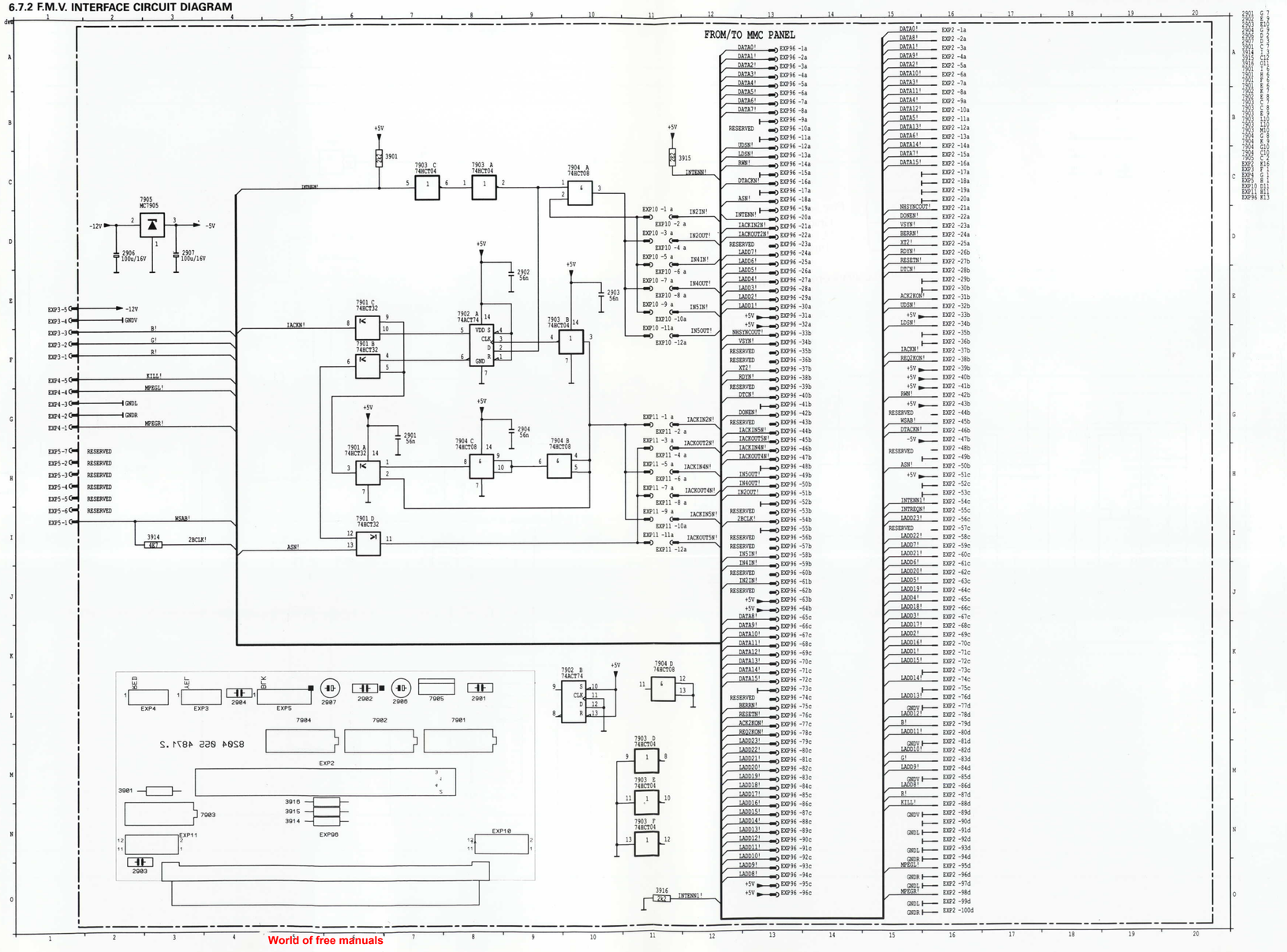
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6.7.1 MMC PCB, COMPONENT SIDE VIEW



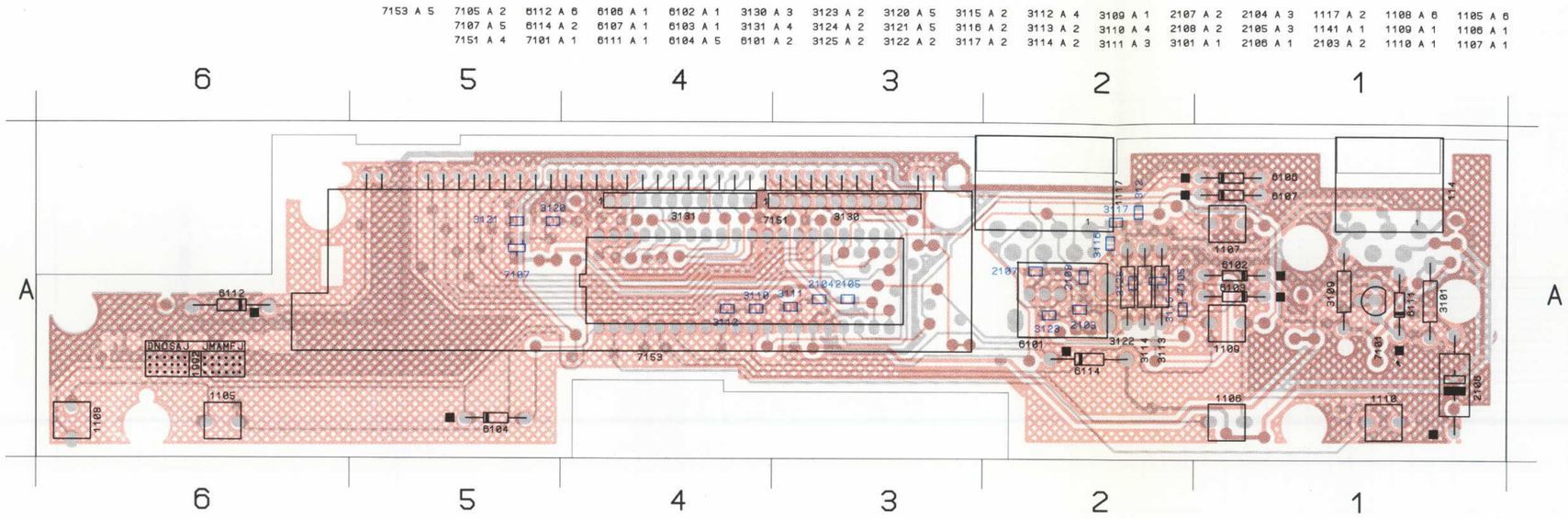
6.7.2 F.M.V. INTERFACE CIRCUIT DIAGRAM



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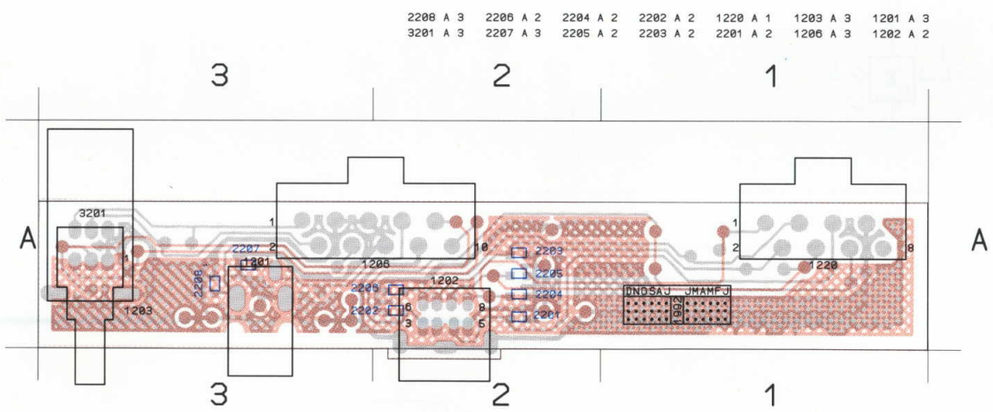
6.8.1 DISPLAY PANEL PCB COPPER TRACK/SMD SIDE VIEW



6.8.2. LIST OF ELECTRICAL PARTS DISPLAY PANEL AND HEADPHONE PANEL

Item	Code	Codenummer
1105	4822 276 13114	TACT SW 4,3MM
1106	4822 276 13114	TACT SW 4,3MM
1107	4822 276 13114	TACT SW 4,3MM
1108	4822 276 13114	TACT SW 4,3MM
1109	4822 276 13114	TACT SW 4,3MM
1110	4822 276 13114	TACT SW 4,3MM
1201	4822 267 31572	HEADPHONE SOCKET
BU-11	4822 267 31289	PORT 1 SOCKET (MOUSE INPUT)
32O1	4822 102 10398	VOLUME HEADPHONE POTM. (DUAL 10K LOG)
6101	4822 214 51772	IR-RECEIVER GP1U521X
6102	4822 130 34281	BZX55-C15
6103	4822 130 30621	1N4148
6104	4822 130 30621	1N4148
6105	4822 130 30621	1N4148
6106	4822 130 34173	BZX55-C5V6
6107	4822 130 34173	BZX55-C5V6
7101	5322 130 44647	BC368
7102	4822 130 42696	BC818-25
7103	5322 130 42048	BC818-25
7104	4822 130 42696	BC818-25
7105	5322 130 41982	BC848BT
7106	5322 130 41982	BC848BT
7107	4822 276 13114	BC848BT
7151	4822 209 72226	IC U309MG-40P
7153	4822 130 91194	FL.DISPL.

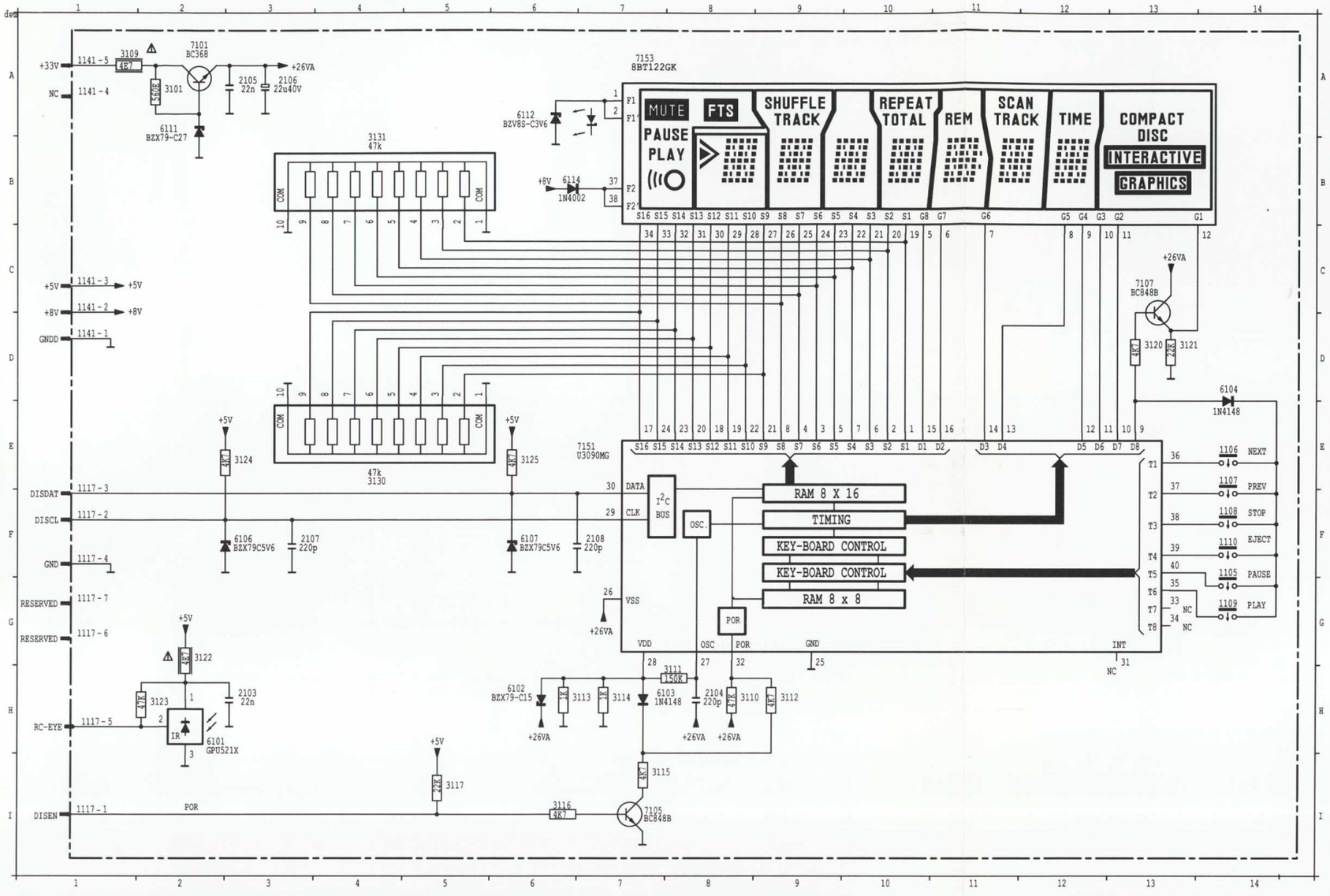
6.8.3 HEADPHONE PANEL

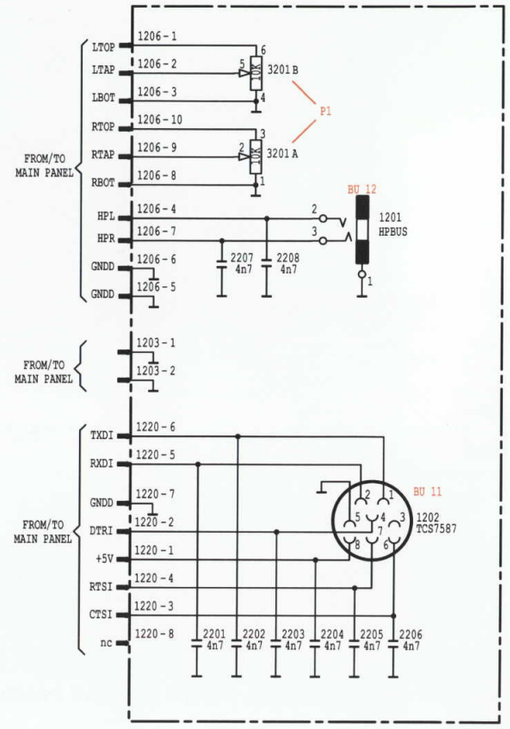


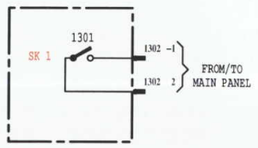
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6.8.4 DISPLAY PANEL AND HEADPHONE PANEL CIRCUIT DIAGRAM







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7 DIAGNOSTICS

7.1 TROUBLESHOOTING AND REPAIR

This section contains some guides to aid the technician in troubleshooting the CDI player. The CD servo section and Audio Processing Unit are similar to any CD player. Thus, the same techniques for troubleshooting a CD player may be used. Added features in servicing the CDI player is the Low Level Test and the Service Shell, see section 5." Service Software". The Low Level Test needs a VT100 terminal or a Service PCB as an extra tool to run and test the functioning of the MMC .The Service Shell provides tests for the Video, CD Servo, and Audio circuits. Section 5.2 covers all the Service Shell test procedures.

All circuit board assemblies can be serviced to the component level except the MMC board. Due to the complexity of the MMC board, replacement is recommended when defective. The CDM-9 CD Mechanism is also replaced as an assembly. Disassembly instructions and exploded views are provided in the service manual see section 4.1.7.2.

Troubleshooting hints:
Symptom: Service Shell cannot be started with the test plug.
Possible fault: Connections between port 1 and Slave Microprocessor may be bad. Test plug could be wrong. Slave Microprocessor may be defective.
Hint: If the Player Shell cannot be started, perform the Low Level Test (LL TEST).

7.1.1 Troubleshooting the Power Supply

The Power Supply can be checked and serviced after removal from the main chassis. The connectors to the player's circuits (the loads) may be unplugged to check the power supply. However, the 5Vdc source must be loaded with a 5 ohm resistor (10 watts), to provide a current of about 1 amp. (Note: if a load is not used, the Overvoltage Protect circuit is activated.) A variac may be used to slowly increase the ac voltage, while checking the 5Vdc source. As the ac is increased, an audible squeal is heard between 10 and 50 volts ac (starting of the power supply).

Service hints:
* If the fuse is open, Switching Transistor 7002 is probably shorted. Also check transistors 7001 and 7004.
* There are two possible error conditions if the power supply squeals:
  1) there may be a short circuit in the secondary side of the power supply circuit or in the other player circuits.
  2) the overvoltage protection circuit is activated. If the overvoltage protection is energized, 7007 becomes hot. Check the control circuit.

7.1.2 Troubleshooting and Service the MMC panel

The MMC board is replaced as a module when defective. The technician must know the functions of the MMC Unit to diagnose a CDI player. The CDI player contains some built-in diagnostics to aid in troubleshooting. One diagnostic tool is the Service Shell (see section 5.2) and the other is the Low Level Test or LL Test (see section 5.1). The LL Test should be performed if there is access to neither the Player Shell nor the Service Shell. If the Low Level MMC test indicates a fault, replace the MMC Unit. If the Low Level Test Cannot be initiated, check the power sources and main clock signals on the MMC board (see section 7.2.5). If all supplies and clock signals are present, replace the MMC Unit.

7.1.3 CD-part and Audio Section Troubleshooting

A problem in the CD-I player can be isolated to a particular circuit by carefully observing the symptoms. For example, if there is no audio, but a picture from a CD-I disc is displayed, it is obvious that the CD Servo and decoding circuits are functional. Therefore the fault can be isolated to the audio decoding circuits only. Or the symptom may be opposite, the audio circuits may be working, but not the video. Again, the servo circuits must be functioning. Troubleshooting of the video decoding should then be followed.

When there is a symptom indicating a fault in the CD Drive circuitry, troubleshooting techniques used in CD players can be followed since the CD Unit portion of the CD-I player is basically a CD player (refer to the CD Unit schematic diagrams in the service manual). If the CDM does not start, check for Vdd, clock, and reset on the CD Drive Microprocessor. If these signals are present, perform the X-bus test in the Service Shell. Also check for activity on the X-bus and SPI-bus. If there is a communication failure, proceed with the MMC Low Level Test to determine if there is a failure in the system control circuitry. If the communication buses are functional, check the CD servo circuits using the Service Shell test modes. These modes are the standard CD servo test modes to test the OPU, turntable and swing arm. If there is a failure in the servo test modes, further checks with measurements on the CD panel (see section 7.2.2) should reveal the fault .

If the servo circuits are functioning, check the decoder circuits. Activity should be seen on the I^2S (DAAB, CLAB, and WSAB) and subcode (SCAB and SDAB) lines from the SAA7310 Decoder IC. If there is no activity, check the supply (Vdd) and input signals (HF, XIN).
If there is activity, check the ADOC circuitry.

When the servo and decoder circuits are functioning properly, there may be a problem in the Audio Processing Unit. The APU Panel plugs in to the CD Unit circuit board (see APU schematic and Wiring Diagram in the service manual). Interconnections are thus made to the CD Unit via two connectors on the bottom of the board. The three connectors at the top of the APU provide interconnection with the MMC Panel. Extension connectors (part number 4822 321 22268; requires 2 for service) are available to gain access to the bottom connectors for troubleshooting. Supply voltages and signals going into the APU Panel can be checked at the connectors.
For example, the I2S bus from the MMC panel can be checked on connector A16 (7 Pin connector) on the top of the board. Also, the analog output can be checked at connector A9 on the bottom of the board. If the input signals are present, but not the analog audio at the output, then a problems exists on the APU. Further checks of the APU circuitry should be followed. If the analog audio signals are present at the output of the APU, then the signal route on the CD Unit should be followed to find the fault. The Kill and buffer circuitry on the CD Unit should be checked for proper operation.

7.1.4 Video Section Troubleshooting

Note 1: refer to the Video Encoder Circuit Diagram, MMC Circuit Diagram, and the Interconnect Wiring Diagram in the service manual.

Note 2: Use two service extension cables (part number 4822 321 22267) to allow easy access to the Video Encoder Panel.

The symptoms displayed can help the technician isolate the problem to a particular circuit. The following examples illustrate how a fault can be isolated.

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Symptom 1: the player shell is displayed, but video from the disc cannot be displayed. If this condition exists, the Video Encoder Panel and video analog circuits are functioning. Since the player shell is displayed, the video synthesizer circuit is functioning. However, there must be a fault on the MMC Panel, since this is where the video decoding takes place. Thus the problem is isolated to the video decoding section on the MMC Panel.

Symptom 2: no video. This symptom may be caused by either the Video Encoder Panel or by the MMC Panel. A few voltage and signal measurements can quickly isolate the problem. Hint, also check all the video outputs: S-video, RF, and CVBS. If video is not present from any output, check the RGB, composite sync, and power source inputs from the CD Unit to the Video Encoder Panel (Connector 1061 on the bottom of the Video Encoder Panel).
If these signals are present, the MMC Panel's decoder circuits are functional. Further checks of the Video Encoder circuit can isolate the problem further. Check the Video Encoder IC. Also check Vcc1 and Vcc2 to the Video Encoder IC. If both sources are missing, check Resistor 3660. If Vcc1 is missing, check Resistor 3618 and if Vcc2 is missing, check 3619.

Symptom 3: no color. This symptom is most likely caused by a problem in the ENCODER circuit. Check the subcarrier oscillator at Pin 6 of the Video Encoder IC. If this signal is present (correct frequency), check the chroma output signal at Pin 15. If there is no chroma output, IC7601 may be the fault. Also check for short circuits between pins of the IC. If the chroma is present, check the chroma input at Pin 17. If the chroma is not present here, check the coupling components between Pins 15 and 17. If there is chroma at this point, check the composite output at Pin 20. If the chroma is missing, suspect the Video Encoder IC (IC7601).

7.2.1 Measurements & adustments power supply 1006

CAUTION.
Never turn on the power supply if no load resistor has been connected.

- For service purposes you only have to connect a load resistance to the + 5,2V supply voltage.
  Use a 4 Ohm / 25W resistor.
  Of course in that case the other supply voltages are not in accordance with the specification.
- Safety regulations require that the set under repair should be restored to its original state and that components identical to the ones specified should be used.
- For reasons of safety, components marked should be replaced by identical components. For code numbers refer to the parts list of electrical components.

Beware of the live parts!

7.2.1.1 Checkpoints
Check the following supply voltages:

SUPPLY	NOMINAL VALUE (DC)	CONNECTOR/PINS
+ 5,2V	+ 5,3V DC	P0006 pin 4
+ 12 V	+ 12,1V DC	P0005 pin 1 or M7 pin 8 (MMC Panel)
− 12 V	− 12,1V DC	P0005 pin 2 or M7 pin 7 (MMC Panel)
− 8 V	− 8V DC	P0004 pin 6 or C1 pin 3 (CD Panel)
+ 8 V	+ 8V DC	P0004 pin 7 or C1 pin 2 (CD panel)
+ 30 V	+ 28,5V DC	P0004 pin 8 or C1 pin 1 (CD panel)

All voltages have been measured relative to earth.

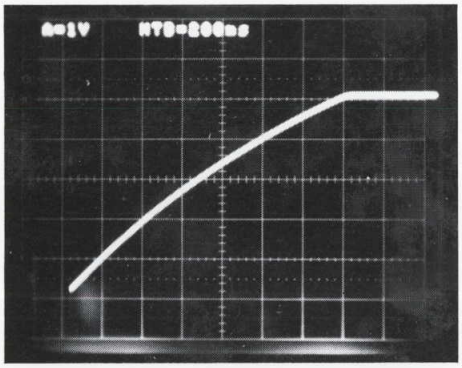
7.2.1.2 Adjustments
Adjustment + 5,2V supply voltage
Adjust R3020 for a voltage of 5.3V DC ± 40 mV on test point 51.
For practical reasons it is also possible to measure at pin 3 of connector G12 on the extension board.

7.2.2 Measurements & adjustments CD panel 1004
In the circuit diagrams and on the drawings of the panels measuring points are marked with: .
Some times signals to be measured are pointed as for example: IC7181pin1.
All DC signals are measured with an universal electronic voltmeter.
All AC signals are measured with an oscilloscoop

7.2.2.1 Lasercurrent.
The lasercurrent is adjusted in the CDM9 and is a factory adjustment. After replacing a defective CDM the laser current does not need to be adjusted.
Play track 1 of testdisc 5, the voltage accross item 3114(measuring point 1 and point 2) on the CD panel should be: 0,7 V / DC ± 10 %.

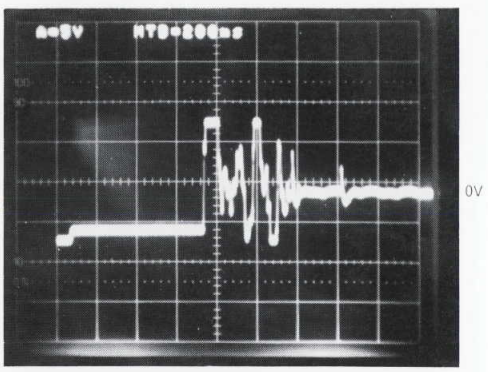
7.2.2.2 Focus signal.
Play track 1 of testdisc 5, the voltage accross item 2151 (measuring point 3 and GND) on the CD panel should be: + 400 mV / DC ± 10%.

7.2.2.3 Starting signal.
Insert a disc and measure accross item 2112 (measuring point 4 and GND).
After pushing the play button the next picture appears on the oscilloscoop:



The signal is triggered by the Si/RD signal on IC7101pin 6.

7.2.2.4 Motorcontrol signals.
Insert testdisc 5.
Measure accross IC7181pin1 and GND, after pushing the play button the next picture should appear on the oscilloscope.

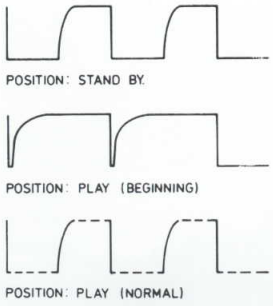


After a while, when playing track 1, the voltage should be: − 1.7 V DC ± 10%
Play track 1 of testdisc 5, the voltage across measuring point 6 and ground should be: 3.2 Volt DC ± 10%

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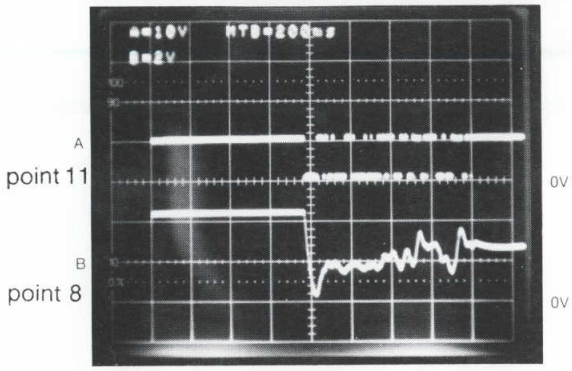
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Signal accross measuring point 7 and GND should be :

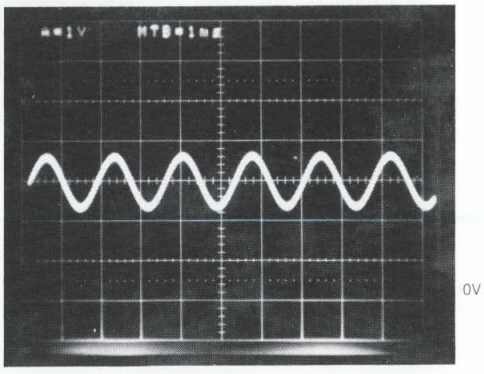


38 849 A12

Insert test disc 5. Accross measuring point 8 and GDN the next picture should appear on the oscilloscope after pushing the play button

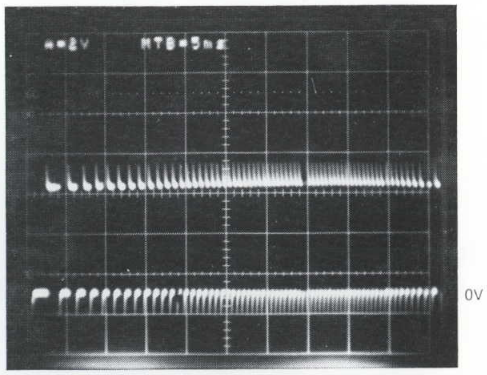


7.2.2.5 Radial error circuit signals.
Voltage accross measuring point 18 and GND:
2,6 V / DC ±10%.
Voltage accross measuring point 19 and GND:
110 mV / DC ±10% in PLAY mode.
Voltage accross measuring point 21 and GND:
1,2 V / DC ±10% in PLAY mode.
Voltage accross measuring point 22 and GND:



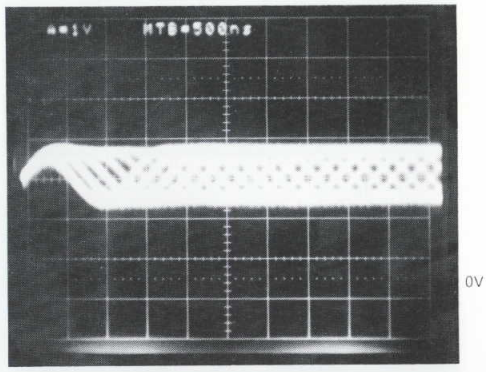
Voltage accross measuring points 23,24,26 and 27 depending on playing mode, 0 V if LOW or 5V if HIGH

For measuring point 28 and 33 put the player in the service shell on CD drive test mode 2. The voltage accross point 28 and GND should be:

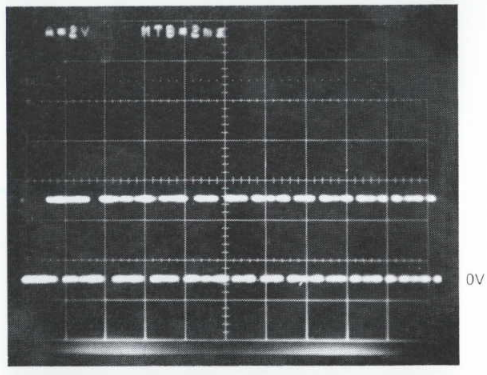


7.2.2.6 Clock signal µP IC7201
Measuring point 29: clock signal f = 4MHz.

7.2.2.7 Decoder signals
Play track 1 of testdisc 5.
The signal accross measuring point 31 and GND should be:



Insert testdisc 5 and put the player in the service shell on CD drive test mode 2.
The signal accross measuring point 32 should be:



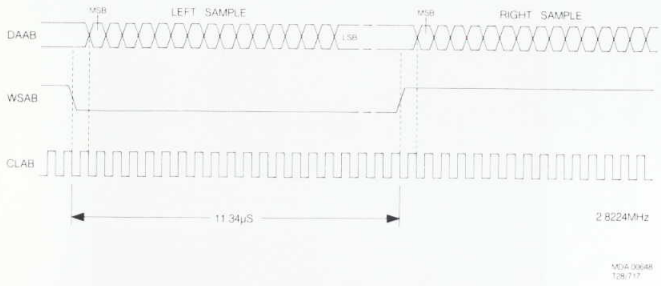
Measuring point 34: clock signal f = 11.289.600 Hz.
Voltage accross measuring point 37 and 37:
775 mV /DC ± 10%

Measuring points 38: LOW. If the blackdot track of testdisc 5A is played then pulses activity should be measured on this point.

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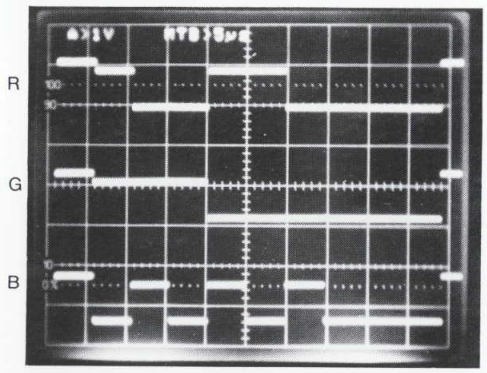
Measuring point 39,41 and 42:



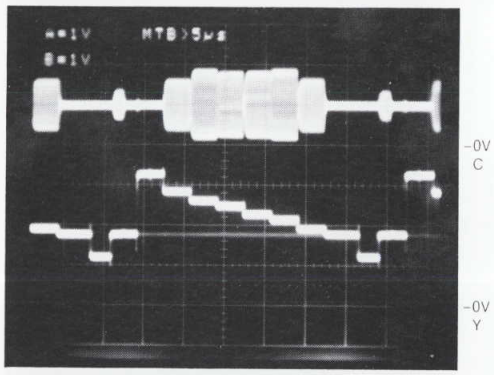
7.2.2.8 Video signals

Put the player in the service shell on testimage (colorbar).

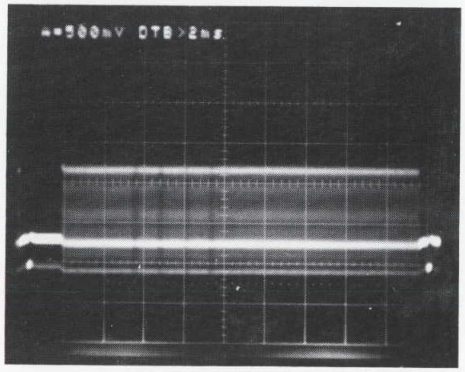
Measuring point 43 and 44:



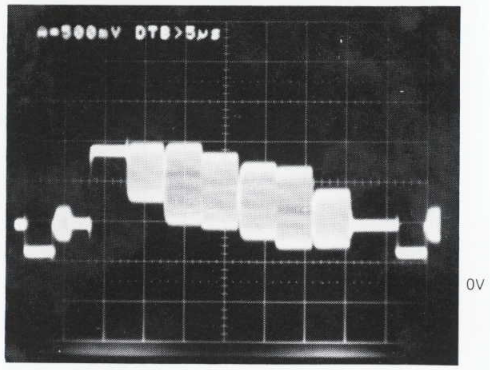
Measuring point 46:



Measuring point 47:



Measuring point 48:



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7.2.3 Measurements & adjustements audio processing unit

Select the submenu **"MMC slave"** of the Service Shell, see section 5.2. With this menu we can check besides the remote control functions also the audio functions **L-R** and **mono/stereo.** This audio function can only be checked when an audio-disc is inserted. When any disturbances occur, the following checks/measurements can be performed (2 % 8).

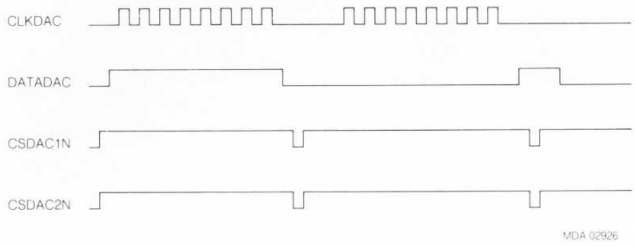
Required test discs:
Use an arbitrary Digital Audio disc in the **service shell,** submenu **MMC slave.**
Testdisc no. 5 - 5A (4822 397 30096 - SBC 426)
Use launch disc or arbitrary CD-I disc which contains audio levels A-B-C and/or CD-DA
Audio signals disc (4822 397 30184 - SBC 429)

Extension PCB's.
For measurements at this PCB it is necessary to create a service position for the APU panel.
This is done with the extension PCBs 6 pole service code 4822 321 22268
The slave processor (7206) on the MMC panel controls the attenuators 7506 and 7507 via te serial/parallel convertor (7508). One step of the counters in the **service shell** menu corresponds with 1dB.

7.2.3.1 Slave processor data

Check whether the signals appear on test/measurements points 66 % 69 (connector A11 pin 1%4) from the slave processor.

66 – CLKDAC
67 – DATADAC
68 – CSDAC1N
69 – CSDAC2N



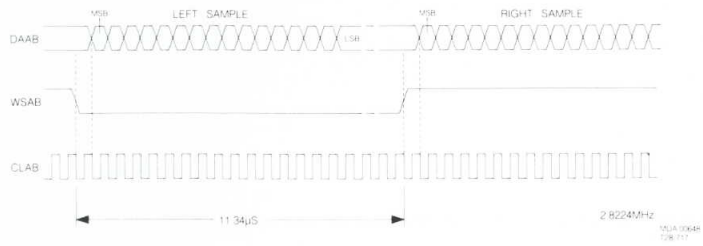
These signals are very hard to recognize on an oscilloscope during the normal application. Only in the **service shell** and controlling the attenuators you can observe activity .
If there is any activity on one of the lines 66 % 69 one can suppose that the information of this signals are oke. This is also to be considered for the data lines D0 % D7.

If the control signals not appear or deviates, check the connections from MMC panel Plug M11 pin 1 % 4.

If no disturbances, check the data outputs D0 % D7 of IC7508.

7.2.3.2 I2S signals

Check whether the signals, given below, appear on the test points 57 - 58 - 59 (connector A016 pin 2 - 4 - 6)
Time base related only to CD-DA.



If deviates, check connections from MMC panel, plug M16 pin 2-4-6

7.2.3.3 Xin clock signal

(testpoint 61, connector A023 pin 2)

Play a CD-DA track.
The frequency of the Xin signal must be:
11,2896 MHz (CD-DA.)

Play CD-I audio.
The frequency of the Xin signal must be:
9,767 MHz for CD-I level A and CD-I level B.
4,838 MHz for CD-I level C.

If deviates check connection from MMC panel, connector M23 pin 1 % 3 and I^2S interface on MMC panel.

7.2.3.4 DEEMP signal

(testpoint 56, connector A016 pin 1)
Insert test disc 5 or 5 A and during track 14 (recorderd without pre-emphasis) the signal DEEMP should be low. (0 V.)
During track 15 (recorded with pre-emphasis) this signal DEEMP should be high (+ 5V.)

If deviates, check the connection from MMC panel, plug M16 point 7.

7.2.3.5 FILTERN signal

(testpoint 62, connector A016 pin 7)
Insert CD-I disc which contains audio levels A-B-C and/or Digital audio.
This signal FILTERN should be high (+ 5V.) In case a track is played back with audio level C (speech).
The signal FILTERN should be low (0 V.) in case of level A or B or DA.

7.2.3.6 KILL signal

(testpoint 54, connector A025 pin 6)
This KILL signal must be +12V during reset.
In normal/play position this signal is – 8 V.

If deviates check the connection with CD-panel (C025 pin 6).

7.2.3.7 Performance check APU

Position digital audio
– Insert Audio signals test disc 1, SBC 429
– Play track no. 1. (1kHz sinus signal L + R 0dB)
– The level on testpoint 63 and 64 should be:
0.9 Vrms ± 2dB

If this level deviates check first the signals

FILTERN	62	step 6,
KILL	54	step 7 and
Xin	61	step 4.

– The level on testpoint 71 and 72 should be:
2 Vrms ± 3dB.

Position audio level c
– Insert CDI disc
– Play track with audio level C, 1 KHz L + R, 0 dB.
– The level on testpoint 63 and 64 should be:
0.9 Vrms ± 3 dB

If this level deviates check first the signals

FILTERN	62	step 6 and
KILL	54	step 7.

– The level on test point 71 and 72 should be:
2 Vrms ± 3dB.

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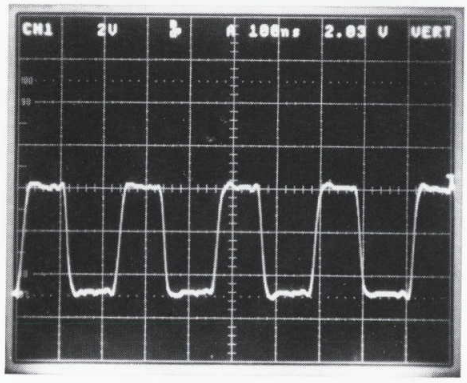
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7.2.4 Measurement & adjustments video encoder unit 1003

Required test equipment.
Electronic voltmeter
Oscilloscope
Frequency counter

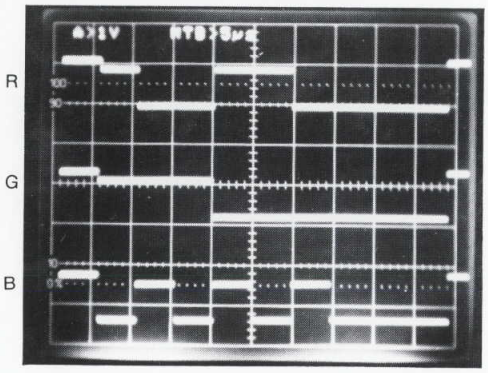
7.2.4.1 Check of PAL subcarrier .
- Player switched off.
- Connect frequency counter to testpoint 83, (Pin 6 IC 7601) and turn on the player.
- The frequency on testpoint 83 should be; 4 433 618 Hz. ± 50 Hz.
- The amplitude on testpoint 83 should be in between; 400 mV and 1000 mVpp
- If the frequency of this signal deviates, perform alignment of trimmer 2681.

Adjustment PAL sub carrier oscillator.
- Player switched off.
- Standard switch NTSC/PAL (SK-2) in position 625, PAL .
- Connect frequency counter to testpoint 75 ,Pin 8 IC 7667 and turn on the player.
- Adjust with trimmer 2681, the frequency on testpoint 75 at 4 433 618 Hz. ± 50 Hz.

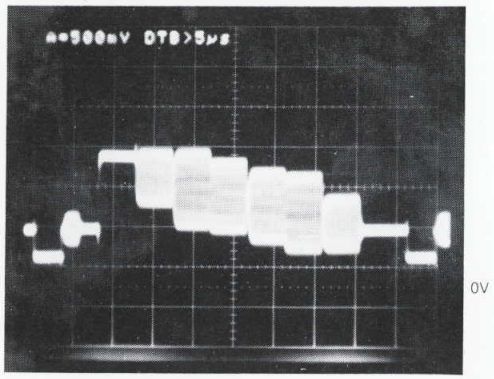


7.2.4.2 Check of standard control signal SW
The control signal SW on testpoint 78,(pin 1 of connector E 1062) should be low (0 V).If this signal deviates check the connections to the CD panel print connector E1063 pin 1 and the connection from the CD panel to the MMC panel.

7.2.4.3 Check of RGB input signals
On the given photo below the signals are given for R - G - B.
On Testpoints 86 87 88. (points 1-2-3 of connector E1062)

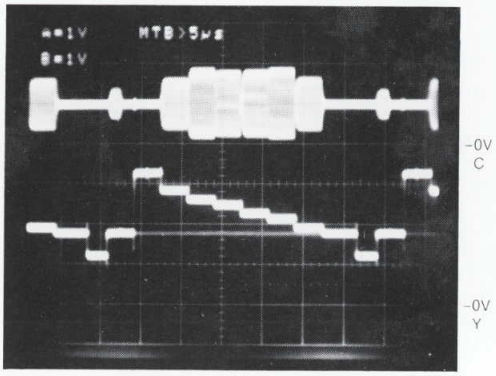


Check of Output signals for CVBS - Y / C.



PAL-CVBS signals Testpoint 89

Video signal	1000 mV_{pp}
White level	710 mV_{pp}
sync	290 mV_{pp}
Burst	290 mV_{pp}



PAL- Y/C Sign. Testpoint 91/92

Video signal	1000 mV_{pp}
White level	710 mV_{pp}
sync	290 mV_{pp}
Chroma	300 mV_{pp}

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7.2.5 Measurements and adjustments MMC panel 1001

Required equipment:
Multimeter
Display terminal type Digital VT100 or equivalent
Digital oscilloscope
Analog oscilloscope
Timer/counter

7.2.5.1 Measurements Supply:
Check if the following voltages are present at connector M1.
pin 1M1: +5V +/− 5% (= digital power supply)
pin 2M1: +5V +/− 5% (= digital power supply)
pin 3M1: ground (=digital ground)
pin 4M1: ground
pin 5M1: ground (=analog ground)
pin 6M1: +5V +/− 5% (analog supply)
pin 7M1: −12V +/− 10%
pin 8M1: +12V +/− 10%

7.2.5.2 Clock signals:
Carry out measurements just after hardware reset.
This is done each time after pressing the OPEN/CLOSE button or after power-on.

System clock = 30.0000 MHz +/− 1500 Hz (PAL)
This system clock must be present at the following points: IC7201 pin 30
IC7101 pin 119
IC7110 pin 119

At IC 7201 pin 29 Clock divided by two must be present: 15.000 MHz (=30.000 : 2).

At IC7201 pin 69 the UART clock of 68070 must be present: Frequency 4.9152 MHz ± 250 Hz

At IC7241 pin 32 the DUART clock must be present.
Frequency 3.68684 MHz ± 90 Hz

At IC7206 pin 39 clock of '68HC05' must be present.
Frequency 4.000 MHz ± 100 Hz

At IC7301 pin 94 the clock of the CDIC must me present:
Frequency 22.5792 MHz ± 1100 Hz.

At IC7306 pin 16 the DSP clock must be present.
Frequency 7.5264MHz ± 380 Hz

At pin 2M24 the '2B-clock' must be present.
Frequency 11.2896 MHz ± 560 Hz

Carry out measurements at pin 2M4. Clock of 'XT4' must be present.
Frequency 7.5000 ± 380 Hz
The frequency at pin 8M3 'COXN' must be 75kHz +/− 25kHz. (saw thooth signal). Short circuit capacitor 2228 and carry out measurements at IC7318 pin 9.
Frequency 19.3536 ± 100 KHz.

7.2.5.3 I2S interface:
Check connector M16
1M16: FILTERN : 0V
2M16: DAAB
4M16: CLAB : frequency 2.8224 MHz (only for CD-DA)
6M16: WSAB : frequency 44.1 KHz (only for CD-DA)
7M16: DEEM : 0V (only for CD-DA and only if deem-phasis track is played)

7.2.5.4 Reset circuitry:
Press the OPEN/CLOSE button at front panel and measure the 'RESETCD' time (low!). This 'low' time must be 140ms ± 20 ms.

Also measure the RESETCD time (low!) if the button is released.
The signal RESETCD must be low for 140ms ± 20ms.

IC7201 pin 28 RESETN; low time = 250 ms ± 20 ms

7.2.5.5 Check of microprocessor 68070.
Check after power on:
IC7201, pin 27 (= HALTN) = high (+5V)
IC7201, pin 28 (= RESETN) = high (+5V)
IC7201, pin 24 (=DTACKN) = changing high/low
IC7201, pin 26 (=BERRN) = high (+5V)

7.2.5.6 Low level test
Purpose is to test the hardware with software. Connect a terminal, or Service PCB to the UART of microprocessor 68070 via connector at rear side port 2 (= BU-2). How to start the low level test see section 5.1.
Settings of the terminal:
Baudrate: 9600
start bit: 1
data bists: 8
stop bits: 0
no parity/ no handshake

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