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Compact disc interactive player CDI 220/00

Interactive Media Systems

CD-I

Service
Service
Service

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Service Manual

COMPACT disc Interactive

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3 Service information
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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 agrées, seuls habilités à réparer votre appareil en panne".

CLASS 1
LASER PRODUCT
3122 110 03420

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4822 725 24137

PHILIPS

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 (2 different frames)	: 625 lines
interleaved (2 identical frames)	: 625 lines
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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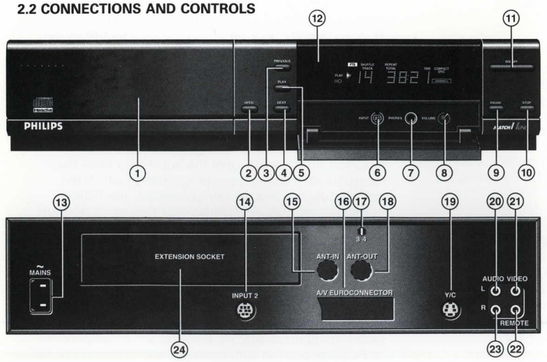
2.2 CONNECTIONS AND CONTROLS



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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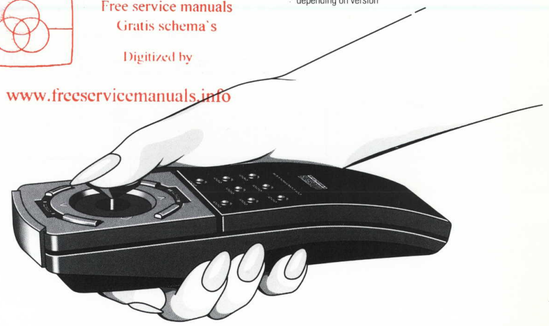
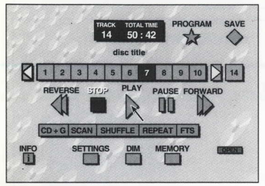


The control sits conveniently in the hand, and the thumbstick and action keys, which are by far the most-used controls, are easily operated one-handed.

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:

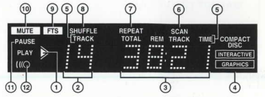
- Start CD-I (starts CD-I or Photo-CD application).

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

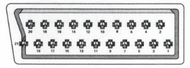
CVBS output (cinch):	1 Vpp into 75 Ohm
Audio output (2 x cinch) :	2 Vrms into 75 Ohm
Remote in (cinch):	2 Vpp at 2.2 kOhm
Antenna input:	75 Ohm*
RF output:	75 Ohm*
Headphone (6.3 mm socket) :	8 Ohm - 2 kOhm

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.

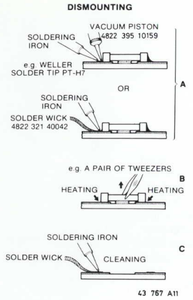


Fig. 1

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).

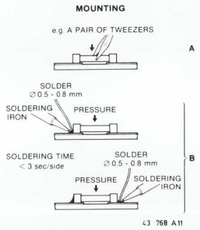


Fig. 2

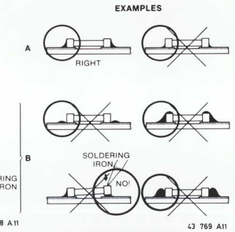
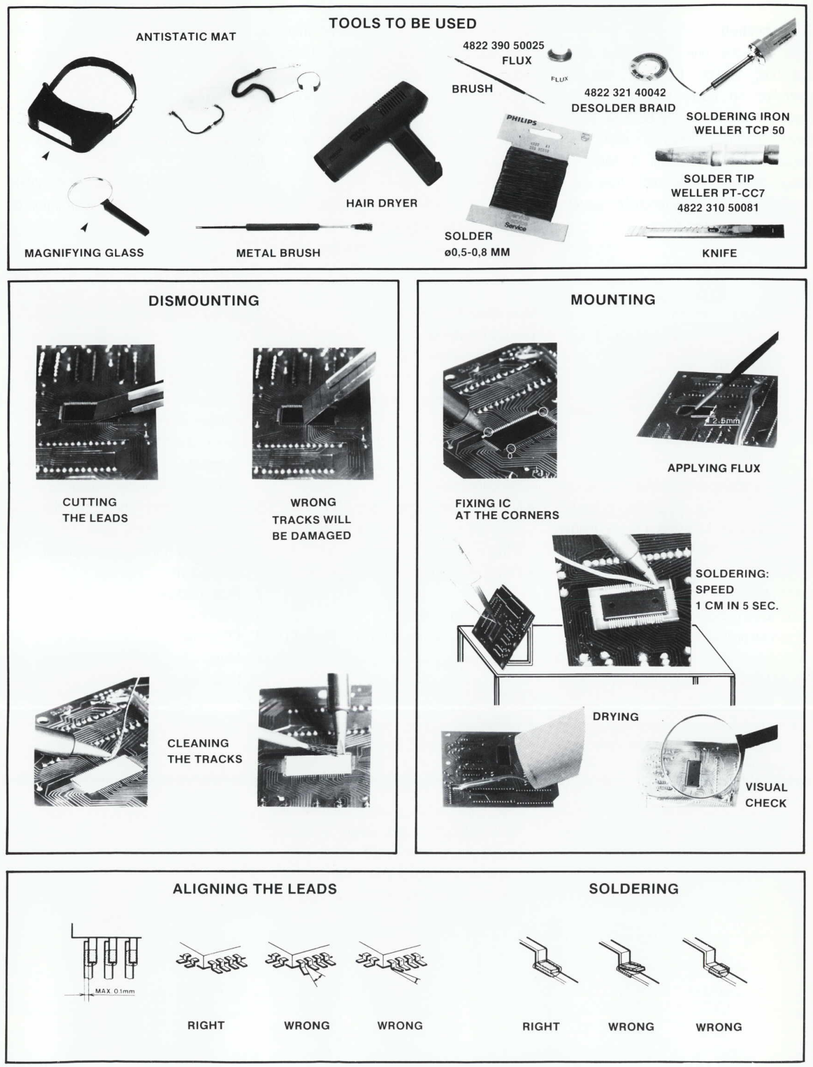


Fig. 3

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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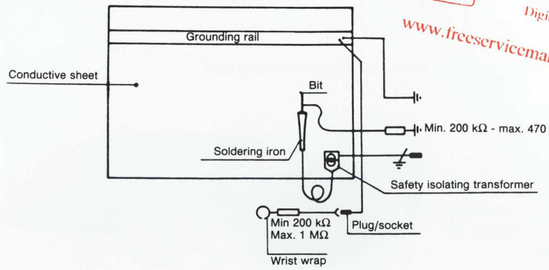

Special attention should be paid in regions having a dry atmosphere and when the floor is covered with a nylon carpet or such.

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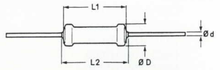
3.4 CODENUMBERS FOR STANDARDIZED RESISTORS

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...

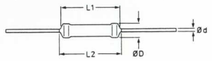
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

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

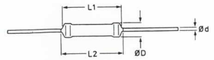
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ is 4822 053 21336

PR01, PR02 and PR03 power metal film resistors

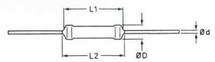
øD_{max}	L1	$L2_{max}$	ød
2.5	6.5	8.0	0.6



øD_{max}	$L1_{max}$	$L2_{max}$	ød
3.9	10	11	0.8



øD_{max}	$L1_{max}$	$L2_{max}$	ød
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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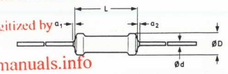
NFR25 fusible resistors ⚠



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

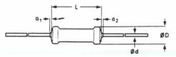
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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

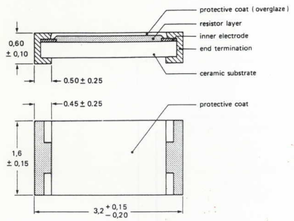
Composition of the service number for the NFR25H
Main subgroup: 4822 052 11...

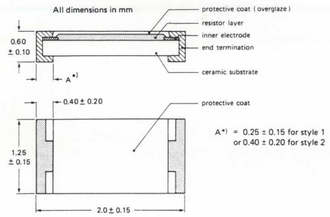
The codenumber above is completed by inserting the first two figures (resistance code)followed by the multiplier.

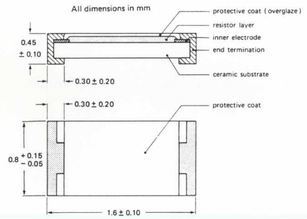
8 for R= 1 to 9,1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9,1 KΩ
3 for R= 10 to 91 KΩ

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.

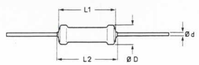
8 for R= 0 to 9.1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9.1 KΩ
3 for R= 10 to 91 KΩ
4 for R= 100 to 910 KΩ
5 for R= 1 to 9.1 MΩ
6 for R= or > 10 MΩ

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



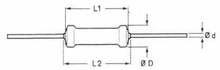
D	L	L2 max.	d
1,7 +0,2 −0,1	3,5 +0,2 −0,15	3,7	0,5 −0,04

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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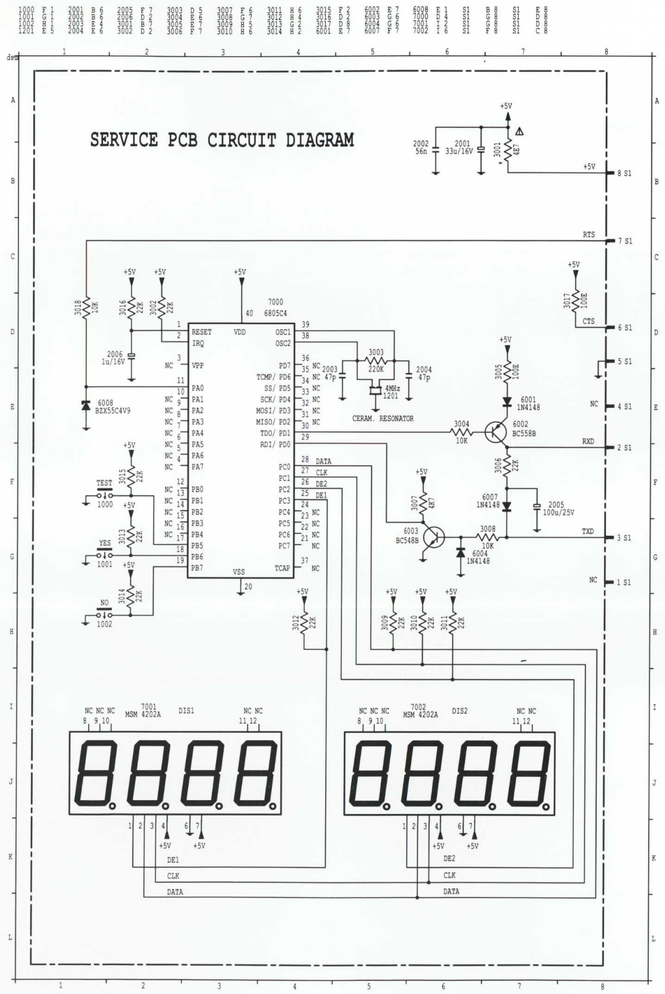
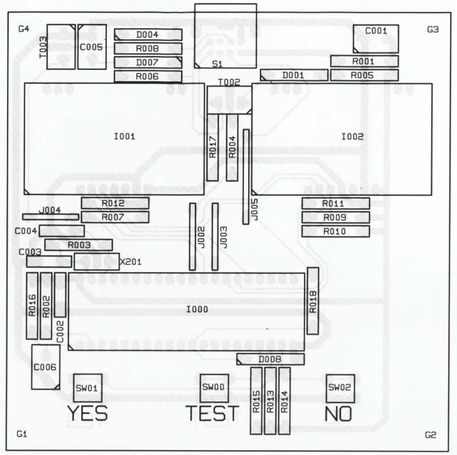
3.5 SERVICE TOOLS

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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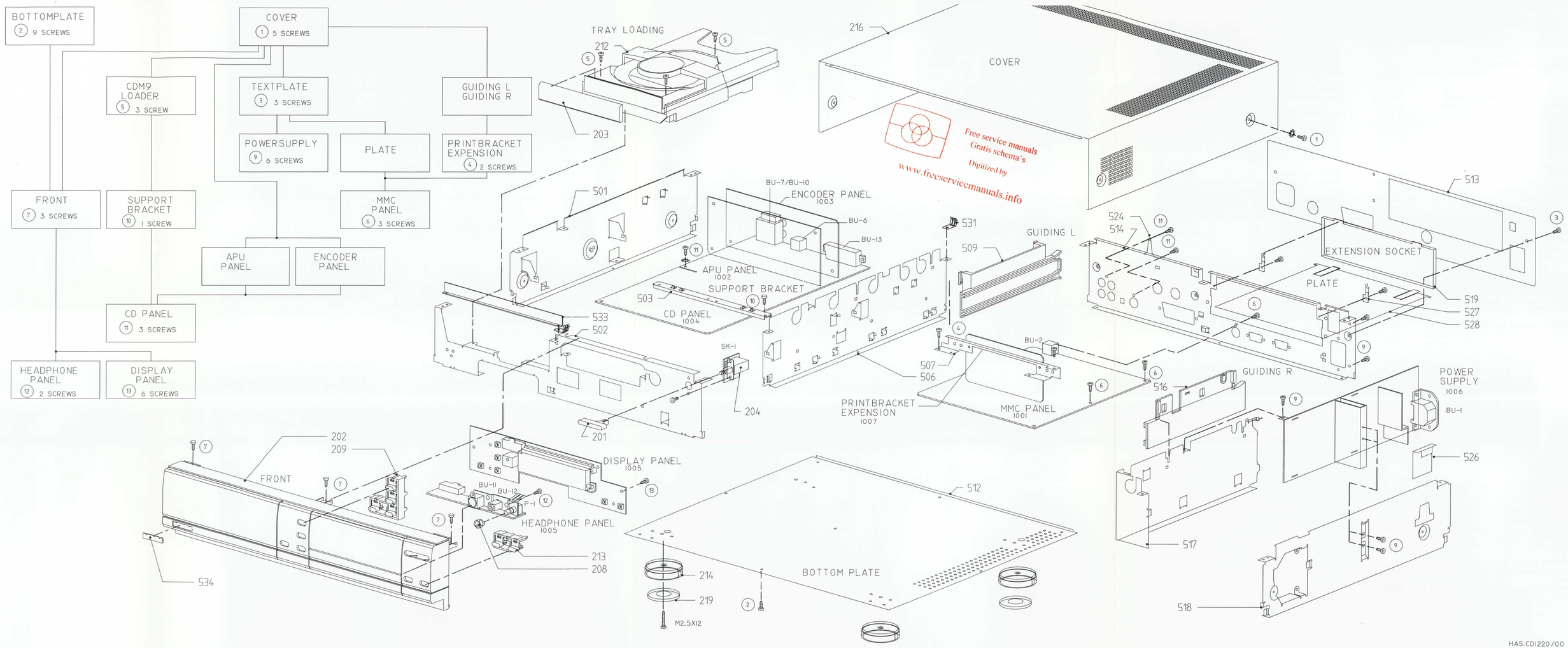
4.1.8 EXPLODED VIEW OF THE CABINET



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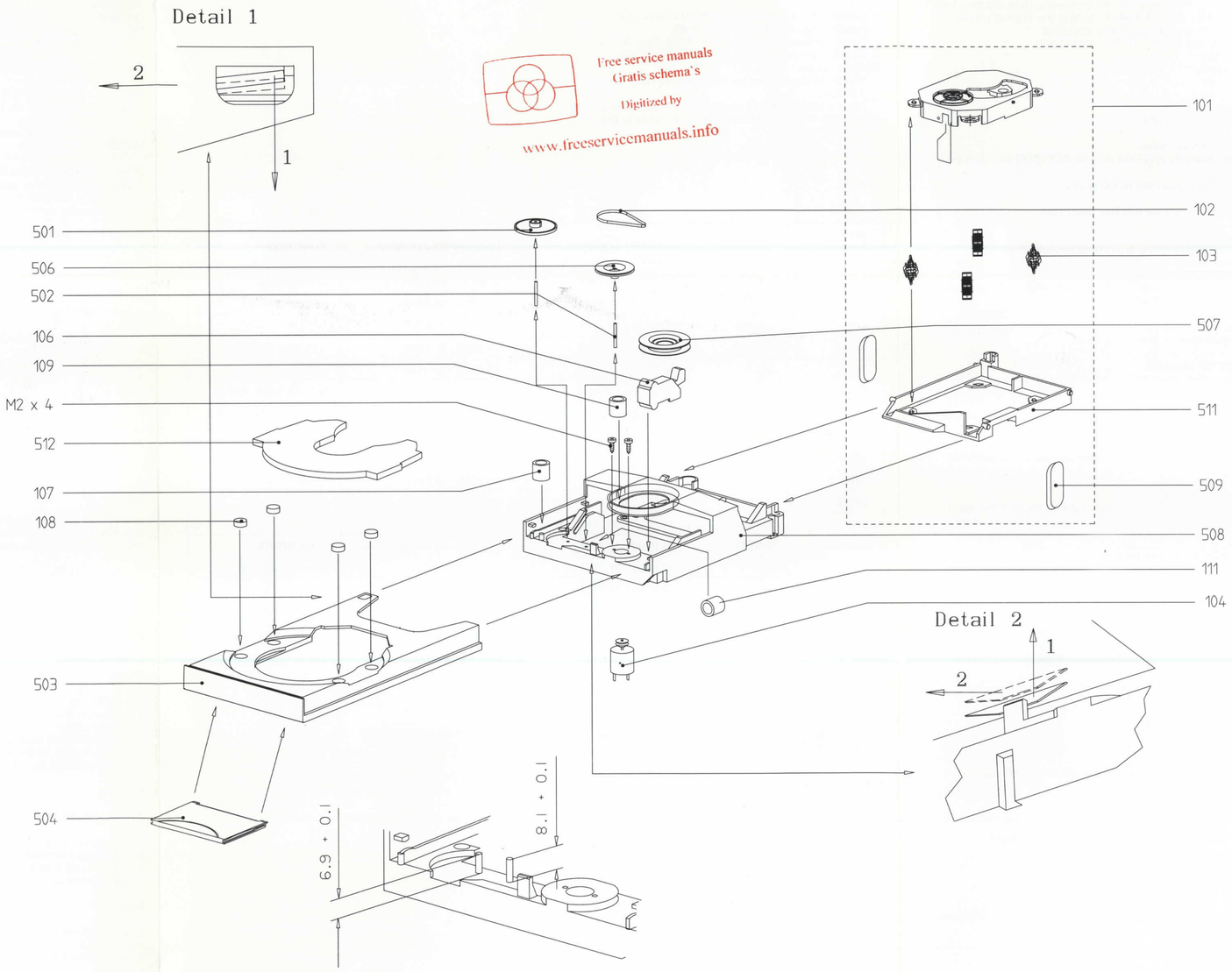
4.1.8.1 PARTS LIST OF CABINET

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



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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.

cd status		test mode
drive test	X bus	Dig Out
Arm in	Arm out	Next step
	EXIT	
	(error) message bar	

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.

LEFT/LEFT – 00 +		RIGHT/RIGHT – 00 +
LEFT/RIGHT – 00 +		RIGHT/LEFT – 00 +
STEREO/MONO STEREO	EXIT	LAST KEY
	(error) message bar	

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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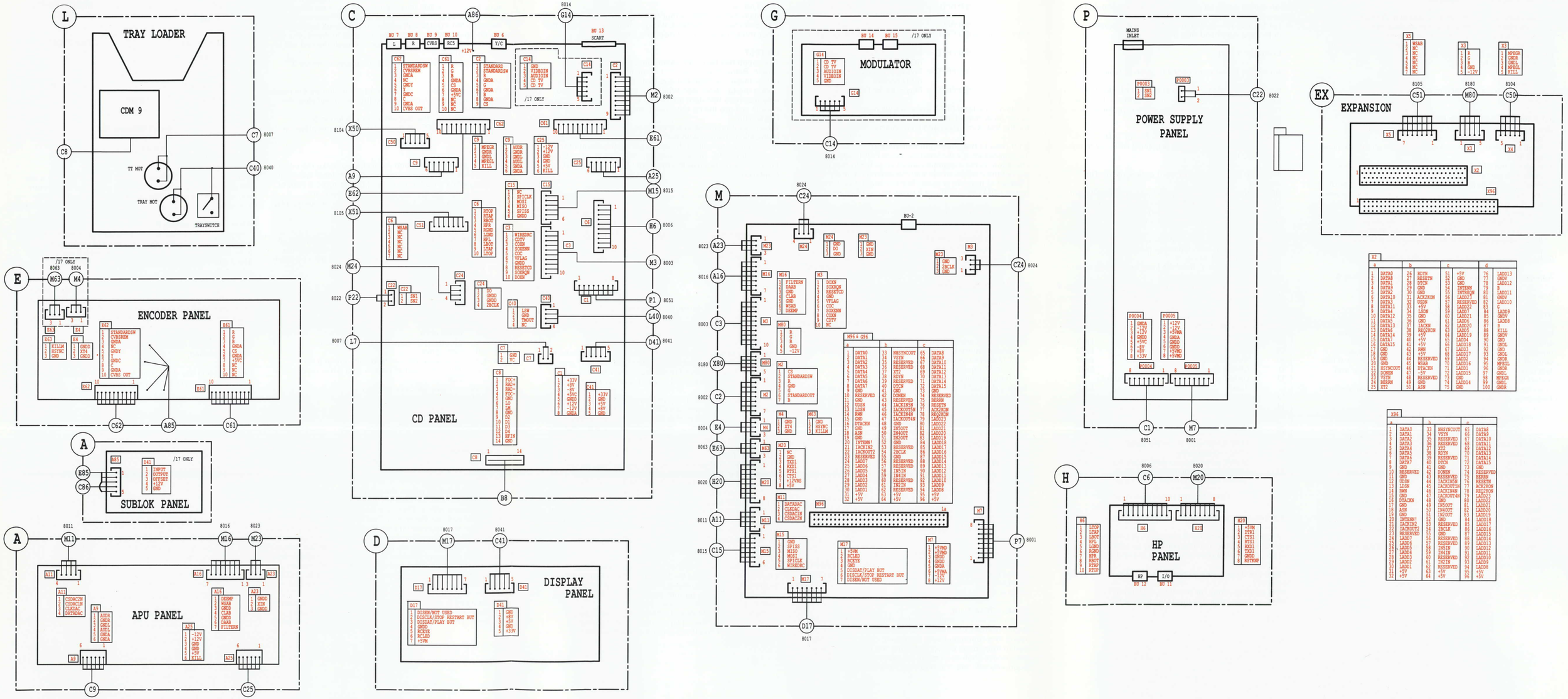
6.1 WIRING DIAGRAM



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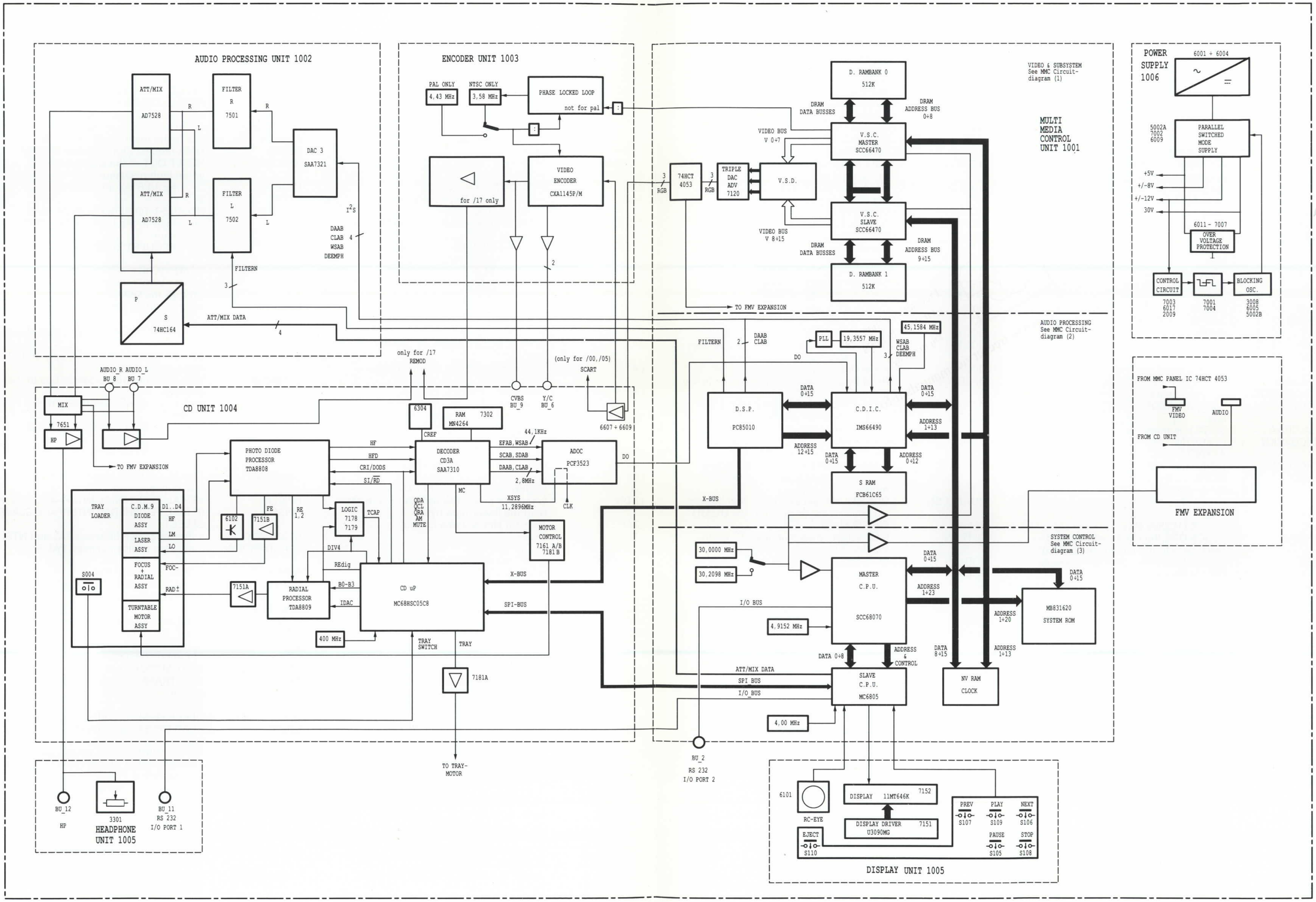
6.2 BLOCK DIAGRAM



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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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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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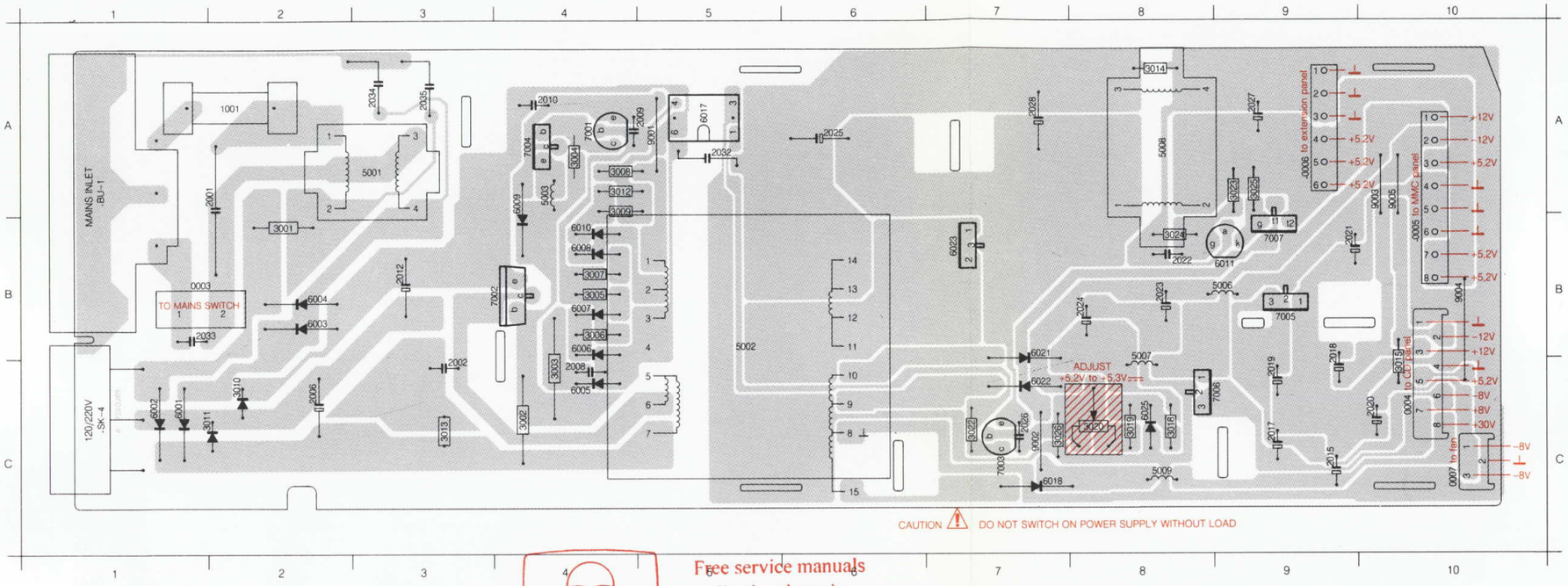
6.3.1 POWER SUPPLY PCB, COMPONENT SIDE VIEW



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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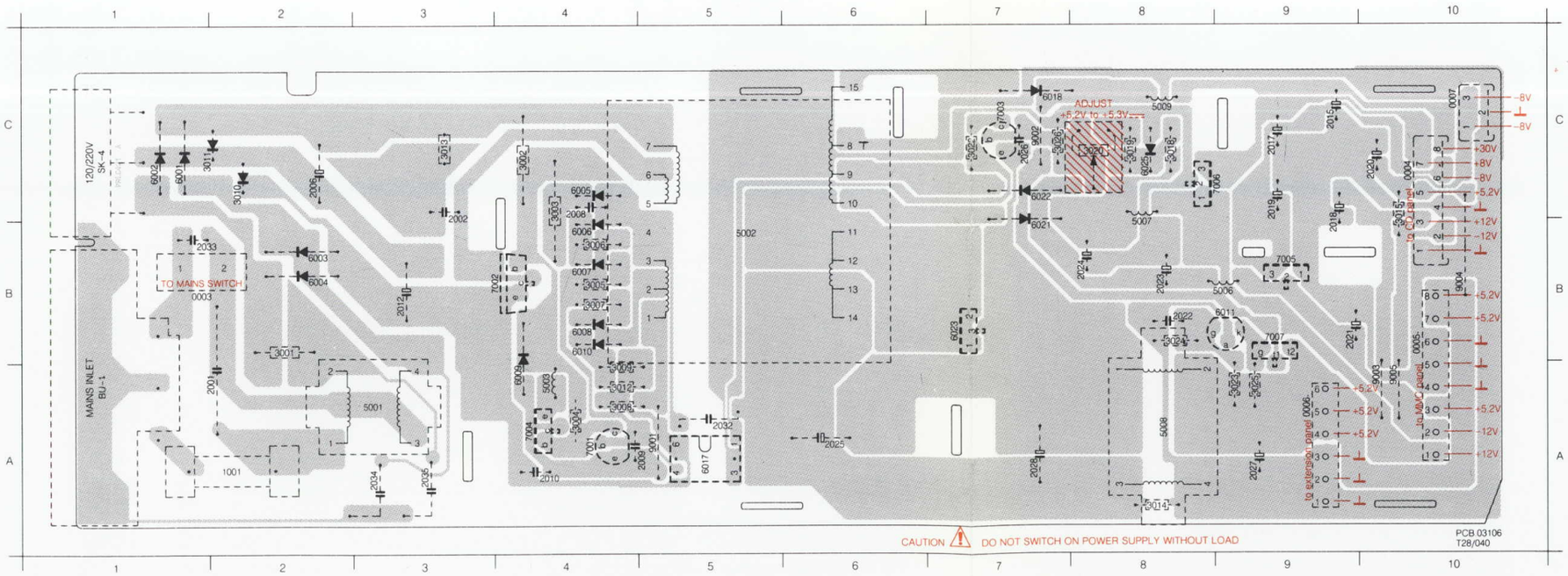
6.3.1 POWER SUPPLY PCB, COPPER TRACK SIDE VIEW



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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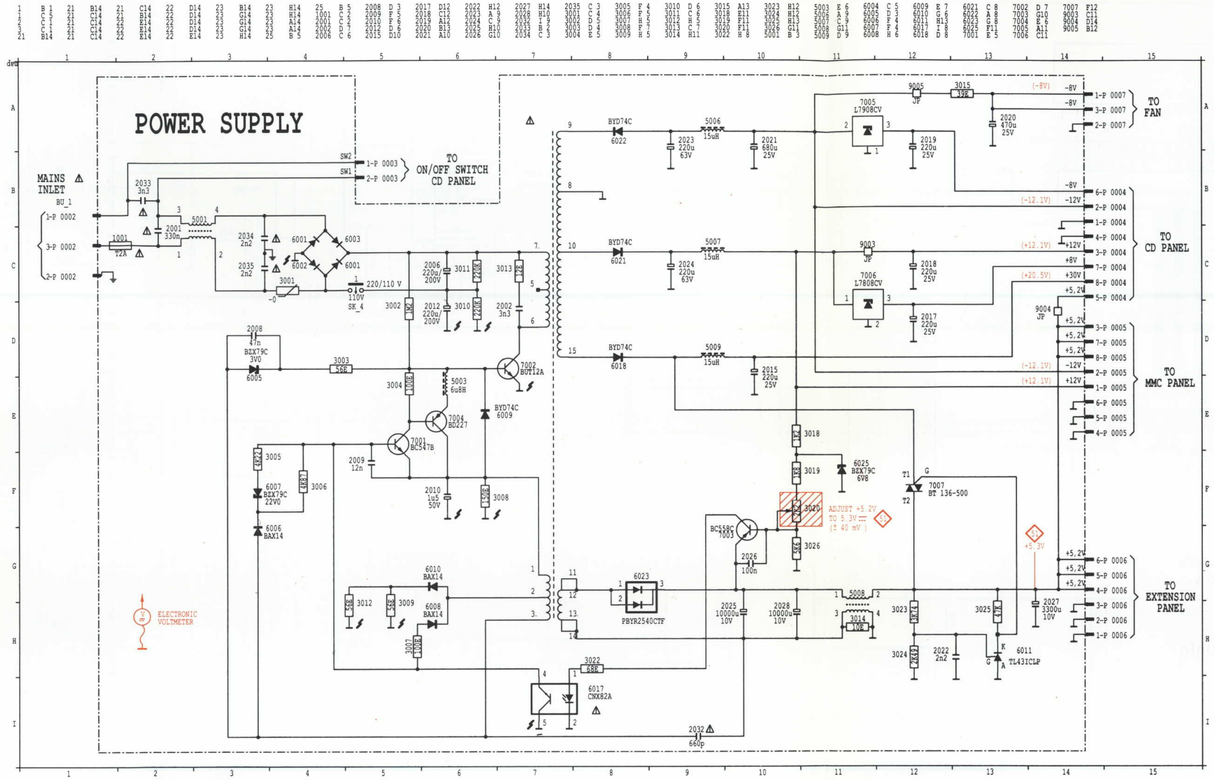
6.3.2 POWER SUPPLY CIRCUIT DIAGRAM



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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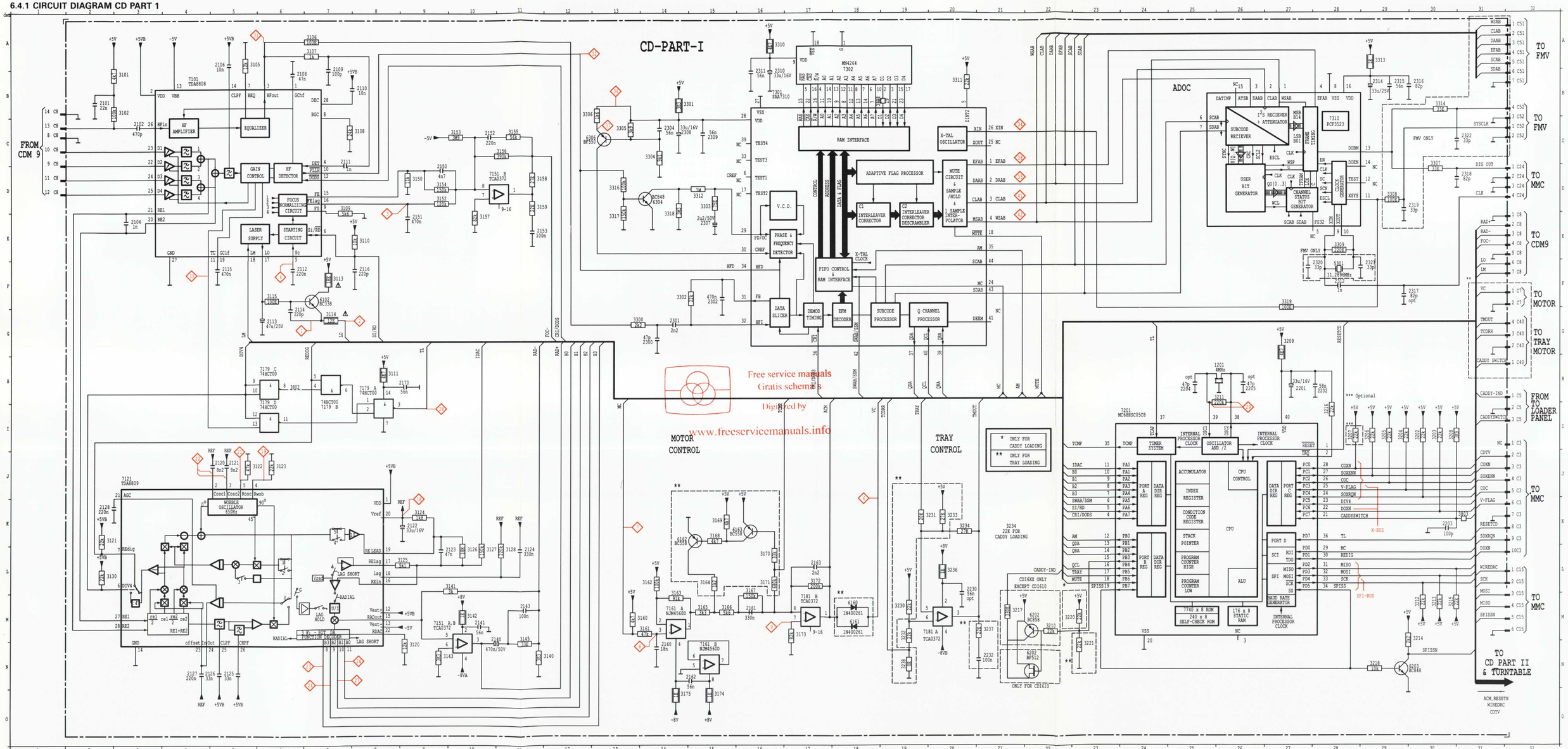
6.4.1 CIRCUIT DIAGRAM CD PART 1


CD-PART-I
FROM CDM 9
TO FMV
TO MMC
TO CDM9
TO MOTOR
TO TRAY MOTOR
FROM TO LOADER PANEL
TO CD PART II & TURNTABLE
MOTOR CONTROL
TRAY CONTROL
ADOC
CD1610
CD1610
CD1610

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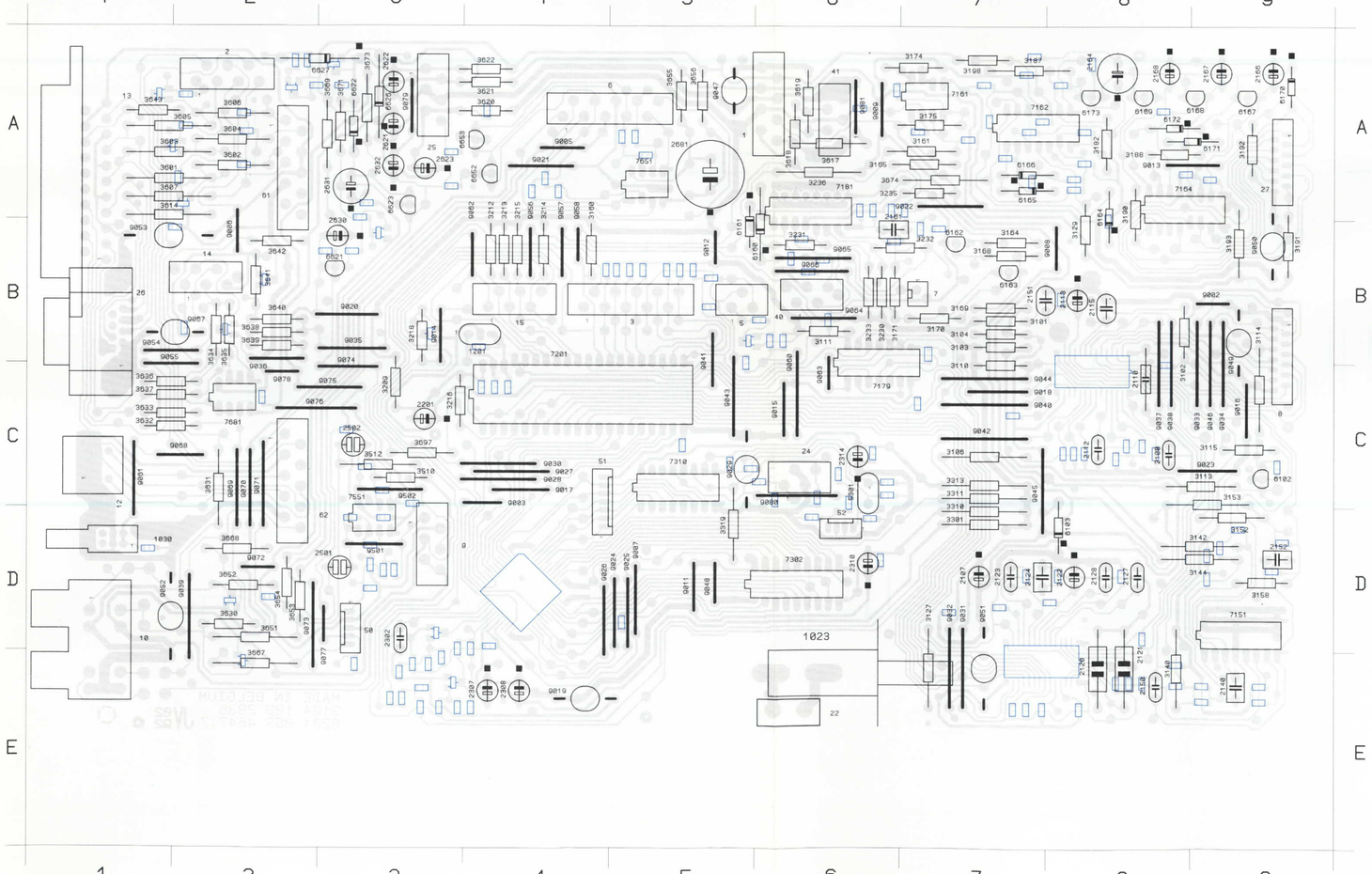
6.4.2 LIST OF ELECTRICAL PARTS CD PANEL

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

1	A 6	51	D 4	2115	B 8	2152	A 6	2300	E 4	2620	A 4	3114	B 9	3153	D 8	3174	A 7	3198	A 7	3221	C 5	3311	C 7	3602	A 2	3631	C 2	3659	A 5	3690	B 3	6172	A 8	6654	D 2	9007	D 5	9029	D 5	9050	B 9	9072	D 2
2	A 2	52	D 6	2118	C 7	2163	B 6	2309	E 4	2621	A 3	3115	C 9	3154	E 8	3175	A 6	3199	B 8	3230	B 6	3312	E 3	3603	A 2	3632	C 1	3660	A 4	3697	C 3	6173	A 8	6655	E 2	9008	B 8	9030	C 3	9051	E 7	9073	E 2
3	B 4	61	A 2	2120	E 8	2164	A 8	2310	D 6	2622	A 3	3120	D 8	3155	D 9	3176	A 7	3200	A 7	3231	B 6	3313	C 7	3604	A 2	3633	C 1	3661	A 5	3802	C 7	6202	B 5	7101	C 8	9009	A 6	9031	D 7	9052	D 2	9074	C 3
5	B 5	62	C 2	2121	E 8	2166	A 9	2311	D 6	2623	A 3	3121	E 7	3156	D 9	3177	A 7	3202	B 5	3232	B 7	3314	C 6	3605	A 2	3634	B 2	3662	A 4	3803	B 5	6203	B 3	7121	E 8	9011	D 5	9032	D 7	9053	B 2	9075	C 2
6	A 4	1023	E 6	2122	D 8	2167	A 9	2312	C 6	2630	B 3	3122	E 7	3157	E 9	3178	A 8	3203	B 5	3233	B 6	3316	E 3	3606	A 2	3635	C 2	3663	A 3	3806	A 8	6304	E 3	7151	E 9	9012	B 5	9033	B 9	9054	B 1	9076	C 2
7	B 7	1030	D 1	2123	D 7	2168	A 8	2314	C 6	2631	A 3	3123	E 8	3158	D 9	3179	A 8	3204	B 5	3234	B 6	3317	E 3	3607	A 1	3636	C 1	3664	A 3	3808	D 5	6306	D 3	7161	A 7	9013	A 8	9034	B 9	9055	C 1	9077	D 3
8	B 9	1201	B 4	2124	D 7	2169	A 9	2315	C 5	2632	A 3	3124	D 8	3159	D 9	3180	A 8	3205	B 5	3235	A 7	3318	E 4	3610	B 2	3637	C 1	3667	E 2	5301	D 6	6607	A 2	7162	A 7	9014	B 3	9035	B 3	9056	B 4	9078	C 2
9	D 3	2101	B 8	2125	E 8	2170	B 6	2316	C 5	2681	A 5	3125	D 7	3160	B 4	3181	A 6	3206	B 5	3236	A 6	3319	D 5	3611	A 2	3638	B 2	3668	D 2	6102	C 9	6608	A 2	7164	B 8	9015	C 6	9036	C 2	9057	B 4	9079	A 3
10	D 1	2102	C 8	2126	E 8	2201	C 3	2317	D 6	2682	C 2	3126	D 7	3161	A 6	3182	A 8	3207	B 4	3237	B 6	3501	D 3	3612	A 2	3639	B 2	3669	A 3	6103	D 8	6609	A 1	7179	C 5	9016	C 9	9037	B 8	9058	B 4	9080	C 6
12	C 1	2103	C 8	2127	D 8	2202	C 4	2318	D 6	3101	B 7	3127	D 7	3162	A 6	3183	A 7	3208	B 5	3238	B 7	3502	D 3	3613	A 2	3640	B 2	3670	B 3	6160	A 6	6620	B 3	7181	B 6	9017	C 4	9038	B 8	9060	B 6	9081	A 6
13	B 1	2104	E 8	2128	D 8	2203	B 5	2319	D 6	3102	C 8	3128	D 8	3163	A 7	3184	A 7	3209	C 3	3300	E 3	3503	D 3	3614	B 2	3641	B 2	3671	A 3	6161	B 5	6621	B 3	7201	C 4	9018	C 7	9039	D 2	9061	C 1	9501	D 3
14	B 2	2105	D 7	2140	E 9	2204	C 4	2320	C 5	3103	B 7	3129	B 8	3164	B 7	3185	A 8	3210	B 6	3301	D 7	3504	C 3	3617	A 5	3642	B 2	3672	B 3	6162	B 7	6622	A 3	7301	D 4	9019	E 5	9040	C 7	9062	B 4	9502	C 3
15	B 4	2106	C 7	2141	D 9	2205	C 4	2321	C 6	3104	B 7	3130	E 7	3165	A 7	3186	A 8	3211	B 4	3302	E 3	3505	D 3	3618	A 6	3643	A 1	3673	A 3	6163	B 7	6623	A 3	7302	D 6	9020	B 5	9041	C 5	9063	C 6		
22	E 6	2107	D 7	2142	D 9	2230	B 6	2322	D 6	3105	C 8	3140	D 8	3166	A 7	3187	A 8	3212	B 4	3303	E 4	3506	E 3	3619	A 6	3651	D 2	3674	A 7	6164	A 8	6624	A 3	7310	D 5	9021	A 4	9042	C 7	9064	B 6		
24	C 6	2108	C 8	2143	E 9	2231	B 6	2501	D 3	3106	C 7	3141	E 8	3167	B 7	3188	A 8	3213	B 4	3304	E 3	3507	D 3	3620	A 4	3652	D 2	3675	A 3	6165	A 7	6625	A 2	7551	D 3	9022	A 7	9043	C 5	9065	B 6		
25	A 3	2109	C 8	2150	E 8	2232	B 6	2502	C 3	3107	C 8	3142	D 9	3168	B 7	3189	A 8	3214	B 4	3305	E 3	3508	C 3	3621	A 4	3653	D 2	3676	A 3	6166	A 8	6626	A 3	7651	A 5	9023	C 8	9044	C 7	9066	B 6		
26	C 1	2110	B 8	2151	B 8	2300	E 3	2503	D 3	3108	C 8	3143	E 9	3169	B 7	3190	B 8	3215	B 4	3306	E 3	3509	D 3	3622	A 4	3654	D 2	3677	A 2	6167	A 9	6627	A 2	7681	C 2	9024	D 5	9045	C 7	9067	B 1		
27	A 9	2111	C 8	2152	D 9	2301	E 3	2504	C 3	3109	C 8	3144	D 9	3170	B 7	3191	B 9	3216	C 3	3307	C 5	3510	C 3	3624	A 2	3655	A 5	3678	A 2	6168	A 8	6640	B 2	9002	B 9	9025	E 5	9046	B 9	9068	C 1		
40	B 6	2112	C 8	2153	D 9	2302	E 3	2505	D 3	3110	C 7	3145	E 9	3171	B 6	3192	A 9	3217	B 6	3308	C 6	3511	D 2	3625	A 2	3656	A 5	3679	A 2	6169	A 8	6641	B 2	9003	D 4	9026	B 4	9047	A 5	9069	D 2		
41	A 6	2113	B 8	2160	A 7	2304	E 3	2601	D 1	3111	B 6	3150	E 8	3172	B 6	3193	A 9	3218	C 3	3309	C 5	3512	C 3	3626	A 2	3657	A 5	3681	A 7	6170	A 9	6652	A 4	9005	A 4	9027	C 4	9048	D 5	9070	D 2		
50	D 3	2114	C 9	2161	B 7	2307	E 4	2602	B 2	3113	C 8	3152	D 9	3173	B 7	3194	A 7	3220	B 6	3310	D 7	3601	A 2	3630	D 2	3658	A 4	3682	A 7	6171	A 8	6653	A 4	9006	A 2	9028	C 3	9049	B 9	9071	D 2		



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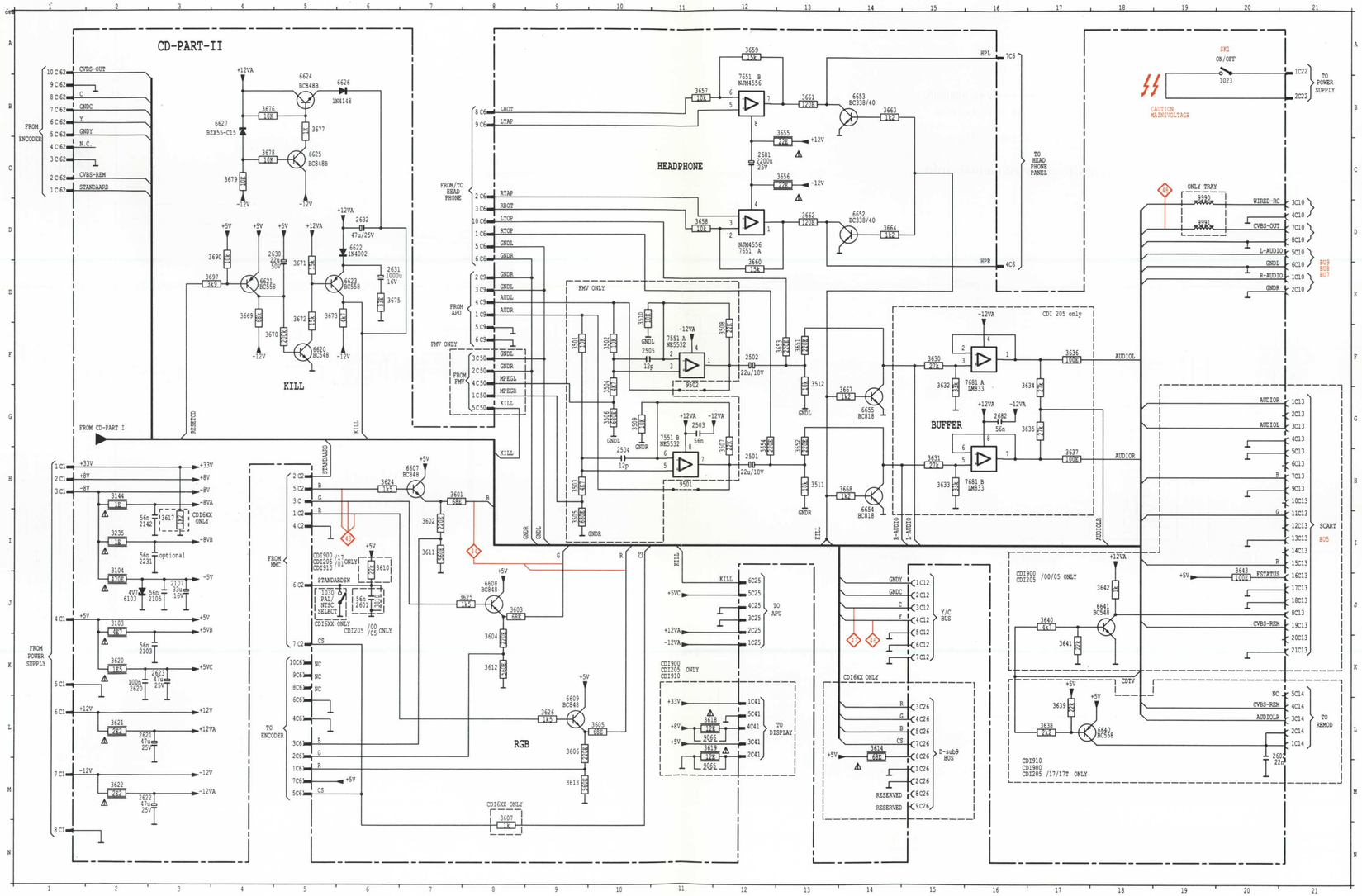
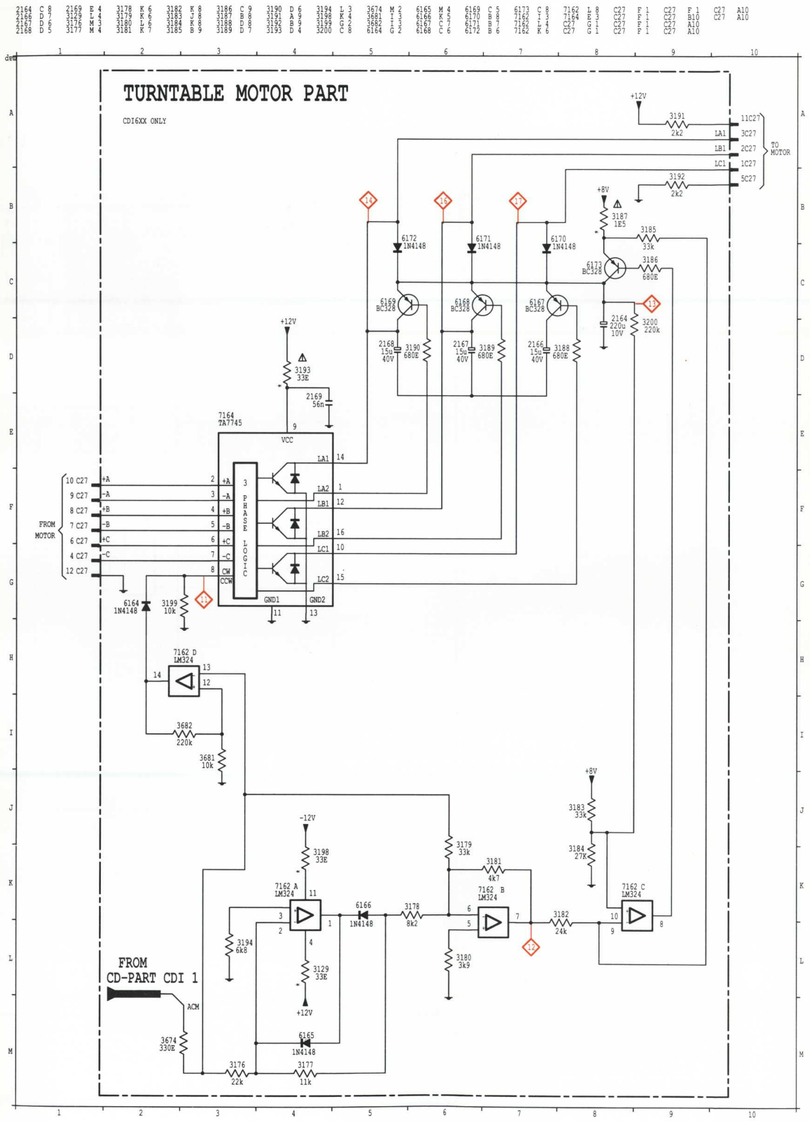
6.4.3 CD PANEL PCB, COPPER TRACK/SMD SIDE VIEW

| | | |

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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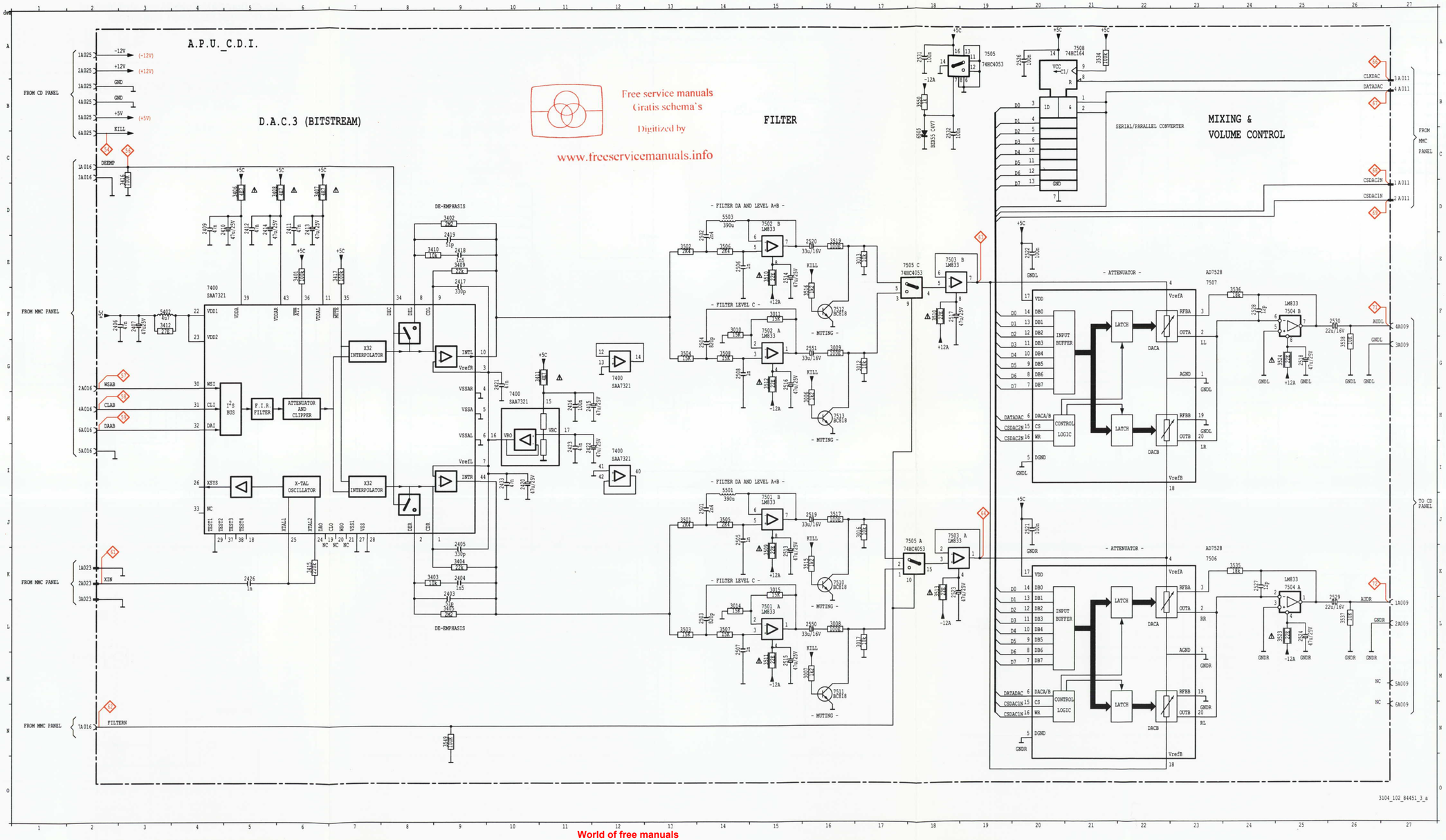
6.5.1 APU CIRCUIT DIAGRAM



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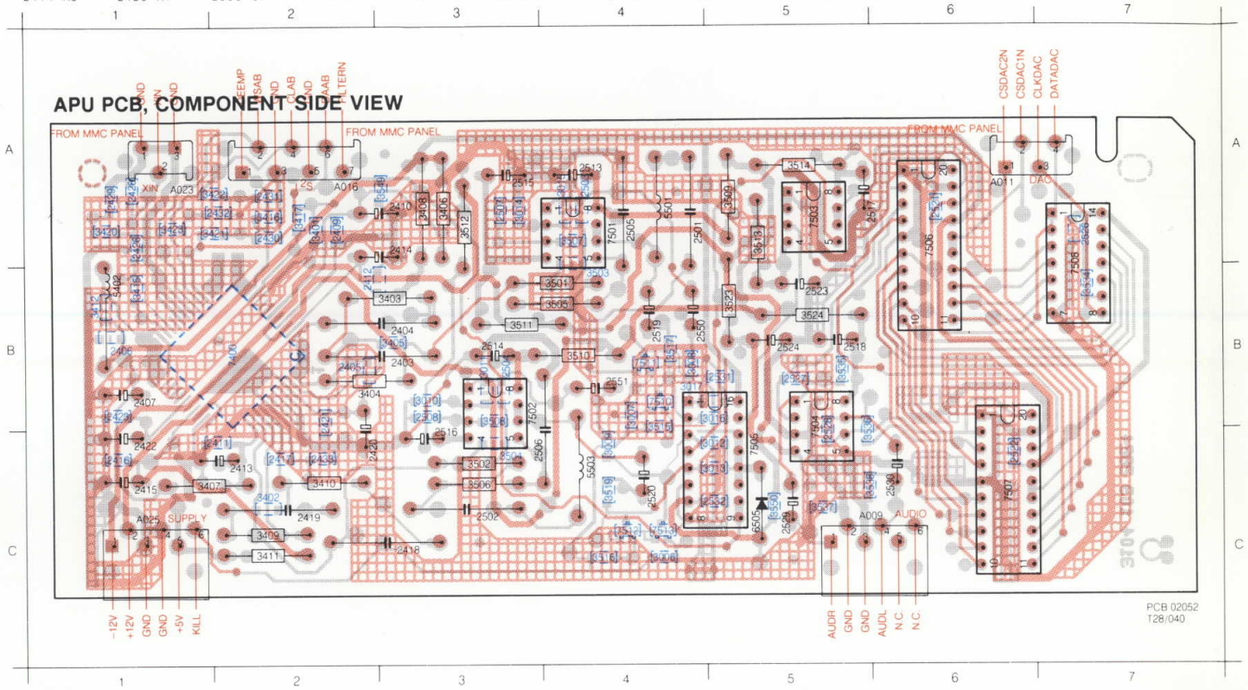
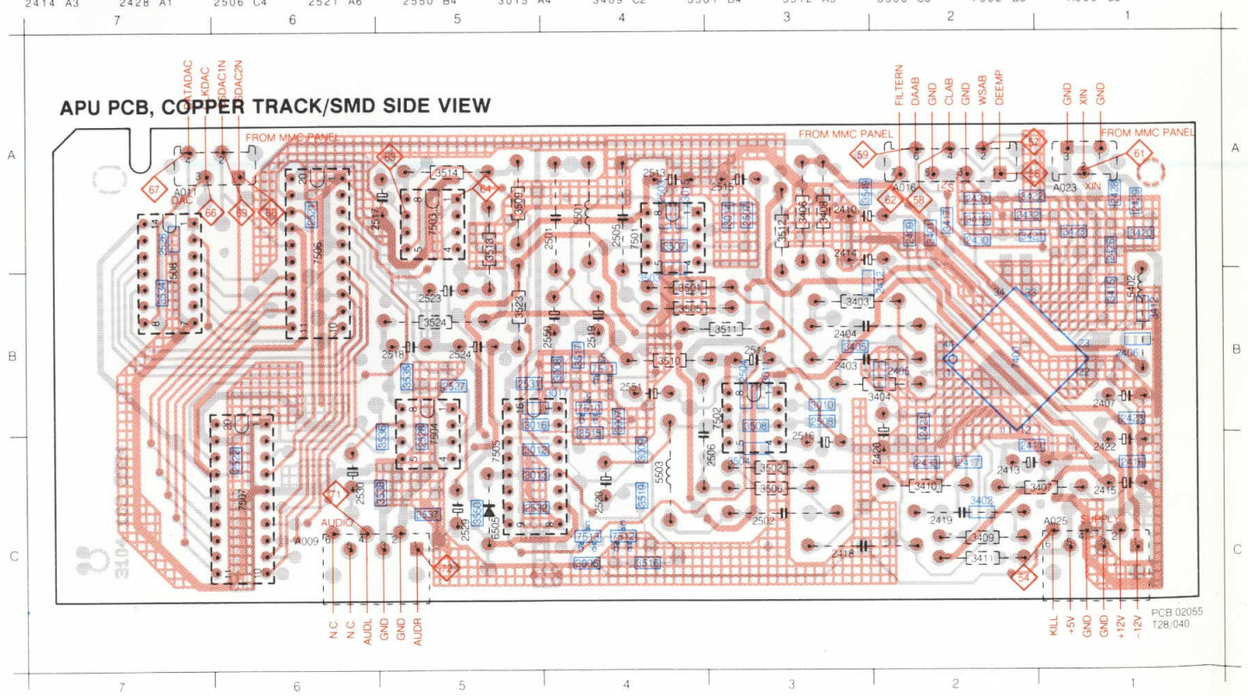
6.5.2 APU PCB, COMPONENT SIDE VIEW AND COPPER TRACK/SMD SIDE VIEW

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



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



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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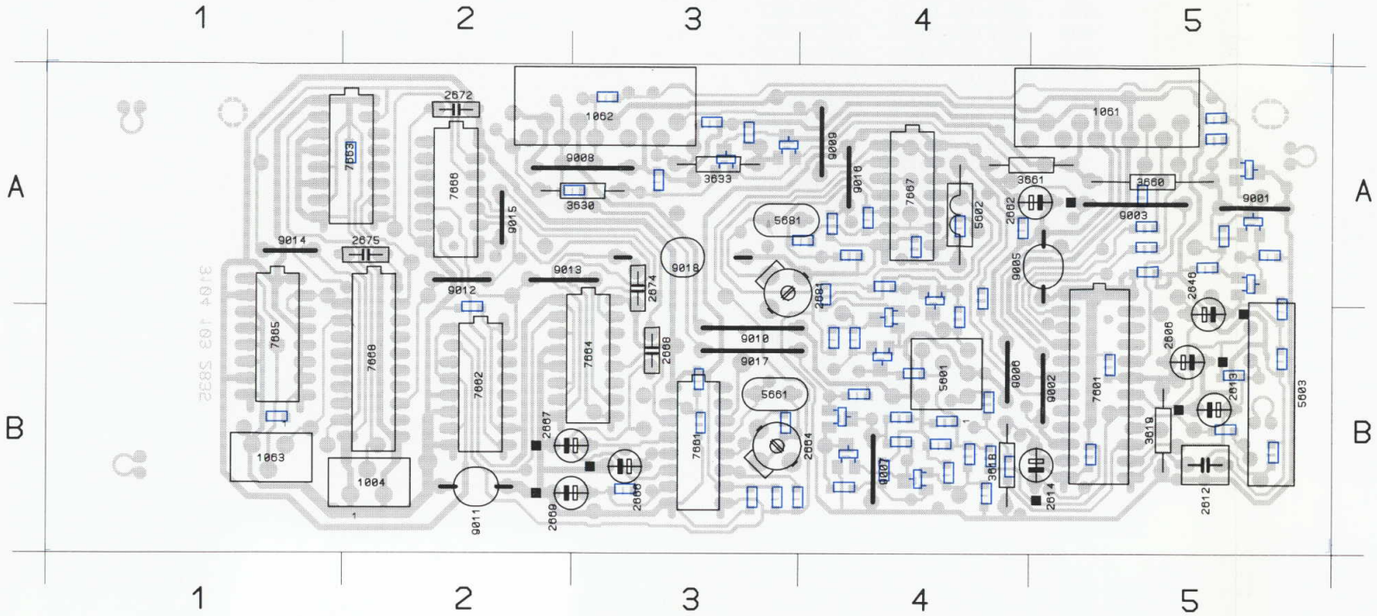
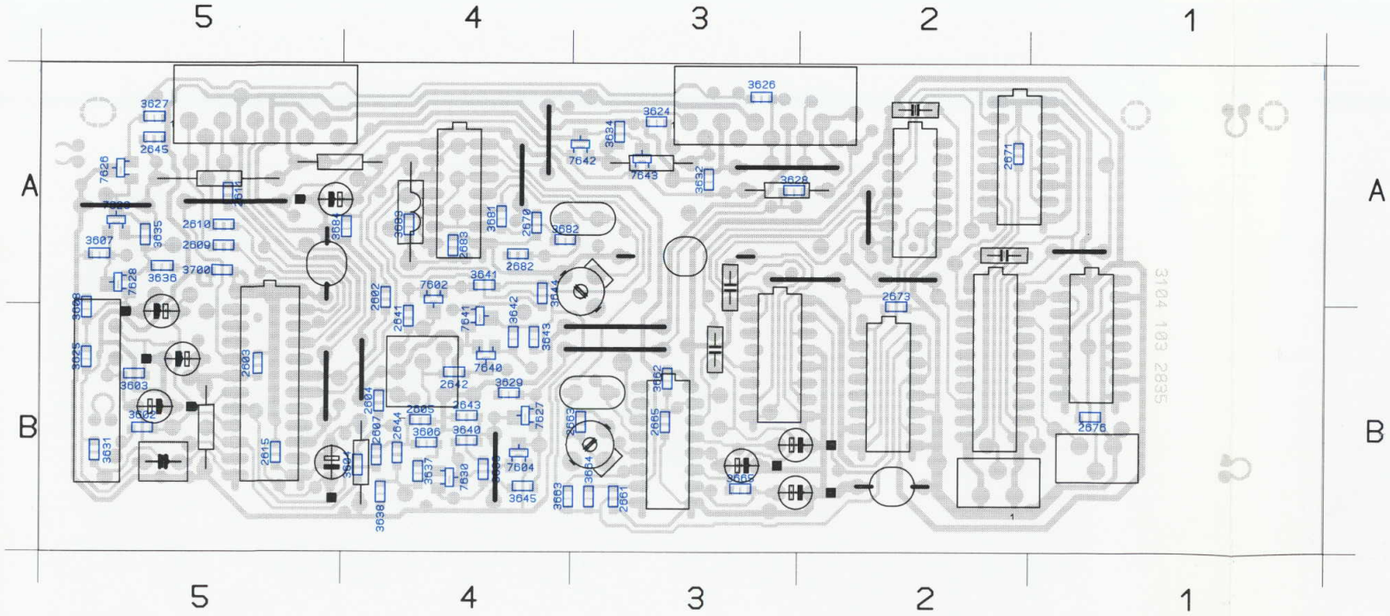
6.6.1 VIDEO ENCODER PCB, COMPONENT SIDE VIEW

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	3660 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	3661 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	3660 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	3661 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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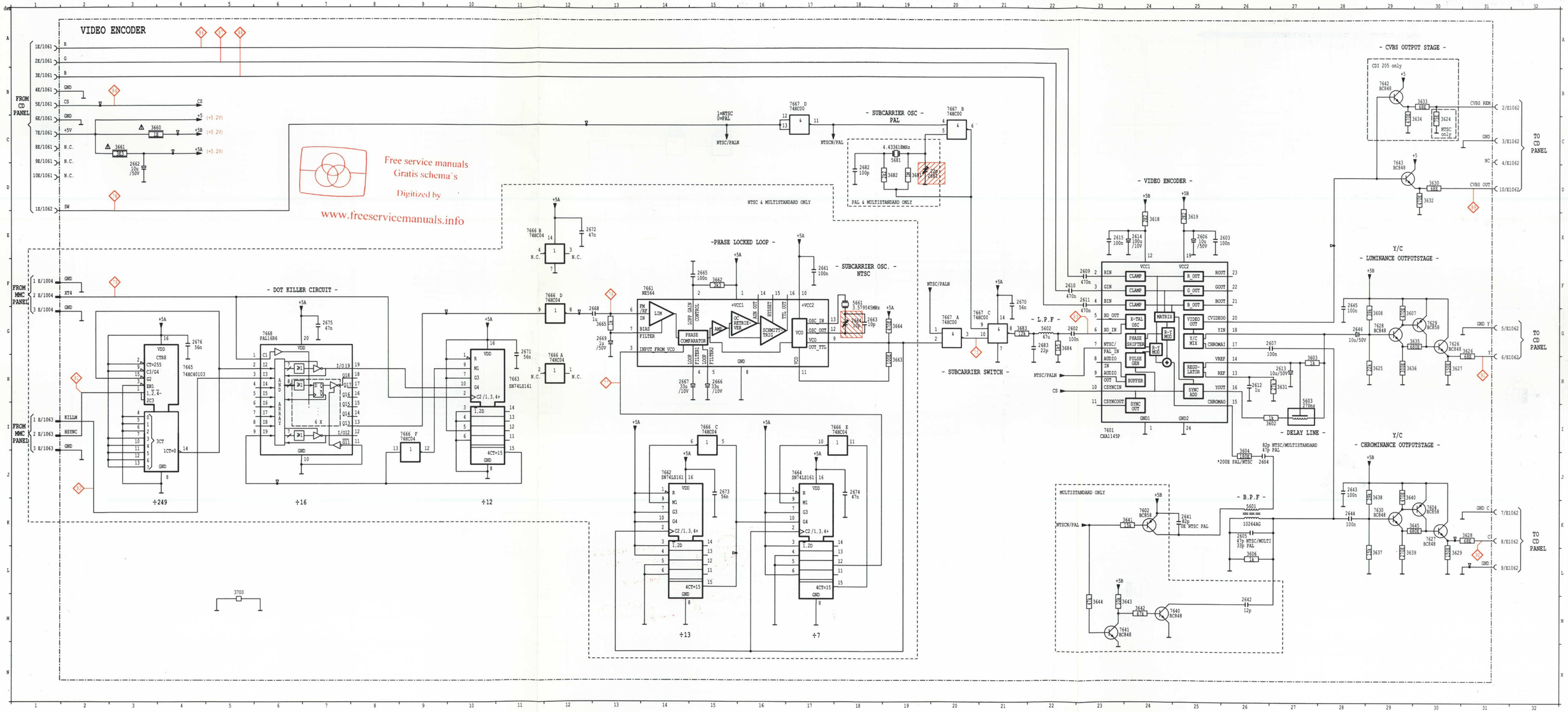
6.6.3 VIDEO ENCODER CIRCUIT DIAGRAM



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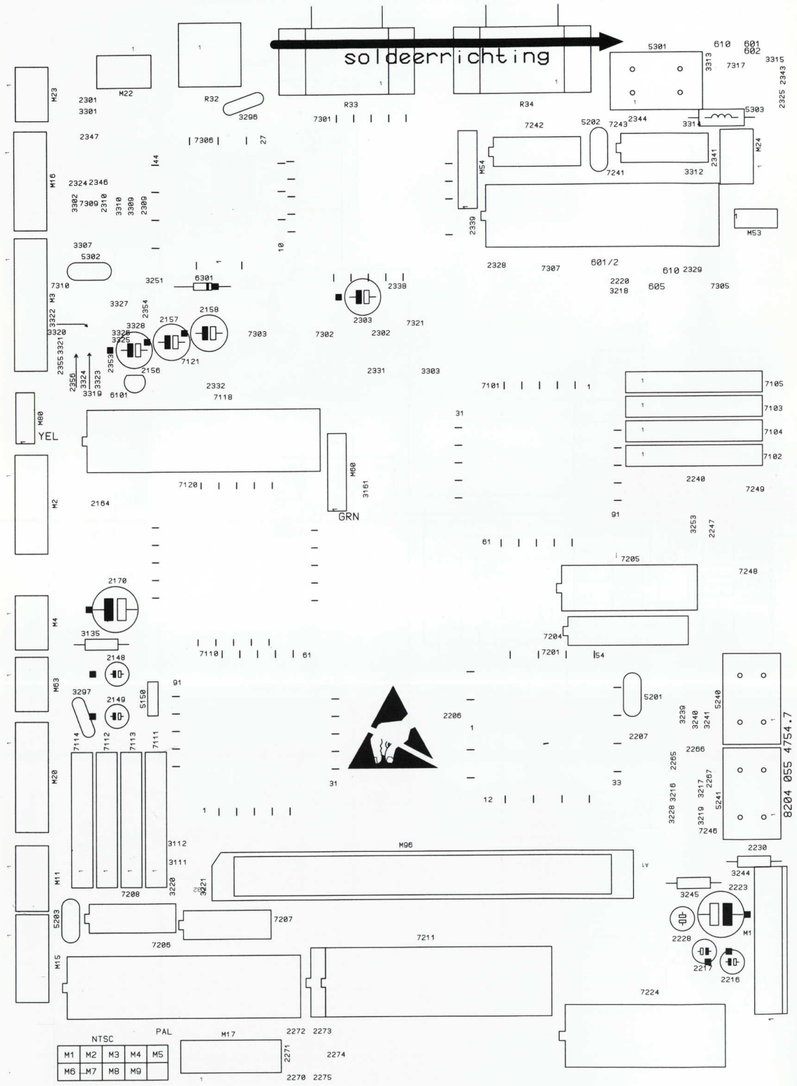
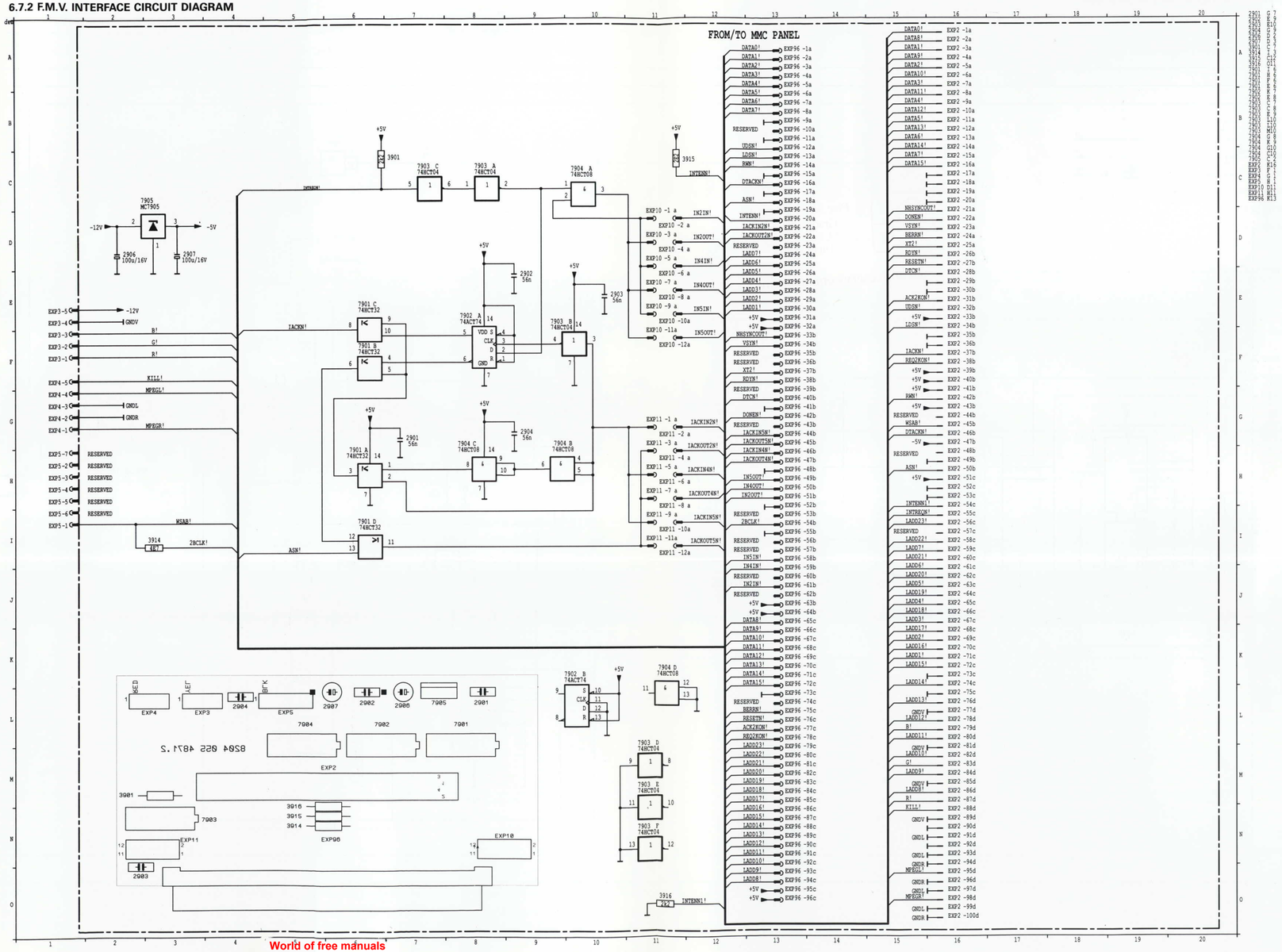
6.7.1 MMC PCB, COMPONENT SIDE VIEW



6.7.2 F.M.V. INTERFACE CIRCUIT DIAGRAM



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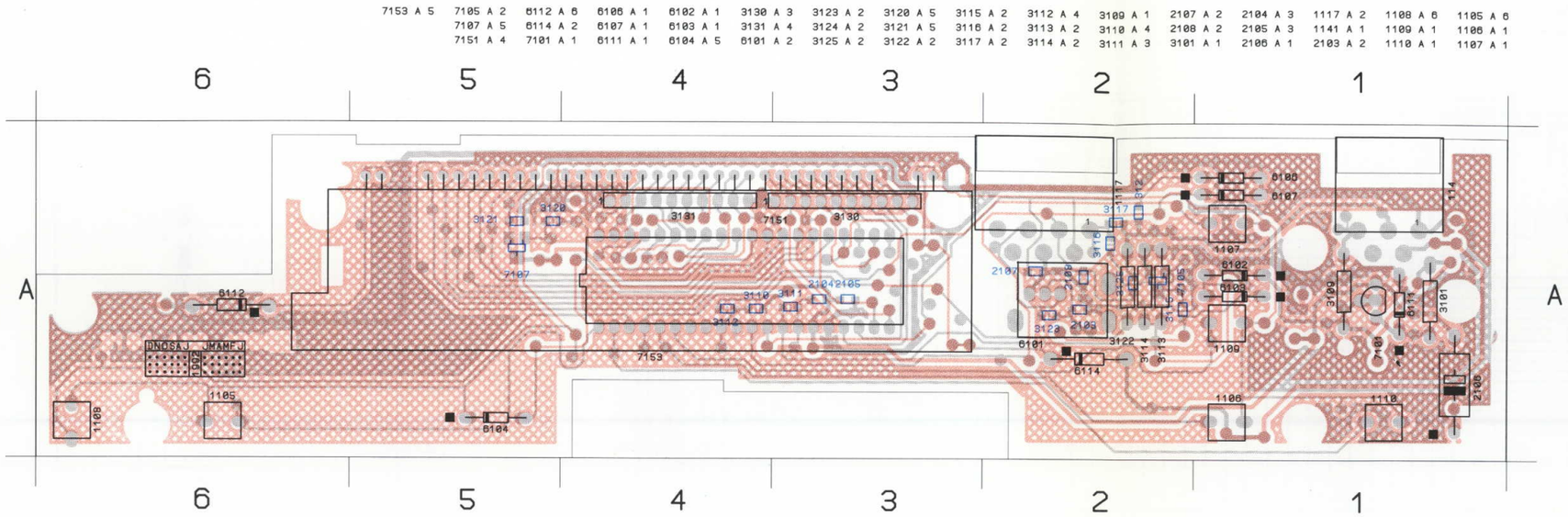
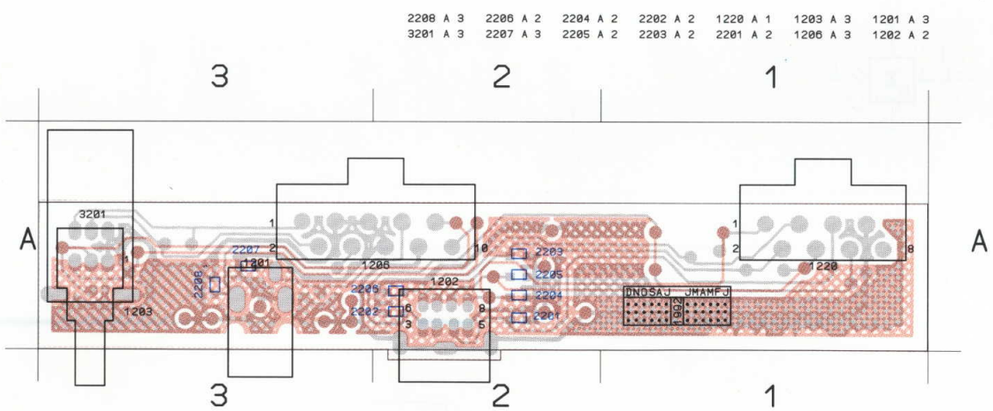
6.8.1 DISPLAY PANEL PCB COPPER TRACK/SMD SIDE VIEW



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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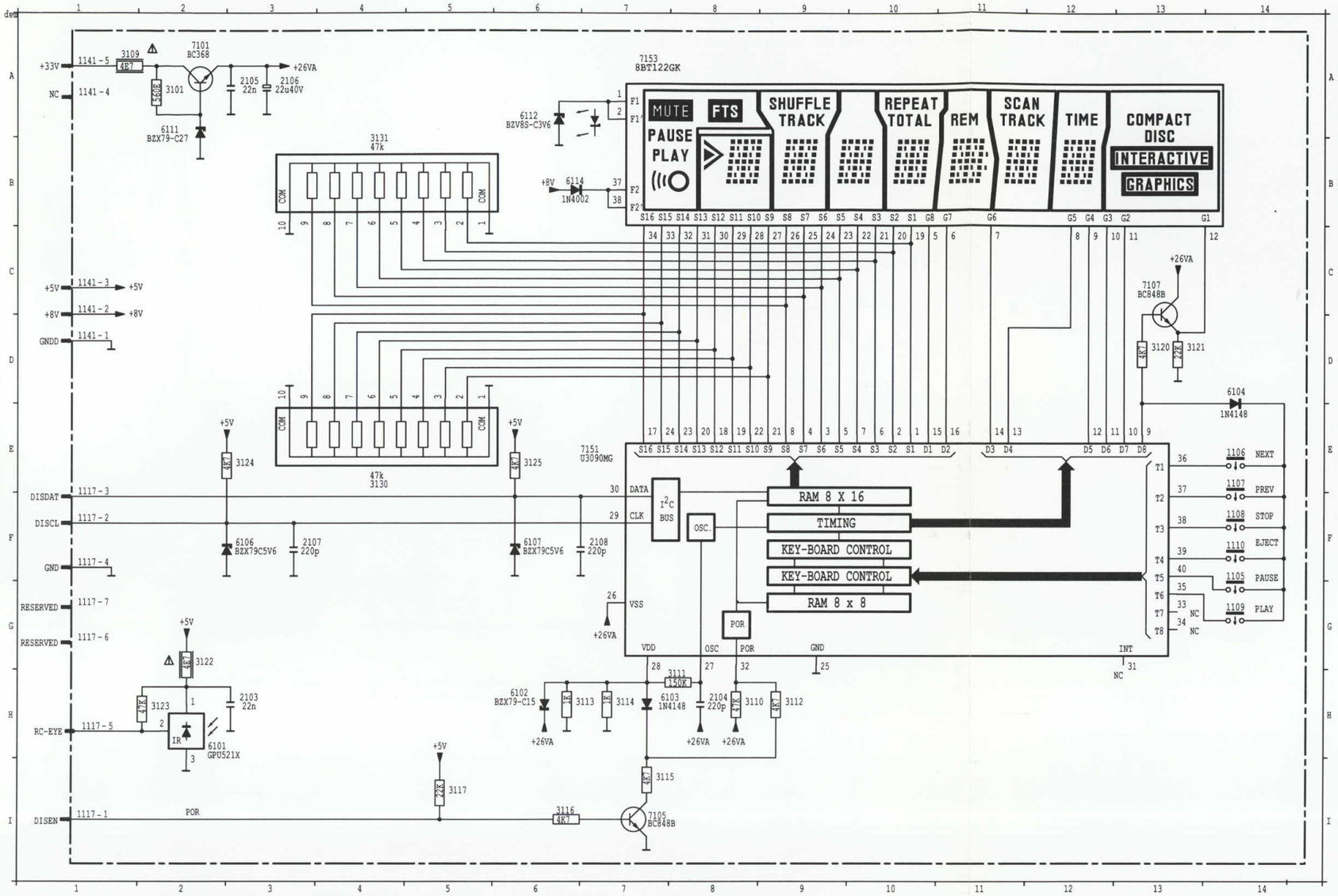
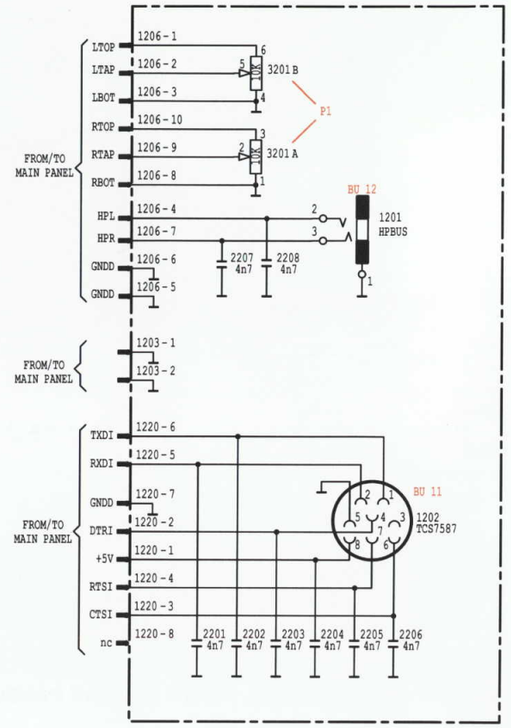
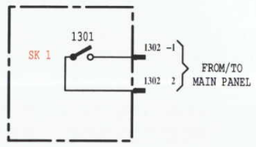
6.8.4 DISPLAY PANEL AND HEADPHONE PANEL CIRCUIT DIAGRAM







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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.

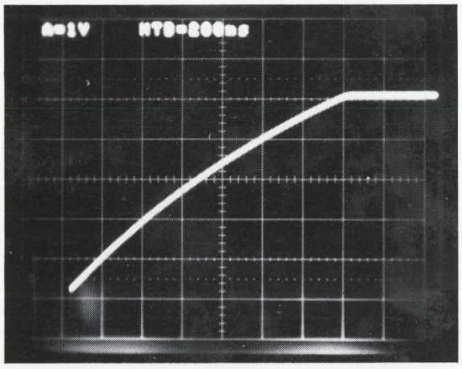
7.2.1.2 Adjustments
Adjustment + 5,2V supply voltage
Adjust R3020 for a voltage of 5.3V DC ± 40 mV on test point 51.
For practical reasons it is also possible to measure at pin 3 of connector G12 on the extension board.

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 %.

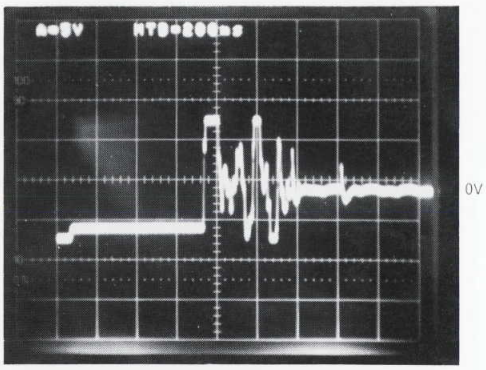
7.2.2.2 Focus signal.
Play track 1 of testdisc 5, the voltage accross item 2151 (measuring point 3 and GND) on the CD panel should be: + 400 mV / DC ± 10%.

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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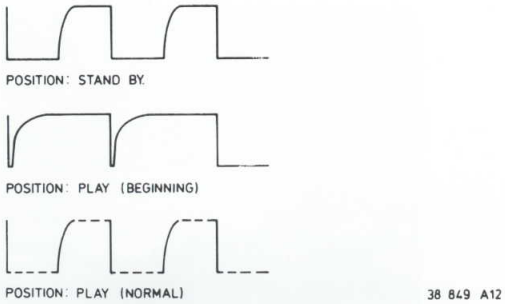
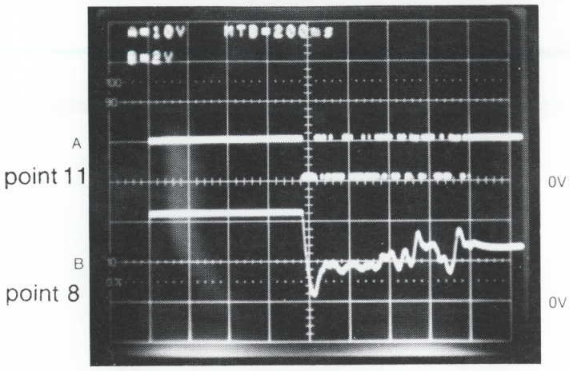
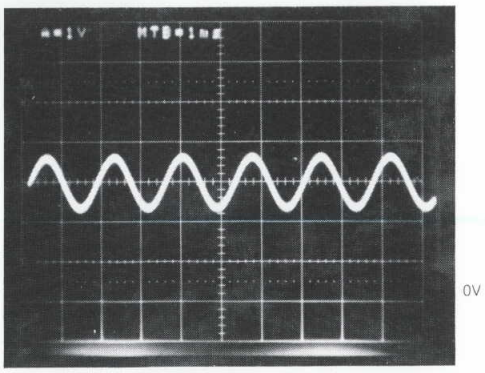
Signal accross measuring point 7 and GND should be :



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

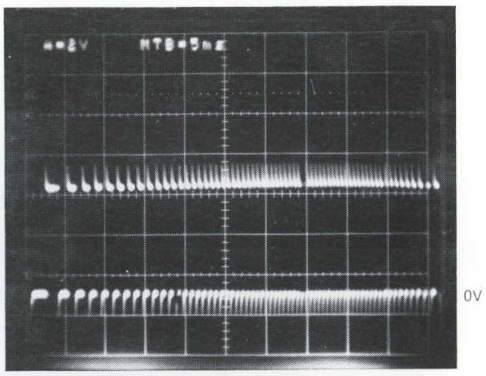


7.2.2.5 Radial error circuit signals.
Voltage accross measuring point 18 and GND:
2,6 V / DC ±10%.
Voltage accross measuring point 19 and GND:
110 mV / DC ±10% in PLAY mode.
Voltage accross measuring point 21 and GND:
1,2 V / DC ±10% in PLAY mode.
Voltage accross measuring point 22 and GND:



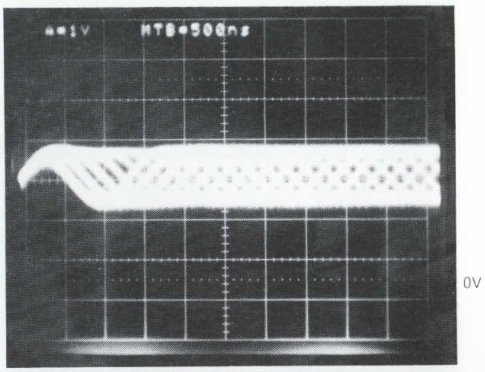
Voltage accross measuring points 23,24,26 and 27 depending on playing mode, 0 V if LOW or 5V if HIGH

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:

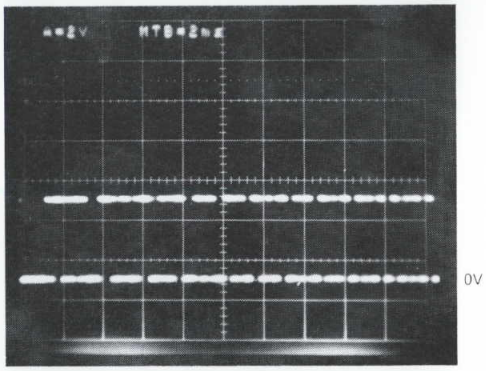


7.2.2.6 Clock signal μP IC7201
Measuring point 29: clock signal f = 4MHz.

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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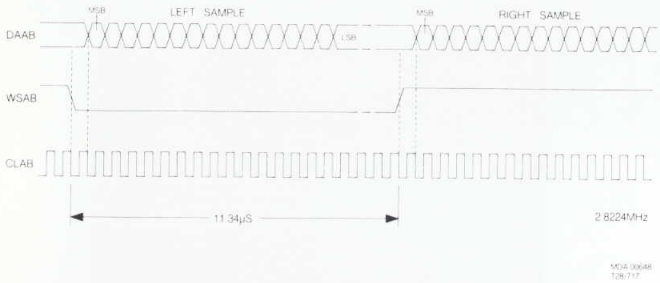
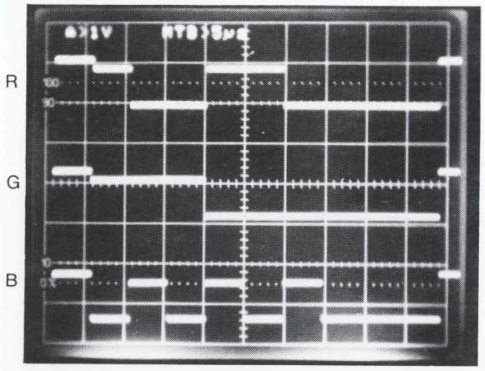
Measuring point 39,41 and 42:



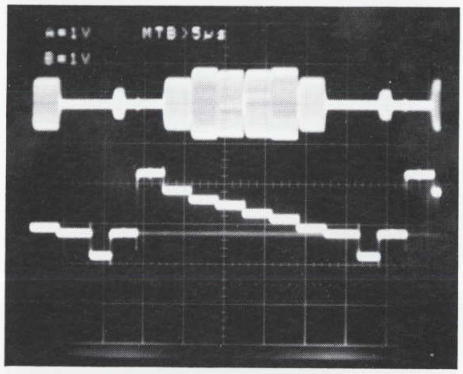
7.2.2.8 Video signals

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

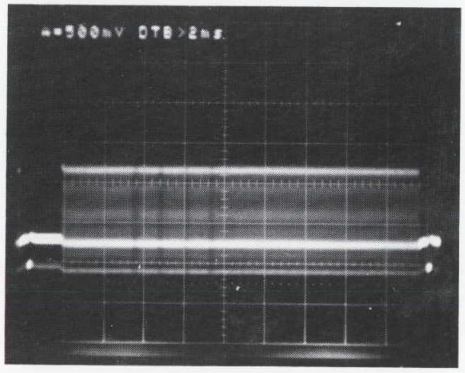
Measuring point 43 and 44:



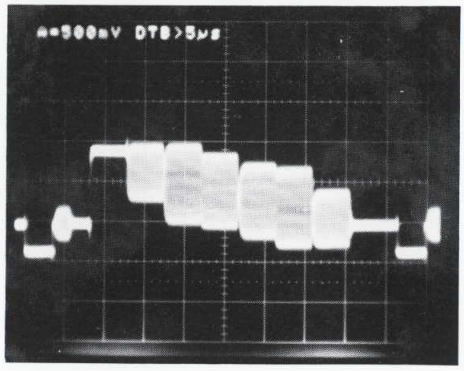
Measuring point 46:



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).

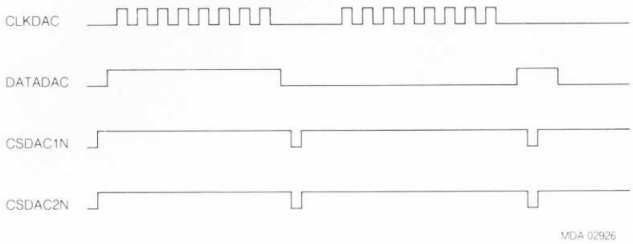
Required test discs:
Use an arbitrary Digital Audio disc in the **service shell,** submenu **MMC slave.**
Testdisc no. 5 - 5A (4822 397 30096 - SBC 426)
Use launch disc or arbitrary CD-I disc which contains audio levels A-B-C and/or CD-DA
Audio signals disc (4822 397 30184 - SBC 429)

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



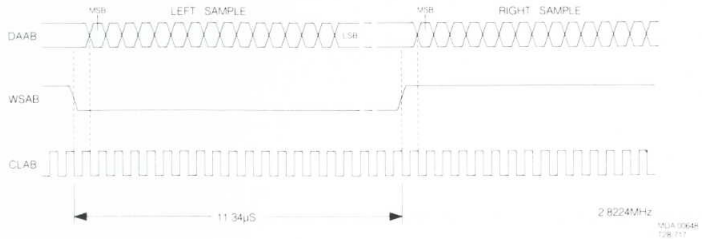
These signals are very hard to recognize on an oscilloscope during the normal application. Only in the **service shell** and controlling the attenuators you can observe activity .
If there is any activity on one of the lines 66 % 69 one can suppose that the information of this signals are oke. This is 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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7.2.4 Measurement & adjustments video encoder unit

1003

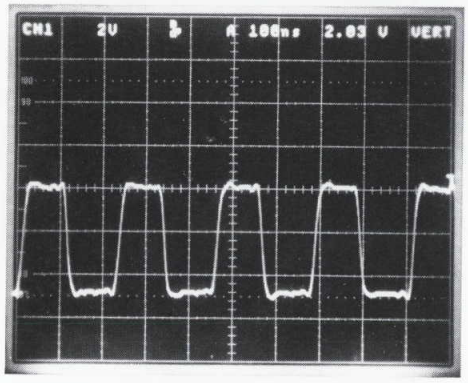
Required test equipment.
Electronic voltmeter
Oscilloscope
Frequency counter

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.

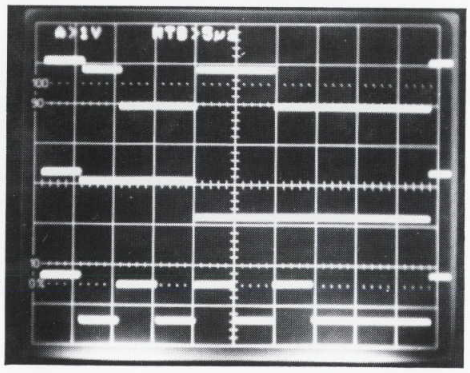


7.2.4.2 Check of standard control signal SW

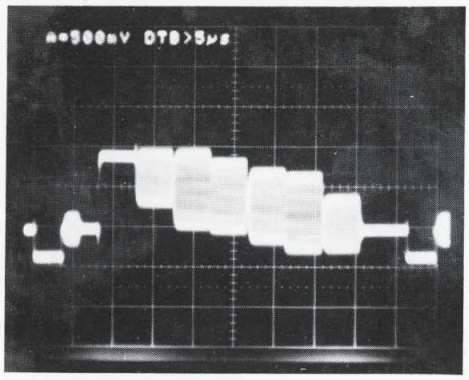
The control signal SW on testpoint 78,(pin 1 of connector E 1062) should be low (0 V).If this signal deviates check the connections to the CD panel print connector E1063 pin 1 and the connection from the CD panel to the MMC panel.

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)

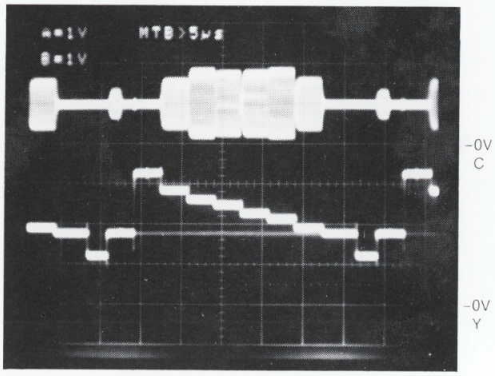


Check of Output signals for CVBS - Y / C.



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 deemphasis 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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Compact disc interactive player

CDI 220/20/25/31/37/39

Service
Service
Service

Interactive
Media
Systems

CD-I

Free service manuals
Gratis schema`s
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Service Manual

COMPACT disc Interactive

CONTENTS

1 Detailled table of contents
2 Product information
3 Service information
4 Mechanical drawings
5 Descriptions of Service Software
6 Electrical drawings
7 Diagnostics, measurements and adjustments
8 Partslist

/20/25/39 are PAL players
/31/37 are NTSC players

These sets are equiped with Compact Disc Mechanism type CDM9; service code 4822 691 30275. This CDM is also used in CDI205 and CDI910

(SF)
Avattaessa ja suojalukitus ohitettaessa olet alttiina näkymättömälle lasersäteilylle. Älä katso säteeseen.

(S)
Osynlig laserstrålning när denna del är öppnad och spärren ar urkopplad. Betakta ej strålen.

(DK)
Usynlig laserstråling ved abning når sikkerhedsafbrydere er une af funktion. Undgå udsaettelse for stråling.

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

CLASS 1
LASER PRODUCT
3122 110 03420

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2 PRODUCT INFORMATION

2.1 TECHNICAL SPECIFICATION

System • Système • Sistema • Systeem • System • Sistema • Sistema
CD-Interactive
CD-Interactif

Usable discs • Disques utiliables • Discos utilizables • Discos Utiliable • Te gebruiken discs • Verwendbare discs • Dischi usabili

CD-I	*CD-I*
CD-DA	*CD-Audio*
PHOTO-CD	*Photo CD*
CD-I READY	*CD-I READY*
CD BRIDGE	*CD-I BRIDGE*
CD+GRAPHICS	*CD+GRAPHICS*

Power requirement • Alimentation • Alimentacion • Alimentación Voedingsspanning • Netzanschluß • Alimentazione
Europe: 220-230 V/50 Hz USA: 120 V/60 Hz
UK: 240 V/50 Hz Japan: 100 V/50,60 Hz

Power consumption • Consommation • Consume de corriente Opgenomen vermogen • Leistungsaufname • Consumo di corrente • Consomo de Corriente
35 W with, 22 W without extension (22ER9141)
35 W avec, 22 W sans extension (22ER9141)

Operating temperature • Temperature de fonctionnement Temperatura de operacion • Bedrijfstemperatuur Betriebstemperatur • Temperatura di fonzionamento • Temperatura de funcionamiento
41°F(5°C) to 95°F(35°C)
5°C à 35°C

Relative humidity • Humidité relative • Humedad relative Relatieve vochtigheid • Relative Feuchtigkeit • Umidità relativa • Humedad relativa
5% to 95% (no condensation)
5% à 95% (sans condensation)

Weight • Poids • Peso • Gewicht • Gewicht • Peso • Peso
5,2 kg

Dimensions (w x h x d) • Dimensions (l x h x p) Dimensiones (a x a x p) • Afmetingen (b x h x d) Abmessungen (B x H x T) • Dimensioni (l x h x p) • Dimensiones (anch. x alt. x prof.)
420 mm x 90 mm x 286 mm
16.55" x 3.55" x 11.25"

Input • Entrée • Entrada • Ingang • Eingang • Ingresso • Entradas

remote in: 2 V_{pp} at 2.2 kOhm cinch socket
Prise cinch 2 V_{c-c} à 2,2 kOhm

input: (2 ports) 8-pin mini-DIN
(2 entrées) mini DIN 8 broches

pin *Broche*	signal *Signal*	I/O *E/S*
1	nc	
2	rxd	I / *E*
3	txd	O / *S*
4	nc	
5	ground / *Masse*	
6	cts	I / *E*
7	rts	O / *S*
8	+5V (200 mA maxi.)	

Note: Pointing device speed of 9600 baud is supported.
Remarque: Vitesse de transmission jusqu' à 9600 baud. • Nota: Se admite un dispositivo de puntero de 9600 baudios de velocidad. • Opmerking: Voor de aanwijsapparaten is een snelheid van 9600 baud mogelijk. • Hinweis: Die Geschwindigkeit der Zeigevorrichtung von 9600 baud wird unterstützt • Nota: Tollera la velocità dell'accessorio di comando di 9600 baud. • Nota: Velocidad del dispositivo de apunta admitida: 9600 baudios.

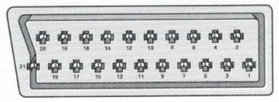
Output • Sortie • Salida • Uitgang • Ausgang • Uscita • Saídas • Salidas

video: 1 V_{pp} (75 Ohm load, sync neg) RCA pin jack
1 V_{c-c} (charge 75 Ohm, sync. nég.) Prise cinch

S-video: y-output 1 V_{pp} (75 Ohms)
c-output 300 mV_{pp} (75 Ohms)
S-video 4-pin miniDIN
Sortie Y 1 V_{c-c} (75 Ohm)
Sortie C 300 mV_{c-c} (75 Ohm)
mini DIN 4 broche S-vidéo

pin *Broche*	signal *Signal*
1	ground y / *Masse Y*
2	ground c / *Masse C*
3	y / *Y*
4	c / *C*

AV/Euroconnector
Péritélévision A/V



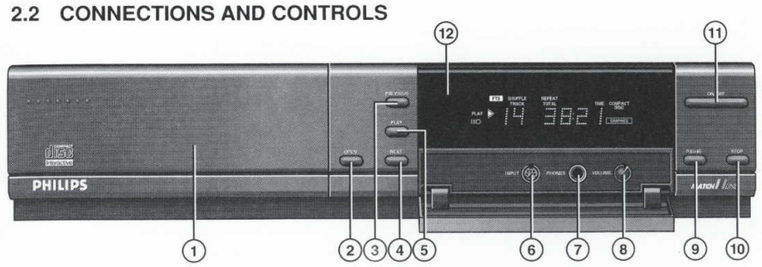
pin *Broche*	signal *Signal*
1	audio R / *audio R (droite)*
2	nc / *non connecté*
3	audio L / *audio L (gauche)*
4	audio ground / *masse audio*
5	blue ground / *masse bleu*
6	nc / *non connecté*
7	blue / *bleu*
8	slow switching (0=TV 1=AV/Euroconnector) *commutation lente (0=TV 1=Péritélévision A/V)*
9	green ground / *masse vert*
10	nc / *non connecté*
11	green / *vert*
12	nc / *non connecté*
13	red ground / *masse rouge*
14	nc / *non connecté*
15	red / *rouge*
16	fast switching (RGB/CVBS) *commutation rapide (RVB/CVBS)*
17	CVBS ground / *masse CVBS (PAL)*
18	fast switching (ground) *commutation rapide (masse)*
19	CVBS/RGB sync / *CVBS/RVB sync.*
20	nc / *non connecté*
21	shield / *blindage*

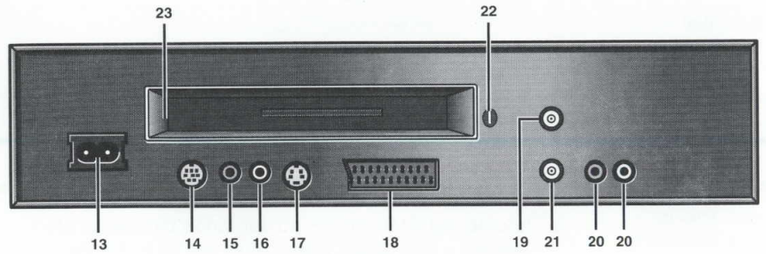
Headphones
Prise Casque: Input impedance 32 Ohm to 2 kOhm output power 30 mW at 1 kHz, 32 Ohm stereo socket 3.5 mm
impédance entrée 32 Ohm à 2 kOhm puissance sortie 30 mW à 1 kHz, 32 Ohm stéréo, prise Jack 3.5 mm

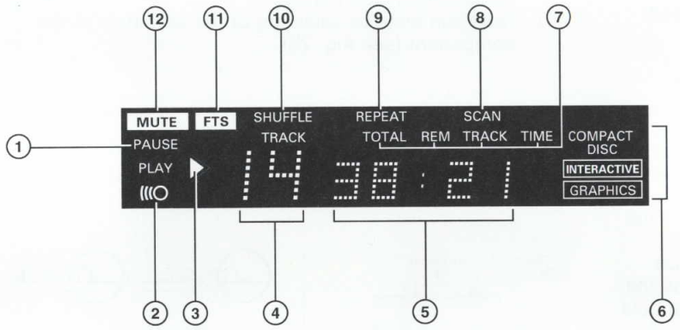
Audio: 2 V_{rms}
2 channel individual RCA pin cinch sockets
2 V_{eff}
2 prises cinch (une par canal)

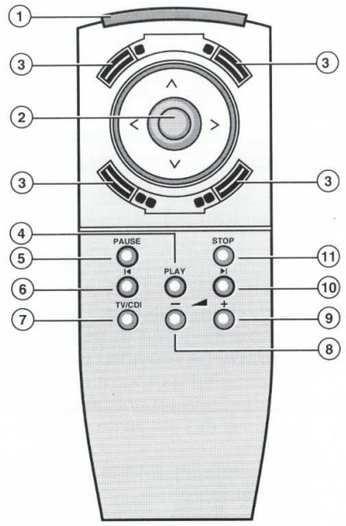
Designs and specifications are subject to change without notice.
La conception et les spécifications de ce produit sont sujet à modifications sans avis préalable. • Los diseños y las especificaciones están sujetos a cambios sin previo aviso. • Änderungen von Ausführung und technische Daten vorbehalten • I disegni e le specifiche tecniche sono soggette a modifiche senza preavviso. • As especificações descitas estão sujeitas a altreação sem aviso prévio. • El diseño y las especificaciones estás sujetos a cambios sin previo aviso.

2.2 CONNECTIONS AND CONTROLS









DESCRIPTION OF CONTROLS AND CONNECTIONS

FRONT
1. Disc loading tray
2. Open/close button
3. Previous track selection button
4. Next track selection button
5. Play button
6. Input port for CD-I pointing devices
7. Headphone jack
8. Headphone volume control
9. Pause button
10. Stop button
11. AC power on/off button
12. Soft tone multifunction display with infra-red remote control receiver

REAR
13. Mains AC (alternating current) input jack
14. Input2 port for CD-I pointing devices, keyboard or RS232 connection
15. Remote control input
16. Video output (CVBS)
17. Y/C (S-video) output
18. A/V Euroconnector*
19. RF OUT*
20. Audio output L
    Audio output R
21. TV Antenna input*
22. Channel selector*
23. Extension socket (for 22ER9141)* Full motion video

DISPLAY PANEL
1. CD pause active
2. Remote control active (flashing indicator)
3. Disc playing (stepping indicator)
4. Track number (CD-Audio)
5. Elapsed or remaining time (CD-Audio)
6. Type of disc indicator
7. Time indicators
8. CD scan active
9. CD repeat active
10. CD shuffle active
11. CD FTS active
12. Mute indicator

REMOTE CONTROL
1. Infra red remote control
2. Thumbstick
3. Action buttons (for left or right handed operation)
4. Play button
5. CD pause button
6. CD previous track selection button
7. Audio mute button - CD-I/TV button*
8. Volume down button
9. Volume up button
10. CD next track selection button
11. CD stop button

*Available on some player versions only.

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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.

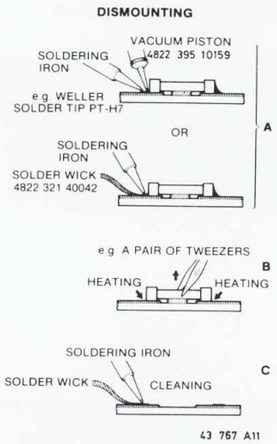


Fig. 1

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).

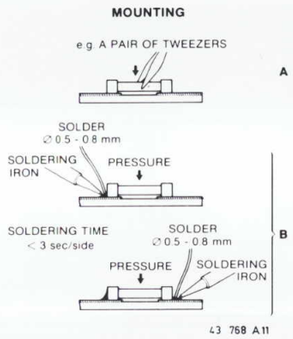


Fig. 2

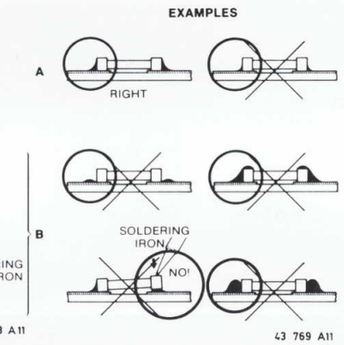


Fig. 3

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)

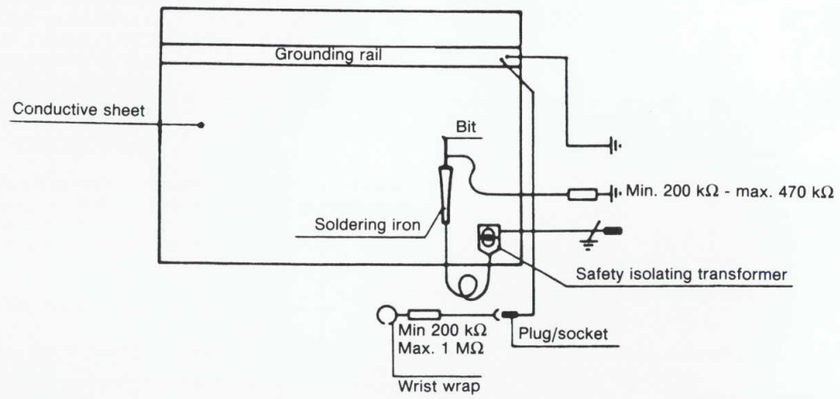
To prevent permanent damages as a result of switch-on phenomena, no ESD-sensitive components, or PCBs populated with these components, should be inserted in or removed from test-sockets or systems with the supply voltage on.
Prevent switching peeks on the mains as a consequence of switching electric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



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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TOOLS TO BE USED

ANTISTATIC MAT

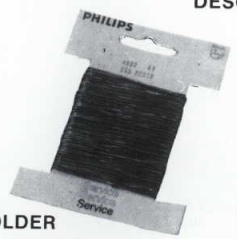
HAIR DRYER

4822 390 50025
FLUX

BRUSH

4822 321 40042
DESOLDER BRAID

SOLDERING IRON
WELLER TCP 50



SOLDER
ø0,5-0,8 MM

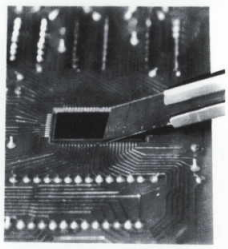
SOLDER TIP
WELLER PT-CC7
4822 310 50081

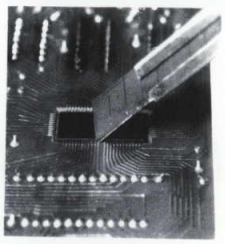
MAGNIFYING GLASS

METAL BRUSH

KNIFE

DISMOUNTING


CUTTING
THE LEADS


WRONG
TRACKS WILL
BE DAMAGED

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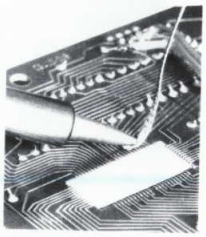
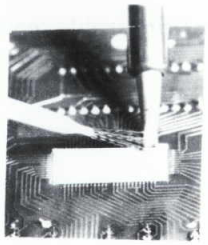
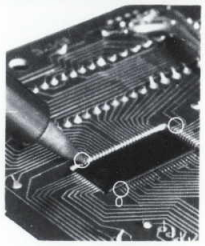
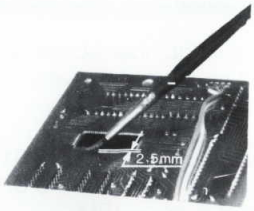

CLEANING
THE TRACKS

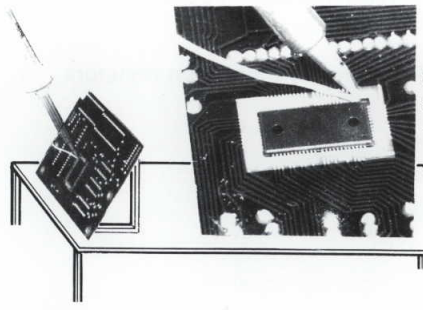


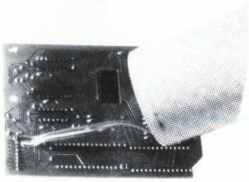
MOUNTING

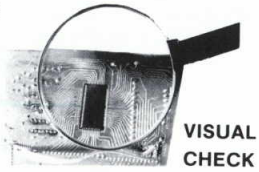

FIXING IC
AT THE CORNERS



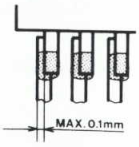
APPLYING FLUX


SOLDERING:
SPEED
1 CM IN 5 SEC.

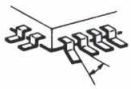

DRYING

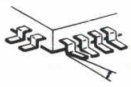

VISUAL
CHECK

ALIGNING THE LEADS

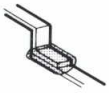


RIGHT

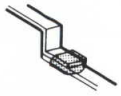

WRONG


WRONG

SOLDERING


RIGHT

WRONG


WRONG

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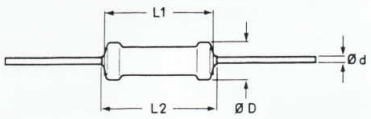
CODENUMBERS FOR STANDARDIZED RESISTORS

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...

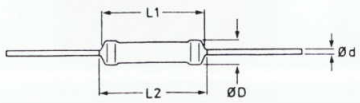
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

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

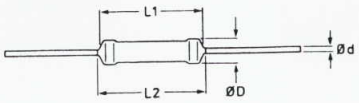
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ
is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ
is 4822 053 21336

PR01, PR02 and PR03 power metal film resistors

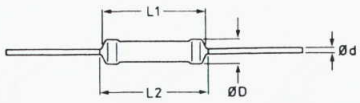
ϕD_{max}	L1	$L2_{max}$	ϕd
2.5	6.5	8.0	0.6



ϕD_{max}	$L1_{max}$	$L2_{max}$	ϕd
3.9	10	11	0.8



ϕD_{max}	$L1_{max}$	$L2_{max}$	ϕd
5.2	16.7	17.9	0.8



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

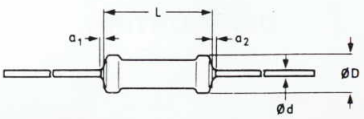
Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

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

NFR25 fusible resistors ⚠



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

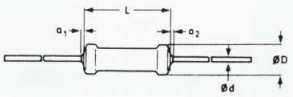
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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

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3.4 CODENUMBERS FOR STANDARDIZED RESISTORS

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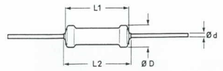
VR25, VR37 high-ohmic/high -voltage resistors



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:
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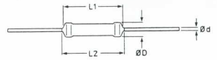
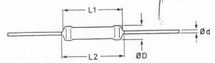
PR01, PR02 and PR03 power metal film resistors

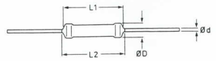
$øD_{max}$	L1	$L2_{max}$	ød
2.5	6.5	8.0	0.6



$øD_{max}$	$L1_{max}$	$L2_{max}$	ød
3.9	10	11	0.8



$øD_{max}$	$L1_{max}$	$L2_{max}$	ød
5.2	16.7	17.9	0.8



Rated dissipation at T(amb) = 70 degrees :
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1 for R= 100 to 910 Ω
2 for R= 1 to 9,1 KΩ
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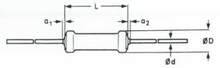
4 for R= 100 to 910 KΩ
5 for R= or > 1 MΩ

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

NFR25 fusible resistors ⚠



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

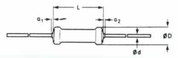
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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

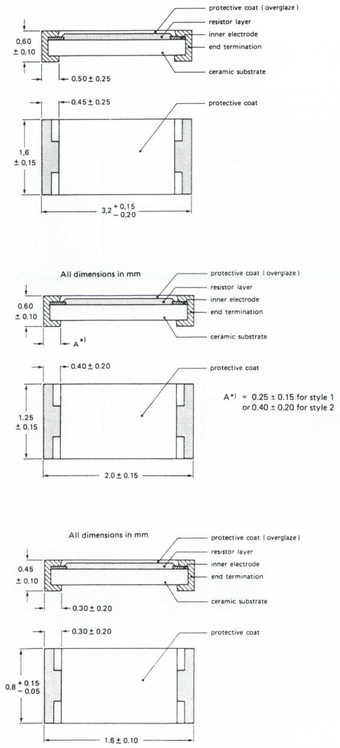
Composition of the service number for the NFR25H
Main subgroup: 4822 052 11...

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.

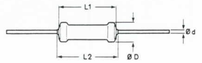
8 for R= 0 to 9.1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9.1 KΩ
3 for R= 10 to 91 KΩ
4 for R= 100 to 910 KΩ
5 for R= 1 to 9.1 MΩ
6 for R= or > 10 MΩ

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



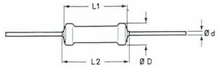
D	L	L2 max.	d
1,7 +0,2 −0,1	3,5 +0,2 −0,15	3,7	0,5 −0,04

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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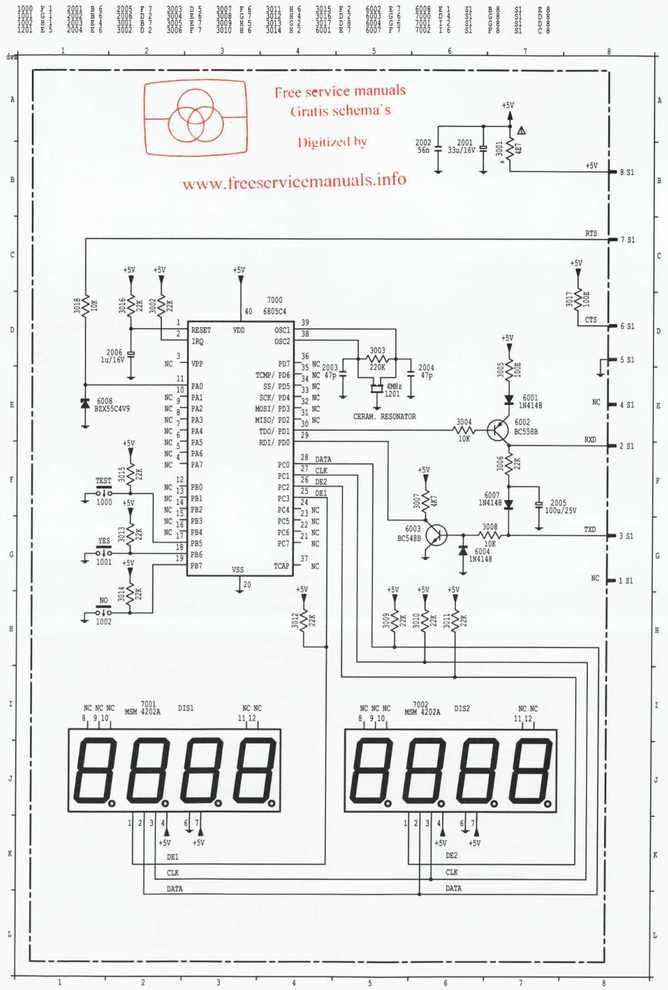
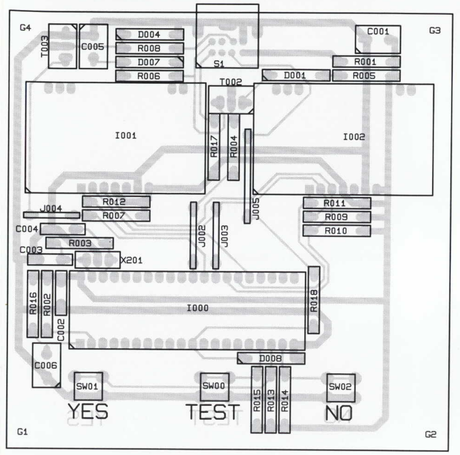
3.5 SERVICE TOOLS

3.5.1 Service PCB

3.5.1.1 Circuit diagram



3.5.1.2 Layout



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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	µF/16V	4822 124 20688
2002	56	nF	4822 121 41154
2003	47	pF	4822 122 31072
2004	47	pF	4822 122 31072
2005	100	µF/25V	4822 124 20701
2006	1	µF/63V	4822 124 20722
3001	4,7	Ω	4822 052 10478
3002	22	KΩ	4822 050 22203
3003	220	KΩ	4822 050 22204
3004	10	KΩ	4822 050 21003
3005	100	Ω	4822 050 21001
3006	22	KΩ	4822 050 22203
3007	4,7	KΩ	4822 050 24702
3008	10	KΩ	4822 050 21003
3009	22	KΩ	4822 050 22203
3010	22	KΩ	4822 050 22203
3011	22	KΩ	4822 050 22203
3012	22	KΩ	4822 050 22203
3013	22	KΩ	4822 050 22203
014	22	KΩ	4822 050 22203
3015	22	KΩ	4822 050 22203
3016	22	KΩ	4822 050 22203
3017	100	Ω	4822 050 21003
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(male)		4822 267 31289
Plug	8 a mini DIN (Female)		4822 264 50262

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3.5.2 LIST OF ACCESSORIES AND SERVICE TOOLS

Item	Codenumber	Description
1	4822 395 50145	TORX SCREW DRIVER SET
2	4822 214 52007	LOW-LEVEL- TEST PANEL ASSY
3	4822 321 61677	CABLE FOR TEST PANEL
4	4822 264 50263	PLUG FOR STARTUP OF SERVICESHELL ON PORT 2 (BU 2)
5	4822 397 30096	AUDIO TESTDISC SET
6	4822 397 30155	TESTDISC WITH CONTINOUS 1KHz SIGNAL 70 MIN.
7	4822 397 30184	AUDIO SIGNALS DISC
8	4822 701 11922	SKEW DISC 0,6
9	4822 701 11923	EXCENTRICITY DISC 150 I
10	4822 691 30293	ROLLER CONTROLLER
11	4822 691 30298	TRACKER BALL
12	4822 691 30299	JOY STICK
13	4822 691 30297	MOUSE

3.5.2.1 PARTSLIST FOR ROLLERCONTROLLER

Item	Codenumber	Description
1	4822 321 61841	CABLE ASSY
2	4822 413 90093	BALL
3	4822 276 13359	SWITCH
4	4822 410 62427	KEYTOP-LEFT
4	4822 410 62428	KEYTOP-RIGHT
5	4822 492 42645	SPRING

3.6 THE MONOBOARD CENTRAL REPAIR PROCEDURE

In case of a defect on the Multi Media Controller (see Blockdiagram) 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 Monoboard:

Version	Codenumber
/20	4822 214 52065
/25	4822 214 52068
/31	4822 214 52069
/37	4822 214 52056
/39	4822 214 52066

- 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, then boards are not accepted and the return price will not be credited !!!

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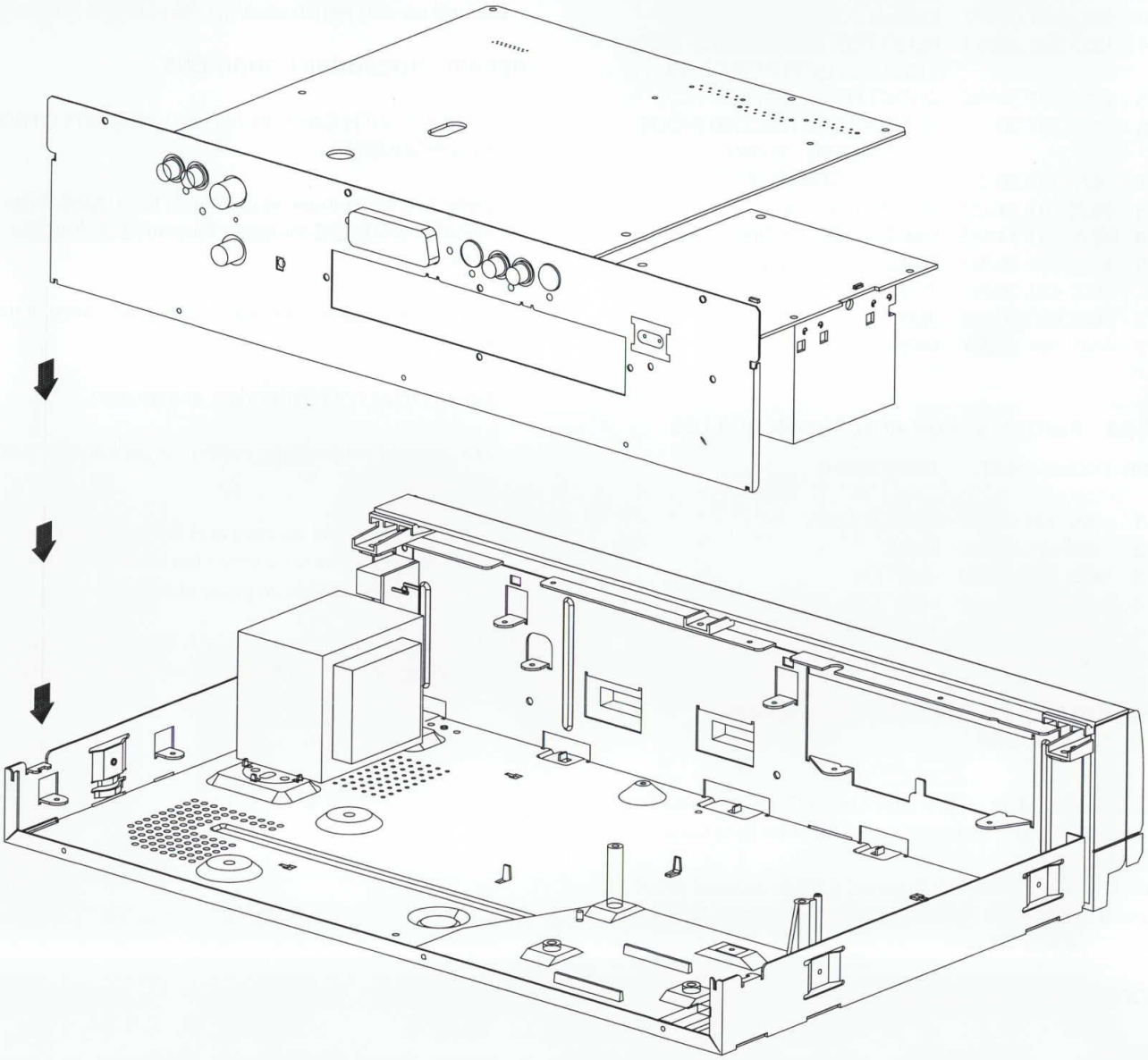
4 MECHANICAL DRAWINGS AND PARTS LIST

4.1 SERVICE POSITIONS



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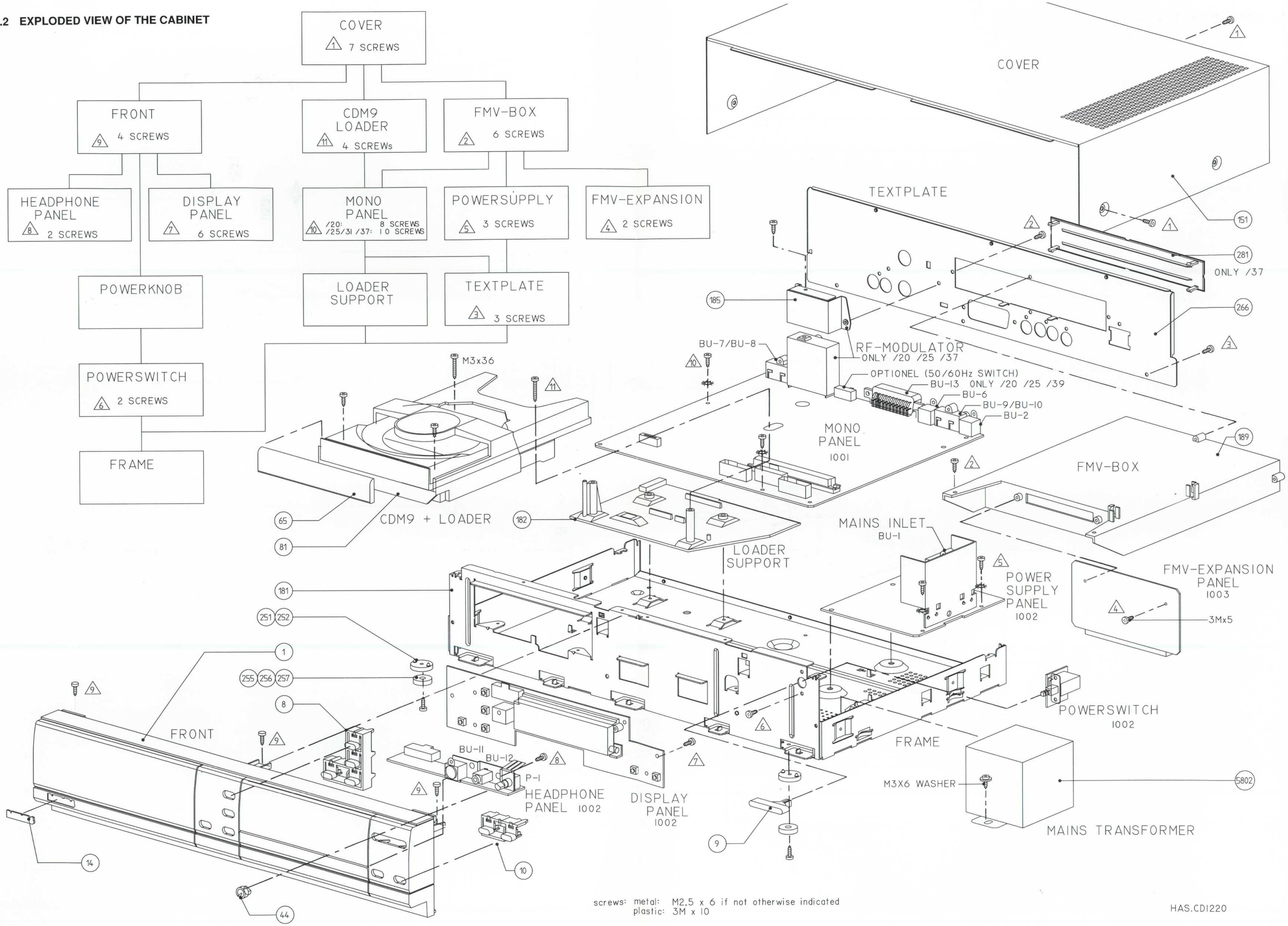
4.2 EXPLODED VIEW OF THE CABINET



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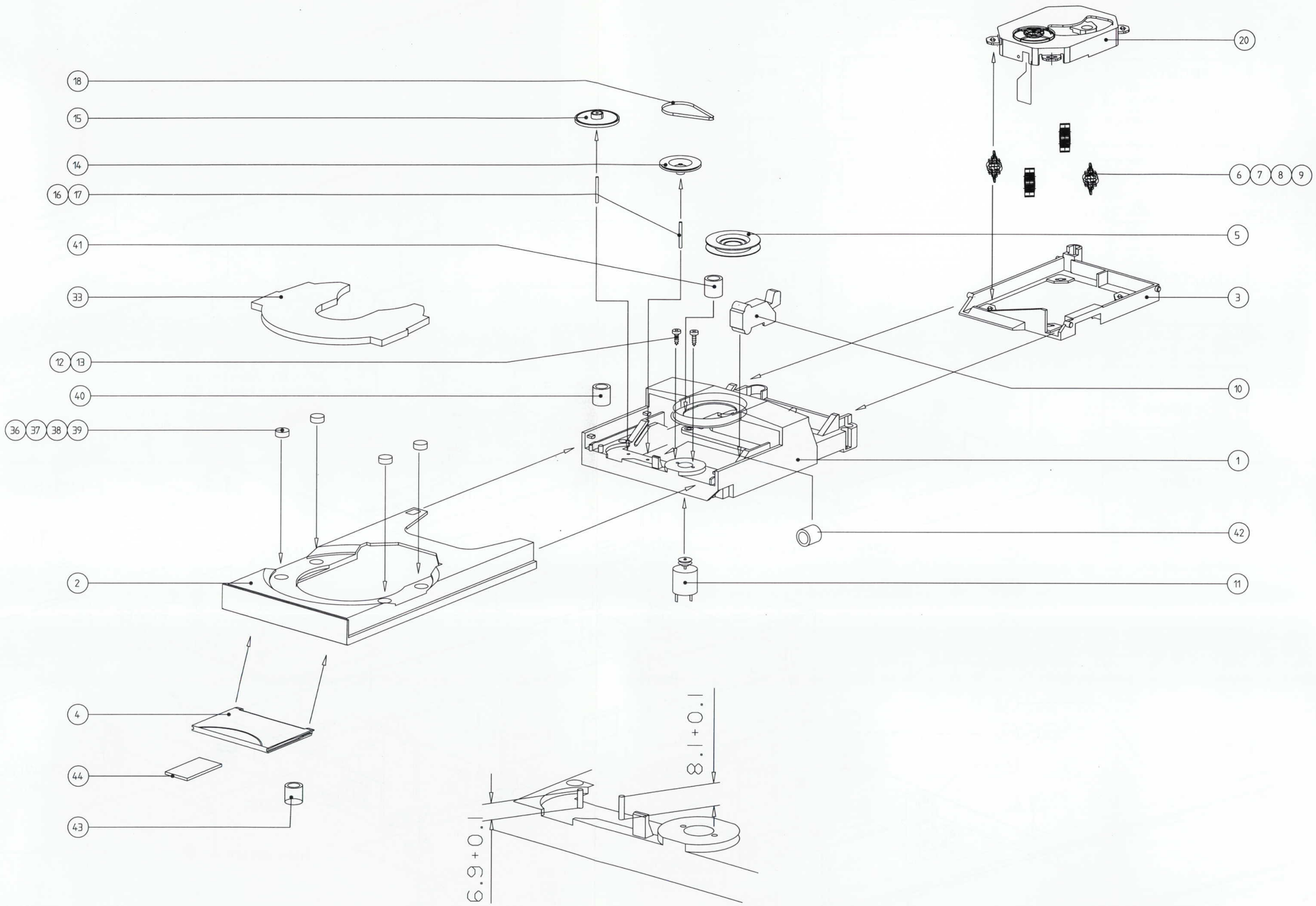
4.3 EXPLODED VIEW OF LOADER



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5 SERVICE SOFTWARE

In the set there are 3 different testsoftware available:

1. FTD-display/keyboard test
2. Low Level test
3. Service Shell

5.1 THE FTD-DISPLAY/KEYBOARD TEST

Scope
This testfeature includes following tests:
- FTD filament test
- Player keyboard test
- NVDS signal test
  (The NVDS signal is to switch on/off to the FMV mode)

5.1.1 Test sequence

- To startup this test press the 'PAUSE' button on the front of the player while switching on the power. After approximately 5 seconds a '0' will appear on the FTD. Now the test software is activated.
- First test, the keyboard test. Now all front keys should be pressed one by one in a proper sequence. Every time the correct key is pressed, the counter on the FTD will increment by one.
  The correct sequence is :

  1. EJECT
  2. PREVIOUS TRACK
  3. PLAY
  4. NEXT TRACK
  5. PAUSE
  6. STOP

After this, if any key is pressed then the FTD test will startup. In this test also the remote control player-control-keys can be used.

- **Second test**, the FTD/NVDS test. By using any key (remote or on the front of the player) except the 'PLAY' will toggle all FTD filaments on and off. Simultaneously the NVDS signal, which is an internal signal will be toggled. This can be noticed by looking to the TV or monitor screen, the picture on the screen will dissapear at the toggling of NVDS.

- **To continue and go to the normal mode just press 'PLAY'.**
  Now the player shell will be started and the player can be operated normally again.

5.2 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. The Low Level test in Menu driven.

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:

- Display header and release number.
- VSC init
- ROM
- NVRAM
- DRAM
- CDIC
- SLAVE processor (68HC05)
- Clock Calibration (only for Terminal Low Level test)
- ATTEX (only for Terminal Low Level test)
- X-bus

5.2.1 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

5.2.2 Testsquence

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

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

STEP	ACTION/TEST PERFORMED
0	Exit Low Level test
1	Writing to a default RAM address
2	ROM parity check
3	NVRAM test
4	DRAM test
5	CDIC test
6	Slave processor test
7	Clock Calibration
8	ATTEX test
9	X-bus test

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5.2.3 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 15k 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.
   If the character receved was a space ($20) the start the terminal lltest.
   If the character received was an ACK ($06) the start the pcb lltest.
5. Else start the normal player boot.

The UART is connected to I/O port 2

5.2.4 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.

5.2.5 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 : VDSC

STEP 0A0B : VDSC channel 1&2 registers

display: 0A0B

In this step some registers of the VDSC Channel 1&2 are initialized.

STEP 1 : ROM

In this step the contents of the ROM is checked.
Following tests are done on the ROM :

1. Display ID byte and release number of this ROM. (test A)
   format 'IDxxRLyy'
3. Check if the parity of the ROM is OK. (test C)

STEP 1 : ROM

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

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

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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 chip1 and chip2 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 256k. So for the full range it counts from 1 to 4.

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 CHIP1

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

STEP 7B : TEST DRAM CHIP1 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 CHIP2

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

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STEP 8B : TEST DRAM CHIP2 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

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 inver ted 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

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 RLxx

For a moment the slave release number is displayed

STEP 10D : READ AND DISPLAY CD RELEASE NUMBER

display: 10D RLxx

Wait until a key is pressed.
Read the next byte: this is a dummy read.

STEP 11 : X-BUS TEST

This test checks the Xbus communication from DSP to servo processor. First it writes a transparent command into the CIDIC memory. The servo processor receives it by the X bus and returns the command via the SPI bus to the slave processor. The given command is then returned by the slave to the testsoftware.

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STEP 11A : XBUS TRANSPARENT COMMAND TO CIDIC

display : 11A

In this step atransparent Xbus test command is written to CIDIC. CIDIC will transfer this command to the servo processor via the Xbus.

STEP 11B : READ ACKNOWLEDGE FROM THE SLAVE

display : 11B

In this step the following actions take place :

1. Wait about 2 sec to give the slave the time to acknowledge.
2. If the acknowledge is $A4 $7A $3B $1C then continue
   else give an error and stop testing.

   If error,
   display : 11b Er21

STEP	DESCRIPTION
0a	VDSC channel 1 initialization
0b	VDSC channel 2 initialization
1a	ROM identification release number
1c	ROM checksum check
5	NVRAM test with rom data as data
6af	DRAM fill chip1&chip2 with address as data
6ar	DRAM read and compare data
6bf	DRAM fill chip1&chip2 with inverted add. as data
6br	DRAM read and compare data
7af	DRAM fill chip1 with address as data
7ar	DRAM read and compare
7bf	DRAM fill chip1 with inverted address as data
7br	DRAM read and compare data
8af	DRAM fill chip2 with address as data
8ar	DRAM read and compare
8bf	DRAM fill chip2 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
11a	Xbus test write command to CIDIC
11b	Xbus test read response from servo in Slave µP

Table 1 : PCB LLTEST steps overview

.5.2.6 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
In this step the VDSC is initialized in the same way as in the pcb lltest.

ITEM 0 : EXIT LOW LEVEL TEST

Selecting this item will end the lltest and continue with the boot. After the boot the player shell is started up.

ITEM 1 : Writing to a default 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 and the system will hang up.

ITEM 2 : ROM parity check

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.

ITEM 3 : NVRAM test

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.

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ITEM 4 : DRAM

The dram test is always a destructive test. The test is performed for both ram CHIP1 and CHIP2 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.

ITEM 5 : CDIC

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

ITEM 6 : 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.

ITEM 7 : 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 pin34 of IC7304 (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 pin34 of IC7304 will not be changed or influenced.
- The calibration is done now.

ITEM 8 : ATTEX test

This step is only intended to be used with an oscilloscope. The software will generate a pattern on some ATTEX pins. These pins and their signals are described below. It is not guaranteed that this test always runs. If one of the devices connected to the ATTEX is defective (no DTACK) it will surely result in a hang-up of the testsoftware.
Within this test the following selections can be made:

0. Exit ATTEX menu
   Exit the menu for ATTEX test and go back to main menu.

1. Generate full range VDSC-cs
   Generate Chip Selects in the Complete VDSC address range.
   Addres range : $000000 - $47FFFF

2. Generate full range CIDIC-cs
   Generate Chip Selects in the Complete CIDIC address range.
   Range : CIDIC base address - (CIDIC base address + $FFFF)

3. Generate full range Slave-cs
   Generate Chip Selects in the Complete slave processor address range.
   Range : Slave base address - (Slave base address + $7777).

4. Generate full range NVRAM-cs
   Generate Chip Selects in the complete NVRAM address range.
   Range : NVRAM base address - (NVRAM base address + $1FFFF)

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5. Generate KillME and DMAEN (toggle)
   Generate a toggle function for the KILLME and DMAEN signals in their complete address range.
   Range : base address - (base address+$7FFF)

ITEM 9 : X-BUS test

This tests the X-bus between DSP and servo processor. It assumes that the SPI communication channel between slave processor and servois working correctly. First it writes a X-bus test command into the CIDIC command register (transparent mode). The DSP will send this command via the X-bus to the servo processor. The servo processor recognizes this X-bus test command and sends it back via the SPI bus to the slave processor. If the X-bus test command is received by the slave processor correctly then the test was successful, if not then something could be wrong with the X-bus in such a case an error is displayed.

5.2.7 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 RETURN button is pressed, the next address will be read and checked. With this output it will be easier to debug the MONOboard
- 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	Xbus transfer error	Er21

Table 2. Error codes overview

5.2.8 RELEASE NUMBER, ID 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-$7FFFF)
MONO address range for the 1Mb :
$400000-$47FFFF)

ROM address	$7FFFF =	LSByte of the checksum
	$7FFFE =	MSByte of the checksum
	$7FFFD =	Release number of this ROM (BCD coded)
	$7FFFC =	Player ID (BCD coded)
MONO address	$47FFFF =	LSByte of the checksum of the ROM
	$47FFFE =	MSByte of the checksum of the ROM
	$47FFFD =	Release number of the ROM (BCD coded)
	$47FFFC =	Player ID (BCD coded)

5.2.9 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 $400000 to $47FFFD
ROM checksum displayed in STEP 1 =
ROM checksum + (LSB + MSB) of this checksum.
This is also equal to the checksum of the complete ROM.

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5.3 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.

5.3.1 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).

5.3.2 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.

5.3.3 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.

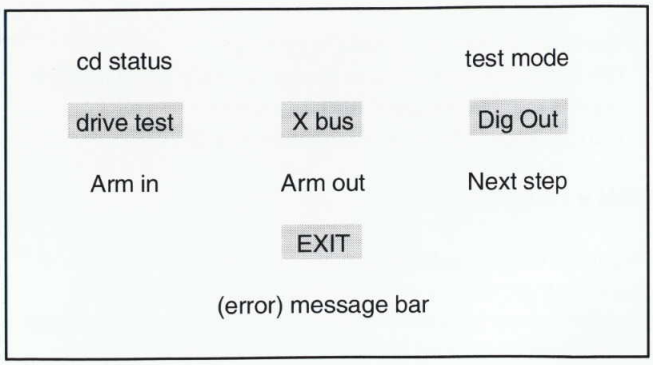

Fig 3.2 CD test menu

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.

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Mode 2

The turntablemotor is rotating and controlledby 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 consumer players

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 buttonon 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.

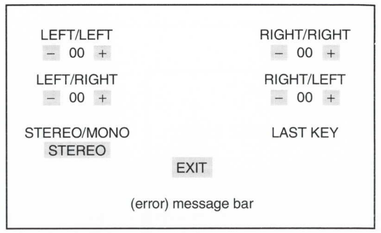


Fig 3.4 APU test menu

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...

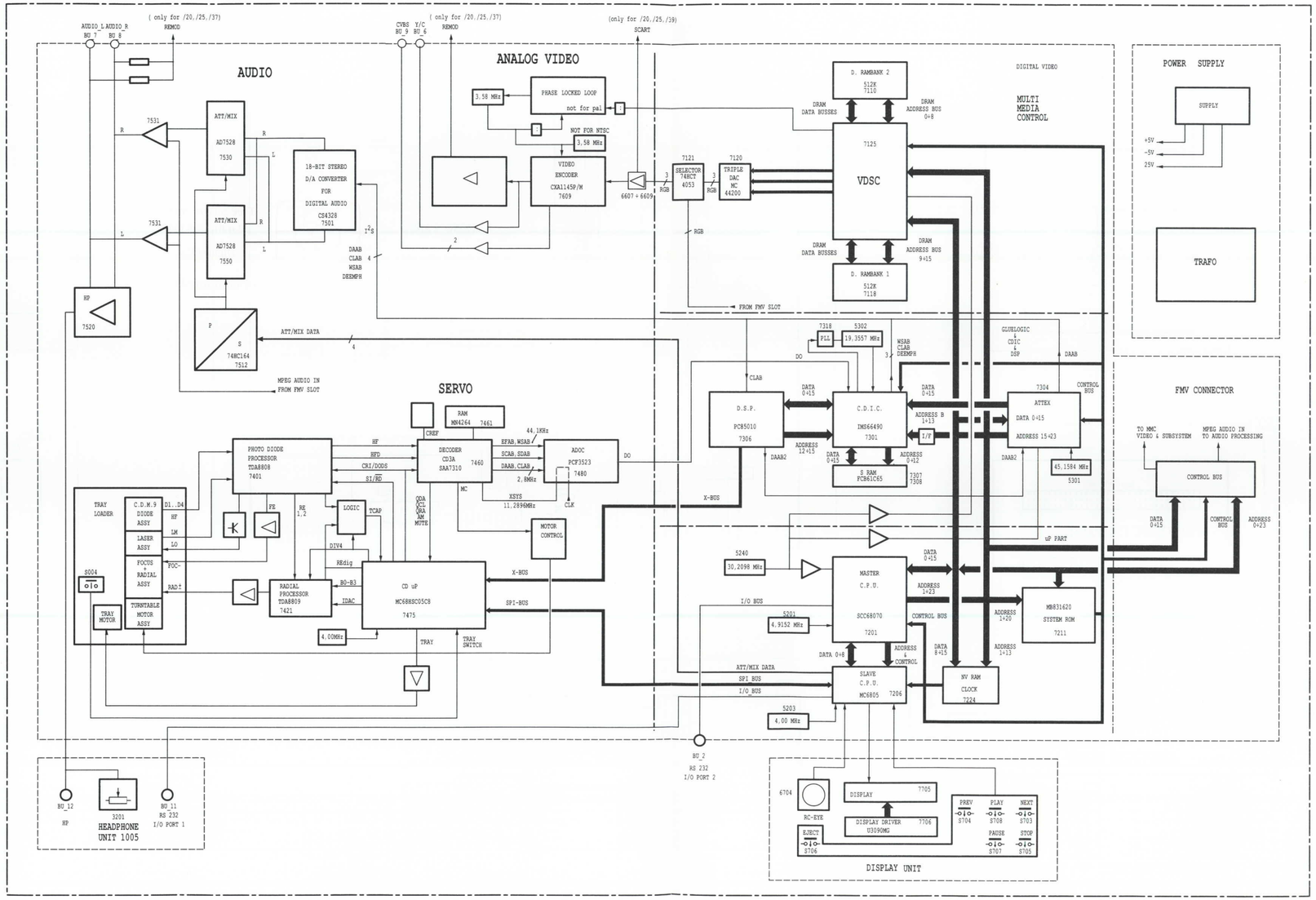
This paragraph will describe the meaning of the error messages given by the service shell and contains suggestions about possible errors. This paragraph must be updated with new information from testing and debugging players.

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 player-shell 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.

6 ELECTRICAL DRAWINGS

6.1 BLOCK DIAGRAM



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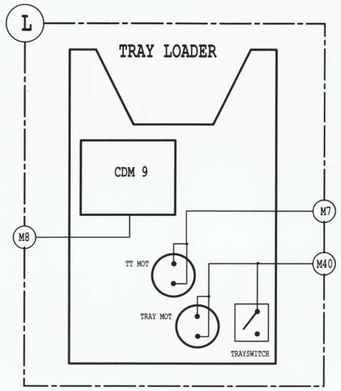
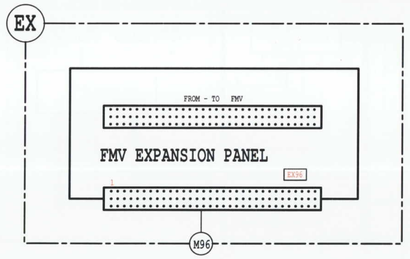
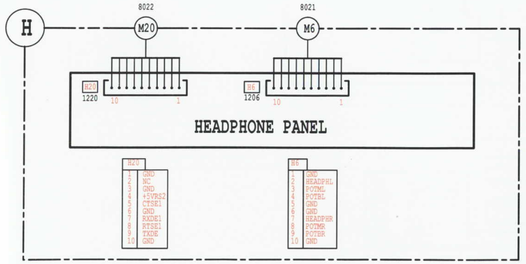
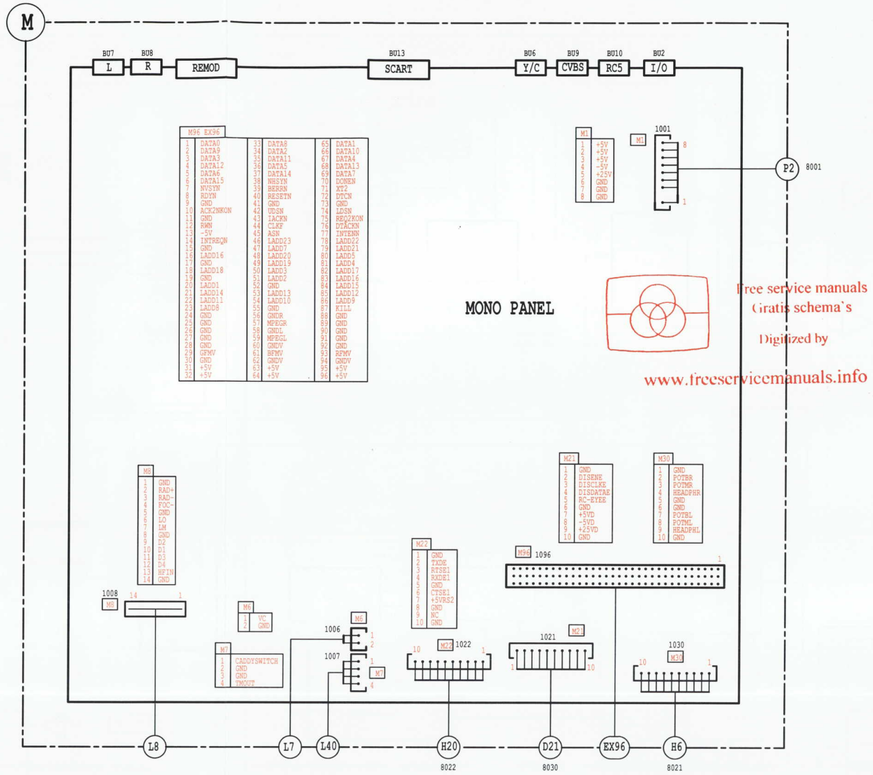
6.2 WIRING DIAGRAM









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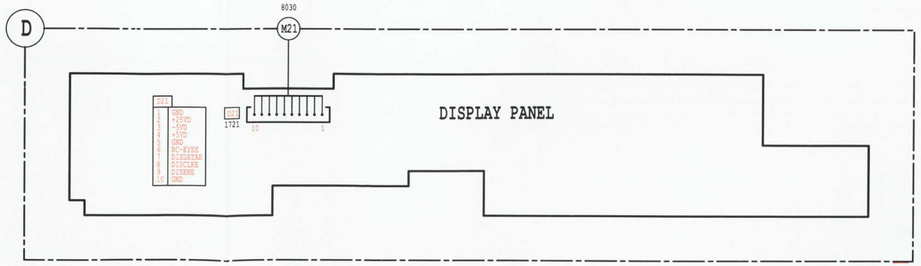

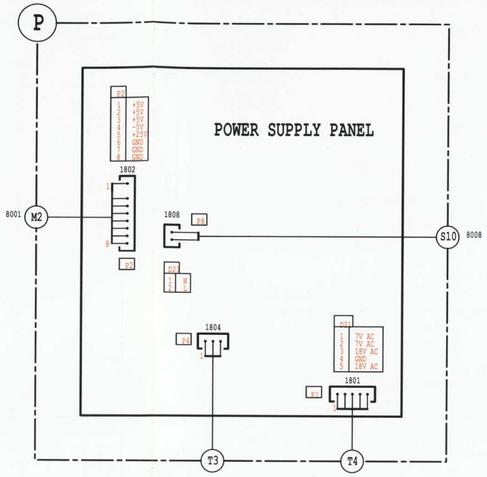

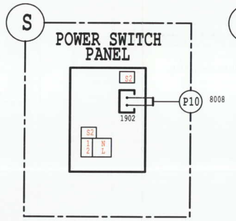

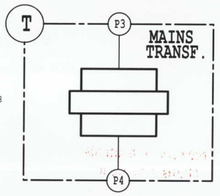

6.2.1 Alphabetical signal listing

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

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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 I²S 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

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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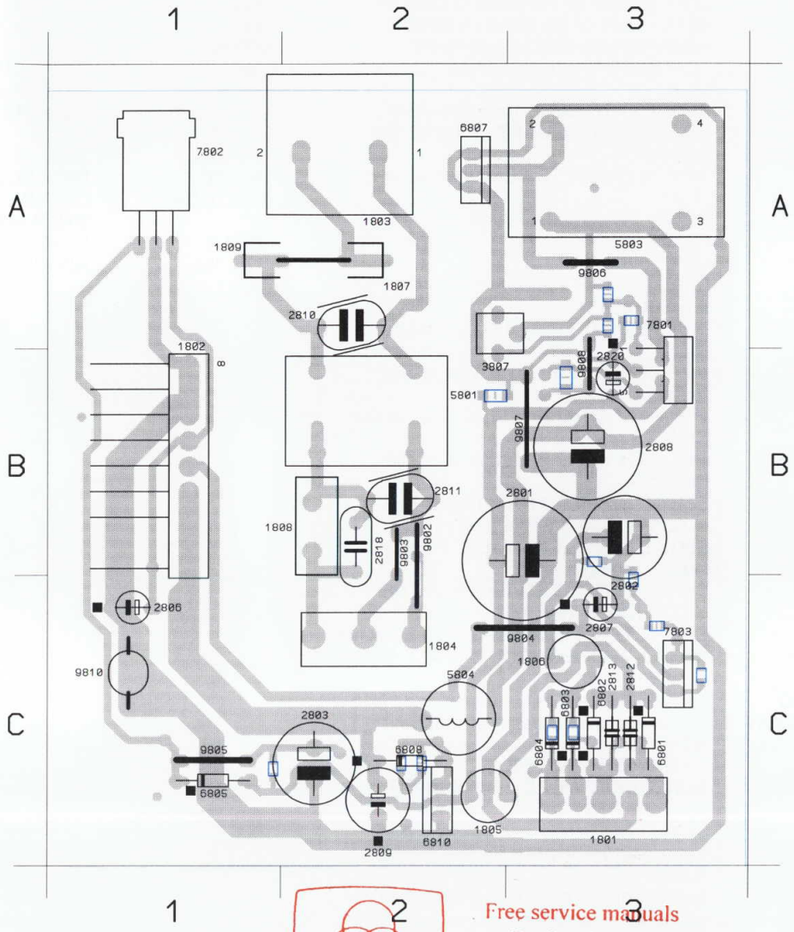
6.3 POWER SUPPLY PANEL

6.3.1 Power supply PCB
Component side view

1801 C 3	1809 A 1	2806 C 1	2813 C 3	2820 B 3	3807 A 2	6803 C 3	7802 A 1	9807 B 3
1802 B 1	1810 B 2	2807 C 3	2814 C 1	3801 C 3	3808 C 2	6804 C 3	7803 C 3	9808 A 3
1803 A 2	2801 B 2	2808 B 3	2815 C 2	3802 C 3	5801 B 2	6805 C 1	9802 B 2	9810 C 1
1804 C 2	2802 B 3	2809 C 2	2816 C 3	3803 C 3	5803 A 3	6807 A 2	9803 B 2	
1805 C 2	2803 C 2	2810 A 2	2817 C 3	3804 A 3	5804 C 2	6808 C 2	9804 C 2	
1806 C 3	2804 B 3	2811 B 2	2818 B 2	3805 A 3	6801 C 3	6810 C 2	9805 C 1	
1807 A 2	2805 B 3	2812 C 3	2819 B 2	3806 A 3	6802 C 3	7801 A 3	9806 A 3	



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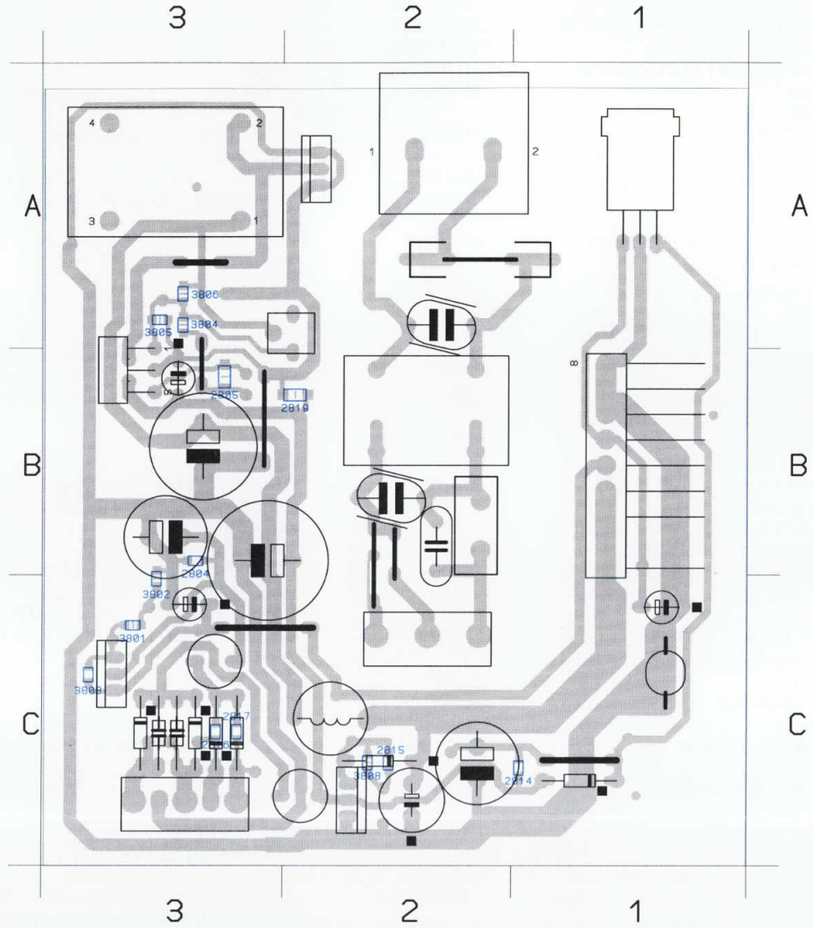
Power supply PCB
Coppertrack side view

9807 B 3	7802 A 1	6803 C 3	3807 A 2	2820 B 3	2813 C 3	2806 C 1	1809 A 1	1801 C 3
9808 A 3	7803 C 3	6804 C 3	3808 C 2	3801 C 3	2814 C 1	2807 C 3	1810 B 2	1802 B 1
9810 C 1	9802 B 2	6805 C 1	5801 B 2	3802 C 3	2815 C 2	2808 B 3	2801 B 2	1803 A 2
	9803 B 2	6807 A 2	5803 A 3	3803 C 3	2816 C 3	2809 C 2	2802 B 3	1804 C 2
	9804 C 2	6808 C 2	5804 C 2	3804 A 3	2817 C 3	2810 A 2	2803 C 2	1805 C 2
	9805 C 1	6810 C 2	6801 C 3	3805 A 3	2818 B 2	2811 B 2	2804 B 3	1806 C 3
	9806 A 3	7801 A 3	6802 C 3	3806 A 3	2819 B 2	2812 C 3	2805 B 3	1807 A 2



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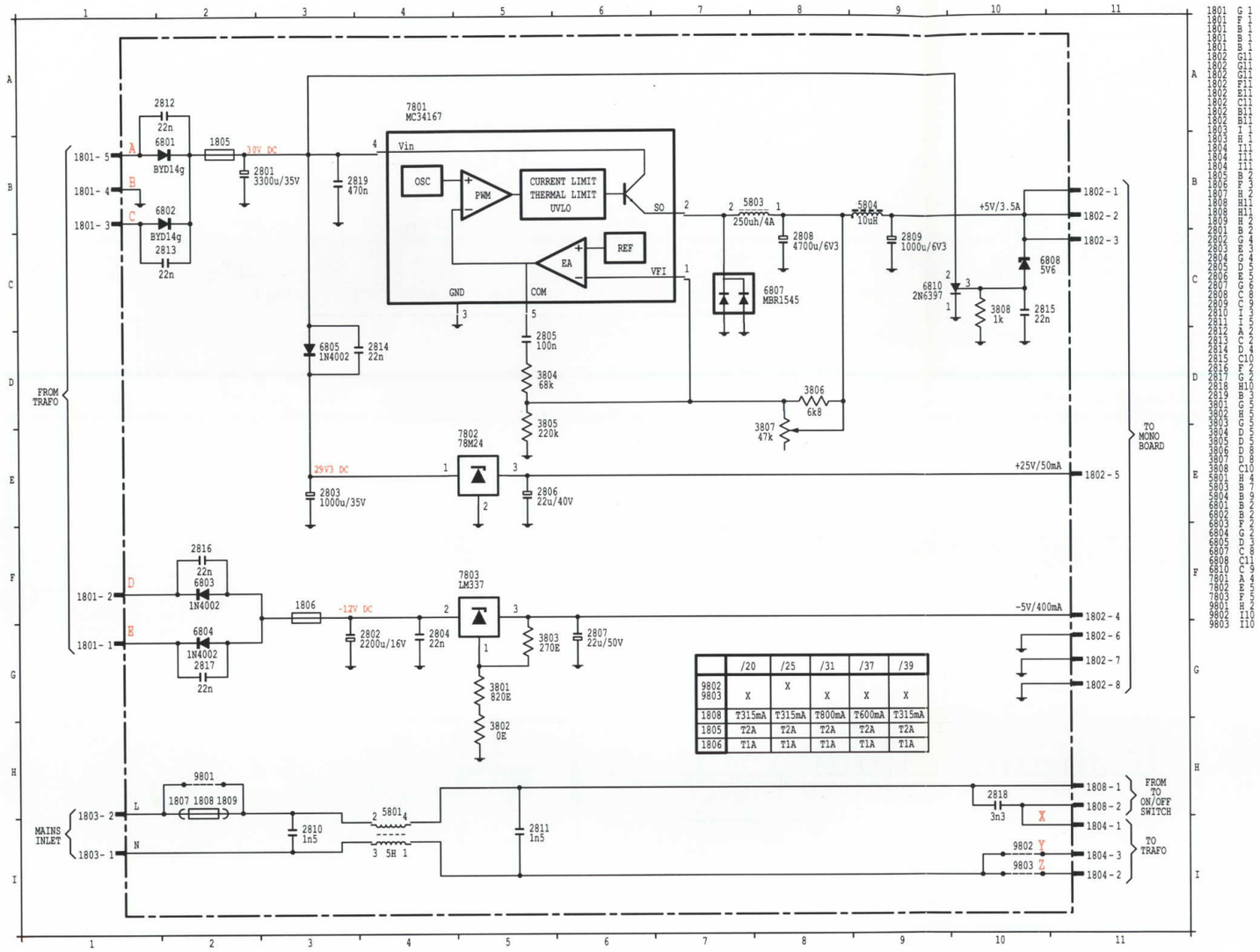
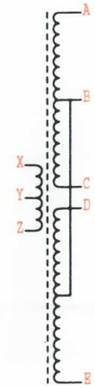
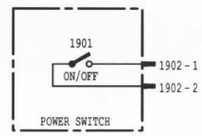
6.3.2 Power supply Circuit diagram



	/20	/25	/31	/37	/39
9802 9803	X	X	X	X	X
1808	T315mA	T315mA	T800mA	T600mA	T315mA
1805	T2A	T2A	T2A	T2A	T2A
1806	T1A	T1A	T1A	T1A	T1A





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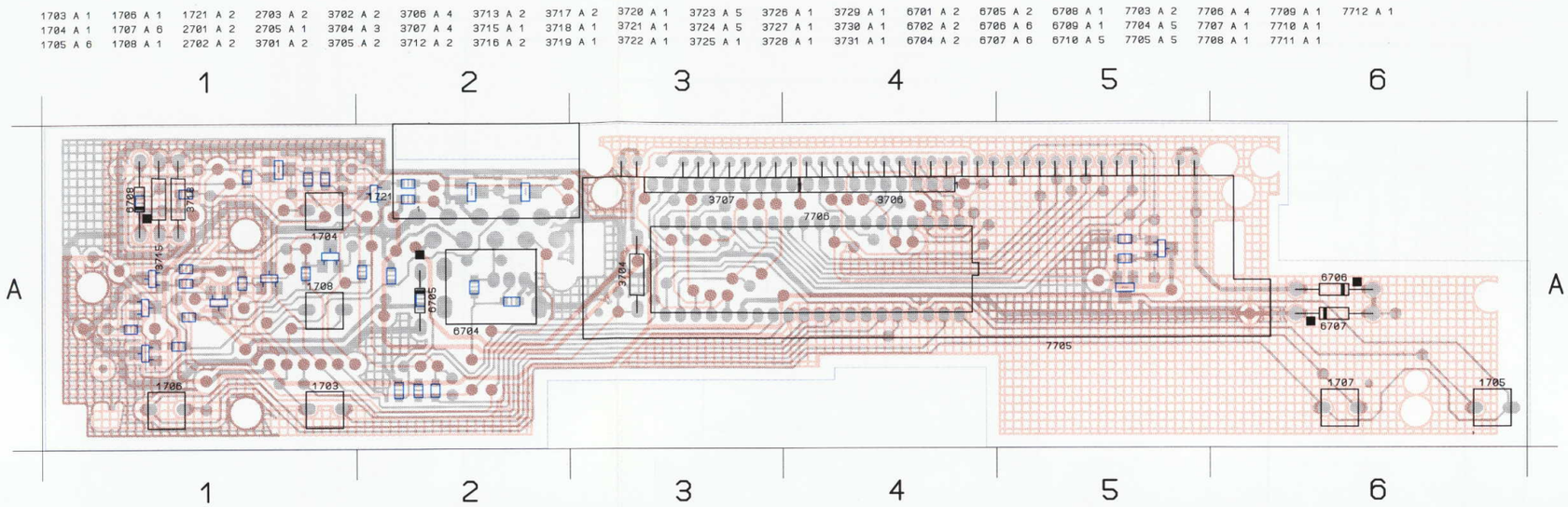
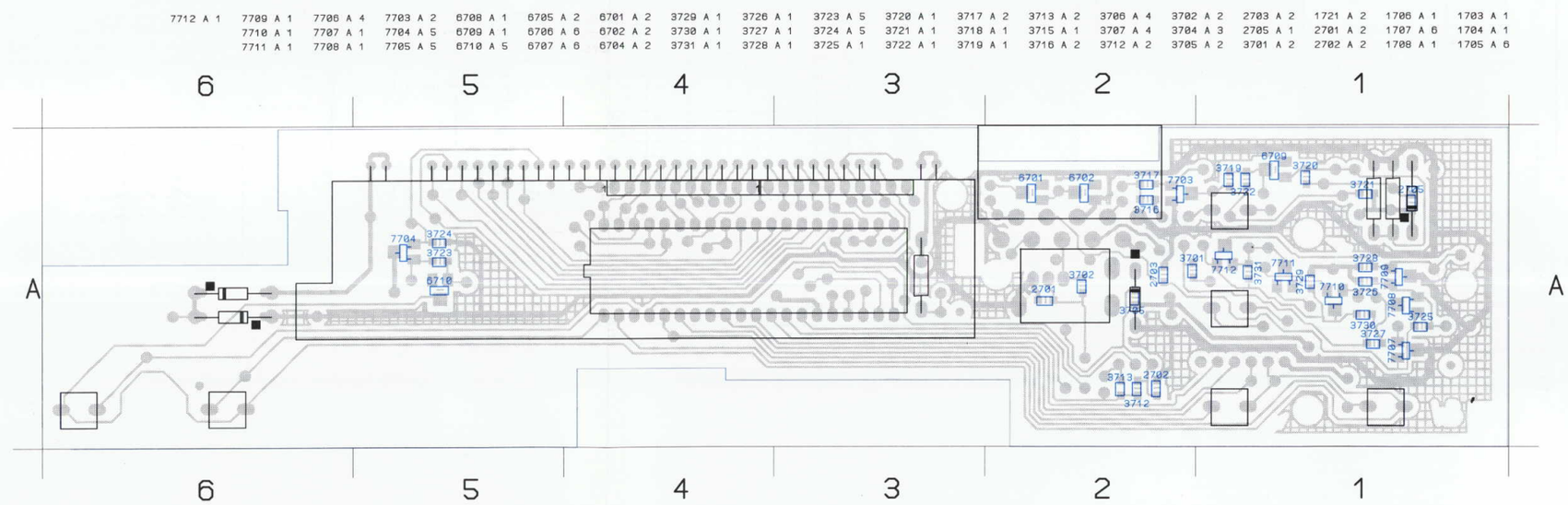
6.4 CONTROL & DISPLAY PANEL

6.4.1 Control & Display PCB





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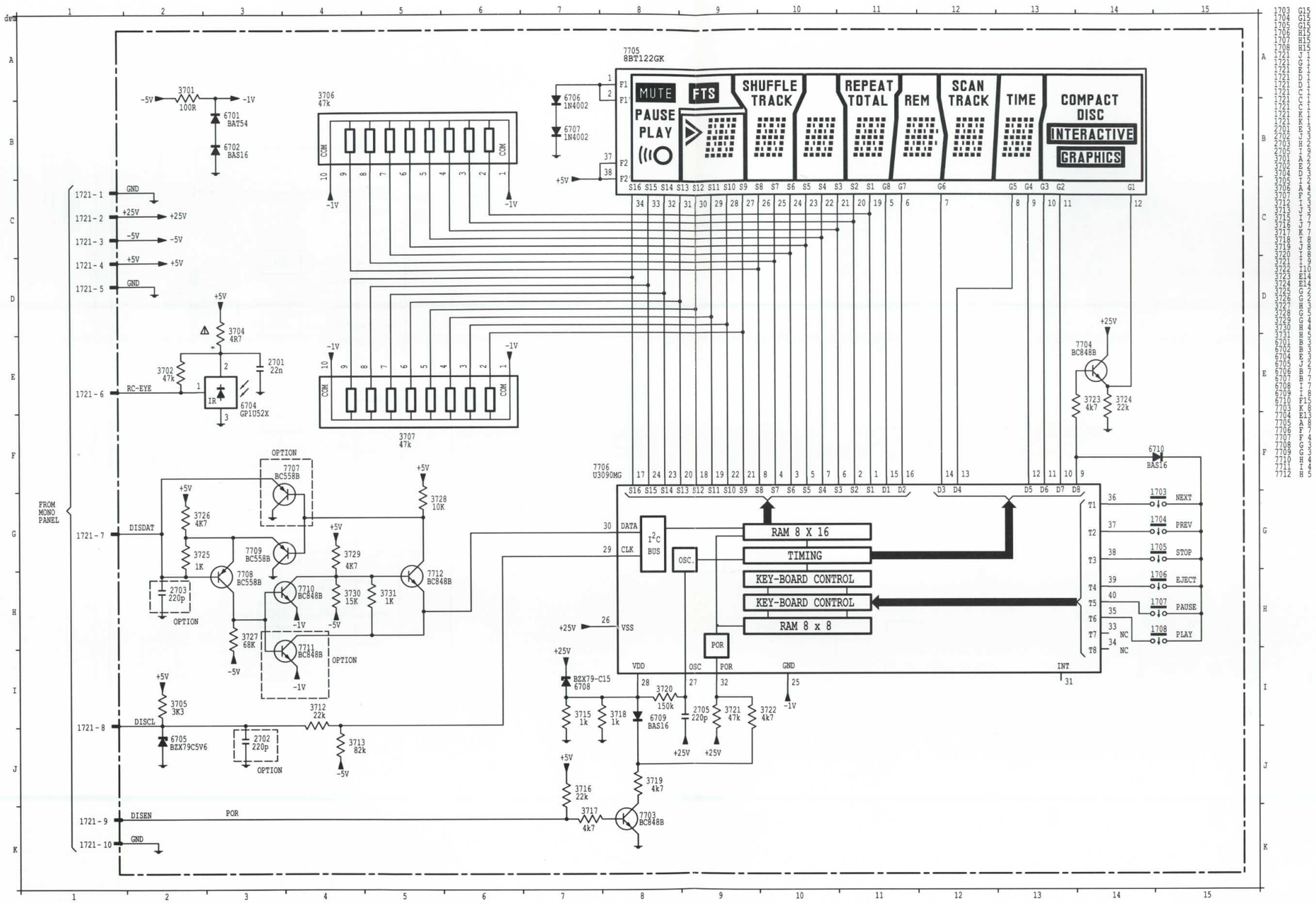
6.4.2 Control & Display Circuit diagram



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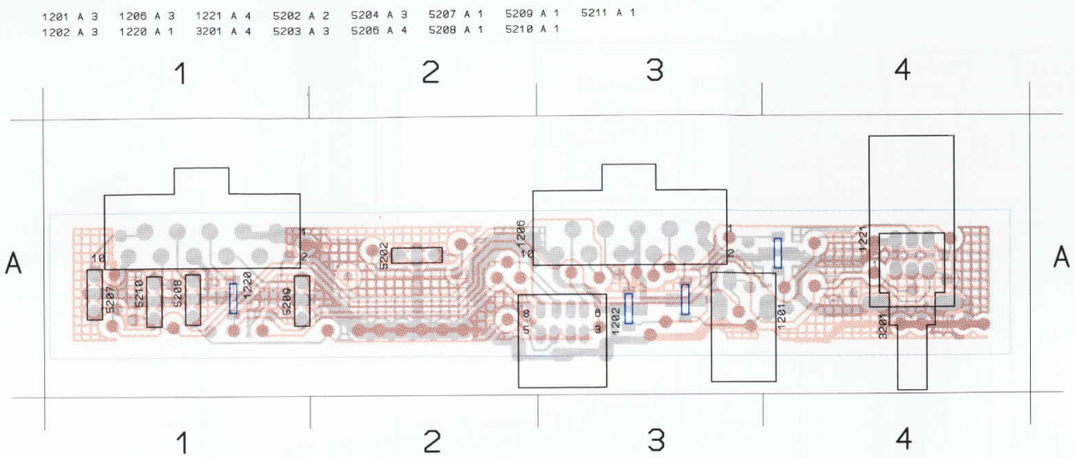
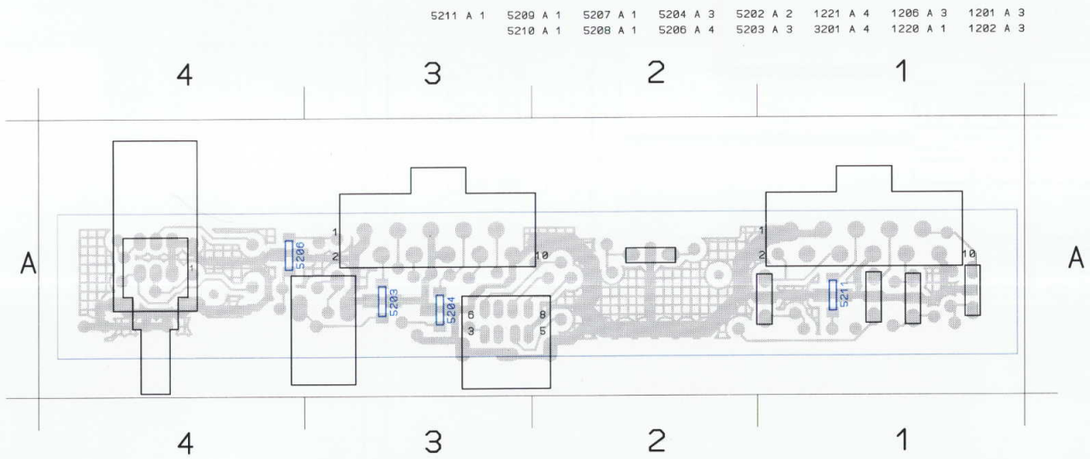
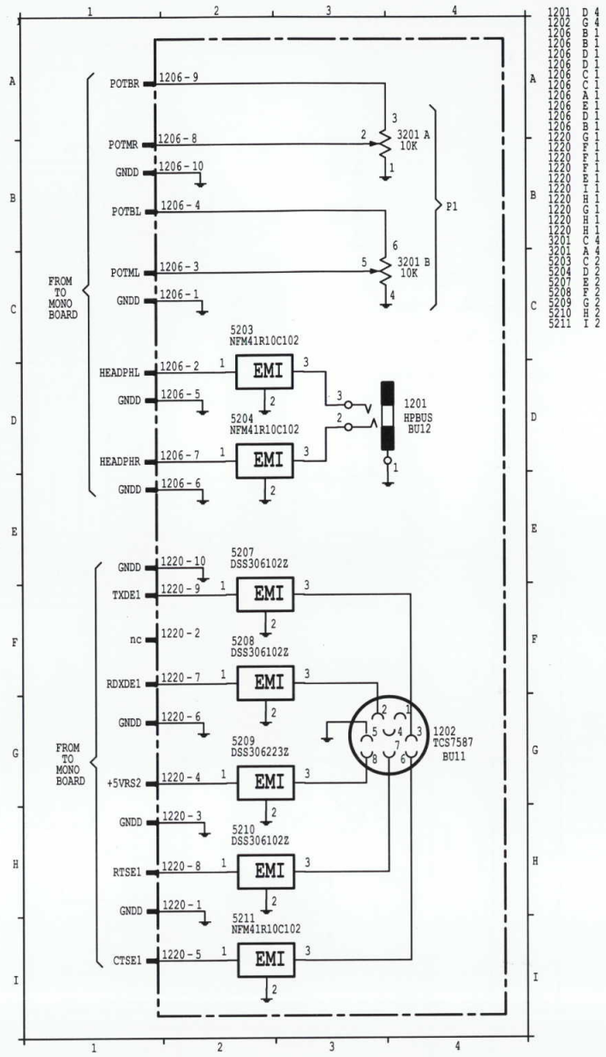
6.5 HEADPHONE PANEL

6.5.1 Headphone PCB





6.5.2 Headphone Circuit diagram



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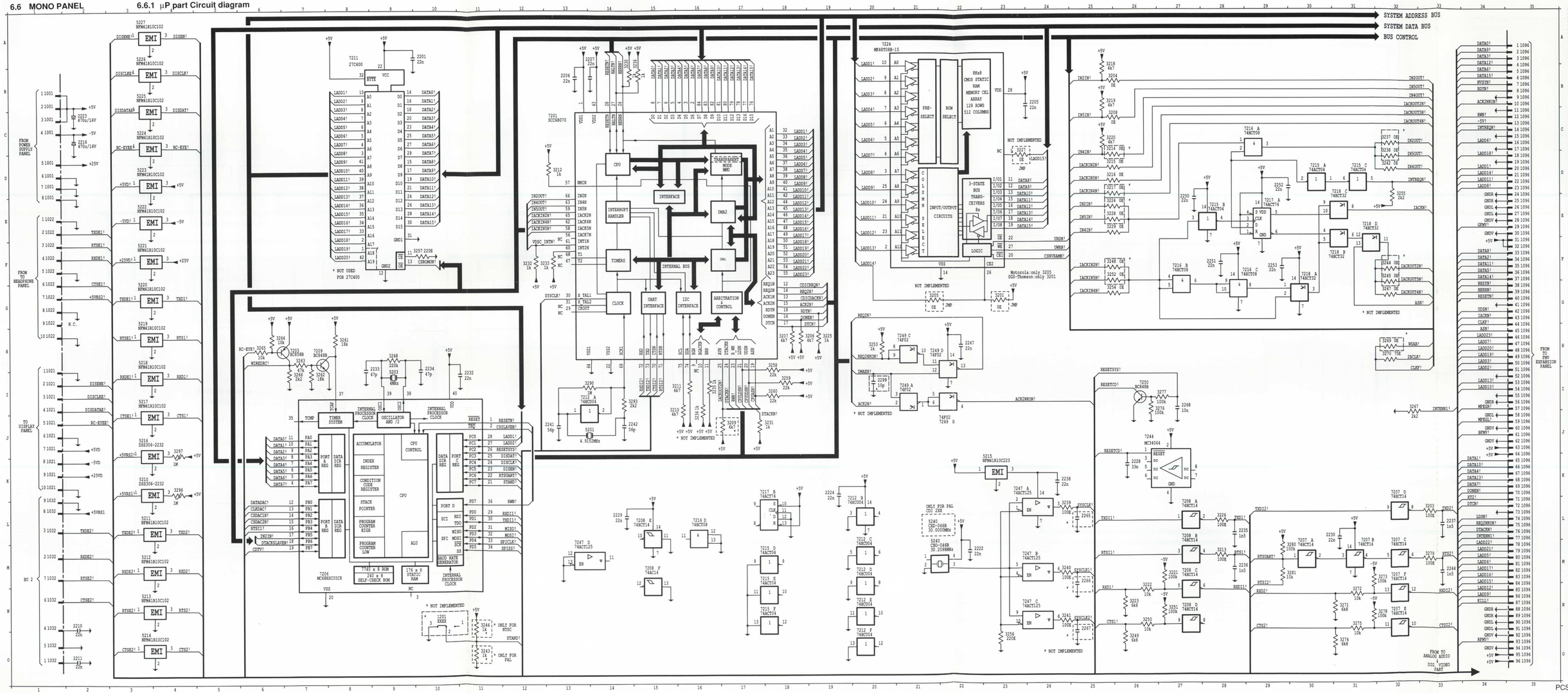
6.6 MONO PANEL

6.6.1 µP part Circuit diagram



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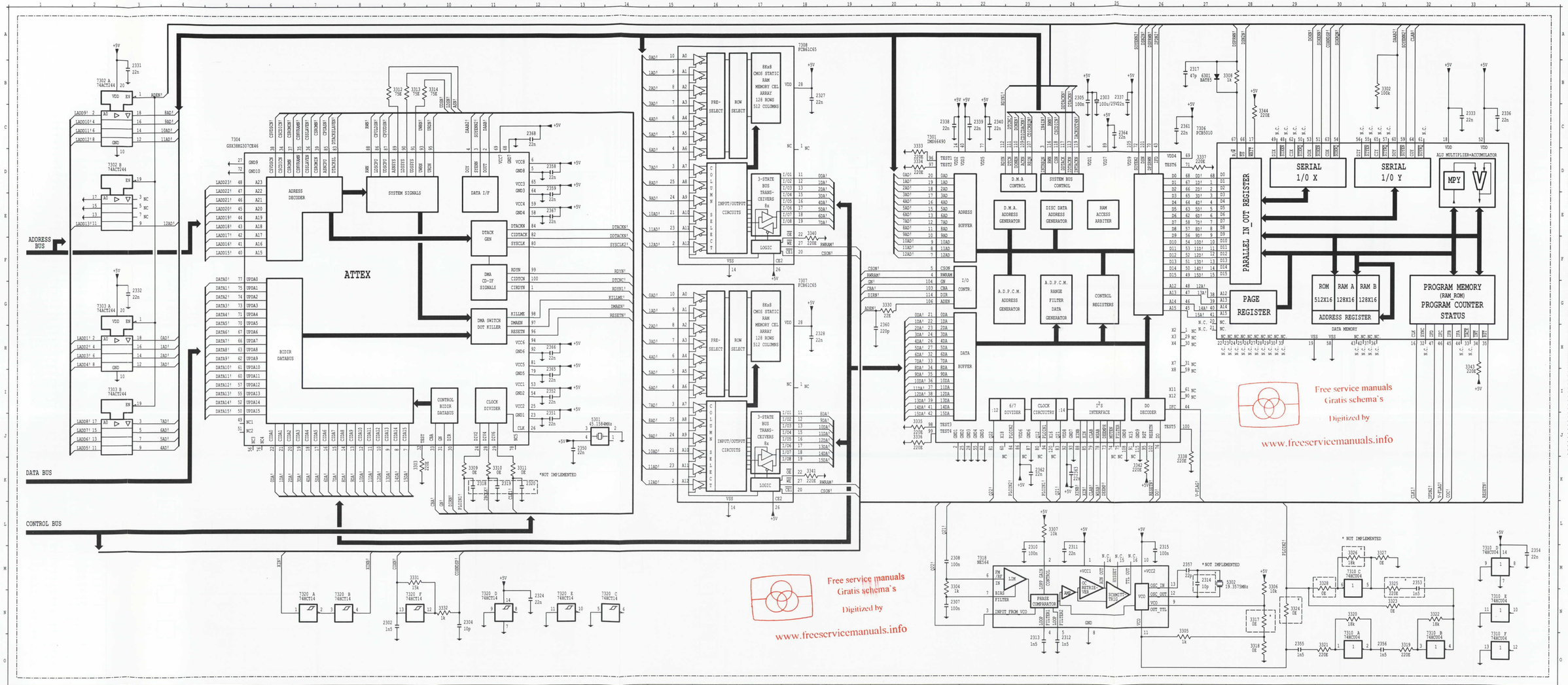
6.6.2 Gluelogic, CDIC, DSP part Circuit diagram



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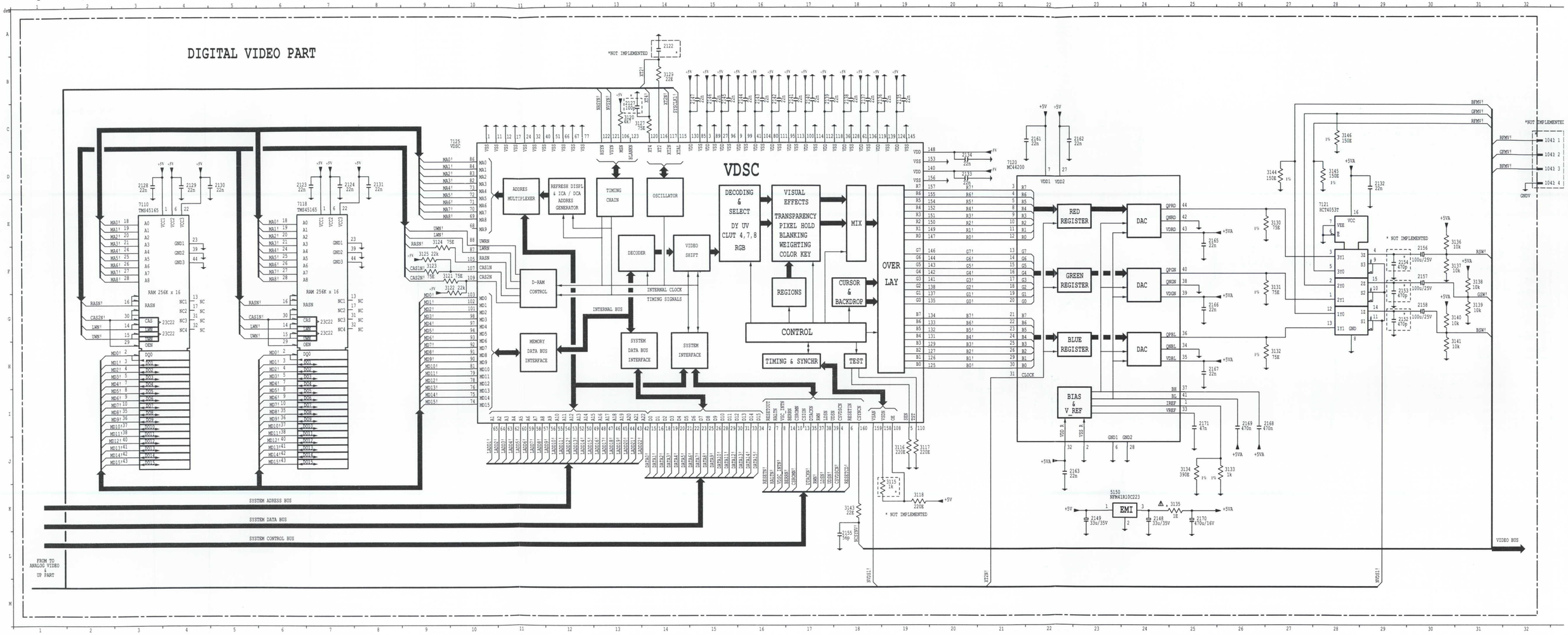
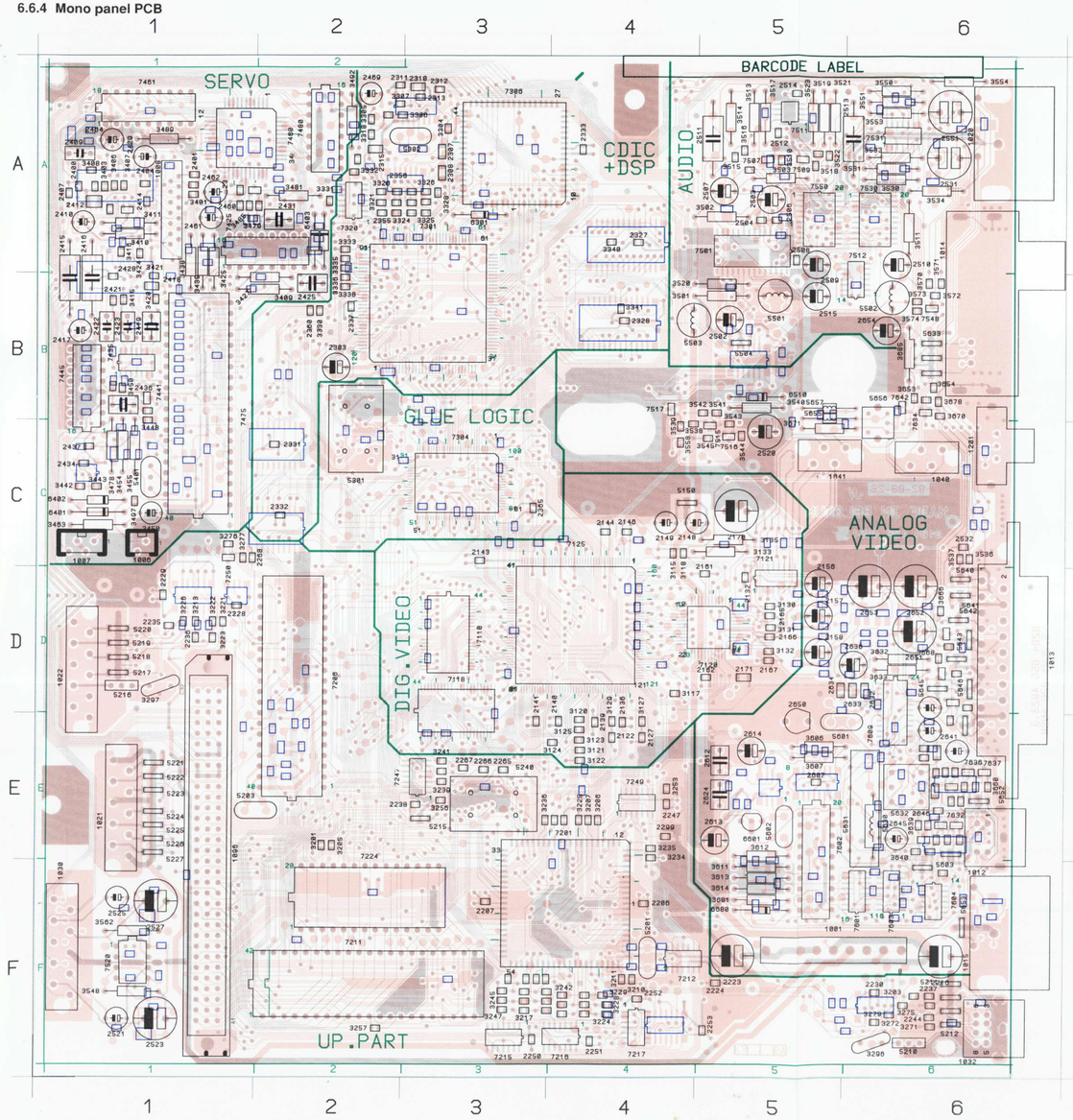
6.6.3 Digital video part Circuit diagram



6.6.4 Mono panel PCB



1001 F 5	2312 A 3	2504 A 5	3134 C 5	3387 A 2	3478 C 1	3611 F 5	5641 D 6	7620 D 6
1006 C 1	2313 A 3	2505 B 5	3135 C 5	3388 A 3	3471 B 1	3612 E 5	5642 D 6	7621 D 6
1007 C 1	2314 A 3	2506 A 5	3136 D 5	3389 B 3	3472 B 1	3613 F 5	5643 D 6	7622 D 6
1008 A 1	2315 A 2	2507 A 5	3137 D 5	3310 C 2	3473 B 1	3614 F 5	5644 D 6	7630 E 6
1012 E 6	2317 A 3	2508 A 5	3138 D 5	3311 C 3	3474 B 1	3615 E 5	5645 D 6	7631 E 6
1013 D 6	2318 B 3	2509 A 5	3139 D 5	3312 C 3	3475 B 1	3616 E 5	5646 D 6	7632 E 6
1014 B 6	2319 C 2	2510 A 6	3140 D 5	3313 C 3	3476 B 1	3620 D 6	5647 E 6	7633 F 6
1015 F 6	2320 C 3	2511 A 5	3141 D 5	3314 C 3	3478 C 1	3621 D 6	5648 D 6	7634 B 6
1020 A 6	2324 A 2	2512 A 5	3143 D 4	3317 A 2	3479 A 1	3622 D 6	5649 B 6	7635 E 6
1021 E 1	2327 A 4	2513 A 6	3144 C 5	3318 A 2	3480 A 2	3623 D 6	5650 F 6	7636 E 6
1022 D 1	2328 B 4	2514 A 5	3145 C 5	3319 A 2	3481 A 2	3624 D 6	5651 E 6	7637 E 6
1030 F 1	2331 C 2	2515 B 5	3146 C 5	3320 A 2	3482 A 2	3625 D 6	5652 E 6	7648 D 6
1032 F 6	2332 C 2	2516 A 5	3201 E 2	3321 A 2	3483 A 1	3626 D 6	5653 F 6	7641 D 6
1040 C 6	2333 A 4	2517 A 6	3203 F 6	3322 A 3	3484 A 1	3627 D 6	5655 B 6	7642 B 6
1041 C 5	2336 A 3	2518 B 6	3204 F 4	3323 A 3	3485 A 1	3628 D 6	5656 C 6	7643 D 6
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2123 E 3	2340 A 3	2523 F 1	3208 F 4	3327 A 3	3489 A 1	3633 D 6	6402 C 1	
2124 E 3	2350 C 2	2524 F 1	3209 F 4	3328 A 3	3490 A 1	3634 E 6	6403 A 2	
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2210 F 6	2426 B 2	2638 D 6	3254 F 4	3432 A 1	3540 B 5	5150 C 4	7445 C 1	
2211 F 6	2427 A 2	2639 E 6	3255 F 3	3433 A 2	3541 B 5	5201 F 4	7460 A 1	
2216 F 6	2428 B 1	2640 E 6	3256 E 3	3435 A 1	3542 B 5	5203 E 2	7461 A 1	
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2223 F 5	2430 A 2	2642 E 6	3258 E 4	3437 A 2	3544 C 5	5211 F 6	7471 A 1	
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2230 F 6	2434 C 1	2647 E 6	3262 E 2	3441 C 1	3548 F 1	5215 E 3	7501 A 5	
2232 D 2	2435 C 1	2648 E 6	3263 E 2	3442 C 1	3549 F 1	5216 D 1	7502 B 5	
2233 E 2	2436 B 1	2649 D 5	3264 D 2	3443 C 1	3550 A 6	5217 D 1	7503 A 5	
2234 E 2	2437 C 1	2650 E 5	3265 E 1	3444 C 1	3551 A 6	5218 D 1	7504 A 5	
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2250 F 3	2458 A 2	2659 C 5	3274 F 6	3453 B 1	3561 F 1	5227 E 1	7520 F 1	
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2252 F 4	2460 A 1	3116 C 4	3276 C 1	3455 C 1	3563 F 1	5301 C 2	7531 A 6	
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2267 E 3	2464 A 1	3121 E 4	3280 F 6	3459 B 1	3573 B 6	5502 B 5	7551 A 6	
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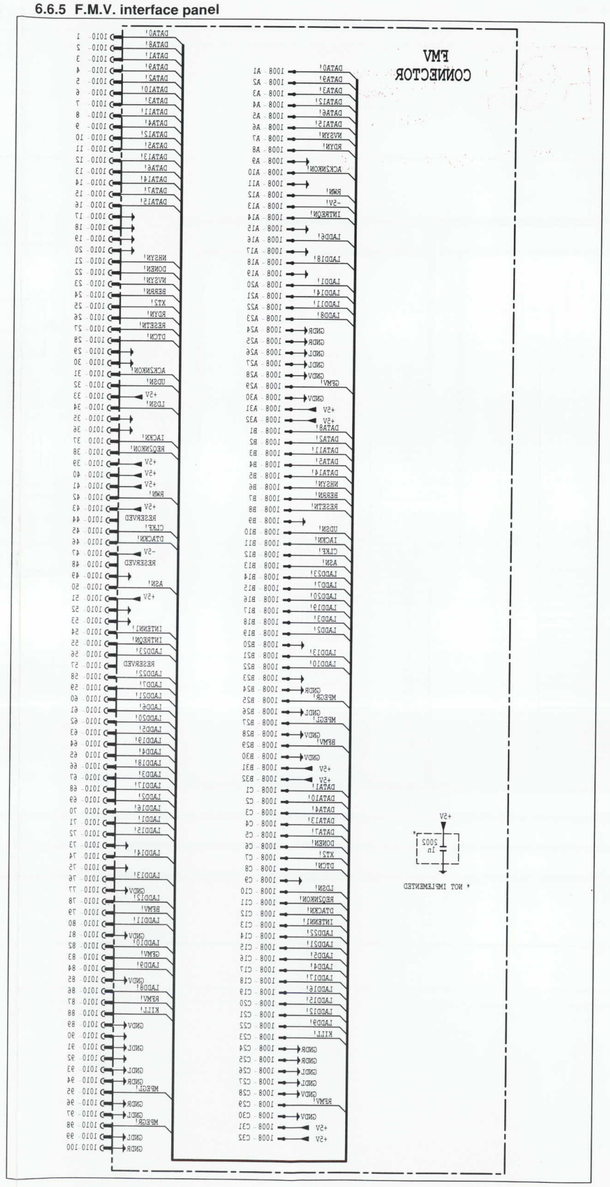
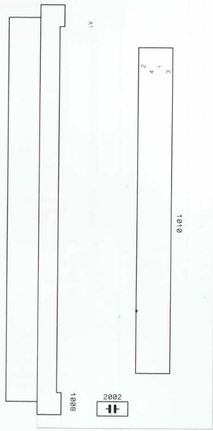
2311 A 2	2503 A 5	3133 C 4	3306 A 2	3469 C 1	3610 F 6	5640 D 6	7611 E 5	

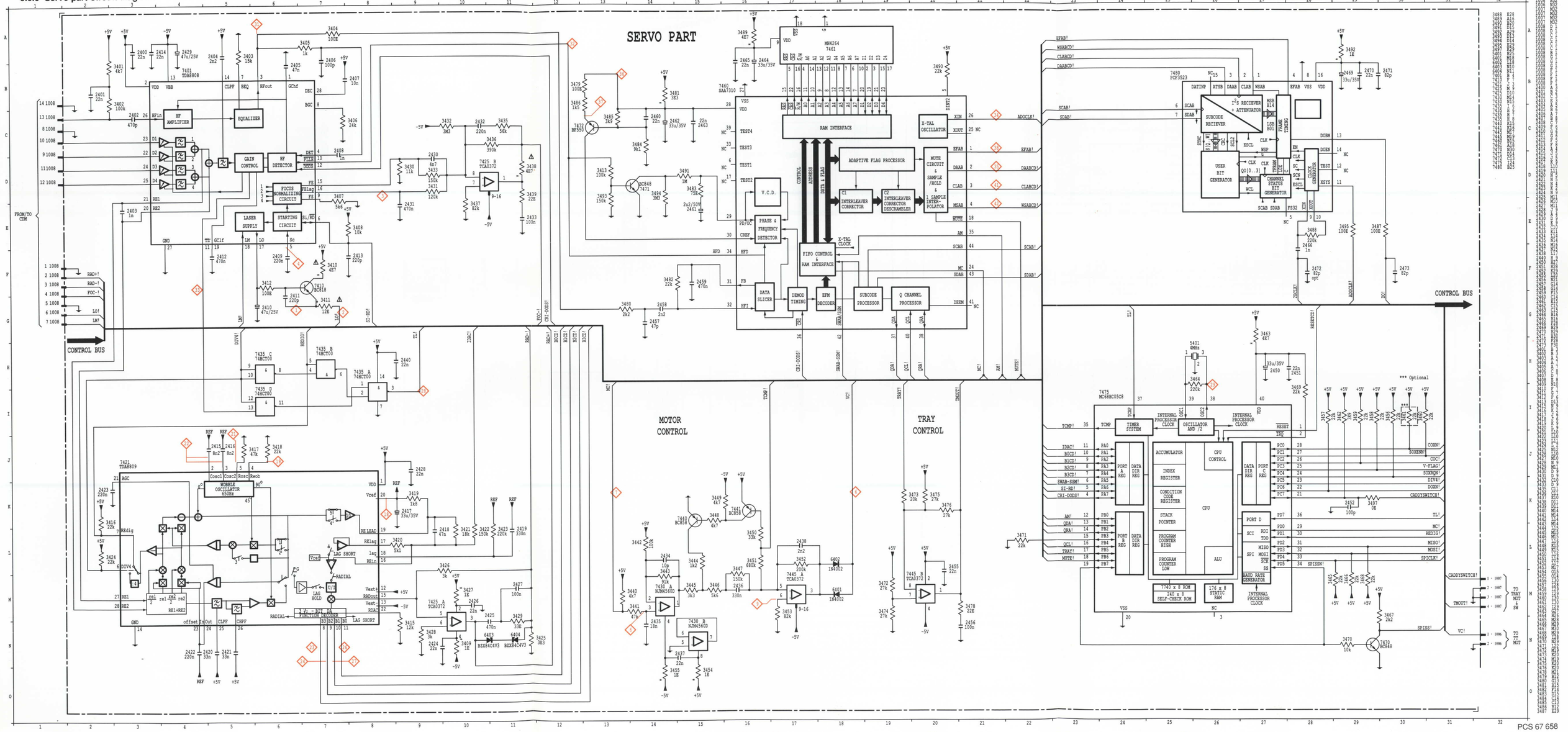
6.6.5 F.M.V. interface panel



F.M.V. expansion



6.6.6 Servo part Circuit diagram



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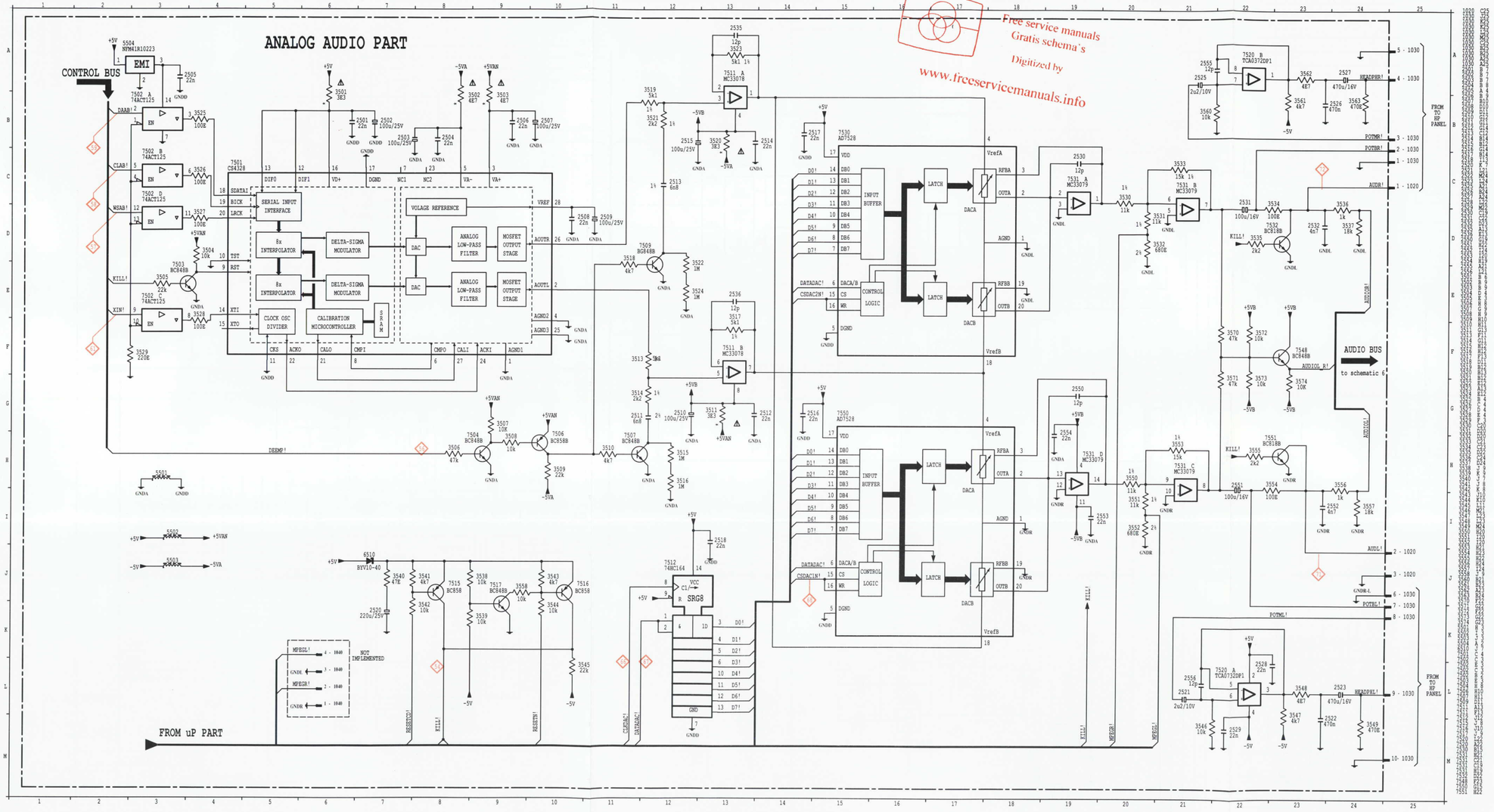
6.6.7 Analog audio part Circuit diagram



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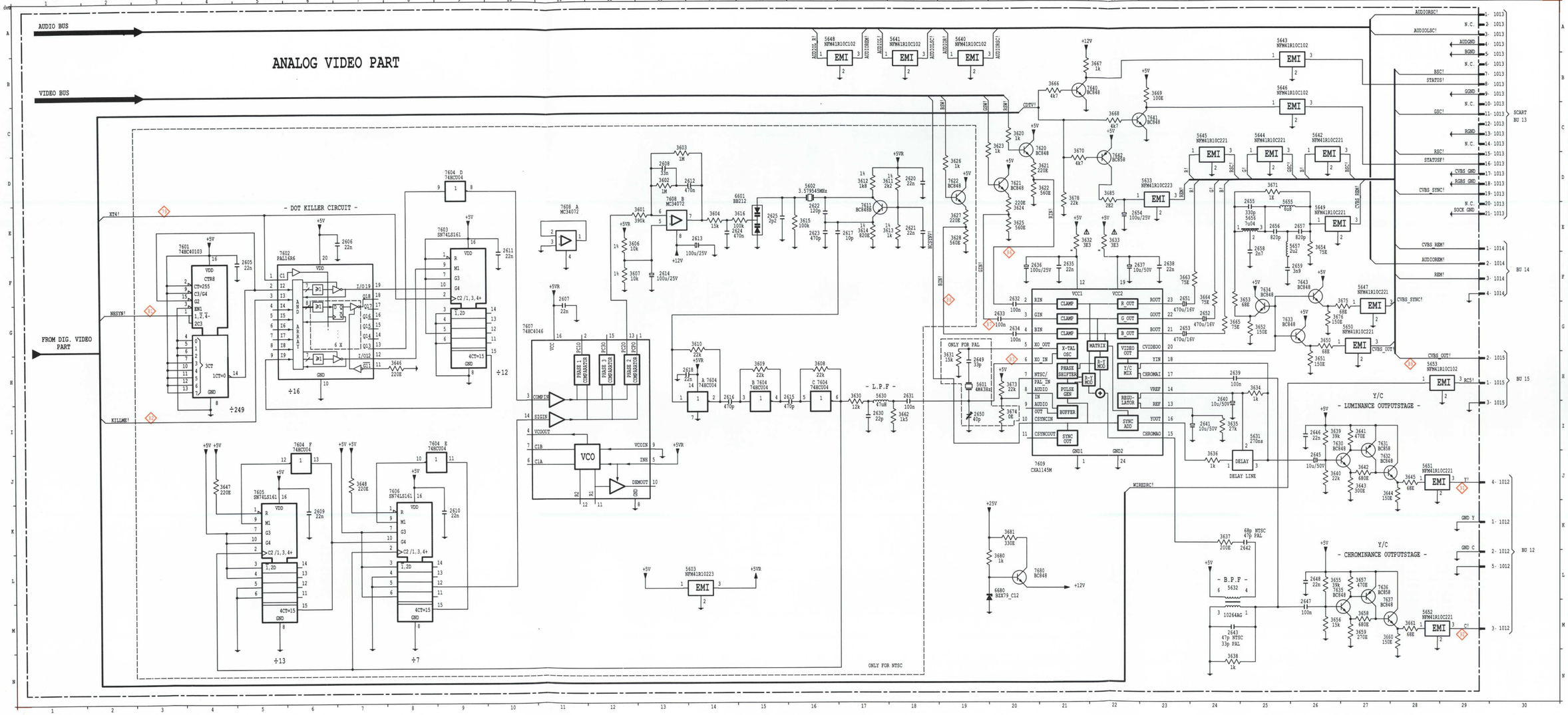
6.6.8 Analog video part Circuit diagram



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6.6.9 Mono panel PCB
SMD side view

7620 D 6	5641 D 6	3611 F 5	3470 C 1	3307 A 2	3134 C 5	2504 A 5	2312 A 3
7621 D 6	5642 D 6	3612 E 5	3471 B 1	3308 A 3	3135 C 5	2505 B 5	2313 A 3
7622 D 6	5643 D 6	3613 F 5	3472 B 1	3309 B 3	3136 D 5	2506 A 5	2314 A 3
7630 E 6	5644 D 6	3614 F 5	3473 B 1	3310 C 2	3137 D 5	2507 A 5	2315 A 2
7631 E 6	5645 D 6	3615 E 5	3474 B 1	3311 C 3	3138 D 5	2508 A 5	2317 A 3
7632 E 6	5646 D 6	3616 E 5	3475 B 1	3312 C 3	3139 D 5	2509 A 5	2318 B 3
7633 F 6	5647 E 6	3620 D 6	3476 B 1	3313 C 3	3140 D 5	2510 A 6	2319 C 2
7634 B 6	5648 B 6	3621 D 6	3478 C 1	3314 C 3	3141 D 5	2511 A 5	2320 C 3
7635 E 6	5649 B 6	3622 D 6	3479 A 1	3317 A 2	3143 D 4	2512 A 5	2324 A 2
7636 E 6	5650 F 6	3623 D 6	3480 A 2	3318 A 2	3144 C 5	2513 A 6	2327 A 4
7637 E 6	5651 E 6	3624 D 6	3481 A 2	3319 A 2	3145 C 5	2514 A 5	2328 B 4
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7641 D 6	5653 F 6	3626 D 6	3483 A 1	3321 A 2	3201 E 2	2516 A 5	2332 C 2
7642 B 6	5655 B 6	3627 D 6	3484 A 1	3322 A 3	3203 F 6	2517 A 6	2333 A 4
7643 D 6	5656 C 6	3628 D 6	3485 A 1	3323 A 3	3204 F 4	2518 B 6	2336 A 3
7680 F 5	5657 B 5	3630 F 6	3486 A 2	3324 A 2	3205 E 2	2520 C 5	2337 B 2
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	6403 A 2	3634 E 6	3490 A 1	3328 A 3	3209 F 4	2525 F 1	2350 C 2
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	7118 D 3	3639 E 6	3495 A 2	3334 A 2	3214 F 4	2530 A 6	2355 A 2
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	7461 A 1	5203 E 2	3542 B 5	3435 A 1	3256 E 3	2640 E 6	2428 B 1
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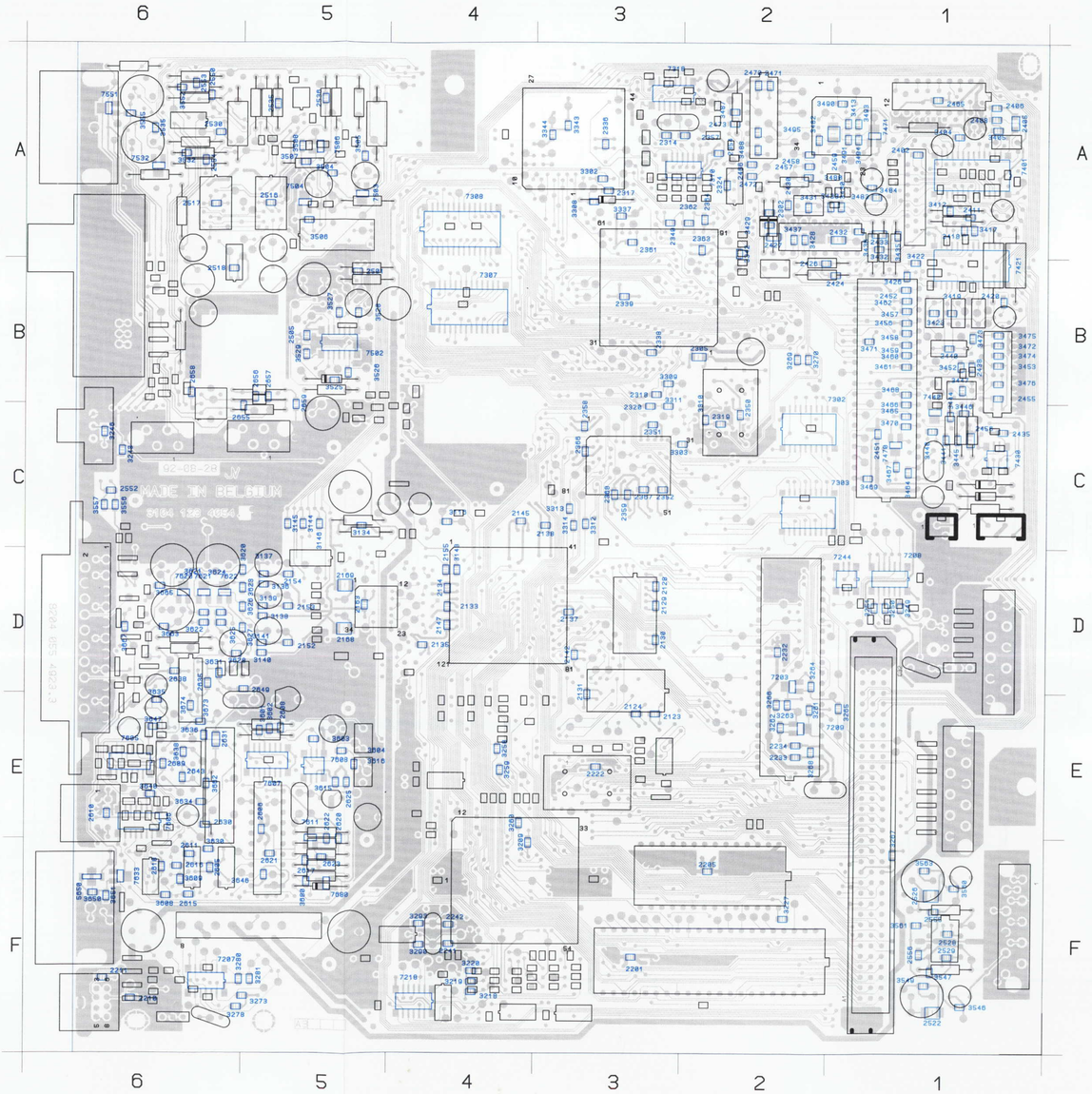

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7 DIAGNOSTICS

7.1 TROUBLESHOOTING AND REPAIR

This section contains some guides to aid the technician in troubleshooting the CDI player. The CD servo section and Analog Audio section 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 equivalent) or a Service PCB as an extra tool to run and test the functioning of the MMC section .
The Service Shell provides tests for the Analog Video, CD Servo, and Analog Audio circuits. Section 5.3 covers all the Service Shell test procedures.

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

Troubleshooting hints:
Symptom: Service Shell cannot bestarted 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).

7.1.2 Troubleshooting and Service the MMC parts

The monoboard is replaced as a module when parts of the Multi Media Controller are defective. The technician must know the functions of the MMC parts 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 5.3) and the other is the Low Level Test or LL Test (see section 5.2). 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 complete monoboard. If the test Cannot be initiated, check the power sources and main clock signals on the MMC section. If all supplies and clock signals are present, replace the MMC Unit.

7.1.3 Servo 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 Servo 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 or Low Level test. 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 Analog Audio circuit.

7.1.4 Video Section Troubleshooting

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

Symptom 1: the player shell is displayed, but video from the disc cannot be displayed. If this condition exists, the Digital Video section 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 section, since this is where the video decoding takes place. Thus the problem is isolated to the video decoding section on the MMC section.

Symptom 2: no video. This symptom may be caused by either the DigitalVideo part or by the Analog Video circuit. 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. If these signals are present, the Digital Video circuits are functional. Further checks of the Analog Video circuit can isolate the problem further. Check the Video Encoder IC. Also check Vcc1 and Vcc2 to the Video Encoder IC.

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, IC7609 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 (IC7609).

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7.2 MEASUREMENTS & ADJUSTMENTS

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

7.2.1 Powersupply section

The main signal in this section is the +5V, to be adjusted with potmeter 3807 up to 5,3 V
All other signals are stated in the circuit diagram

7.2.2 Servo section

7.2.2.1 Lasercurrent.

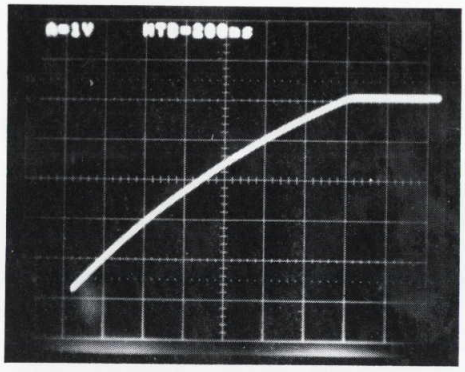
The lasercurrent is adjusted in the CDM9 and is a factory adjustment. After replacing a defective CDM the laser current does not need to be adjusted.
Play track 1 of testdisc 5, the voltage accross item 3411(measuring point 1 and point 2) on the CD panel should be : 0,7 V / DC ± 10 %.

7.2.2.2 Focus signal.

Play track 1 of testdisc 5, the voltage accross item 2431 (measuring point 3 and GND) on the CD panel should be : + 400 mV / DC ± 10%.

7.2.2.3 Starting signal.

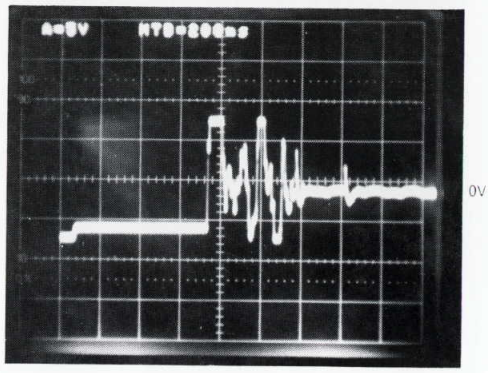
Insert a disc and measure accross item 2409 (measuring point 4 and GND).
After pushing the play button the next picture appears on the oscilloscoop :



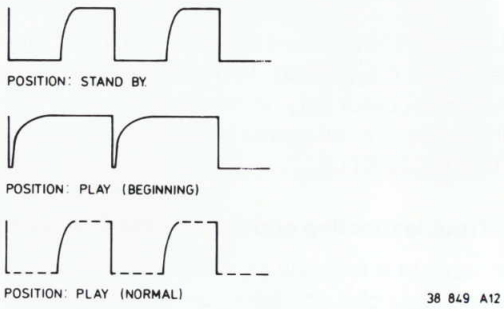
The signal is triggered by the Si/RD signal on IC7401pin6.

7.2.2.4 Motorcontrol signals.

Insert testdisc 5.
Measure accross IC7445A pin3 and GND, after pushing the play button the next picture should appear on the oscilloscope.

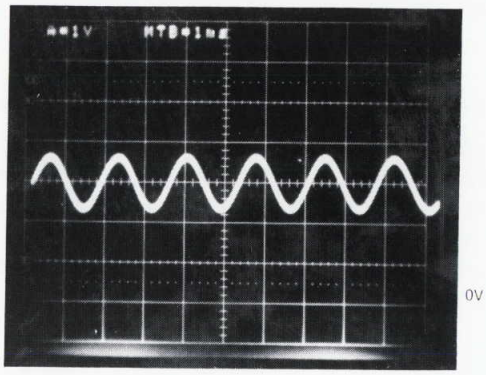


After a while, when playing track 1, the voltage should be:
- 1.7 V DC ± 10%
Play track 1 of testdisc 5, the voltage across measuring point 6 and ground should be: 3.2 Volt DC ± 10%
Signal accross measuring point 7 and GND should be :



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 denpending on playing mode, 0V if LOW or 5V if HIGH

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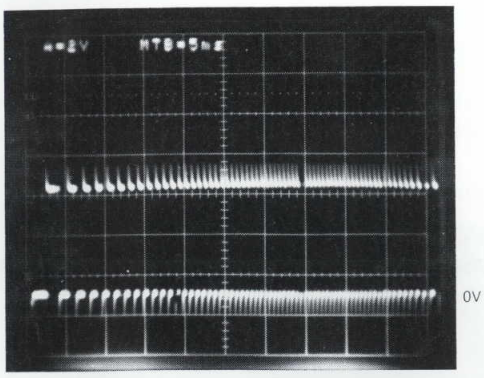
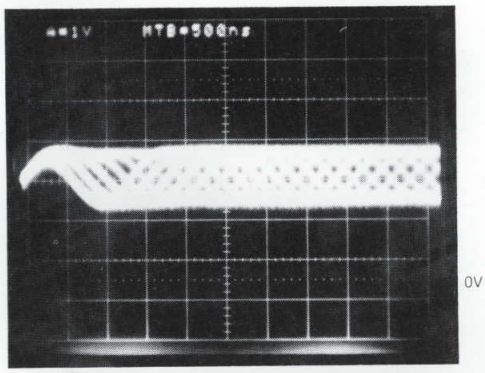
For measuring point 28 and 33 put the player in the service shell on CD drive test mode 2. The voltage accross point 28 and GND should be :

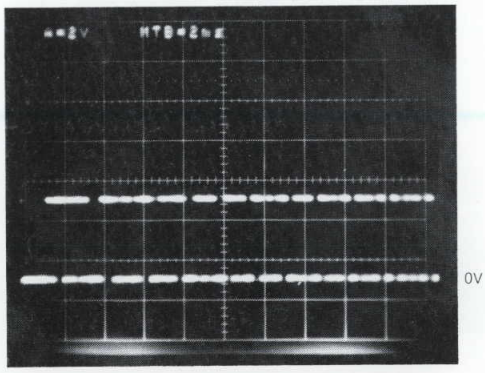


7.2.2.6 Clock signal µP IC7475
Measuring point 29 : clock signal f = 4MHz.

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



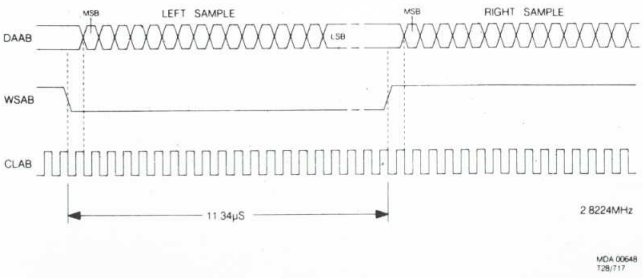
Insert testdisc 5 and put the player in the service shell on CD drive test mode 2.
The signal accross measuring point 32 should be :



Measuring point 34 : clock signal f = 11.289.600 Hz.
Voltage accross measuring point 36 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.

Measuring point 39, 41 and 42 :



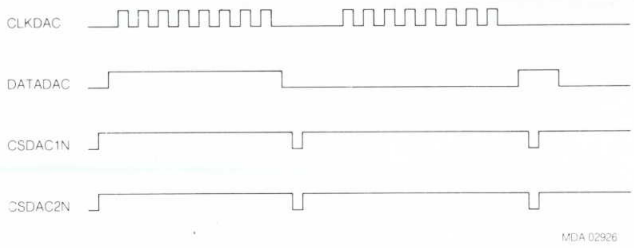
7.2.3 Audio section

Select the submenu **"APU/KEY"** of the Service Shell, see section 5.3. 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 **APU/KEY**.
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)

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 Pin15 of IC7550
69 - CSDAC2N Pin15 of IC7530



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 no disturbances, check the data outputs D0 ÷ D7 of IC7512.

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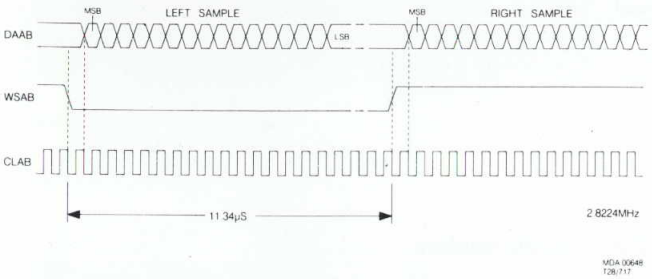
7.2.3.2 I^2S signals

Check whether the signals, given below, appear on the test points 57 - 58 - 59
Time base related only to CD-DA.



7.2.3.3 Xin clock signal

testpoint 61

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.

7.2.3.4 DEEMP signal

(testpoint 56)
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.)

7.2.3.5 KILL signal

(testpoint 54)
This KILL signal must be +12V during reset.
In normal/play position this signal is - 8 V.

7.2.3.6 Performance check APU

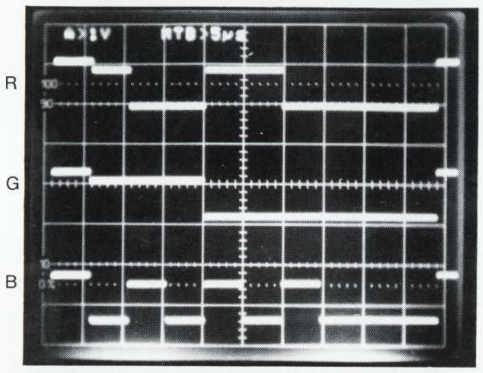
Position digital audio
- Insert Audio signals test disc 1, SBC 429
- Play track no. 1. (1kHz sinus signal L + R 0dB)
- The level on pin7 and pin8 of IC7531 should be: 0.9 Vrms ± 2dB
- The level on testpoint 71 and 72 should be: 2 Vrms ± 3dB.

7.2.4 Video section

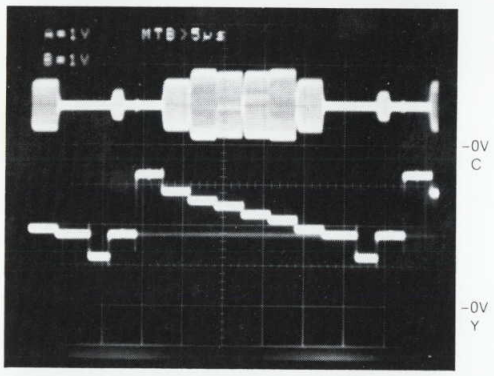
Required test equipment.
- Electronic voltmeter
- Oscilloscope
- Frequency counter

Put the player in the service shell on testimage (colorbar).
signals : BSW!, GSW!, RSW! At pos 7622, 7621 and 7620

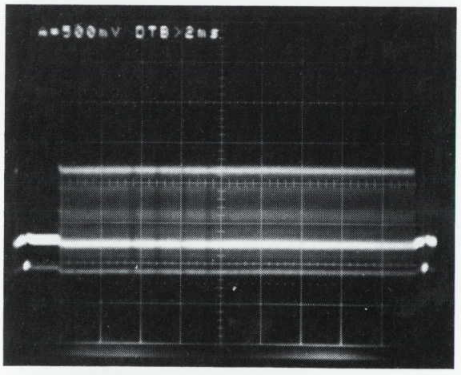
Measuring point 86, 87 and 88:



Measuring point 91:



Measuring point 92:



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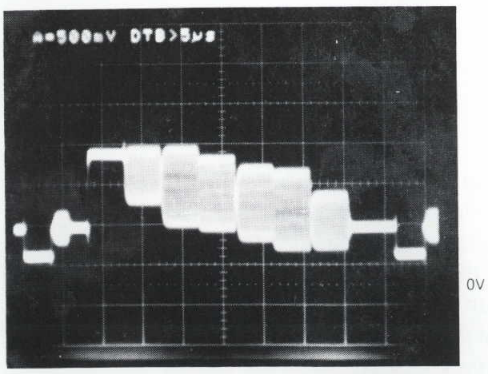
Measuring point 89:



7.2.4.1 Check of subcarrier .

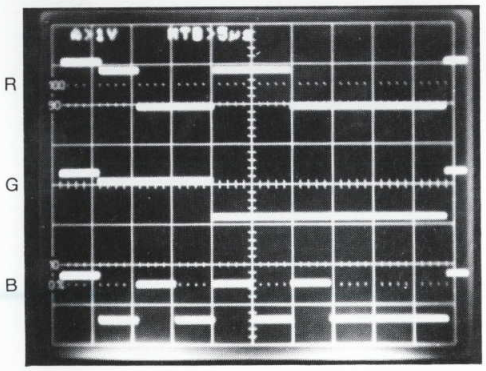
- Player switched off.
- Connect frequency counter to testpoint 83 ,(Pin 6 IC 7609) and turn on the player.
- The frequency on testpoint 83 should be;
  PAL = 4 433 618 Hz. ± 50 Hz.
  NTSC = 3 579 545 Hz. ± 7 Hz.
- The amplitude on testpoint 83 should be in between; 400 mV and 1000 mV_{pp}
- If for PAL the frequency of this signal deviates, perform alignment of trimmer 2650.

7.2.4.2 Check of standard control signal SW

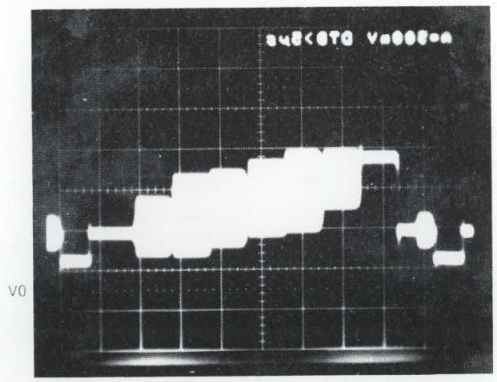
The control signal SW on testpoint 78, should be low (0 V) for PAL and high (5 V) for NTSC.

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 and 88.

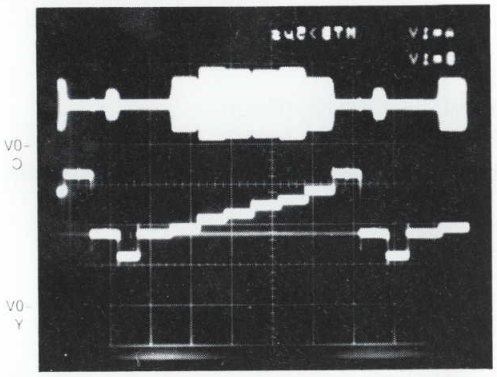


Check of Output signals for CVBS - Y / C.



CVBS signals Testpoint 89

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



Y/C Sign. Testpoint 91/92

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

7.2.5 Multi Media Controller section

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

7.2.5.1 Supply voltages

Check if the following voltages are present at connector 1001

pin1,2,3	: +5 V ± 5%
pin4	: -5 V ± 5%
pin5	: +25 V ± 5%
pin6,7,8	: GROUND

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)
30.2098 MHz ± 600 Hz NTSC)
This system clock must be present at the following points:
IC7201 pin 30
IC7304 pin 80
IC7125 pin 115

At IC 7201 pin 29 Clock divided by two must be present:
15.0000 MHz (=30.000 : 2).
15.1049 MHz (NTSC)

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

7.2.5.3 I^2S interface:

FILTERN	: 0V
DAAB	
CLAB	: frequency 2.8224 MHz(only for CD-DA)
WSAB	: frequency 44.1 KHz (only for CD-DA)
DEEM	: 0V (only for CD-DA and only if de-emphasis 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 140 ms ± 20 ms. Also measure the RESETCD time(low!) if the button is released. The signal RESETCD must be low for 140 ms ± 20 ms.
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 5.2.
Settings of the terminal:

Baudrate	: 9600
start bit	: 1
data bists	: 8
stop bits	: 0

no parity/ no handshake

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8 PARTSLIST

8.1 PARTSLIST OF THE CABINET

Item	Codenumber	Description
1	4822 444 40638	Front assy /37
1	4822 444 40608	Front assy /20/25/39/31
9	4822 410 62316	Powerknob assy
22	4822 502 30408	PL3X10PAN<STZNBK
23	4822 502 30408	PL3X10PAN<STZNBK
24	4822 502 30408	PL3X10PAN<STZNBK
25	4822 502 30408	PL3X10PAN<STZNBK
26	4822 502 30408	PL3X10PAN<STZNBK
27	4822 502 30408	PL3X10PAN<STZNBK
30	4822 502 30408	PL3X10PAN<STZNBK
31	4822 502 30408	PL3X10PAN<STZNBK
44	4822 413 51434	Volume knob
65	4822 444 40607	Tray front
75	4822 502 12795	M2,5X5PAN<STZNBK
76	4822 502 12795	M2,5X5PAN<STZNBK
77	4822 502 12795	M2,5X5PAN<STZNBK
78	4822 502 12795	M2,5X5PAN<STZNBK
81	Tray loader	SEE SEPARATE LIST
151	4822 444 60898	Cover
171	4822 502 12795	M2,5X5PAN<STZNBK
172	4822 502 12795	M2,5X5PAN<STZNBK
173	4822 502 12795	M2,5X5PAN<STZNBK
174	4822 502 12795	M2,5X5PAN<STZNBK
175	4822 502 12795	M2,5X5PAN<STZNBK
178	4822 502 12795	M2,5X5PAN<STZNBK
181		Frame assy
182		Trafo support
183		Spacer locking
184		Spacer locking
185		Remod. bracket
186	4822 402 61422	Spacer
187	4822 402 61422	Spacer
188	4822 402 61422	Spacer
189		FMV box
200		Taptide M3X36
201		Taptide M3X36
202	4822 502 12795	M2,5X5PAN<STZNBK
203	4822 502 12795	M2,5X5PAN<STZNBK
207		ZN 3X6 TORX
208		ZN 3X6 TORX
209	4822 502 12795	M2,5X5PAN<STZNBK
210	4822 502 12795	M2,5X5PAN<STZNBK
211	4822 502 30408	PL3X10PAN<STZNBK
212	4822 502 30408	PL3X10PAN<STZNBK
213	4822 502 30408	PL3X10PAN<STZNBK
214	4822 502 30408	PL3X10PAN<STZNBK
215	4822 530 80522	2,8X5,5
216	4822 530 80522	2,8X5,5
217	4822 502 12795	M2,5X5PAN<STZNBK
218	4822 502 12795	M2,5X5PAN<STZNBK
219	4822 502 12795	M2,5X5PAN<STZNBK
220	4822 502 12795	M2,5X5PAN<STZNBK
221	4822 530 80522	2,8X5,5
222	4822 530 80522	2,8X5,5
223	4822 502 30438	PL3X6PAN<STZNBK
224	4822 502 30438	PL3X6PAN<STZNBK
225		M3X4PAN<STZNBK
226		M3X4PAN<STZNBK
251	4822 462 41992	Foot
252	4822 462 41992	Foot
255	4822 462 40409	Plate for foot
256	4822 462 40409	Plate for foot
257	4822 462 40409	Plate for foot
259	4822 502 12795	M2,5X5PAN<STZNBK
260	4822 502 12795	M2,5X5PAN<STZNBK
268	4822 502 12795	M2,5X5PAN<STZNBK
269	4822 502 12795	M2,5X5PAN<STZNBK
270	4822 502 12795	M2,5X5PAN<STZNBK
271	4822 502 11667	M3X6PAN<STZNBK
272	4822 502 11667	M3X6PAN<STZNBK
273		M3X4PAN<STZNBK
274	4822 502 11667	M3X6PAN<STZNBK
275	4822 502 11667	M3X6PAN<STZNBK
278	4822 502 30408	PL3X10PAN<STZNBK
279	4822 502 30408	PL3X10PAN<STZNBK
281		Cap
301	4822 321 10249	Mainscord /20
301	4822 321 10886	Mainscord /25
301	4822 321 10492	Mainscord /31
301	4822 321 10788	Mainscord /37
301	4822 321 10249	Mainscord /39
302	4822 321 20308	Audio cord set
309	4822 736 21624	Dir.for use /37
309	4822 736 21678	Dir.for use /20/25/39
309	4822 736 21681	Dir for use /31
315	4822 321 61579	Video cord set
316	4822 321 61849	TPX 3500 cord
317	4822 320 11096	Antenna cable /37
318	4822 691 30308	Ballbased IR-remote Control
1001	4822 214 52056	Monopanel assy /37
1001	4822 214 52065	Monopanel assy/20
1001	4822 214 52068	Monopanel assy/25
1001	4822 214 52069	Monopanel assy /31
1001	4822 214 52066	Monopanel assy /39
		These monoboards to be repaired via PCS-repair procedure !
1001		For separate parts see partslist Monoboard
1002		Display/powersupply panel. See separate partslist
1003	4822 214 52048	FMV expansion panel
1800	4822 253 30421	Fuse T600mA ../37
1800	4822 070 38001	Fuse T800mA ../31
1800	4822 070 33151	Fuse T315mA../20/25/39
5802	4822 146 31201	Transformer ../37
5802	4822 146 31208	Transformer ../20/25/39
5802	4822 146 31209	Transformer ../31

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8.2 PARTS LIST OF THE TRAY LOADER

Item	Codenumber	Description
ASSY	4822 691 30294	COMPLETE LOADER WITHOUT CDM
1	4822 464 50934	CHASSIS
2	4822 444 30457	TRAY
3	4822 464 50908	SUB CHASSIS
4	4822 444 60861	COVER
5	4822 402 61412	CLAMPER ASSY
6	4822 466 93065	SUSPENSION
7	4822 466 93065	SUSPENSION
8	4822 466 93065	SUSPENSION
9	4822 466 93065	SUSPENSION
10	4822 271 30707	MICROSWITCH
11	4822 361 21492	MOTOR ASSY
12	4822 502 12001	M2X4 STZN
13	4822 502 12001	M2X4 STZN
14	4822 528 81465	PULLEY
15	4822 528 81464	DRIVE PINION
16	4822 535 93319	SPINDLE
17	4822 535 93319	SPINDLE
18	4822 358 31168	BELT
20	4822 691 30275	CDM9 UNIT
20	4822 691 30277	CDM9 UNIT + SUB CHASSIS + SUSPENSIONS !
33	4822 466 62109	TRANSPORT PROTECTION
40	4822 325 60379	DAMPING TULE
41	4822 325 60379	DAMPING TULE
42	4822 325 60379	DAMPING TULE
43	4822 325 60379	DAMPING TULE
44	4822 466 93163	DAMPING PLATE

8.3 PARTSLIST OF THE DISPLAY AND POWERSUPPLY PANEL

Item	Codenumber	Description
2		Heat sink
4		Bracket for conn.
6		FTD-holder
7		Insulating plate
8		Factory plate
10		Shielding cap
101	4822 492 63076	Spring clip
103	4822 492 63076	Spring clip
107	4822 492 63076	Spring clip
201	4822 325 20188	Mica isulator
202	4822 325 20188	Mica isulator
1201	4822 267 31572	socket 3p hor. fem.
1202	4822 267 51216	minidin socket 8p FEM TCS
1206	4822 267 50994	Conn. 10p grey
1220	4822 267 50994	Conn. 10p grey
1221		Earth spring
1703	4822 276 13114	Switch tact H=4,3
1704	4822 276 13114	Switch tact H=4,3
1705	4822 276 13114	Switch tact H=4,3
1706	4822 276 13114	Switch tact H=4,3
1707	4822 276 13114	Switch tact H=4,3
1708	4822 276 13114	Switch tact H=4,3
1721		Conn. 10p hor male
1801		Conn. 5p ver male
1802		Conn. 8p ver male
1803	4822 265 31015	AC socket /20/25/31/39
1803	4822 265 31016	AC socket /37
1804		Conn. 3p top entry
1805	4822 253 10128	Fuse T2A Rad
1806	4822 253 10138	Fuse T1A Rad
1807	4822 256 30495	Fuseholder
1809	4822 256 30495	Fuseholder
1810	4822 265 40596	Conn. 2p male
1901	4822 276 11309	Powerswitch
1902	4822 265 40596	Conn. 2p male
2701	5322 122 32654	22NF10%X7R 63V
2705	4822 122 33575	220PF5%NPO 50V
2802	4822 124 80148	220UF20% 16V
2803	4822 124 80047	1000UF20% 35V
2804	5322 122 32654	22NF10%X7R 63V
2805	4822 122 33496	100NF10%X7R 63V
2806	4822 124 41596	22UF20% 50V
2807	4822 124 41596	22UF20% 50V
2808		4700UF20% 6V3
2809		1000UF20% 6V3
2810	4822 126 12522	1,5NF20% 400V
2811	4822 126 12522	1,5NF20% 400V
2812	4822 122 10289	22NF 100V
2813	4822 122 10289	22NF 100V
2814	5322 122 32654	22NF10%X7R 63V
2815	5322 122 32654	22NF10%X7R 63V
2816	5322 122 32654	22NF10%X7R 63V
2817	5322 122 32654	22NF10%X7R 63V
2818	4822 126 10454	3,3NF20% 400V
2820	4822 124 41598	33UF20% 35V
3201	4822 101 21199	2X10KPOTM.CARB0N
3701	4822 051 20101	100R00 5% 0,1W
3702	4822 051 20473	47K00 5% 0,1W
3704	4822 052 10478	4R70 5% 0,33W
3705	4822 051 20332	3K30 5% 0,1W
3706	4822 116 90857	4R7X8
3707	4822 116 90857	4R7X8
3712	4822 051 20223	22K00 5% 0,1W
3713	4822 051 20823	82K00 5% 0,1W
3715	4822 050 21002	1K00 1% 0,6W
3716	4822 051 20223	22K00 5% 0,1W
3717	4822 051 20472	4K70 5% 0,1W
3718	4822 050 21002	1K00 1% 0,6W
3719	4822 051 20472	4K70 5% 0,1W
3720	4822 051 20154	150K00 5% 0,1W
3721	4822 051 20473	47K00 5% 0,1W
3722	4822 051 20472	4K70 5% 0,1W
3723	4822 051 20472	4K70 5% 0,1W
3724	4822 051 20223	22K00 5% 0,1W
3725	4822 050 21002	1K00 1% 0,6W
3726	4822 051 20472	4K70 5% 0,1W
3727	4822 051 20683	68K00 5% 0,1W
3728	4822 051 20103	10K00 5% 0,1W
3729	4822 051 20472	4K70 5% 0,1W
3730	4822 051 20153	15K00 5% 0,1W
3731	4822 050 21002	1K00 1% 0,6W
3801	4822 051 20821	820R00 5% 0,1W
3802	4822 051 20008	0R00 5% 0,1W
3803	4822 051 20271	270R00 5% 0,1W
3804	4822 051 20683	68K00 5% 0,1W

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Item	Codenumber	Description
3805	4822 116 83776	220K 1% 0,1W
3806	4822 051 20123	12K00 5% 0,1W
3807	4822 100 11633	47K TRIM CARBON
3808	4822 051 10102	1K00 2% 0,25W
5203		EMI FILTER 1nF/100V
5204		EMI FILTER 1nF/100V
5207		EMI FILTER 1nF/100V
5208		EMI FILTER 1nF/100V
5209		EMI FILTER 22nF/16V
5210		EMI FILTER 1nF/100V
5211		EMI FILTER 1nF/100V
5801	4822 338 33030	MAINS FILTER
5803		FXC INDUCTOR
5804	5322 157 52513	10UH 20%
6701	4822 130 80622	BAT54
6702	5322 130 31928	BAS16
6704	4822 214 52009	IR RECEIVER GP1U58XP
6705	4822 130 34173	BZX79-C5V6
6706	5322 130 30684	1N4002
6707	5322 130 30684	1N4002
6708	4822 130 34281	BZX79-C15
6709	5322 130 31928	BAS16
6801	4822 130 82985	BYD14G
6802	4822 130 82985	BYD14G
6803	5322 130 30684	1N4002
6804	5322 130 30684	1N4002
6805	5322 130 30684	1N4002
6807	4822 209 81758	MBR1545CT
6808	4822 130 34173	BZX79-C5V6
6810	4822 130 20279	2N6397PH
7703	5322 130 41982	BC848B
7704	5322 130 41982	BC848B
7705	4822 130 91194	FTD DISPLAY
7706	4822 209 72226	U3090M-40P
7708	5322 130 41983	BC858B
7709	5322 130 41983	BC858B
7710	5322 130 41982	BC848B
7712	5322 130 41982	BC848B

8.4 PARTS LIST MONOBOARD

Item	Codenumber	Description
PCB	4822 214 52065	PANEL ASSY /20
PCB	4822 214 52068	PANEL ASSY /25
PCB	4822 214 52069	PANEL ASSY /31
PCB	4822 214 52056	PANEL ASSY /37
PCB	4822 214 52066	PANEL ASSY /39
1001		conn. 8p hor.male
1006	4822 265 30525	conn. 2p vert. male
1007	4822 265 40474	conn. 4p vert. male
1008	4822 267 51152	conn. 14p zif straight
1012	4822 267 41079	minidin socket 4p FEM 9217A
1013	4822 267 60326	EUROCONN SCART BLUE
1014	4822 214 52064	RF modulator /20
1014	4822 214 52071	RF modulator /25
1014	4822 214 52046	RF modulator/37 MCB8VU3428
1015		socket 2p female YKC21-550
1020		socket 2p female YKC21-528
1021	4822 265 40442	conn. 10p vert. male
1022	4822 265 40442	conn. 10p vert. male
1030	4822 265 40442	conn. 10p vert. male
1032	4822 267 51216	minidin socket 8p FEM TCS
1096	4822 267 70325	conn. 96p hor. female
1202	4822 255 40129	IC socket 40p
1203	4822 255 40129	IC socket 40p
2123	5322 122 32654	22nF 10% 63V
2124	5322 122 32654	22nF 10% 63V
2128	5322 122 32654	22nF 10% 63V
2129	5322 122 32654	22nF 10% 63V
2130	5322 122 32654	22nF 10% 63V
2131	5322 122 32654	22nF 10% 63V
2132	5322 122 32654	22nF 10% 63V
2133	5322 122 32654	22nF 10% 63V
2134	5322 122 32654	22nF 10% 63V
2135	5322 122 32654	22nF 10% 63V
2136	5322 122 32654	22nF 10% 63V
2137	5322 122 32654	22nF 10% 63V
2138	5322 122 32654	22nF 10% 63V
2139	5322 122 32654	22nF 10% 63V
2140	5322 122 32654	22nF 10% 63V
2141	5322 122 32654	22nF 10% 63V
2142	5322 122 32654	22nF 10% 63V
2143	5322 122 32654	22nF 10% 63V
2144	5322 122 32654	22nF 10% 63V
2145	5322 122 32654	22nF 10% 63V
2146	5322 122 32654	22nF 10% 63V
2147	5322 122 32654	22nF 10% 63V
2148	4822 124 41598	33uF 20% 35V
2149	4822 124 41598	33uF 20% 35V
2155	5322 122 32661	56pF 5% 50V
2156	4822 124 41528	100uF 25V
2157	4822 124 41528	100uF 25V
2158	4822 124 41528	100uF 25V
2161	5322 122 32654	22nF 10% 63V
2162	5322 122 32654	22nF 10% 63V
2163	5322 122 32654	22nF 10% 63V
2165	5322 122 32654	22nF 10% 63V
2166	5322 122 32654	22nF 10% 63V
2167	5322 122 32654	22nF 10% 63V
2168		470nF 10% 63V
2169		470nF 10% 63V
2170	4822 124 41989	470uF 20% 16V
2171	4822 122 32542	47nF 10% 63V

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Item	Codenumber	Description
2201	5322 122 32654	22nF 10% 63V
2205	5322 122 32654	22nF 10% 63V
2206	5322 122 32654	22nF 10% 63V
2207	5322 122 32654	22nF 10% 63V
2210	5322 122 32654	22nF 10% 63V
2211	5322 122 32654	22nF 10% 63V
2216	4822 124 41989	470uF 20% 16V
2222	5322 122 32654	22nF 10% 63V
2223	4822 124 41989	470uF 20% 16V
2224	5322 122 32654	22nF 10% 63V
2228	4822 122 03330	33nF 10% 63V
2229	5322 122 32654	22nF 10% 63V
2230	5322 122 32654	22nF 10% 63V
2232	5322 122 32654	22nF 10% 63V
2233	5322 122 32452	47pF 5% NPO 63V
2234	5322 122 32452	47pF 5% NPO 63V
2235	5322 122 31865	1,5nF 10% 63V
2236	5322 122 31865	1,5nF 10% 63V
2237	5322 122 31865	1,5nF 10% 63V
2238	5322 122 32654	22nF 10% 63V
2241	5322 122 32661	56pF 5% 50V
2242	5322 122 32661	56pF 5% 50V
2244	5322 122 31865	1,5nF 10% 63V
2247	5322 122 32654	22nF 10% 63V
2250	5322 122 32654	22nF 10% 63V
2251	5322 122 32654	22nF 10% 63V
2252	5322 122 32654	22nF 10% 63V
2253	5322 122 32654	22nF 10% 63V
2268	4822 122 33177	10nF 20% 50V
2302	5322 122 31865	1,5nF 10% 63V
2303	4822 124 41528	100uF 25V
2304	5322 122 32448	10pF 5% 50V
2305	4822 122 33496	100nF 10% 63V
2307	4822 122 33496	100nF 10% 63V
2308	4822 122 33496	100nF 10% 63V
2310	4822 122 33496	100nF 10% 63V
2311	5322 122 32654	22nF 10% 63V
2312	5322 122 31865	1,5nF 10% 63V
2313	5322 122 31865	1,5nF 10% 63V
2315	4822 122 33496	100nF 10% 63V
2317	5322 122 32452	47pF 5% NPO 63V
2324	5322 122 32654	22nF 10% 63V
2327	5322 122 32654	22nF 10% 63V
2328	5322 122 32654	22nF 10% 63V
2331	5322 122 32654	22nF 10% 63V
2332	5322 122 32654	22nF 10% 63V
2333	5322 122 32654	22nF 10% 63V
2336	5322 122 32654	22nF 10% 63V
2337	5322 122 32654	22nF 10% 63V
2338	5322 122 32654	22nF 10% 63V
2339	5322 122 32654	22nF 10% 63V
2340	5322 122 32654	22nF 10% 63V
2350	5322 122 32654	22nF 10% 63V
2351	5322 122 32654	22nF 10% 63V
2351	5322 122 32654	22nF 10% 63V
2354	5322 122 32654	22nF 10% 63V
2355	5322 122 31865	1,5nF 10% 63V
2356	5322 122 31865	1,5nF 10% 63V
2357	5322 122 32658	22pF 5% 50V
2358	5322 122 32654	22nF 10% 63V
2359	5322 122 32654	22nF 10% 63V
2360	4822 122 32575	220pF 10% 500V
2361	5322 122 32654	22nF 10% 63V

Item	Codenumber	Description
2362	5322 122 32654	22nF 10% 63V
2363	5322 122 32654	22nF 10% 63V
2364	5322 122 32654	22nF 10% 63V
2365	5322 122 32654	22nF 10% 63V
2366	5322 122 32654	22nF 10% 63V
2367	5322 122 32654	22nF 10% 63V
2368	5322 122 32654	22nF 10% 63V
2400	5322 122 32654	22nF 10% 63V
2401	5322 122 32654	22nF 10% 63V
2402	5322 122 32268	470pF 10% 50V
2403	5322 122 34123	1nF 10% 50V
2404	4822 122 33175	2,2nF 20% 50V
2405	4822 122 32542	47nF 10% 63V
2406	5322 122 32531	100pF 5% 50V
2407	4822 122 33177	10nF 20% 50V
2408	5322 122 34123	1nF 10% 50V
2409	4822 121 42408	220nF 5% 63V
2410	4822 124 41527	47uF 25V
2411	4822 122 32575	220pF 10% 500V
2412		470nF 10%
2413	4822 122 32575	220pF 10% 500V
2414	5322 122 32654	22nF 10% 63V
2415	4822 121 51321	8,2nF 1% 63V
2416	4822 121 51321	8,2nF 1% 63V
2417	4822 124 41598	33uF 20% 35V
2418	4822 122 32542	47nF 10% 63V
2419	5322 121 42661	330nF 5% 63V
2420	4822 122 33342	33nF 10% 63V
2421	4822 122 33342	33nF 10% 63V
2422	4822 121 42408	220nF 5% 63V
2423	4822 121 42408	220nF 5% 63V
2424	5322 122 32654	22nF 10% 63V
2425	4822 121 51252	470nF 5% 63V
2426	5322 122 32654	22nF 10% 63V
2427	4822 122 33496	100nF 10% 63V
2428	5322 122 32654	22nF 10% 63V
2429	4822 124 41527	47uF 25V
2430	5322 126 10223	4,7nF 10% 63V
2431	4822 121 51252	470nF 5% 63V
2432	4822 122 32927	220nF Y5V 50V
2433	4822 122 33496	100nF 10% 63V
2434	5322 122 32448	10pF 5% 50V
2435	4822 122 33893	18nF 10% 63V
2436	5322 121 42661	330nF 5% 63V
2437	5322 122 32654	22nF 10% 63V
2438	4822 122 33175	2,2nF 20% 50V
2440	5322 122 32654	22nF 10% 63V
2450	4822 124 41598	33uF 20% 35V
2451	5322 122 32654	22nF 10% 63V
2452	5322 122 32531	100pF 5% 50V
2455	5322 122 32654	22nF 10% 63V
2456	4822 122 33496	100nF 10% 63V
2457	5322 122 32452	47pF 5% 63V
2458	4822 122 33175	2,2nF 20% 50V
2459		470nF 10% 50V
2460	5322 122 32654	22nF 10% 63V
2461	4822 124 41576	2,2uF 20% 50V
2462	4822 124 41598	33uF 20% 35V
2463	5322 122 32654	22nF 10% 63V
2464	4822 124 41598	33uF 20% 35V
2465	5322 122 32654	22nF 10% 63V
2466	5322 122 34123	1nF 10% 50V
2469	4822 124 41598	33uF 20% 35V

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Item	Codenumber	Description
2470	5322 122 32654	22nF 10% 63V
2471	4822 122 33515	82pF 5% 63V
2473	4822 122 33515	82pF 5% 63V
2501	5322 122 32654	22nF 10% 63V
2502	4822 124 41528	100uF 25V
2503	4822 124 41528	100uF 25V
2504	5322 122 32654	22nF 10% 63V
2505	5322 122 32654	22nF 10% 63V
2506	5322 122 32654	22nF 10% 63V
2507	4822 124 41528	100uF 25V
2508	5322 122 32654	22nF 10% 63V
2509	4822 124 41528	100uF 25V
2510	4822 124 41528	100uF 25V
2511	4822 121 43101	6,8nF 1% 63V
2512	5322 122 32654	22nF 10% 63V
2513	4822 121 43101	6,8nF 1% 63V
2514	5322 122 32654	22nF 10% 63V
2515	4822 124 41528	100uF 25V
2516	5322 122 32654	22nF 10% 63V
2517	5322 122 32654	22nF 10% 63V
2518	5322 122 32654	22nF 10% 63V
2520	4822 124 80144	220uF 20% 25V
2521	4822 124 41576	2,2uF 20% 50V
2522		470nF 10%
2523	4822 124 41989	470uF 20% 16V
2525	4822 124 41576	2,2uF 20% 50V
2526		470nF 10%
2527	4822 124 41989	470uF 20% 16V
2528	5322 122 32654	22nF 10% 63V
2529	5322 122 32654	22nF 10% 63V
2530	4822 122 32139	12pF 2% NPO 63V
2531	4822 124 22339	100uF 16V
2535	4822 122 32139	12pF 2% NPO 63V
2536	4822 122 32139	12pF 2% NPO 63V
2550	4822 122 32139	12pF 2% NPO 63V
2551	4822 124 22339	100uF 16V
2553	5322 122 32654	22nF 10% 63V
2554	5322 122 32654	22nF 10% 63V
2605	5322 122 32654	22nF 10% 63V
2606	5322 122 32654	22nF 10% 63V
2607	5322 122 32654	22nF 10% 63V
2608	4822 122 33342	33nF 10% 63V
2609	5322 122 32654	22nF 10% 63V
2610	5322 122 32654	22nF 10% 63V
2611	5322 122 32654	22nF 10% 63V
2612	4822 121 51252	470nF 5% 63V
2613	4822 124 41528	100uF 25V
2614	4822 124 41528	100uF 25V
2615	5322 122 32268	470pF 10% 50V
2616	5322 122 32268	470pF 10% 50V
2617	5322 122 32448	10pF 5% 50V
2618	5322 122 32654	22nF 10% 63V
2620	5322 122 32654	22nF 10% 63V
2621	5322 122 32654	22nF 10% 63V
2622	4822 126 10004	120pF 5% 63V
2623	5322 122 32268	470pF 10% 50V
2624	4822 121 51252	470nF 5% 63V
2625	5322 122 33063	2,2pF 5% NPO 50V
2630	5322 122 32658	22pF 5% 50V
2631	4822 122 33496	100nF 10% 63V
2632	4822 122 33496	100nF 10% 63V
2633	4822 122 33496	100nF 10% 63V
2634	4822 122 33496	100nF 10% 63V

Item	Codenumber	Description
2635	5322 122 32654	22nF 10% 63V
2636	4822 124 41528	100uF 25V
2637	4822 124 41579	10uF 20% 50V
2638	5322 122 32654	22nF 10% 63V
2639	4822 122 33496	100nF 10% 63V
2640	4822 124 41579	10uF 20% 50V
2641	4822 124 41579	10uF 20% 50V
2642	5322 122 32269	68pF 5% 50V
2643	5322 122 32452	47pF 5% 63V
2645	4822 124 41579	10uF 20% 50V
2646	5322 122 32654	22nF 10% 63V
2647	4822 122 33496	100nF 10% 63V
2648	5322 122 32654	22nF 10% 63V
2654	4822 124 41528	100uF 25V
3116	4822 051 20221	220R00 5% 0,1W
3117	4822 051 20221	220R00 5% 0,1W
3118	4822 051 20221	220R00 5% 0,1W
3120	4822 051 20472	4K70 5% 0,1W
3121		75R00 1%
3122	4822 051 20223	22K00 5% 0,1W
3123		75R00 1%
3124		75R00 1%
3125	4822 051 20223	22K00 5% 0,1W
3127		75R00 1% 0,1W
3129	4822 051 20229	22R00 5% 0,1W
3130		75R00 1% 0,1W
3130		75R00 1% 0,1W
3131		75R00 1% 0,1W
3132		75R00 1% 0,1W
3133	4822 050 21002	1K00 1% 0,1W
3134		390R00 1%
3135	4822 052 10108	1R00 5% 0,33W
3136	4822 051 20103	10K00 5% 0,1W
3137	4822 051 20103	10K00 5% 0,1W
3138	4822 051 20103	10K00 5% 0,1W
3139	4822 051 20103	10K00 5% 0,1W
3140	4822 051 20103	10K00 5% 0,1W
3141	4822 051 20103	10K00 5% 0,1W
3143	4822 051 20229	22R00 5% 0,1W
3144		150R00 1%
3145		150R00 1%
3146		150R00 1%
3201	4822 051 20008	0R00 5% 0,1W
3203	4822 051 20101	100R00 5% 0,1W
3204	4822 051 20008	0R00 5% 0,1W
3206	4822 051 20472	4K70 5% 0,1W
3207	4822 051 20472	4K70 5% 0,1W
3208	4822 051 20008	0R00 5% 0,1W
3210	4822 051 20472	4K70 5% 0,1W
3211	4822 051 20472	4K70 5% 0,1W
3212	4822 050 21002	1K00 1% 0,1W
3213	4822 051 20101	100R00 5% 0,1W
3215	4822 051 20008	0R00 5% 0,1W
3216	4822 051 20008	0R00 5% 0,1W
3218	4822 051 20472	4K70 5% 0,1W
3219	4822 051 20472	4K70 5% 0,1W
3220	4822 051 20472	4K70 5% 0,1W
3221	4822 051 20104	100K00 5% 0,1W
3222	4822 051 20103	10K00 5% 0,1W
3223	4822 051 20682	6K80 5% 0,1W
3225	4822 050 21002	1K00 1% 0,1W
3226	4822 051 20101	100R00 5% 0,1W

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Item	Codenumber	Description
3229	4822 051 20008	0R00 5% 0,1W
3230	4822 050 21002	1K00 1% 0,1W
3231	4822 050 21002	1K00 1% 0,1W
3232	4822 050 21002	1K00 1% 0,1W
3233	4822 050 21002	1K00 1% 0,1W
3234	4822 050 21002	1K00 1% 0,1W
3235	4822 050 21002	1K00 1% 0,1W
3236	4822 050 21002	1K00 1% 0,1W
3239	4822 051 20101	100R00 5% 0,1W
3240	4822 051 20101	100R00 5% 0,1W
3241	4822 051 20101	100R00 5% 0,1W
3242	4822 051 20008	0R00 5% 0,1W
3246	4822 050 21002	1K00 1% 0,1W
3247	4822 051 20008	0R00 5% 0,1W
3249	4822 051 20682	6K80 5% 0,1W
3250	4822 051 20103	10K00 5% 0,1W
3251	4822 051 20104	100K00 5% 0,1W
3253	4822 050 21002	1K00 1% 0,1W
3254	4822 051 20008	0R00 5% 0,1W
3255	4822 051 20222	2K20 5% 0,1W
3256	4822 051 20221	220R00 5% 0,1W
3257	4822 051 20221	220R00 5% 0,1W
3258	4822 051 20223	22K00 5% 0,1W
3259	4822 051 20223	22K00 5% 0,1W
3260	4822 051 20223	22K00 5% 0,1W
3260	4822 051 20223	22K00 5% 0,1W
3261	4822 051 20183	18K00 5% 0,1W
3262	4822 051 20183	18K00 5% 0,1W
3263	4822 051 20473	47K00 5% 0,1W
3264	4822 051 20103	10K00 5% 0,1W
3265	4822 051 20103	10K00 5% 0,1W
3266	4822 051 20222	2K20 5% 0,1W
3267	4822 051 20222	2K20 5% 0,1W
3268	4822 051 20224	220K00 5% 0,1W
3270		75R00 1%
3271	4822 051 20682	6K80 5% 0,1W
3272	4822 051 20103	10K00 5% 0,1W
3273	4822 051 20104	100K00 5% 0,1W
3274	4822 051 20682	6K80 5% 0,1W
3275	4822 051 20103	10K00 5% 0,1W
3276	4822 051 20104	100K00 5% 0,1W
3277	4822 051 20104	100K00 5% 0,1W
3278	4822 051 20104	100K00 5% 0,1W
3279	4822 051 20101	100R00 5% 0,1W
3280	4822 051 20104	100K00 5% 0,1W
3281	4822 051 20103	10K00 5% 0,1W
3290	4822 051 20105	1M00 5% 0,1W
3293	4822 051 20222	2K20 5% 0,1W
3296	4822 116 40238	0R46 - 60V
3297	4822 116 40238	0R46 - 60V
3302	4822 051 20104	100K00 5% 0,1W
3303	4822 051 20221	220R00 5% 0,1W
3304	4822 050 21002	1K00 1% 0,1W
3305	4822 050 21002	1K00 1% 0,1W
3306	4822 051 20103	10K00 5% 0,1W
3307	4822 051 20103	10K00 5% 0,1W
3308	4822 050 21002	1K00 1% 0,1W
3309	4822 051 20008	0R00 5% 0,1W
3310	4822 051 20008	0R00 5% 0,1W
3311	4822 051 20008	0R00 5% 0,1W
3312		75R00 1%
3313		75R00 1%
3314		75R00 1%

Item	Codenumber	Description
3318	4822 051 20008	0R00 5% 0,1W
3319	4822 051 20221	220R00 5% 0,1W
3320	4822 051 20183	18K00 5% 0,1W
3321	4822 051 20221	220R00 5% 0,1W
3322	4822 051 20183	18K00 5% 0,1W
3323	4822 051 20008	0R00 5% 0,1W
3327	4822 051 20008	0R00 5% 0,1W
3330	4822 051 20229	22R00 5% 0,1W
3331	4822 051 20153	15K00 5% 0,1W
3332	4822 050 21002	1K00 1% 0,1W
3333	4822 051 20221	220R00 5% 0,1W
3334	4822 051 20221	220R00 5% 0,1W
3335	4822 051 20221	220R00 5% 0,1W
3336	4822 051 20221	220R00 5% 0,1W
3337	4822 051 20221	220R00 5% 0,1W
3338	4822 051 20221	220R00 5% 0,1W
3340	4822 051 20221	220R00 5% 0,1W
3341	4822 051 20221	220R00 5% 0,1W
3342	4822 051 20221	220R00 5% 0,1W
3343	4822 051 20221	220R00 5% 0,1W
3344	4822 051 20221	220R00 5% 0,1W
3401	4822 051 20472	4K70 5% 0,1W
3402	4822 051 20104	100K00 5% 0,1W
3403	4822 051 20123	12K00 5% 0,1W
3404	4822 051 20101	100R00 5% 0,1W
3405	4822 050 21002	1K00 1% 0,1W
3406	4822 116 83705	24K 2% 0,2W
3407	4822 051 20562	5K60 5% 0,1W
3408	4822 051 20103	10K00 5% 0,1W
3409	4822 052 10108	1R00 5% 0,33W
3410	4822 052 10478	4R70 5% 0,33W
3411	4822 052 10129	12R00 5% 0,33W
3412	4822 051 20101	100R00 5% 0,1W
3413	4822 051 20104	100K00 5% 0,1W
3415	4822 051 20123	12K00 5% 0,1W
3416	4822 051 20223	22K00 5% 0,1W
3417	4822 051 20473	47K00 5% 0,1W
3418	4822 051 20223	22K00 5% 0,1W
3419	4822 051 20182	1K80 5% 0,1W
3420	4822 116 83706	5K1 2% 0,2W
3421	4822 051 20183	18K00 5% 0,1W
3422	4822 051 20154	150K00 5% 0,1W
3422	4822 051 20224	220K00 5% 0,1W
3424	4822 051 20223	22K00 5% 0,1W
3425	4822 050 23308	3R30 1% 0,6W
3426	4822 051 20302	3K00 5% 0,1W
3427	4822 052 10108	1R00 5% 0,33W
3428	4822 051 20302	3K00 5% 0,1W
3429	4822 051 20339	33R00 5% 0,1W
3430	4822 051 20113	11K00 5% 0,1W
3431	4822 051 20124	120K00 5% 0,1W
3432		3M3 5% 0,1W
3433	4822 051 20154	150K00 5% 0,1W
3435	4822 051 20563	56K00 5% 0,1W
3436	4822 051 20394	390K00 5% 0,1W
3437	4822 051 20823	82K00 5% 0,1W
3438	4822 052 10478	4R70 5% 0,33W
3439	4822 116 52186	22E 5% 0,5W
3440	4822 051 20472	4K70 5% 0,1W
3441	4822 051 20473	47K00 5% 0,1W
3442	4822 051 20104	100K00 5% 0,1W
3443	4822 051 20913	91K00 5% 0,1W
3444	4822 051 20122	1K20 5% 0,1W

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Item	Codenumber	Description
3445	4822 051 20332	3K30 5% 0,1W
3446	4822 051 20562	5K60 5% 0,1W
3447	4822 051 20154	150K00 5% 0,1W
3448	4822 051 20472	4K70 5% 0,1W
3449	4822 051 20472	4K70 5% 0,1W
3450	4822 051 20333	33K00 5% 0,1W
3451	4822 051 20684	680K00 5% 0,1W
3452	4822 051 20204	200K00 5% 0,1W
3454	4822 052 10108	1R00 5% 0,33W
3455	4822 052 10108	1R00 5% 0,33W
3456	4822 051 20223	22K00 5% 0,1W
3457	4822 051 20223	22K00 5% 0,1W
3458	4822 051 20223	22K00 5% 0,1W
3459	4822 051 20223	22K00 5% 0,1W
3460	4822 051 20223	22K00 5% 0,1W
3462	4822 051 20223	22K00 5% 0,1W
3463	4822 052 10478	4R70 5% 0,33W
3464	4822 051 20224	220K00 5% 0,1W
3465	4822 051 20223	22K00 5% 0,1W
3466	4822 051 20223	22K00 5% 0,1W
3467	4822 051 20222	2K20 5% 0,1W
3468	4822 051 20223	22K00 5% 0,1W
3469	4822 051 20223	22K00 5% 0,1W
3470	4822 051 20103	10K00 5% 0,1W
3471	4822 051 20223	22K00 5% 0,1W
3472	4822 116 83084	27K 2% 0,2W
3473	4822 051 20203	20K00 5% 0,1W
3474	4822 116 83084	27K 2% 0,2W
3475	4822 116 83084	27K 2% 0,2W
3476	4822 116 83084	27K 2% 0,2W
3478	4822 116 52186	22E 5% 0,5W
3479	4822 051 20104	100K00 5% 0,1W
3480	4822 051 20222	2K20 5% 0,1W
3481	4822 052 10338	3R3 5% 0,33W
3482	4822 051 20223	22K00 5% 0,1W
3483		75R00 1%
3484	4822 051 20912	9K10 5% 0,1W
3485	4822 051 20392	3K90 5% 0,1W
3486	4822 051 20152	1K50 5% 0,1W
3487	4822 051 20101	100R00 5% 0,1W
3488	4822 051 20224	220K00 5% 0,1W
3489	4822 052 10478	4R70 5% 0,33W
3490	4822 051 20223	22K00 5% 0,1W
3491	4822 051 20105	1M00 5% 0,1W
3492	4822 052 10108	1R00 5% 0,33W
3493	4822 051 20154	150K00 5% 0,1W
3494		3M3 5% 0,1W
3495	4822 051 20101	100R00 5% 0,1W
3497	4822 051 20008	0R00 5% 0,1W
3501	4822 052 10338	3R3 5% 0,33W
3502	4822 052 10478	4R70 5% 0,33W
3503	4822 052 10478	4R70 5% 0,33W
3504	4822 051 20103	10K00 5% 0,1W
3505	4822 051 20223	22K00 5% 0,1W
3506	4822 051 20473	47K00 5% 0,1W
3507	4822 051 20103	10K00 5% 0,1W
3508	4822 051 20103	10K00 5% 0,1W
3509	4822 051 20223	22K00 5% 0,1W
3510	4822 051 20472	4K70 5% 0,1W
3511	4822 052 10338	3R3 5% 0,33W
3513	4822 050 25102	5K10 1% 0,6W
3514	4822 050 22202	2K20 1% 0,6W
3515	4822 051 20105	1M00 5% 0,1W

Item	Codenumber	Description
3516	4822 051 20105	1M00 5% 0,1W
3517	4822 050 25102	5K10 1% 0,6W
3518	4822 051 20472	4K70 5% 0,1W
3519	4822 050 25102	5K10 1% 0,6W
3520	4822 052 10338	3R3 5% 0,33W
3521	4822 050 22202	2K20 1% 0,6W
3522	4822 051 20105	1M00 5% 0,1W
3523	4822 050 25102	5K10 1% 0,6W
3524	4822 051 20105	1M00 5% 0,1W
3525	4822 051 20101	100R00 5% 0,1W
3526	4822 051 20101	100R00 5% 0,1W
3527	4822 051 20101	100R00 5% 0,1W
3528	4822 051 20101	100R00 5% 0,1W
3529	4822 051 20221	220R00 5% 0,1W
3530	4822 050 21103	11K00 1% 0,6W
3531	4822 050 21103	11K00 1% 0,6W
3532	4822 051 20681	680R00 5% 0,1W
3533	4822 050 21503	15K00 1% 0,6W
3534	4822 051 20101	100R00 5% 0,1W
3535	4822 050 22202	2K20 1% 0,6W
3538	4822 051 20103	10K00 5% 0,1W
3539	4822 051 20103	10K00 5% 0,1W
3540	4822 050 14709	47R00 1% 0,4W
3541	4822 051 20472	4K70 5% 0,1W
3542	4822 051 20103	10K00 5% 0,1W
3543	4822 051 20472	4K70 5% 0,1W
3544	4822 051 20103	10K00 5% 0,1W
3545	4822 051 20223	22K00 5% 0,1W
3546	4822 051 20103	10K00 5% 0,1W
3547	4822 051 20472	4K70 5% 0,1W
3548	4822 050 24708	4R70 1% 0,6W
3549	4822 051 20471	470R00 5% 0,1W
3550	4822 050 21103	11K00 1% 0,6W
3551	4822 050 21103	11K00 1% 0,6W
3552	4822 051 20681	680R00 5% 0,1W
3553	4822 050 21503	15K00 1% 0,6W
3554	4822 050 21001	100R00 1% 0,6W
3555	4822 050 22202	2K20 1% 0,6W
3558	4822 051 20103	10K00 5% 0,1W
3560	4822 051 20103	10K00 5% 0,1W
3561	4822 051 20472	4K70 5% 0,1W
3562	4822 050 24708	4R7 1% 0,6W
3563	4822 051 20471	470R00 5% 0,1W
3570	4822 051 20473	47K00 5% 0,1W
3571	4822 051 20473	47K00 5% 0,1W
3572	4822 051 20103	10K00 5% 0,1W
3573	4822 051 20103	10K00 5% 0,1W
3574	4822 051 20103	10K00 5% 0,1W
3601	4822 051 20394	390K00 5% 0,1W
3602	4822 051 20105	1M00 5% 0,1W
3603	4822 051 20105	1M00 5% 0,1W
3604	4822 051 20153	15K00 5% 0,1W
3606	4822 050 21003	10K00 1% 0,6W
3607	4822 050 21003	10K00 1% 0,6W
3608	4822 051 20223	22K00 5% 0,1W
3609	4822 051 20223	22K00 5% 0,1W
3610	4822 051 20223	22K00 5% 0,1W
3611	4822 050 22202	2K20 1% 0,6W
3612	4822 050 21802	1K80 1% 0,6W
3613	4822 050 21002	1K00 1% 0,6W
3614	4822 050 28201	820R00 1% 0,6W
3615	4822 051 20104	100K00 5% 0,1W
3616	4822 051 20104	100K00 5% 0,1W

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Item	Codenumber	Description
3620	4822 051 10102	1K00 2% 0,25W
3621	4822 051 20221	220R00 5% 0,1W
3622	4822 051 20561	560R00 5% 0,1W
3623	4822 051 10102	1K00 2% 0,25W
3624	4822 051 20221	220R00 5% 0,1W
3625	4822 051 20561	560R00 5% 0,1W
3626	4822 051 10102	1K00 2% 0,25W
3627	4822 051 20221	220R00 5% 0,1W
3628	4822 051 20561	560R00 5% 0,1W
3630	4822 051 20123	12K00 5% 0,1W
3632	4822 052 10338	3R3 5% 0,33W
3633	4822 052 10338	3R3 5% 0,33W
3634	4822 051 10102	1K00 2% 0,25W
3635	4822 051 20273	27K00 5% 0,1W
3636	4822 051 10102	1K00 2% 0,25W
3537		200R00 5% 0,1W
3638	4822 051 10102	1K00 2% 0,25W
3639	4822 051 20393	39K00 5% 0,1W
3640	4822 051 20223	22K00 5% 0,1W
3641	4822 051 20471	470R00 5% 0,1W
3642	4822 051 20681	680R00 5% 0,1W
3643		300R00 5% 0,1W
3644	4822 051 20151	150R00 5% 0,1W
3645	4822 051 20689	68R00 5% 0,1W
3646	4822 051 20221	220R00 5% 0,1W
3647	4822 051 20221	220R00 5% 0,1W
3648	4822 051 20221	220R00 5% 0,1W
3650	4822 051 20689	68R00 5% 0,1W
3651	4822 051 20151	150R00 5% 0,1W
3652	4822 051 20151	150R00 5% 0,1W
3653	4822 051 20689	68R00 5% 0,1W
3654		75R00 1%
3655	4822 051 20393	39K00 5% 0,1W
3656	4822 051 20153	15K00 5% 0,1W
3657	4822 051 20471	470R00 5% 0,1W
3658	4822 051 20681	680R00 5% 0,1W
3659	4822 051 20271	270R00 5% 0,1W
3660	4822 051 20151	150R00 5% 0,1W
3661	4822 051 20689	68R00 5% 0,1W
3662	4822 051 20152	1K50 5% 0,1W
3670	4822 051 20472	4K70 5% 0,1W
3671	4822 052 10108	1R00 5% 0,33W
3673	4822 051 20223	22K00 5% 0,1W
3678	4822 051 20223	22K00 5% 0,1W
3680	4822 051 10102	1K00 2% 0,25W
3681	4822 050 23301	330R00 1% 0,6W
3685	4822 052 10228	2R20 5% 0,33W
5150		EMI FILTER 22nF/100V
5201	4822 242 81398	4.915 000 MC
5203	4822 242 81396	4.000 000 MC
5210	4822 157 70378	EMI FILTER 22nF/16V
5211		EMI FILTER 1nF/100V
5212		EMI FILTER 1nF/100V
5213		EMI FILTER 1nF/100V
5214		EMI FILTER 1nF/100V
5215		EMI FILTER 22nF/100V
5216	4822 157 70378	EMI FILTER 22nF/16V
5217		EMI FILTER 1nF/100V
5218		EMI FILTER 1nF/100V
5219		EMI FILTER 1nF/100V
5220		EMI FILTER 1nF/100V
5221		EMI FILTER 1nF/100V

Item	Codenumber	Description
5222		EMI FILTER 1nF/100V
5223		EMI FILTER 1nF/100V
5224		EMI FILTER 1nF/100V
5225		EMI FILTER 220pF/100V
5226		EMI FILTER 220pF/100V
5227		EMI FILTER 1nF/100V
5240	4822 242 81394	30.209 800 MC
5240	4822 242 81419	30.0000 MC
5301	4822 242 81395	45.158 400 MC
5302	4822 242 81393	19.357 000 MC
5401	4822 242 72527	CST 4,00MGW-TF01
5501		CHOKE
5502		CHOKE
5503		CHOKE
5504		EMI FILTER 22nF/100V
5602	4822 242 81397	3.579 000 MC
5603		EMI FILTER 22nF/100V
5630	4822 157 53906	47uH
5631	4822 320 40247	DELAY LINE 275 nSEC
5632	4822 157 53259	COIL 166NNF10264AG
5633		EMI FILTER 22nF/100V
5648		EMI FILTER 1nF/100V
5649		EMI FILTER 220pF/100V
5650		EMI FILTER 220pF/100V
5651		EMI FILTER 220pF/100V
5652		EMI FILTER 220pF/100V
5653		EMI FILTER 1nF/100V
6301	4822 130 31983	BAT85
6401	5322 130 30684	1N4002
6402	5322 130 30684	1N4002
6403	4822 130 31981	BZX79-B3V9
6404	4822 130 31981	BZX79-B3V9
6510	5322 130 34885	1N5817
6601	4822 130 31129	BB212
6680	4822 130 34197	BZX79-C12
7110	4822 209 32148	TMS45165-70-DGE
7118	4822 209 32148	TMS45165-70-DGE
7120	4822 209 31292	MC44200
7121	5322 209 60189	PC74HCT4053T
7125		MCDI460-VDSC
7201		SCC68070CCA84
7203	5322 130 41983	BC858B
7206	4822 209 32101	MC68H05/ZC405170R3.2
7207	5322 209 71568	PC74HCT14T
7208	5322 209 71568	PC74HCT14T
7209	5322 130 41982	BC848B
7211	4822 209 32098	SYST.SOFTW. 3.0R1.2
7212	4822 209 30704	MC74HCU04D
7215	4822 209 32147	MC74ACT04DC
7216	5322 209 11596	PC74HCT08T
7217	4822 209 30696	MC74ACT74DR2
7218	5322 209 11599	PC74HCT32T
7224	4822 209 30554	MK48T08B15
7225	4822 209 72587	TCA0372D2
7244	4822 209 61547	MC34064D
7245	4822 209 72587	TCA0372D2
7247	4822 209 32068	MC74ACT125D
7249	5322 209 61434	N74F02D
7250	4822 130 41982	BC848B
7301		IMS66490/1 CDIC'
7302	4822 209 32146	MC74ACT244DWR2

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Item	Codenumber	Description
7303	4822 209 32146	MC74ACT244DWR2
7304		ATTEX CGL00010
7306		PCB5010WP/M023
7307	4822 209 63925	FCB61C65L-70T
7308	4822 209 63925	FCB61C65L-70T
7310	4822 209 30704	MC74HCU04D
7318	4822 209 31963	NE564D
7320	5322 209 71568	PC74HCT14T
7401	4822 209 73234	TDA8808T/C3
7410	4822 130 42696	BC818-25
7421	4822 209 31973	TDA8809T/C2/S1/13
7430	4822 209 30095	LM833D
7435	5322 209 60299	PC74HCT00T
7440	5322 130 41983	BC858B
7441	5322 130 41983	BC858B
7460	4822 209 61759	SAA7310GP/H5
7461	4822 209 70422	MN4264-15
7470	4822 130 41982	BC848B
7471	4822 130 41982	BC848B
7472	4822 130 42131	BF550
7475	4822 209 32099	MC68HC05C8/ ZC405171 R3.1
7480	4822 209 62588	PCF2705P
7501	4822 209 32072	CS4328KS
7502	4822 209 32068	MC74ACT125D
7503	4822 130 41982	BC848B
7504	4822 130 41982	BC848B
7506	5322 130 41983	BC858B
7507	4822 130 41982	BC848B
7509	4822 130 41982	BC848B
7511	4822 209 62312	MC33078D
7512	5322 209 12099	MC74HC164D
7515	5322 130 41983	BC858B
7516	5322 130 41983	BC858B
7517	4822 130 41982	BC848B
7520	4822 209 62059	TCA0372DP1
7530	4822 209 32067	AD7528JR
7531	4822 209 32071	MC33079D
7532	4822 130 42696	BC818-25
7548	4822 130 41982	BC848B
7550	4822 209 32067	AD7528JR
7551	4822 130 42696	BC818-25
7601	4822 209 32069	PC74HCT40103T
7602	4822 209 32097	TIBPAL16R6-7602N 2E
7603	4822 209 32074	MC74HC161D
7604	4822 209 30704	MC74HCU04D
7605	4822 209 32074	MC74HC161D
7606	4822 209 32074	MC74HC161D
7607	4822 209 30726	MC74HC4046AD
7608	4822 209 32073	MC34072D
7609	4822 209 31908	CXA1145M
7620	4822 130 41982	BC848B
7621	4822 130 41982	BC848B
7622	4822 130 41982	BC848B
7630	4822 130 41982	BC848B
7631	5322 130 41983	BC858B
7632	4822 130 41982	BC848B
7633	4822 130 41982	BC848B
7634	4822 130 41982	BC848B
7635	4822 130 41982	BC848B
7636	5322 130 41983	BC858B
7637	4822 130 41982	BC848B
7642	5322 130 41983	BC858B

Item	Codenumber	Description
7680	4822 130 41982	BC848B

8.5 LIST OF ACCESSORIES AND SERVICE TOOLS

Item	Codenumber	Description
1	4822 395 50145	TORX SCREW DRIVER SET
2	4822 214 52007	LOW-LEVEL TEST PANEL ASSY
3	4822 321 61677	CABLE FOR TEST PANEL
4	4822 264 50263	PLUG FOR STARTUP OF SERVICESHELL ON PORT 2 (BU 2)
5	4822 397 30096	AUDIO TESTDISC SET
6	4822 397 30155	TESTDISC WITH CONTINOUS 1KHz SIGNAL 70 MIN.
7	4822 397 30184	AUDIOSIGNALSDISC
8	4822 701 11922	SKEW DISC 0,6
9	4822 701 11923	EXCENTRICITY DISC 150 I
10	4822 691 30293	ROLLER CONTROLLER
11	4822 691 30298	TRACKER BALL
12	4822 691 30299	JOY STICK
13	4822 691 30297	MOUSE

PARTSLIST FOR ROLLERCONTROLLER

Item	Codenumber	Description
1	4822 321 61841	CABLE ASSY
2	4822 413 90093	BALL
3	4822 276 13359	SWITCH
4	4822 410 62427	KEYTOP-LEFT
4	4822 410 62428	KEYTOP-RIGHT
5	4822 492 42645	SPRING

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Compact disc interactive player

CDI 220/40/41/45/57

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Service Manual

COMPACT disc Interactive

SURVEY OF PLAYER VERSIONS

Version	Description
/41	Multivoltage PAL player
/40	PAL player without RF-modulator
/45	PAL player with RF-modulator for the UK-system
/57	NTSC player with RF-modulator for the USA-system

These players are equiped with a Compact Disc Mechanism type CDM9; service code 4822 691 30275.
This CDM is also used in CDI200 CDI205, CDI210 and CDI910.

Service information is included in this manual.

SURVEY OF MAINPANELS

Version	Codenummer
/20	4822 214 52065
/25	4822 214 52068
/37	4822 214 52056
/39	4822 214 52066
/40	4822 214 52163
/41	4822 214 52164
/45	4822 214 52165
/57	4822 214 52145

These mainpanels must be repaired via the central repair procedure. If the defective item is on the circuitry of the µP section,digital audio (LEMM+DSP) section, GLUE logic section or digital video section. See chapter 3.6.

If the defective item is in the circuitry of the SERVO section, analog audio section or analog video section, then the panel can be repaired up to component level.
For partnumbers see chapter 8.4.

(SF) Varioitus!
Laite sisältaa laserdiodin, joka lähettää näkymätöntä silmille vaarallista lasersäteilyä.

(S) Varning!
Osynlig laserstrålning när denna del är öppnad och spärren ar urkopplad.
Betakta ej strålen.

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

(GB)
Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.
Safety components are marked by the symbol ⚠.

CLASS 1
LASER PRODUCT
3122 110 03420

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PHILIPS

PHILIPS

PCS 71 670

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2 PRODUCT INFORMATION

2.1 TECHNICAL SPECIFICATION

System • Système • Sistema • Systeem • System • Sistema • Sistema
CD-Interactive
CD-Interactif

Usable discs • Disques utiliables • Discos utilizables • Discos Utiliable • Te gebruiken discs • Verwendbare discs • Dischi usabili

CD-I	*CD-I*
CD-DA	*CD-Audio*
PHOTO-CD	*Photo CD*
CD-I READY	*CD-I READY*
CD BRIDGE	*CD-I BRIDGE*
CD+GRAPHICS	*CD+GRAPHICS*

Power requirement • Alimentation • Alimentacion • Alimentación Voedingsspanning • Netzanschluß • Alimentazione
Europe: 220-230 V/50 Hz USA: 120 V/60 Hz
UK: 240 V/50 Hz Japan: 100 V/50,60 Hz

Power consumption • Consommation • Consume de corriente Opgenomen vermogen • Leistungsaufname • Consumo di corrente • Consomo de Corriente
35 W with, 22 W without extension (22ER9141)
35 W avec, 22 W sans extension (22ER9141)

Operating temperature • Temperature de fonctionnement Temperatura de operacion • Bedrijfstemperatuur Betriebstemperatur • Temperatura di fonzionamento • Temperatura de funcionamiento
41°F(5°C) to 95°F(35°C)
5°C à 35°C

Relative humidity • Humidité relative • Humedad relative Relatieve vochtigheid • Relative Feuchtigkeit • Umidità relativa • Humedad relativa
5% to 95% (no condensation)
5% à 95% (sans condensation)

Weight • Poids • Peso • Gewicht • Gewicht • Peso • Peso
5,2 kg

Dimensions (w x h x d) • Dimensions (l x h x p) Dimensiones (a x a x p) • Afmetingen (b x h x d) Abmessungen (B x H x T) • Dimensioni (l x h x p) • Dimensiones (anch. x alt. x prof.)
420 mm x 90 mm x 286 mm
16.55" x 3.55" x 11.25"

Input • Entrée • Entrada • Ingang • Eingang • Ingresso • Entradas
remote in 2 Vpp at 2.2 kOhm cinch socket
Prise cinch 2 Vc-c à 2,2 kOhm

input (2 ports) 8-pin mini-DIN
(2 entrées) mini DIN 8 broches

pin *Broche*	signal *Signal*	I/O *E/S*
1	nc	
2	rxd	I / *E*
3	txd	O / *S*
4	nc	
5	ground / *Masse*	
6	cts	I / *E*
7	rts	O / *S*
8	+5V (200 mA maxi.)	

Note: Pointing device speed of 9600 baud is supported.
Remarque: Vitesse de transmission jusqu' à 9600 baud. • Nota: Se admite un dispositivo de puntero de 9600 baudios de velocidad. • Opmerking: Voor de aanwijsapparaten is een snelheid van 9600 baud mogelijk. • Hinweis: Die Geschwindigkeit der Zeigevorrichtung von 9600 baud wird unterstützt • Nota: Tollera la velocità dell'accessorio di comando di 9600 baud. • Nota: Velocidad del dispositivo de apunta admitida: 9600 baudios.

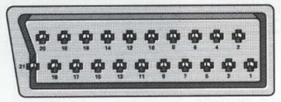
Output • Sortie • Salida • Uitgang • Ausgang • Uscita • Saídas • Salidas

video 1 Vpp (75 Ohm load, sync neg) RCA pin jack
1 Vc-c (charge 75 Ohm, sync. nég.) Prise cinch

S-video y-output 1 Vpp (75 Ohms)
c-output 300 mVpp (75 Ohms)
S-video 4-pin miniDIN
Sortie Y 1 Vc-c (75 Ohm)
Sortie C 300 mVc-c (75 Ohm)
mini DIN 4 broche S-vidéo

pin *Broche*	signal *Signal*
1	ground y / *Masse Y*
2	ground c / *Masse C*
3	y / *Y*
4	c / *C*

AV/Euroconnector
Péritélévision A/V



pin *Broche*	signal *Signal*
1	audio R / *audio R (droite)*
2	nc / *non connecté*
3	audio L / *audio L (gauche)*
4	audio ground / *masse audio*
5	blue ground / *masse bleu*
6	nc / *non connecté*
7	blue / *bleu*
8	slow switching (0=TV 1=AV/Euroconnector) *commutation lente (0=TV 1=Péritélévision A/V)*
9	green ground / *masse vert*
10	nc / *non connecté*
11	green / *vert*
12	nc / *non connecté*
13	red ground / *masse rouge*
14	nc / *non connecté*
15	red / *rouge*
16	fast switching (RGB/CVBS) *commutation rapide (RVB/CVBS)*
17	CVBS ground / *masse CVBS (PAL)*
18	fast switching (ground) *commutation rapide (masse)*
19	CVBS/RGB sync / *CVBS/RVB sync.*
20	nc / *non connecté*
21	shield / *blindage*

Headphones Input impedance 32 Ohm to 2 kOhm output power
Prise Casque 30 mW at 1 kHz, 32 Ohm stereo socket 3.5 mm
impédance entrée 32 Ohm à 2 kOhm puissance sortie 30 mW à 1 kHz, 32 Ohm stéréo, prise Jack 3.5 mm

Audio 2 Vrms
2 channel individual RCA pin cinch sockets
2 Veff
2 prises cinch (une par canal)

Designs and specifications are subject to change without notice.
La conception et les spécifications de ce produit sont sujet à modifications sans avis préalable. • Los diseños y las especificaciones están sujetos a cambios sin previo aviso. • Änderungen von Ausführung und technische Daten vorbehalten • I disegni e le specifiche tecniche sono soggette a modifiche senza preavviso. • As especificações descitas estão sujeitas a altreação sem aviso prévio. • El diseño y las especificaciones estás sujetos a cambios sin previo aviso.

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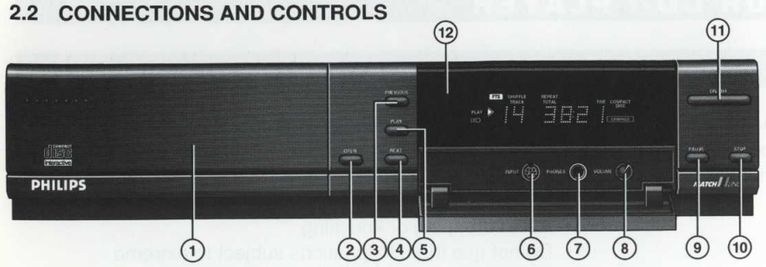
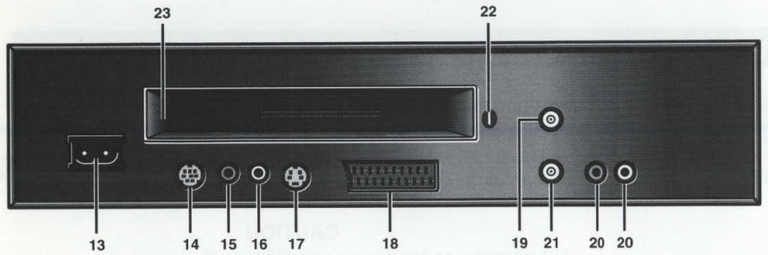
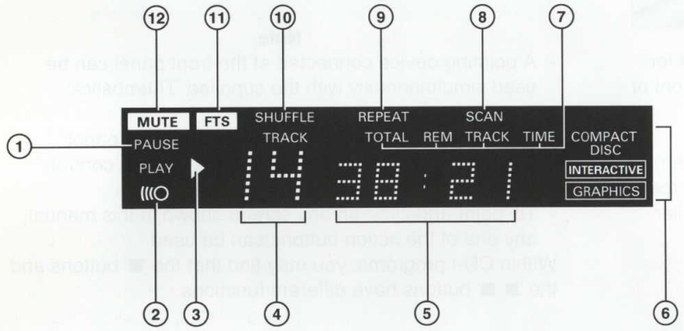
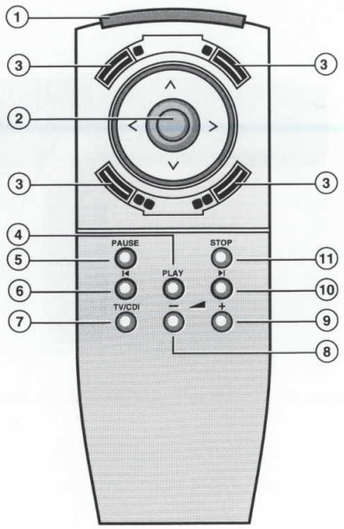
2.2 CONNECTIONS AND CONTROLS









DESCRIPTION OF CONTROLS AND CONNECTIONS

FRONT
1. Disc loading tray
2. Open/close button
3. Previous track selection button
4. Next track selection button
5. Play button
6. Input port for CD-I pointing devices
7. Headphone jack
8. Headphone volume control
9. Pause button
10. Stop button
11. AC power on/off button
12. Soft tone multifunction display with infra-red remote control receiver

REAR
13. Mains AC (alternating current) input jack
14. Input2 port for CD-I pointing devices, keyboard or RS232 connection
15. Remote control input
16. Video output (CVBS)
17. Y/C (S-video) output
18. A/V Euroconnector*
19. RF OUT*
20. Audio output L
    Audio output R
21. TV Antenna input*
22. Channel selector*
23. Extension socket (for 22ER9141)* Full motion video

DISPLAY PANEL
1. CD pause active
2. Remote control active (flashing indicator)
3. Disc playing (stepping indicator)
4. Track number (CD-Audio)
5. Elapsed or remaining time (CD-Audio)
6. Type of disc indicator
7. Time indicators
8. CD scan active
9. CD repeat active
10. CD shuffle active
11. CD FTS active
12. Mute indicator

REMOTE CONTROL
1. Infra red remote control
2. Thumbstick
3. Action buttons (for left or right handed operation)
4. Play button
5. CD pause button
6. CD previous track selection button
7. Audio mute button - CD-I/TV button*
8. Volume down button
9. Volume up button
10. CD next track selection button
11. CD stop button

*Available on some player versions only.

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2.3 BEFORE USING YOUR CD-I PLAYER

PRECAUTIONS

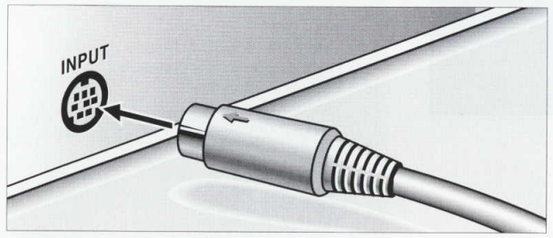
To operate your CD-I player a pointing device is needed. For pointing devices other than the included one, please see the accessories page on the back of this manual.

CAUTION
Never make or change connections with the power switched on.

Pointing devices are sensitive precision instruments. Handle them with care, keeping in mind the following precautions:

- Avoid dropping or knocking
- Do not use them in locations subject to extreme temperatures, humidity, dust or vibration.
- Never hold the pointing device by the cable.
- Never pull the cable to disconnect the pointing device from the player.

WIRED POINTING DEVICES (such as mouse, trackerball, roller controller or touchpad)



- Plug the pointing device connector into an input port for pointing devices on the CD-I player (input *7* at the front or input *15* at the rear).
- Insert the connector with the arrow at the top.
- Place the pointing device in front of the display screen, with the back (the cable end) pointed towards the screen.
- Now, as you roll the mouse, the trackerball or the roller controller, the cursor moves in the corresponding direction on the screen.
- When the cursor is positioned on the required function click on one of the action buttons.
- The function selected by this 'point-and-click' technique is highlighted to confirm the selection.

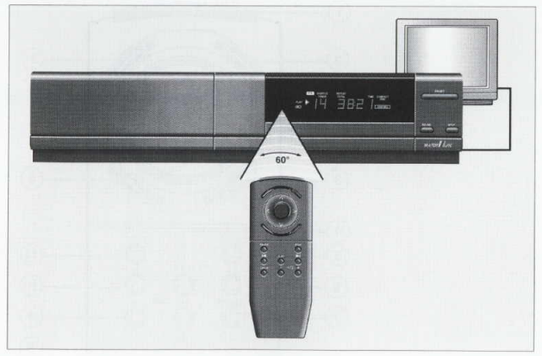
CAUTION
Never make or change connections with the power switched on.

Note
- A pointing device connected at the front panel can be used simultaneously with the supplied 'Thumbstick' remote control.
- Connecting a pointing device only at the rear panel immobilizes the supplied 'Thumbstick' remote control, except in certain programs for two persons.
- To 'point-and-click' on any screen shown in this manual, any one of the action buttons can be used.

Within CD-I programs, you may find that the '■' buttons and the '■ ■' buttons have different functions.

INFRA RED REMOTE CONTROL

Remote control interactive operation
For normal interactive operation, use the 'Thumbstick' remote control to select functions displayed on the TV screen. Simply:
- Aim the remote control at the player.
- Move the Thumbstick to point the cursor arrow on the screen to the required function.
- The cursor arrow movement corresponds to the direction in which the stick is moved. The arrow moves faster if the stick is moved further.
- Click on one of the action buttons.
- The function selected by this 'point-and-click' technique is highlighted to confirm the selection.

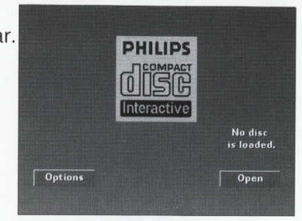


Note
To 'point-and-click' on any screen shown in this manual, any one of the four action buttons can be used. Within CD-I programs, you may find that the '■' buttons and the '■ ■' buttons have different functions.

2.4 SETTING UP

SWITCHING ON AND OFF

- Press the ON/OFF button *(11)* to switch the player on.
- Switch on the TV (and HiFi system if used).
- Select the CD-I input on the TV (and HiFi system if used).
- On the TV, the player start-up screen will appear. This screen has the following system function icons to guide and assist you:

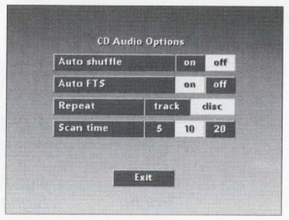


Open/Close:
To open or close the disc tray.
Options:
See: 'OPTIONS SCREEN'.

- Press the ON/OFF button *(11)* to switch the player off.
- Switch off the TV (and HiFi system, if used).

OPTIONS SCREEN

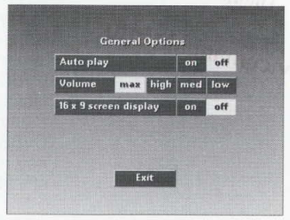
1. CD Audio
To preselect your preferred settings when playing audio CDs:



Auto shuffle
After switching the player on, the tracks on the CD will automatically be played in a random order.
Auto FTS
After switching the player on, the FTS program of the CD will be played automatically
Repeat
Select to repeat a complete audio disc or a single track when the repeat function is activated.
Scan time
Select the time you want the beginning of each audio track to play for when the scan function is activated.

- When finished, point-and-click on 'Exit'.

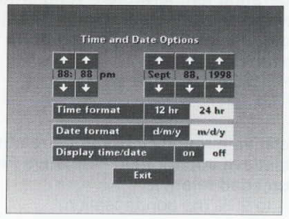
2. General
To change the player general settings:



Auto play
After switching the player on, playback will start automatically when a disc is loaded.
Volume
Selecting the player default volume setting.
16 : 9 screen display
Selecting 16 : 9 screen display, when you have your player connected to a TV with a 16 : 9 screen.

- When finished, point-and-click on 'Exit'.

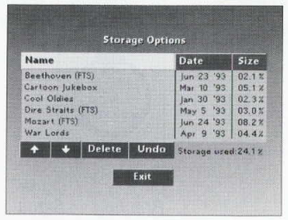
3.Time and Date
To change the player time/date settings.



Time/Date set
If the time or date shown on the screen is wrong, select the appropriate ↑ and ↓ arrows to set hours, minutes, day, month and year in turn, as required.
Time format
Select 24 hour or 12 hour clock.
Date format
Select dd/mm/yy to present the date in day-month-year sequence. Select dd/mm/yy to present the date in month-day-year sequence.
Display time/date
Select whether time and date will displayed on the TV screen or not.

- When finished, point-and-click on 'Exit'.

4. Storage
To refer to the intermediate results of CD-I titles and of programs created for your audio and Photo CDs. The 'Storage' screen shows the information held in memory: titles, dates and percentage of memory used.



Clicking on 'Name', 'Date', or 'Size' sorts the information accordingly.
- Use the scroll arrows to move up and down the list.
- To delete an item, click on its title and then click on 'Delete'. If you change your mind after deleting, click on 'Undo'.

- When finished, point-and-click on 'Exit'.

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2.5 DISC PLAY

GENERAL

Push button control:
- For basic play control, or for playing discs through a stereo system without using the TV, you can use the buttons on the front panel or on the remote control.
- The play, pause and stop buttons operate in the same way as the corresponding on-screen functions.
- The next and previous buttons skip one track forward or backward respectively.

Note

The functioning of these buttons will depend completely on the application when playing a CD-I program.

Changing over to TV:
- Select the desired channel or input of your TV using the controls of your TV set.
- When the player is switched on, its antenna signal is fed through to the TV and depending on the player-TV connection, TV reception might be interrupted automatically.
- To change over to TV reception at any time in such case, press the TV/CDI button *(7)* on the remote control.
- To return to CD-I play, press the TV/CDI button *(7)* again.

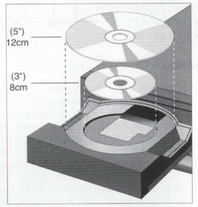
Sound level:
- When playing any disc adjust the sound level as required, preferably on the TV or HiFi amplifier.
- The volume up *(9)* /down *(8)* buttons on the remote control may also be used, but for each disc these controls always start at level set in the setting menu.
  A suitable level must therefore first be set on the TV or HiFi amplifier.

Note

Connecting headphones does not mute the loudspeaker sound. This must be done manually, on the TV or HiFi system, if required.

LOADING AND UNLOADING

Loading:
- Point and click on 'Open' (you may also press the OPEN button *(2)* on the player) to open the disc tray *(1)*.
- Take the disc from its holder and place it on the tray with the label up.
- Point and click on 'Close' (you may also press the OPEN button *(2)* on the player, or gently push the front of the tray) to close the tray.
- The TV screen changes according to the type of disc.



CAUTION

Never put more than one disc at a time into the CD-I player

Unloading:
- Point and click on 'Open' (you may also press the OPEN button *(2)* to open the disc loading tray.
- The player start-up screen reappears on the TV.
- Take the disc from the tray and replace it in its holder.
- Point and click on 'Close' (you may also press the OPEN button *(2)* on the player, or gently press the front of the tray) to close the tray with or without a new disc.

Note

- You may unload the disc at any time by pressing the OPEN button *(2)*.
- Unloading a CD-I disc while the CD-I program is running, will terminate the CD-I program abruptly. 'Bookmarks' or intermediate results, if used by the CD-I program, might not be updated to the latest situation.

PLAYING A CD-I DISC

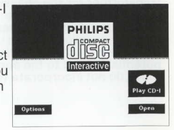
Note

This procedure is equal for CD BRIDGE discs, CD-I READY discs and PHOTO CDs.

CAUTION

Never leave a still picture on the screen for any length of time. This can cause burning-in of the picture tube. In such a case switch off the player or remove the disc.

- When a title consists of more than one consecutive disc, a so-called 'multi-disc' title, follow the instructions for opening and closing of the tray as shown on the screen. When you use the open button *(2)* on the player the title is considered to be played wholly and any intermediate scores, settings or 'bookmarks' will not be updated. Any additional disc of the multi-disc title will not be recognised as part of it. The tray may also be closed by gently pressing the front of it.



- After loading the disc, the CD-I start-up screen appears on the TV.
- To start the CD-I program, select the 'Play' icon on the screen; you may also press the PLAY button *(5)* on the player or remote control *(4)*.
- Using a PLAY button will also automatically close the tray when open.(*)
- The opening screen of the CD-I program now appears on the TV.
- From this point, all interaction is between you and the program.
- To stop at any time, select the stop or exit function provided by the CD-I program.

(*) The default Volume is than automatically set to the level selected in the 'General' screen.

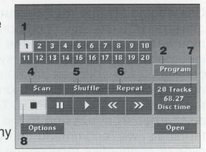
DISC PLAY

PLAYING AN AUDIO CD — 1. Using the audio screen

Note

This procedure can also be used for audio sections on 5 inch (12 cm) laser discs.

- After loading the disc, the CD-Audio screen appears on the TV.



1. **Play track bar:** shows the total number of tracks (up to 30). You can 'point-and-click' to select any track. For discs with more than 30 tracks, the forward → and reverse ← scroll arrows are used to move through the track list.
2. **Program:** allows you to program a list of special tracks called a Favorite Track Selection. When you select PROGRAM, the FTS track bar and the FTS icon will appears.
3. **FTS:** allows you to play Favorite Track Selections. This icon only appears if a Favorite Track Selection has been created for the disc that is loaded in the player.
4. **Scan:** allows you to listen to the beginning of every track listed in the play track bar. You can set the scan time to 5, 10 or 20 seconds in the 'Options' screen.
5. **Shuffle:** allows you to play the tracks in the play track bar in a random order.
6. **Repeat:** allows you to repeat either a track or the entire disc. You can change the repeat mode in the 'Options' screen.
7. **Track/time window:**
   - after loading, and in stop mode, this shows the total number of tracks and the total playing time.
   - in play and pause modes, the window shows the track number and either the elapsed or the remaining track playing time. To change between elapsed and remaining time, 'point-and-click' at the time shown in the window.
8. All the disc play control functions are shown on the screen, and can be selected as desired by 'point-and-click' with your remote control. The operation of the functions is briefly explained in the following table.

Note

If auto shuffle or auto FTS has been selected on the 'CD Audio' screen, this function will be activated automatically.

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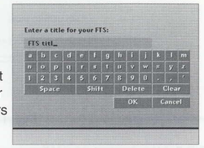
Operation	select
Select a track	**track** number if the disc contains more than 10 tracks, use the left < and right > scroll arrows to move through the track numbers as required.
Pause	**pause** use to interrupt play.
Exit pause	**pause** or **play** play restarts at exactly the same point as pause was selected.
Forward search	**forw(ard) >>** searches forward through disc, first slowly, then fast.
Reverse search	**rev(erse) <<** searches backwards through disc, first slowly, then fast.
Stop play	**stop ■** use to stop playing if play is re-started, it begins at the first track.
Scan the disc	**scan** plays the beginning of each track on the disc in turn.
Exit scan	**scan** normal play starts from this point.
Shuffle play	**shuffle** shuffle sequence appears in track bar.
Exit shuffle	**shuffle** normal play starts from this point.
Repeat	**repeat** repeats the entire disc (or FTS program), or the track being played, as selected on the "Options" screen.
Play FTS	**FTS** only available when an FTS program has already been created for the disc in the player.
Exit FTS	**FTS** normal play starts from this point.
Program FTS	**program** • point to tracks as required on the play track bar, and in each case click on any action button to record the track in the FTS track bar. • To cancel an unwanted track, point to it in the FTS track bar and click on any action button. • To cancel the entire FTS program, point to the first track in the FTS track bar and click on any action button repeatedly until all the tracks disappear.
Store FTS	**Save FTS** the keyboard screen replaces the CD-Audio screen. See 'creating FTS titles'.
Start play	► **play** play starts at the beginning of track 1, or any other preselected track number. If a track is already playing, it is re-started. Note: When play starts, adjust the sound level as required.

DISC PLAY

PLAYING AN AUDIO CD — 2. Creating FTS titles

- After creating a Favorite Track Selection for a disc, you can compose a title of approx. 30 characters (depending on the character width) for the selection using the keyboard screen.
- The title then appears on the CD-Audio screen whenever the disc is loaded.
- At the CD-Audio screen, 'point-and-click' on the program, then 'point-and-click' on the save diamond.
- The CD-Audio screen will change to the keyboard screen.
- Select each character of the title in turn, using shift to change between upper and lower case characters and space to separate words.

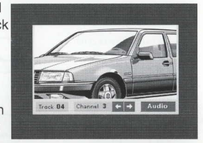


- Delete erases the last selected character.
- Clear erases the complete (or partially complete) title.
- Cancel returns to the CD-Audio screen without saving the title.
- OK saves the title and returns to the CD-Audio screen.

PLAYING AN AUDIO CD — 3. CD graphics

Available on some player versions only.

- When an audio CD with graphics is played, the CD Graphics screen will appear automatically.
- To let the picture channel bar appear/disappear click on the action button anywhere outside the channel bar.
- You can select another track number by clicking on 'Track' or either arrow next to it.
- Depending on the disc other channel numbers might give you other information such as the lyrics in a different language.



- Refer to the instructions that come with the disc for their functions.
- To play audio only, click on the 'audio' icon.

CAUTION

Never leave a still picture on the screen for any length of time. This can cause burning-in of the picture tube. In such a case switch off the player or remove the disc.

PLAYING A PHOTO CD

- After loading the disc, the CD-I start-up screen appears on the TV.
- To start the Photo CD program, select the 'PLAY CD-I' icon on the screen; you may also press the PLAY button *(5)* on the player or remote control *(4)*.
- The opening screen of the Photo CD program now appears on the TV.
- At the bottom of this screen a menu bar with icons is shown.

- Select the icon.
- The 'Options' screen will now appear.
- To select a language click on the box, the flag or the name of a country.
- The previous setting will be replaced automatically.
- Select the icon (Return) of this screen to go back to the Photo CD opening screen.

- Select the icon (Information) and the INFORMATION screen, explaining the control buttons of the menu bar in the selected language, appears.
- From this point, all interaction is between you and the program.

CAUTION

Never leave a still picture on the screen for any length of time. This can cause burning-in of the picture tube. In such a case switch off the player or remove the disc.

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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.

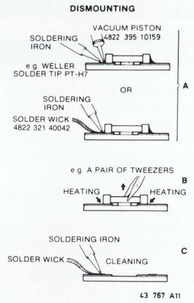


Fig. 1

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).

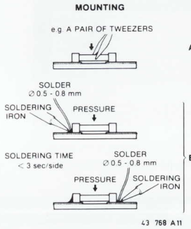


Fig. 2

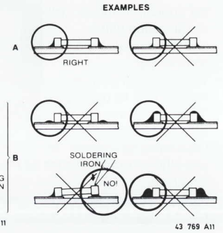


Fig. 3

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

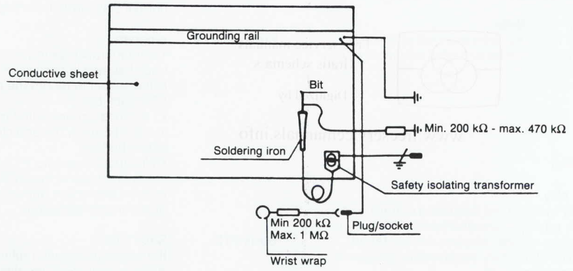
Transport and store the circuits and PCBs in their original packages.
As an alternative to the original package one may use a conductive material or special IC package which short-circuits all the pins of the component with one another.
Always discharge the package before opening it.

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.



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

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.

PHILIPS SAFETY GUIDELINES FOR THE PROFESSIONAL SERVICE TECHNICIAN

Important

Proper service and repair is important to the safe, reliable operation of all Philips equipment. The service procedures recommended by Philips and described in this service manual are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It also is important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Philips could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Philips has not undertaken any such broad evaluation. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Philips must first satisfy himself thoroughly that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

Safety Checks

After the original service problem has been corrected, a complete safety check should be made. Be sure to check over the entire set, not just the areas where you have worked. Some previous servicer may have left an unsafe condition, which could be unknowingly passed on to your customer. Be sure to check all of the following:

Fire and Shock Hazard

1. Be sure all components are positioned in such a way as to avoid the possibility of adjacent component shorts. This is especially important on those units which are transported to and from the service shop.
2. Never release a repaired unit unless all protective devices such as insulators, barriers, covers, strain reliefs, and other hardware have been installed according to the original design.
3. Soldering and wiring must be inspected to locate possible cold solder joints, solder splashes, sharp solder points, frayed leads, pinched leads, or damaged insulation (including the ac cord). Be certain to remove loose solder balls and all other loose foreign particles.
4. Check across-the-line components and other components for physical evidence of damage or deterioration and replace if necessary. Follow original layout, lead length, and dress.
5. No lead or component should touch a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces or edges must be avoided.
6. Critical components having special safety characteristics are identified with a ▲ by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol ▲ on the schematic diagrams and/or exploded views.

   Replacement parts without the same safety characteristics may create shock, fire, or other hazards.
7. When servicing any unit, always use a separate isolation transformer for the chassis. Failure to use a separate isolation transformer may expose you to possible shock hazard, and may cause damage to servicing instruments.
8. Many electronic products use a polarized ac line cord (one wide pin on the plug). Defeating this safety feature may create a potential hazard to the servicer and the user. Extension cords which do not incorporate the polarizing feature should never be used.

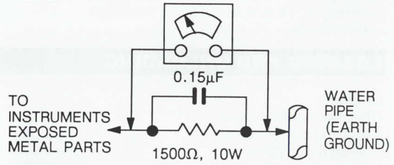
Fire and Shock Hazard (Continued)

9. After reassembly of the unit, always perform an ac leakage test or resistance test from the line cord to all exposed metal parts of the cabinet. Also, check all metal control shafts (with knobs removed), antenna terminals, handles, screws, etc. to be sure the unit is safe to operate without danger of electrical shock.

* Broken line: ▬ · ▬ · ▬ · ▬ · ▬

Leakage Current Cold Check

1. Unplug the ac line cord and connect a jumper between the two prongs of the plug.
2. Turn on the power switch.
3. Measure the resistance value between the jumpered ac plug and all exposed cabinet parts of the receiver, such as screw heads, antennas, and control shafts. When the exposed metallic part has a return path to the chassis, the reading should be between 1 megohm and 5.2 megohms. When the exposed metal does not have a return path to the chassis, the reading must be infinity. Remove the jumper from the ac line cord.



Leakage Current Hot Check

1. Do not use an isolation transformer for this test. Plug the completely reassembled unit directly into the ac outlet.
2. Connect a 1.5k, 10W resistor paralleled by a 0.15uF. capacitor between each exposed metallic cabinet part and a good earth ground such as a water pipe, as shown above.
3. Use an ac voltmeter with at least 5000 ohms/volt sensitivity to measure the potential across the resistor.
4. The potential at any point should not exceed 0.75 volts. A leakage current tester may be used to make this test; leakage current must not exceed 0.5 milliamps. If a measurement is outside of the specified limits, there is a possibility of shock hazard. The receiver should be repaired and rechecked before returning it to the customer.
5. Repeat the above procedure with the ac plug reversed. (Note: An ac adapter is necessary when a polarized plug is used. Do not defeat the polarizing feature of the plug.)

Parts Replacement

1. Many electrical and mechanical parts in Philips equipment have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. The use of a substitute part which does not have the same safety characteristics as the Philips recommended replacement part shown in this service manual may create shock, fire, or other hazards. Under no circumstances should the original design be modified or altered without written permission from Philips. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.
2. All ICs and many other semiconductor parts are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce the life of the part drastically.

LASER NOTE:

DANGER - Invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.
CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
CAUTION - The use of optical instruments with this product will increase eye hazard.

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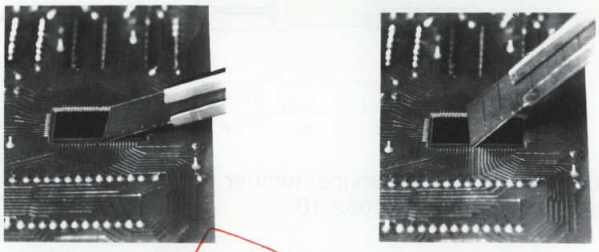
TOOLS TO BE USED

DISMOUNTING



CUTTING THE LEADS

WRONG TRACKS WILL BE DAMAGED

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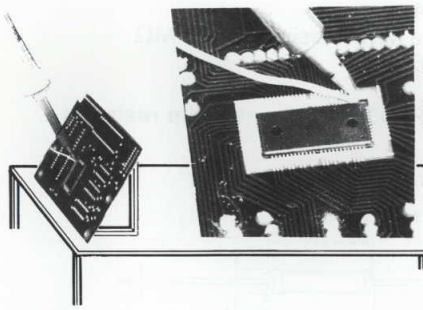
CLEANING THE TRACKS

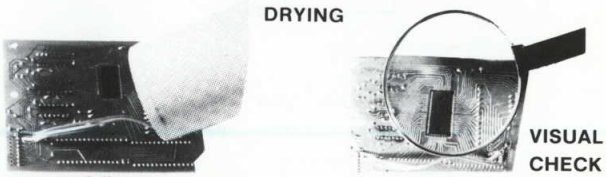
MOUNTING

APPLYING FLUX

FIXING IC AT THE CORNERS



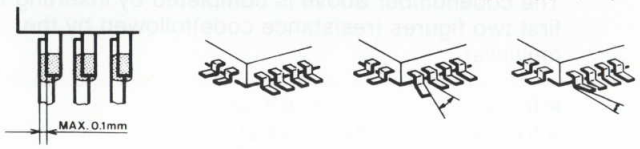
SOLDERING: SPEED 1 CM IN 5 SEC.



DRYING

VISUAL CHECK

ALIGNING THE LEADS



RIGHT WRONG WRONG

SOLDERING

RIGHT WRONG WRONG

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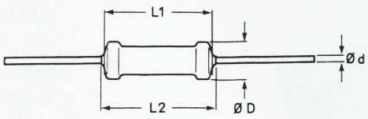
3.4 CODENUMBERS FOR STANDARDIZED RESISTORS

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...

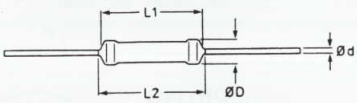
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

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

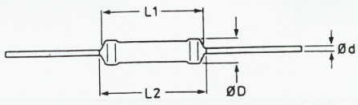
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ
is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ
is 4822 053 21336

PR01, PR02 and PR03 power metal film resistors

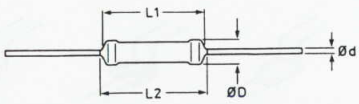
ϕD_{max}	L1	$L2_{max}$	ϕd
2.5	6.5	8.0	0.6



ϕD_{max}	$L1_{max}$	$L2_{max}$	ϕd
3.9	10	11	0.8



ϕD_{max}	$L1_{max}$	$L2_{max}$	ϕd
5.2	16.7	17.9	0.8



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

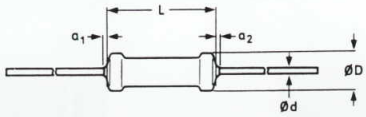
Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

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

NFR25 fusible resistors ⚠



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

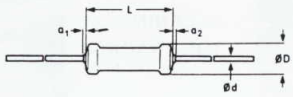
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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

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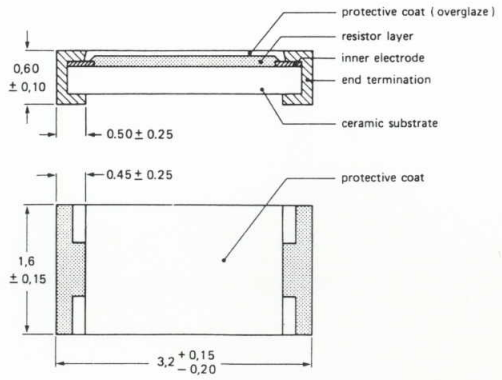
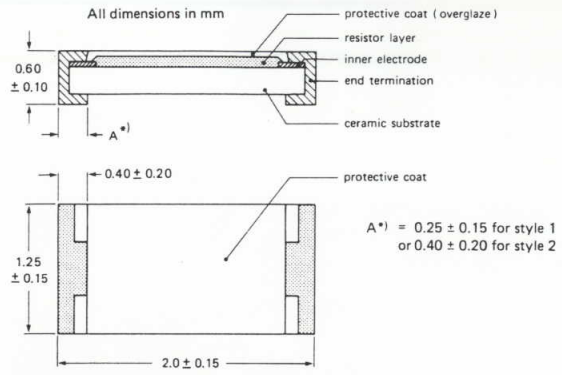
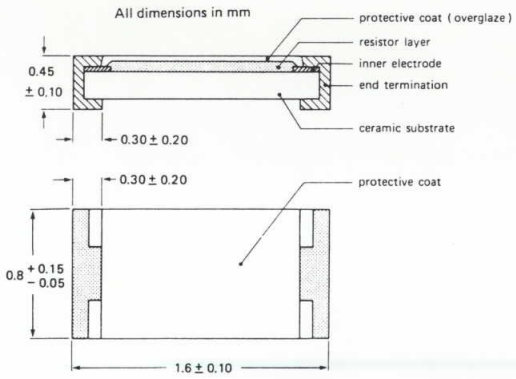
RC-01, RC-11 AND RC-21 chip resistors







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.

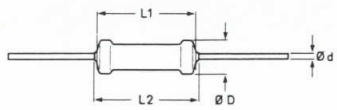
8 for R=	0	to 9.1 Ω
9 for R=	10	to 91 Ω
1 for R=	100	to 910 Ω
2 for R=	1	to 9.1 KΩ
3 for R=	10	to 91 KΩ
4 for R=	100	to 910 KΩ
5 for R=	1	to 9.1 MΩ
6 for R= or > 10 MΩ		

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



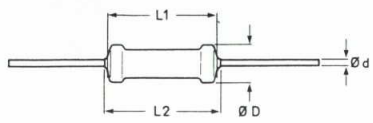
D	L	L2 max.	d
1,7 +0,2 −0,1	3,5 +0,2 −0,15	3,7	0,5 −0,04

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....

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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 List of accessories and service tools

Item	Codenumber	Description
1	4822 395 50145	TORX SCREW DRIVER SET
2	4822 214 52007	LOW-LEVEL- TEST PANEL ASSY
3	4822 321 61677	CABLE FOR TEST PANEL
4	4822 264 50263	PLUG FOR STARTUP OF SERVICESHELL ON PORT 2 (BU 2)
5	4822 397 30096	AUDIO TESTDISC SET
6	4822 397 30155	TESTDISC WITH CONTINOUS 1KHz SIGNAL 70 MIN.
7	4822 397 30184	AUDIO SIGNALS DISC
8	4822 701 11922	SKEW DISC 0,6
9	4822 701 11923	EXCENTRICITY DISC 150 I
10	4822 691 30293	ROLLER CONTROLLER
11	4822 691 30298	TRACKER BALL
12	4822 691 30328	TOUCH PAD
13	4822 691 30297	MOUSE

3.5.2 Partslist for rollercontroller

Item	Codenumber	Description
1	4822 321 61841	CABLE ASSY
2	4822 413 90093	BALL
3	4822 276 13359	SWITCH
4	4822 410 62427	KEYTOP-LEFT
4	4822 410 62428	KEYTOP-RIGHT
5	4822 492 42645	SPRING

3.6 THE MONOBOARD CENTRAL REPAIR PROCEDURE

In case of a defect on the Multi Media Controller (see Blockdiagram) 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 Monoboard:

Version	Codenumber
/40	4822 214 52163
/41	4822 214 52164
/45	4822 214 52165
/57	4822 214 52145

- 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 PROTECTED 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, then boards are not accepted and the return price will not be credited !!!

- **Dealers have to contact the local PHILIPS Service-organization.**

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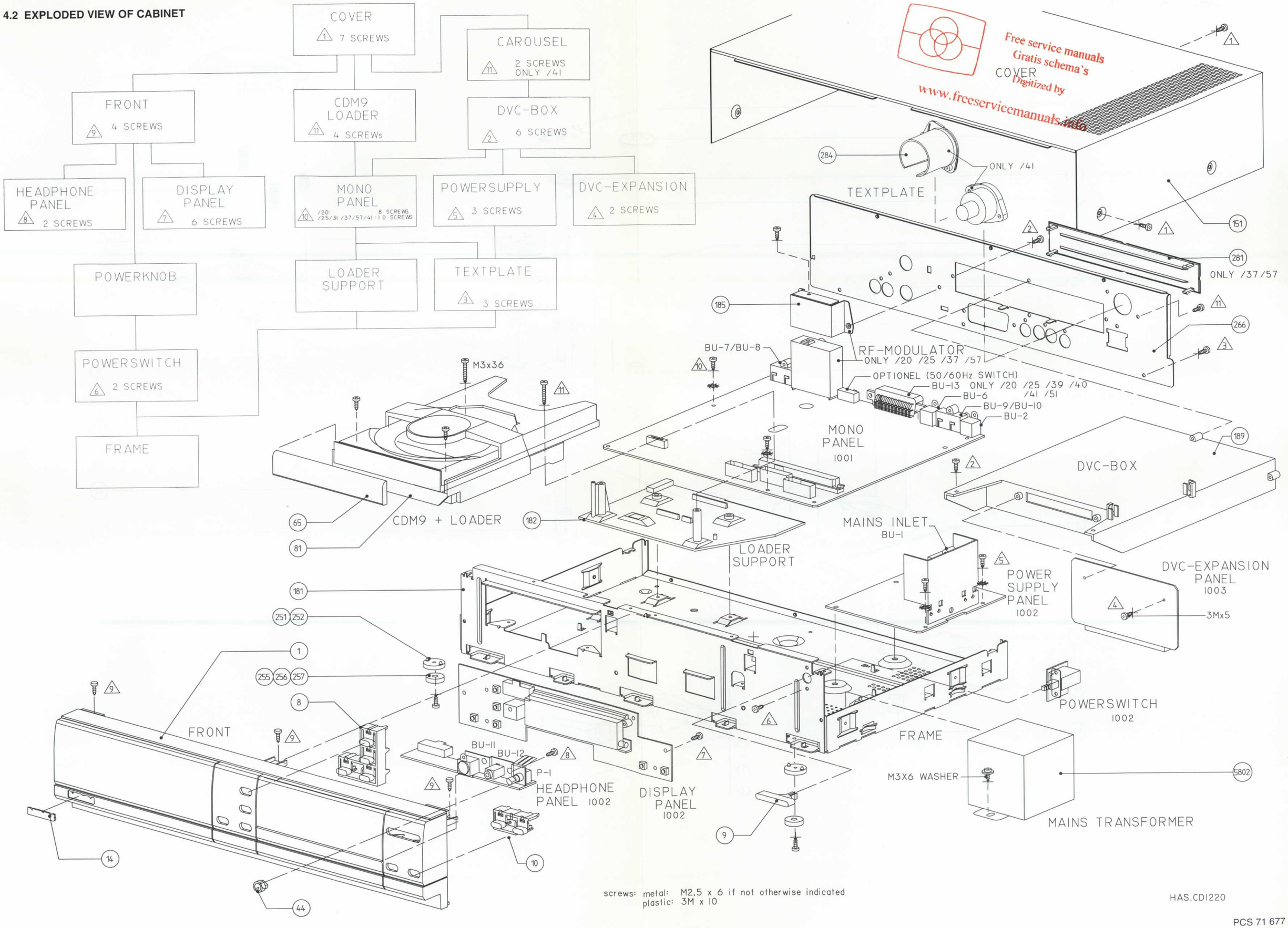
4.2 EXPLODED VIEW OF CABINET



screws: metal: M2,5 x 6 if not otherwise indicated
plastic: 3M x 10

PCS 71 677

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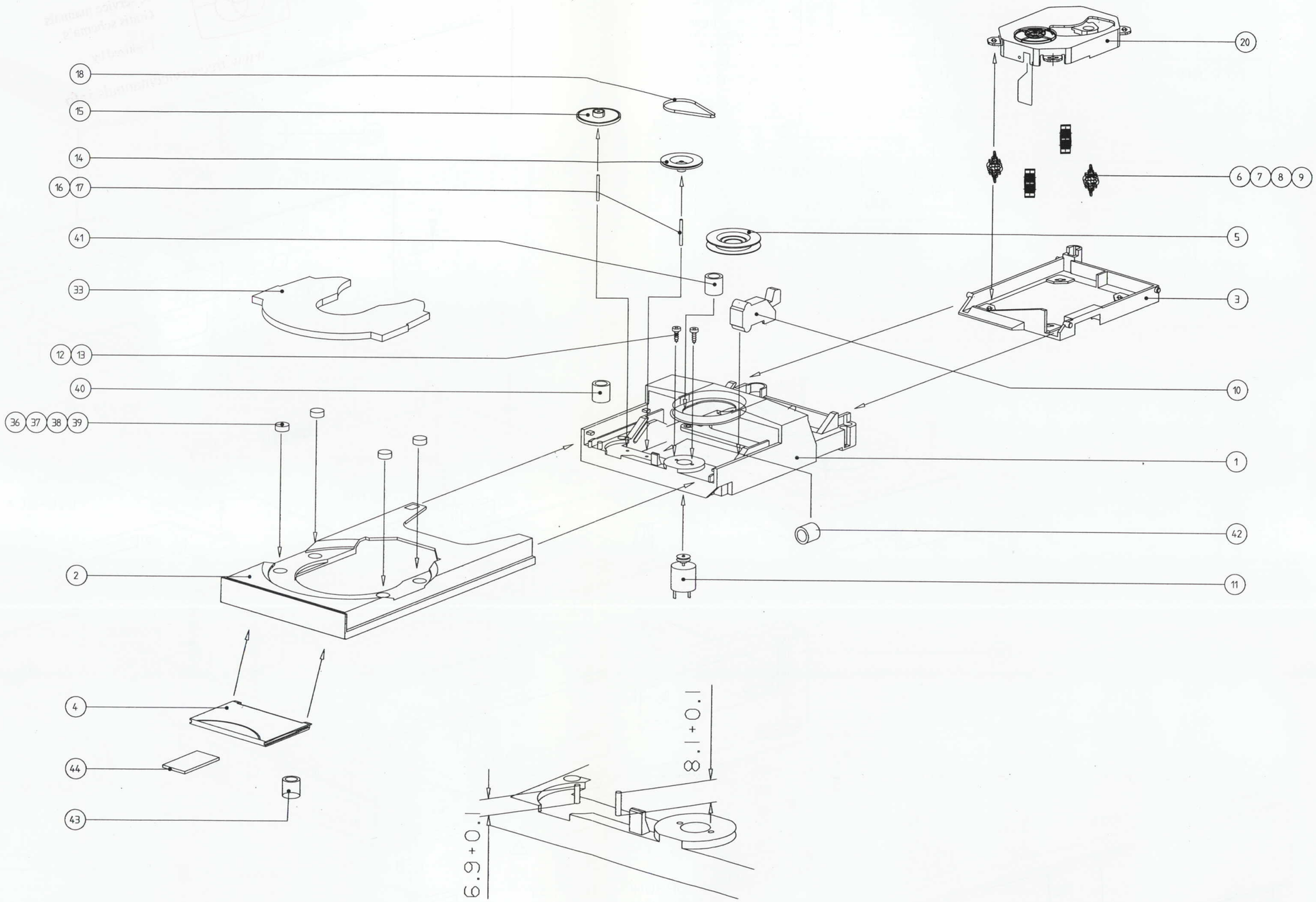
4.3 EXPLODED VIEW OF LOADER



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5 SERVICE SOFTWARE

In the set there are 2 different testsoftware available:

1. Low Level test
2. Service Shell

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. The Low Level test in Menu driven.
To run the low level test a terminal (or equivalent) must be connected to port 2 (= BU2). To start the test the space-bar on the terminal must be pushed at the same that the power is switched on at the CDI-player. To continue with the test, the instuctions on the screen of the terminal must be followed.

5.1.1 Testsequence

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

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

STEP	ACTION/TEST PERFORMED
0	Exit Low Level test
1	Writing to a default RAM address
2	ROM parity check
3	NVRAM test
4	DRAM test
5	DSP test
6	Slave processor test
7	Chip Select test
8	VDSC test

Display lltest header and release number
In this step the VDSC is initialized in the same way as in the pcb lltest.

ITEM 0 : EXIT LOW LEVEL TEST

Selecting this item will end the lltest and continue with the boot. After the boot the player shell is started up.

ITEM 1 : Writing to a default 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 and the system will hang up.

ITEM 2 : ROM parity check

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.

ITEM 3 : NVRAM test

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.

ITEM 4 : DRAM

The dram test is always a destructive test. The test is performed for both ram CHIP1 and CHIP2 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.

ITEM 5 : DSP

1. Write $AA to the Interrupt Vector Register.
2. Read and compare IVR
3. Write $55 to the IVR
4. Read and compare again

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

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ITEM 6 : SLAVE processor

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.

ITEM 7 : Chip Select test

This step is only intended to be used with an oscilloscope. The software will generate a Chip Select pattern for All devices.It is not guaranteed that this test always runs. If one of the devices is defective (no DTACK) it will surely result in a hang-up of the testsoftware.
The devices are DRAM 1, DRAM 2, SYSTEM ROM, DSP, SLAVE, NVRAM and KILLME & DMAEN

ITEM 8 : VDSC test

1. Write continously $00 to the Display Decoder Registers of the master and slave.
2. Read continuously the contents of the Control Status Register (CSR).

5.2 THE SERVICE SHELL

Introduction.
For service purposes the CD-I set has built-in testsoftware 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

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.

5.3.3 Subject dependent information

Main menu
The main menu contains two test item boxes and the EXIT box. Selecting TEST IMAGE will give immediate action, the CD DRIVE will start the CD DRIVE test submenu.

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:

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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.

MODE 4

In this mode the CDDA shell will appear like playing normally.
If something goes wrong, then the errors which will be 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.

MEANING OF ERROR MESSAGES DURING MODE 4

Format of the message on the screen : 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

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...
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.

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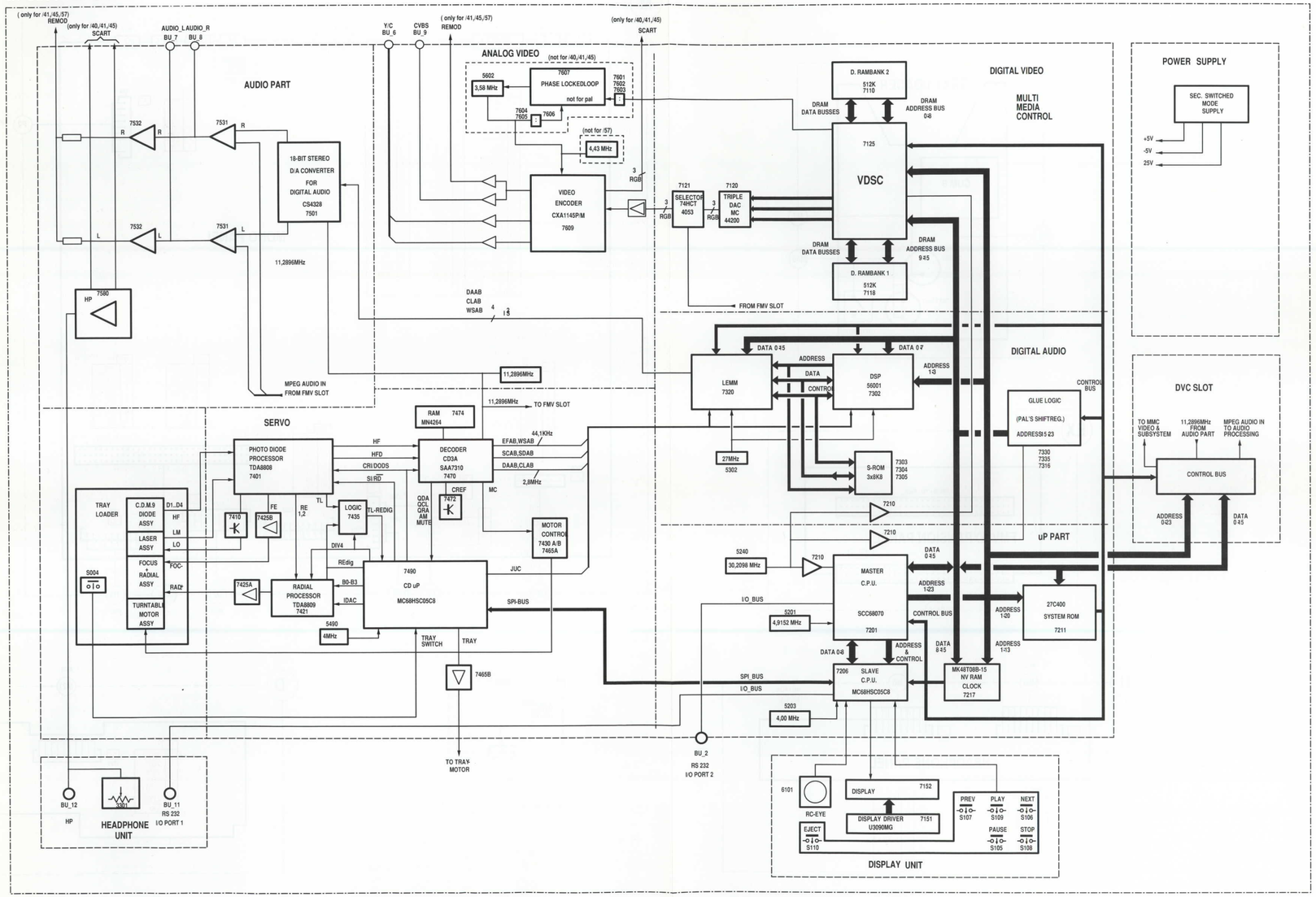
6 ELECTRICAL DRAWINGS
6.1 BLOCK DIAGRAM



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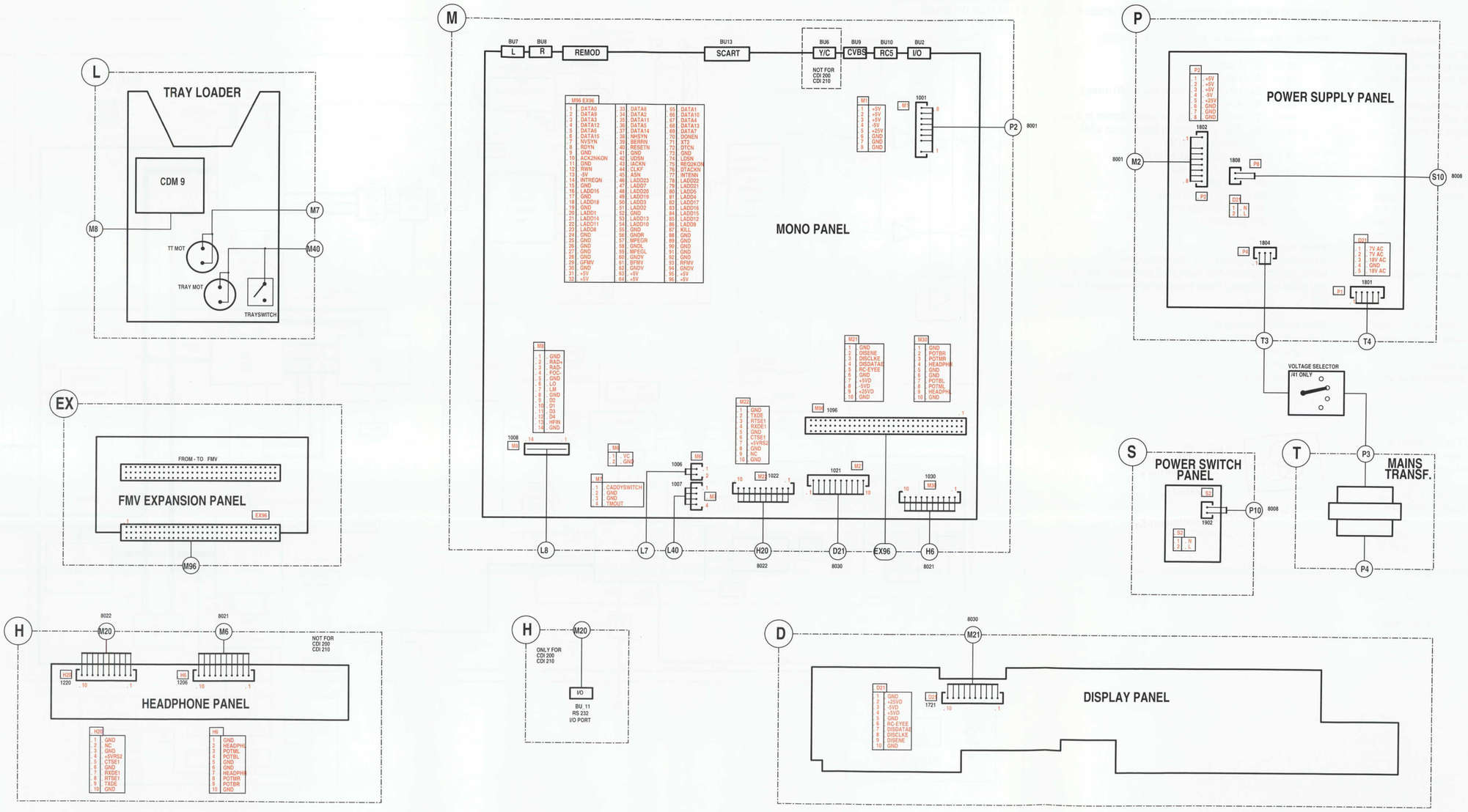
6.2 WIRING DIAGRAM



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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
ACK2NKON : DMA REQUEST ACKNOWLEDGE (96-pins connector, channel 2 : FMV)
ADEN : (=ADENA)ADDRESS ENABLE NOT. When low, the address ADENA coming from the bus (68070)
ADOCLK : output clock from the ADOC (11.2896 MHz)
AM : ADDITIONAL MUTE
ASN : ADDRESS STROBE (active low, tristate) indicates when an address is valid on the bus for the system
ASPRAT : Aspect ratio switch signal (16:9 or 4:3)
AUDGND : Audio ground (SCART)
AUDL : >> AUDIO LEFT
AUDIOL : >>
AUDIOLSC : >> (scart)
AUDIOREM : Audio signal to remodulator
AUDR : >> AUDIO RIGHT
AUDIOR : >>
AUDIORSC : >> (scart)
AVN : AUTOVECTORED INTERRUPTS (active low), can be used by an extension
A0..15 : Local addressbus of the audio DSP-processor
B0..7 : digital video (blue) from VDSC DRAM
B0CD..B3CD : input control bits for off-, catch-, play status and DAC output current for radial motor
B,G,R : output colours of the VSD
BERRN : >> BUS ERROR (active low, open drain)
BFMV : blue color coming from the FMV-extension
BGND : Blue color ground (SCART)
BIN : blue color input for the CXA1145 encoder
BLANI : (= BLAN1M) BLANKING OUTPUT (active low, tristate) of the VSC
BSC : blue color (scart)
BSW : blue color coming from the switch CDI/external (FMV) video
C : Chrominance singnal (Y/C)
CADDYIN : high when reading data
CADDYSWITCH : control signal for position tray
CAS1N : column address strobe 1 (VDSC)
CAS2N : column address strobe 2 (VDSC)
CBA : 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
CLABCD : bitclock from the 7310 chip
CLK=2BLCK : CLOCK (11,2896 MHz)
CLKDAC : CLOCK DAC, the clock used to send serial data to the volume adjustment
CLKF : 2B-clock (11,2896 MHz) for the FMV-extension
CLK1 : the clock on which the DSP operates (7,5264 MHz)
CLK11 : not used (connected to ground)
CLK3A : 11.2896 MHz clock for the SAA7310 decoder
CLOCK_27 : 27 MHz clock : used as system clock by the DSP and the LEMM
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
COXNDSP : clock DSP, the clock used to send serial data on the X-bus
CSDMAKILL : generates killme : Dot killer enable signal (active for NTSC) and functions as DMA enable for the FMV extension
CSDSPN : signal used by LEMM to generate the DSP chip select signal (KIP) (active low)
CST : combined chipselect signal for NVRAM/system ROM
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
CRI-DODS : counter reset inhibit of the 7310 chip
CS : CHIP SELECT
CSCDICN : CHIP SELECT CDIC (active low) bus information is intended for or coming from CDIC
CSKILL-MEMM : chip select for kill and DMA circuit.
CSKILL-MEMMS : >> syncronized
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 : >>
CSROM0N : CHIP SELECT ROM (active low) bus information is coming from the ROM'S
CSSLAVEN : CHIP SELECT SLAVES (active low)
CSON : CHIP SELECT (active low) for the 8kx8 SRAM'S
CSVDSCN : CHIP SELECT for the VDSC
CSYN : COMPOSITE SYNCHRONIZATION input from the VSC'S (active low)
CTS1..4 : CLEAR TO SEND (active low) it indicates that the remote reciving device is ready
CTS#2 : >>
CTSE1..2 : CLEAR TO SEND input
CTSI1..2 : >>
CVBS : CVBS output
CVBS-OUT : >>

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CVBS-GND	:	CVBS ground (SCART)
CVBS-REM	:	CVBS input signal for the remodulator
CVBS-SYNC	:	composite sync input for the SCART connector
D0..D23	:	Local data bus of the audio DSP-processor
D8NVR	:	data bit 8 (least significant bit) signal for the NVRAM
DAAB	:	(DAAB2, DAABCD) serial data output of the X-bus I^2S standard
DATA0..15	:	DATA LINES
DATADAC	:	data which will be send to the DAC('S) for volume adjustment
DDTACKN	:	DATA TRANSFER ACKNOWLEDGE (active low) from CDIC
DEEMP	:	DEEMPHASIS
DIG OUT	:	DIGITAL OUTPUT
DIRN	:	DIRECTION CONTROL. indecates the direction of data transfer through the transievers
DISCLK	:	(DISCLKE) DISPLAY CLOCK >>
DISDAT	:	(DISDATAE) DISPLAY DATA >>
DISEN	:	(DISENE) DISPLAY ENABLE >>
DISSEL	:	software selection signal (CDI210/220)
DIV4	:	DIVIDE BY 4 signal
DMAEN	:	DMA enable for the FMV extension
DS	:	Data memory select output of the DSP-processor (active low)
DSPACKN	:	DMA acknowledge (Channel 1) : 68070 → LEMM (active low)
DSPREQN	:	DMA request (Channel 1) : LEMM → 68070 (active low)
DSP-INTN	:	interrupt request DSP → 68070 (active low)
DTACKN	:	data transfer acknowledge (68070) (active low)
DTCNC	:	data transfer completed corrected (CDIC)
DTRAM	:	DTACKN generation signal for NVRAM acces
DTROM	:	DTACKN generation signal for system ROM acces
DTCN	:	Data transfer completed (active low; 68070)
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 DSP
DSN2N	:	DATA STROBE (active low) of the DSP
DATACK ROM	:	DATA TRANSFER ACKNOWLEDGE of the ROM
DTACKSLAVEN	:	DATA TRANSFER ACKNOWLEDGE of the SLAVE processor
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
FOC+	:	>>
FSB	:	Frame select line output of the LEMM → DSP : this line is asserted for every WSAB (pin 66 of the LEMM) transition
GFMV	:	green color coming from from the FMV-extension
GGND	:	Green color ground (SCART)
GIN	:	green color input for the CXA1145 encoder
GN	:	when low: the outputs and inputs of the trancievers are enabled
GNDC	:	Ground for the color signal (Y/C)
GNDL	:	Ground for MPEG audio left (96-pins connector)
GNDR	:	Ground for MPEG audio right (96-pins connector)
GNDV	:	Ground for MPEG video (96-pins connector)
GNDY	:	Ground for the luminance
GSC	:	green color (SCART)
GSW	:	green color coming from the switch CDI/external (FMV) video
G0..7	:	digital video (green) from VDSC > DRAM
HALTN	:	active low, open drain, biderectional. if low together whit the resetn it couses the 68070 to enter the reset state.
HEADPHL	:	(HPL)headphone audio left
HEADPHR	:	(HPR)headphone audio right
HFIN	:	HF current input
HSYN	:	(active low) horizontal synchronisation input from the VSC
HSYNCOUT	:	(active low) horizontal synchronisation output for monitor or tv
HVID0..7S	:	8bit pixel bus for channel 1 VSD from VSC
IACK2	:	Interrupt acknowledge from 68070 (active low) → AVN line of the 68070 (auto-vector interrupt) → the 68070 generates this signal (IACK2) when the slave proc. asserts IN2
IACKN	:	interrupt acknowledge for the FMV-extension
IACKIN2N	:	>>
IACKIN4N	:	>> decoded interrupt acknowledge (active low).
IACKIN5N	:	>> asserted during an interrupt 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

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IFDN2 : main channel word-flag to the DSP
IN2 : interrupt request from slave proc. → 68070 (active low)
IN5 : interrupt request input 5 of the 68070 (not used)
INTENN1 : interrupt enable for the FMV-extension
INTENN : >> when low, no extensions use the interupts,when high interupt devices are daisy chained
INTENN2 : >>
INTENN3 : >>
INTENN4 : >>
INTREQN : interrupt request from the FMV-extension
IN2IN : (= IN2OUT) >>
IN4IN : (= IN4OUT) >> 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
IN4OUT2 : >>
IN5OUT2 : >>
IN2OUT3 : >>
IRQA : interrupt request from LEMM → DSP (active low) and mode A pin of the DSP (after the DSP reset, the DSP reads the level on this pin to define the mode of operation)
IRQABN : logical AND of the IRQA and the IRQB line (lemm output pin → DSP)
IRQB : interrupt request from LEMM → DSP (active low) and mode B pin of the DSP (after the DSP reset, the DSP reads the level on this pin to define the mode of operation)
JUC : jump completed signal from servo proc. → LEMM
KILL : to mute audio outputs by power on and off
KILLME : (KILL-ME) dot killer enable signal (active for NTSC)
KIP : host enable input pin of the DSP-processor : this signal enables a transfer on the DSP host bus DATA0..7 (active low)
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..7IN : >> 8 bit pixel-bus for channel 2 (VSC-SLAVE)
LVID0OUT..7OUT: >>
LWN : read/write enable (for the lower part of the data: MD0..7) for the DRAM (VDSC)
LWRSN : R/W lower memory data to DRAM from VSC slave
LWRMN : R/W lower memory data to DRAM from VSC master
MA0..8 : VDSC DRAM address bus
MC : MOTOR CONTROL signal
MD0..15 : VDSC DRAM data bus
MISO : MASTER IN SLAVE OUT
MOSI : MASTER OUT SLAVE IN
MPEGL : left audio signal color coming from the FMV-extension goes the adder CDI/FMV audio
MPEGR : right audio signal color coming from the FMV-extension goes the adder CDI/FMV AUDIO
MSM : master slave selection input
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
NCSYNV : composite sync for the VDSC
NHSYN : active low horizontal sync input for the FMV-extension
NRESET : when low the video synthesizer is in reset
NVDS : digital output to control an external switch for TV overlays (active low)
NVDSI : >> synchronized with NXT2
NVSYN : (active low) vertical sync input for the FMV-extesion
PCLK1IN : PIXEL CLOCK for channel 1
PCLK2IN : PIXEL CLOCK for channel 2
PLOIN1 : input clock for CDIC (22,5792 MHz)
PLOIN2 : input clock for CDIC (19,3536 MHz)
PLOIN : clock signals for emulator panel
PLOINE : >>
POTBL : headphone left volume control
POTBR : headphone right volume control
POTML : headphone left volume control
POTMR : headphone right volume control
QCL : Q-channel CLOCK
QDA : Q-channel DATA
QRA : Q-channel REQUEST INPUT/ACKNOWLEDGE OUTPUT
Q22 : output to PLL (22,5792 MHz) devided by 14
Q21 : output to PLL (19,3536 MHz) devided by 12
Q_DATA : I^2S data from LEMM → audio DAC
Q_CLK : I^2S bit clock from LEMM → audio DAC
Q_WCLK : I^2S word clock from LEMM → audio DAC
RAD+ : >> RADIAL OUT to CDM
RAD- : >>
RASN : row address valid (active low) for the VDSC DRAM'S
RBOT : for HPR volume control
RC5 : wired RC input (cinch)
RC-EYEDIS : RC-EYE DISABLE signal (not used)

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RCEYE : (RCEYEE)REMOTE CONTROL EYE
RCLED : REMOTE CONTROL LED
RD : READ signal DSP : this signal is asserted to read external memory (three SRAM'S FCB61C65) on the data bus D0..23 (active low)
RDN : READY signal, starting up procedure finished
RDYN : READY (active low) of the DMA channel
REDIG : RADIAL ERROR DIGITAL
REM : power supply remodulator
RESETCD : when low resetsequence starts
RESETINN : when low VSC is in reset
RESETN : this is the rest for all other ic's on MMC
RESETSYS : system reset (controlled by the slave-processor)
REQ2N : DMA-request of channel 2
REQ2NKON : DMA-request (96-pins connector, channel 2 : FMV
REQ2KON : DMA-request of channel 2 via DMA 2 on/off circuit
RFMV : red color coming from the FMV-extension
RGBS_GND : incoming video SCART (not used) ground
RGND : red color ground (SCART)
RIN : red color input for the CXA1145 encoder
RSC : red color (scart)
RSTOUT : RESET OUT of the slave processor when high resetsequence starts
RSW : red color coming from the switch CDI/external (FMV) video
RTAP : >> for HPR volume control
RTOP : >>
RTSE1..2 : REQUEST TO SEND
RTSI1..2 : REQUEST TO SEND
RTSUART : REQUEST TO SEND from the slave processor to the UART of the 68070 processor
RST1..4 : >> REQUEST TO SEND (active low)
RST#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
RXDE1..2 : RECIEVE DATA
RXDI1..2 : RECIEVE DATA
R0..7 : digital video (red) from VDSC DRAM
RXD1..4 : >> RECIEVE DATA RXD is data input
XD#1..2 : >>
SCAB : subcode data clock (2,8224 MHz) from the 7310
SCK : serial clock output from the LEMM → DSP : the data and frame select for the DSP is clocked out on the rising edge of this clock
SDAB : subcode data from the 7310
SI : on - off control for laser supply and focus circuit
SI-RD : on - off control for laser supply and focus circuit/ready signal, starting up procedure finished
SLMA0..8 : VSC-slave memory address bus to the DRAM'S
SLMD0..15 : VSC-slave memory data bus to the DRAM'S
SOCKGND : socket ground (SCART)
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 : (SPISSN) SERIAL PERIPHERAL INTERFACE SLAVE SELECT
SRD : serial data from LEMM → DSP
STAND : NTSC or PAL selection signal
STANDARDOUT : software choise between PAL and NTSC
STANDARDSW : handware choise between PAL and NTSC
STANDEM : status from emulator,input for DUART
STANDEMEN : enable signal for switch signal on emulator
STANDIN : NTSC or PAL selection signal (input for slave)
STATUS : RF/external video selection signal
STATUSF : CVBS/RGB video selection signal
STD : serial data from DSP → LEMM
SSM : START STOP MOTOR
SWAB : SUBCODING WORD CLOCK INPUT
SWAB-SSM : subcoding word clock output and start/stop input of the 7310
SWEM : software dat to switch on the emulator
SYSCLK : >> SYSTEM CLOCK
SYSCLKA : >>
SYSCLK1 : >>
SYSCLK2 : >>
TCAP : input capture feature for the on-chip timer
TCMP : output for the output compare feature of the on chip timer
TL : TRACK LOSS of the TDA8808 combined with the radial error signal of the TDA8809
TMOUT : TRAY MOTOR OUT
TRAY : tray open/close signal
TXDE1..2 : transmit data
TXDI1..2 : transmit data
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)
UWN : read/write enable (for the upper part of the data: MD8..15) fir the DRAM (VDSC)
UWRSN : read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-SLAVE
VC : output DC-motor (VOLTAGE CONTROL)
VDSC-INTN : interrupt request of the VDSC

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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
WIREDRC	:	see RC5
WR	:	write enable output of the DSP : this signal is asserted to write external memory (three SRAM'S FCB61C65) on the data bus D0..23 (active low)
WRMN	:	read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-MASTER
WRN	:	WRITE UPPER DATA BYTE (active when low)
WRPN1M..S	:	control input for channel 1 or 2 (active low) of the VSD
WSAB	:	>> WORD SELECT from A to B CHIP
WSAB2	:	>>
WSABCD	:	11.2896 MHz bitclock (I^2S)
XINB	:	delayed clock XIN from CDIC goes back to CDIC
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	:	(XT2N) the system clock devided by two
XT4	:	>> the system clock devided by four
XT41N	:	>>
XY	:	this DSP output signal selects which external memory space (X or Y) is selected
Y	:	luminance signal (Y/C)
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 2 B-chip
12A..15A	:	ADDRESS BUS between CDIC and DSP

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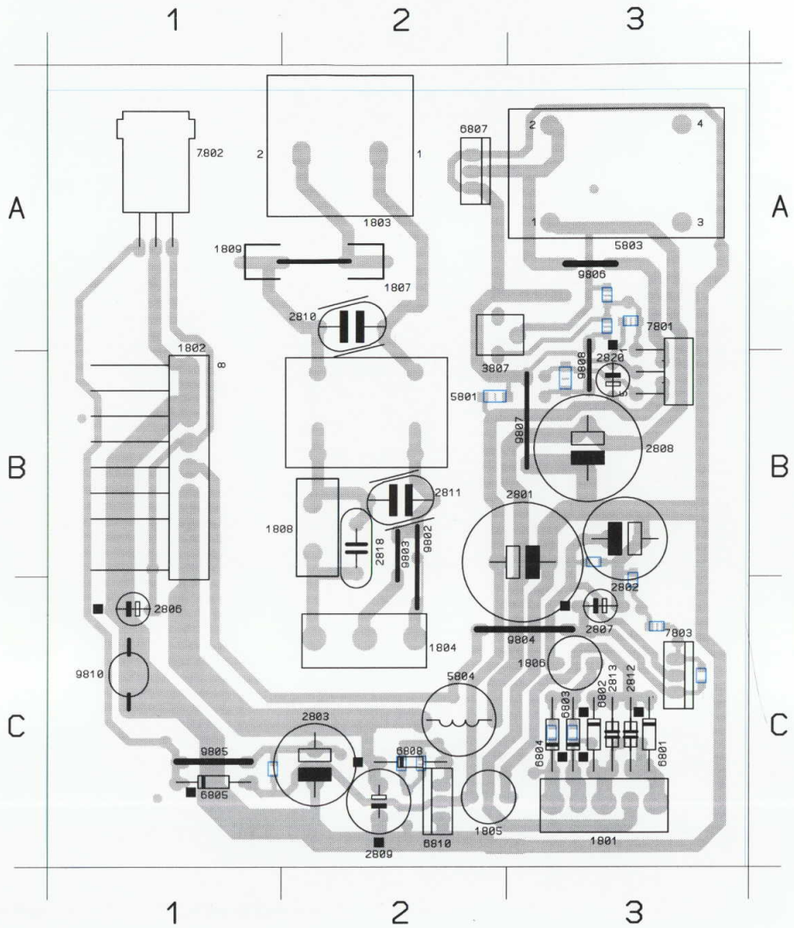
6.3 POWER SUPPLY PANEL

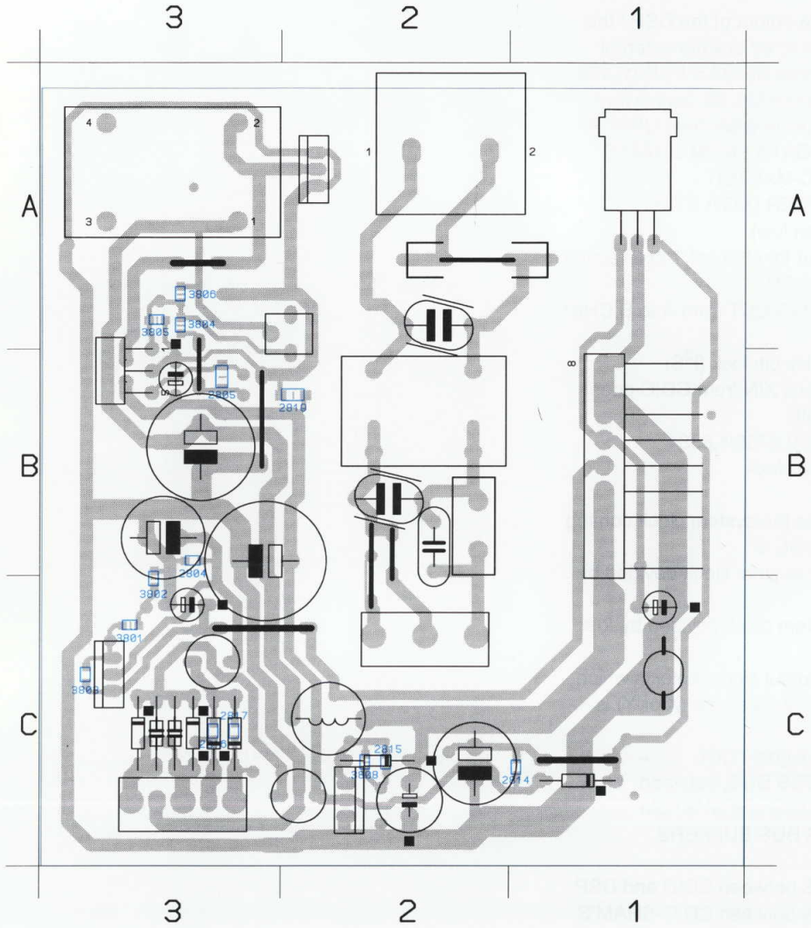
6.3.1 Power supply PCB
Component side view

1801 C 3	1809 A 1	2806 C 1	2813 C 3	2820 B 3	3807 A 2	6803 C 3	7802 A 1	9807 B 3
1802 B 1	1810 B 2	2807 C 3	2814 C 1	3801 C 3	3808 C 2	6804 C 3	7803 C 3	9808 A 3
1803 A 2	2801 B 2	2808 B 3	2815 C 2	3802 C 3	5801 B 2	6805 C 1	9802 B 2	9810 C 1
1804 C 2	2802 B 3	2809 C 2	2816 C 3	3803 C 3	5803 A 3	6807 A 2	9803 B 2	
1805 C 2	2803 C 2	2810 A 2	2817 C 3	3804 A 3	5804 C 2	6808 C 2	9804 C 2	
1806 C 3	2804 B 3	2811 B 2	2818 B 2	3805 A 3	6801 C 3	6810 C 2	9805 C 1	
1807 A 2	2805 B 3	2812 C 3	2819 B 2	3806 A 3	6802 C 3	7801 A 3	9806 A 3	



Power supply PCB
Coppertrack side view

9807 B 3	7802 A 1	6803 C 3	3807 A 2	2820 B 3	2813 C 3	2806 C 1	1809 A 1	1801 C 3
9808 A 3	7803 C 3	6804 C 3	3808 C 2	3801 C 3	2814 C 1	2807 C 3	1810 B 2	1802 B 1
9810 C 1	9802 B 2	6805 C 1	5801 B 2	3802 C 3	2815 C 2	2808 B 3	2801 B 2	1803 A 2
	9803 B 2	6807 A 2	5803 A 3	3803 C 3	2816 C 3	2809 C 2	2802 B 3	1804 C 2
	9804 C 2	6808 C 2	5804 C 2	3804 A 3	2817 C 3	2810 A 2	2803 C 2	1805 C 2
	9805 C 1	6810 C 2	6801 C 3	3805 A 3	2818 B 2	2811 B 2	2804 B 3	1806 C 3
	9806 A 3	7801 A 3	6802 C 3	3806 A 3	2819 B 2	2812 C 3	2805 B 3	1807 A 2



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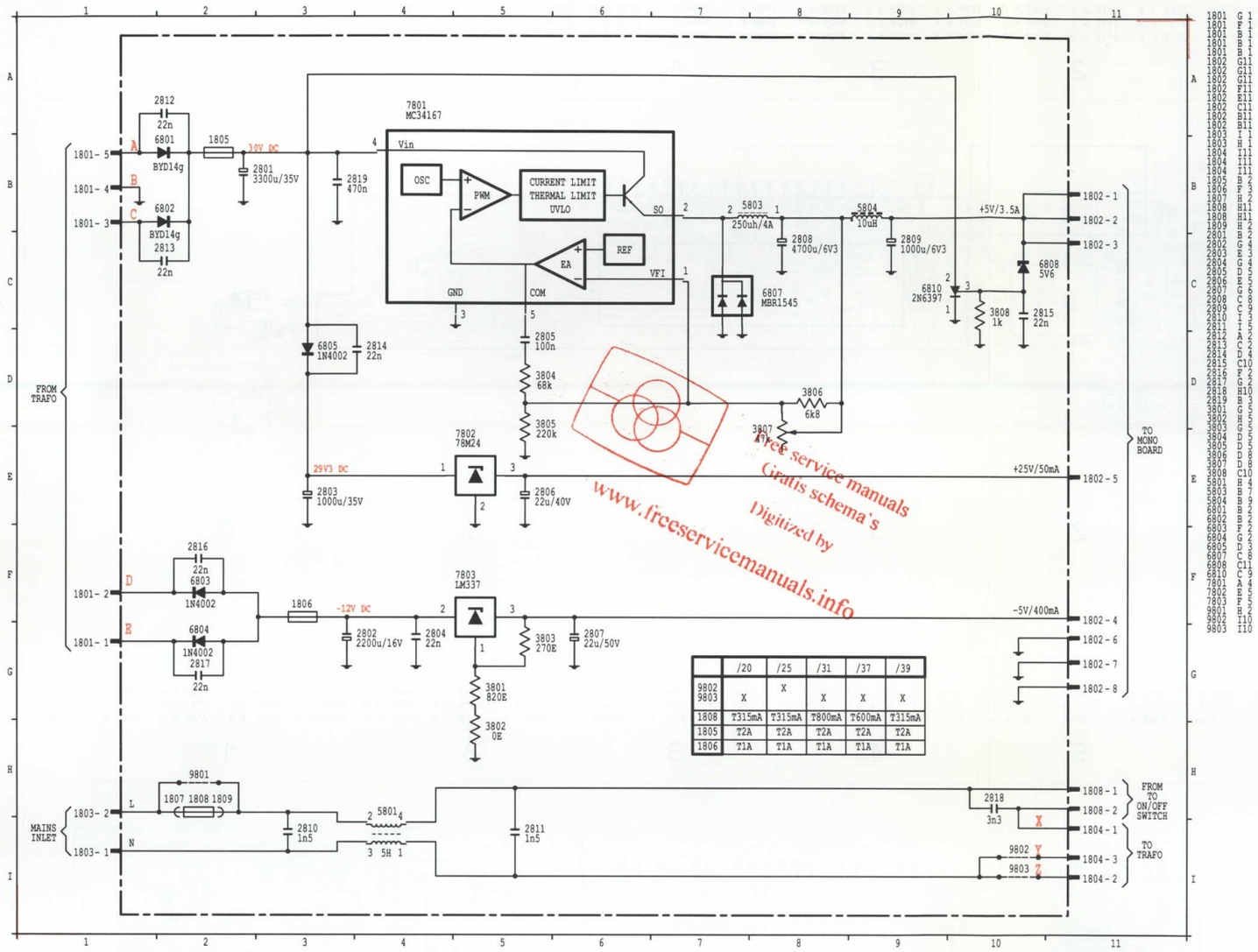
6.3.2 Power supply Circuit diagram



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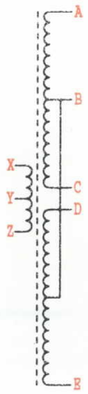
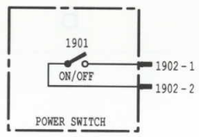
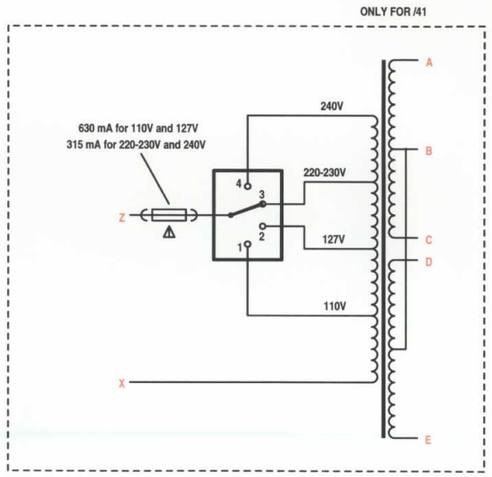
	/20	/25	/31	/37	/39
9802 9803	X	X	X	X	X
1808	T315mA	T315mA	T800mA	T600mA	T315mA
1805	T2A	T2A	T2A	T2A	T2A
1806	T1A	T1A	T1A	T1A	T1A







	/20 /39 /40	/25 /45	/31	/37 /57	/41
9802		X			
9803	X		X	X	X
1808	T315mA	T315mA	T800mA	T600mA	T2A
1805	T2A	T2A	T2A	T2A	T2A
1806	T1A	T1A	T1A	T1A	T1A

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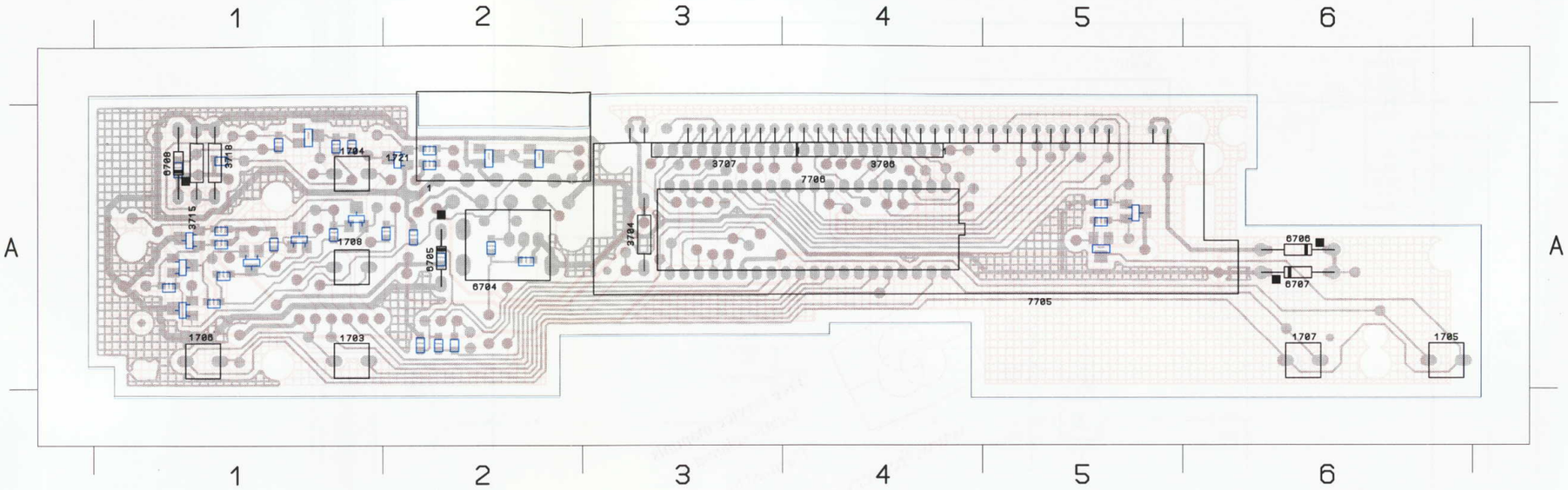
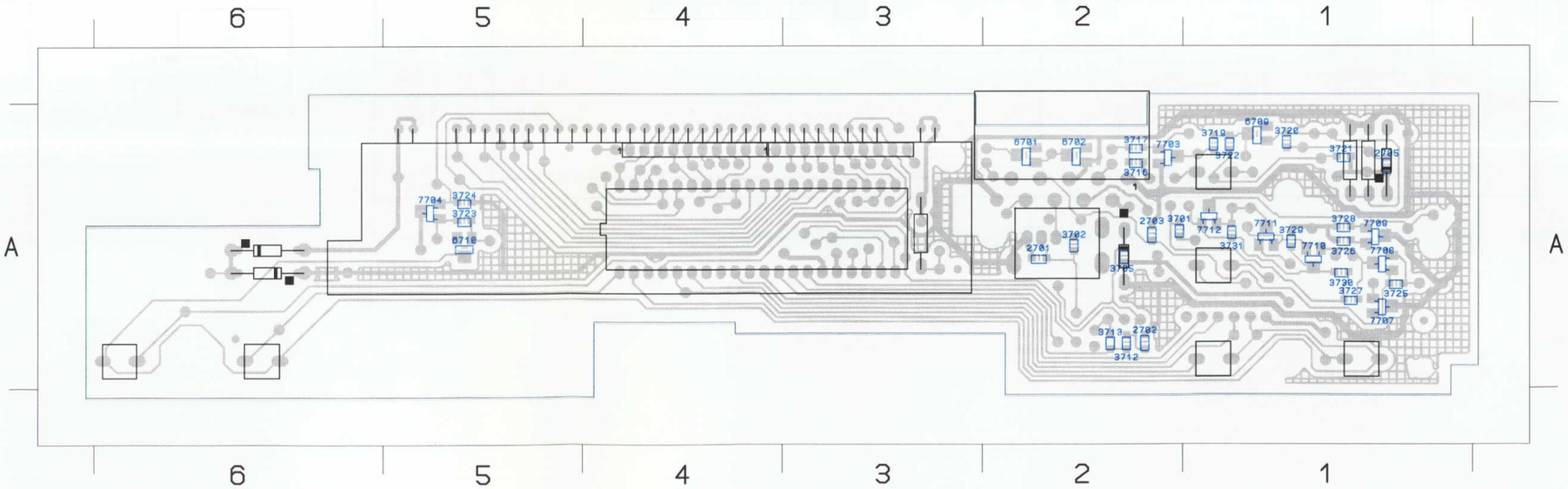
6.4 CONTROL & DISPLAY PANEL

6.4.1 Control & Display PCB

1703 A 1 1706 A 1 1721 A 2 2703 A 2 3702 A 2 3706 A 4 3713 A 2 3717 A 2 3720 A 1 3723 A 5 3726 A 1 3729 A 1 6701 A 2 6705 A 2 6708 A 1 7703 A 2 7706 A 4 7709 A 1 7712 A 1
1704 A 1 1707 A 6 2701 A 2 2705 A 1 3704 A 3 3707 A 3 3715 A 1 3718 A 1 3721 A 1 3724 A 5 3727 A 1 3730 A 1 6702 A 2 6706 A 6 6709 A 1 7704 A 5 7707 A 1 7710 A 1
1705 A 6 1708 A 1 2702 A 2 3701 A 2 3705 A 2 3712 A 2 3716 A 2 3719 A 1 3722 A 1 3725 A 1 3728 A 1 3731 A 1 6704 A 2 6707 A 6 6710 A 5 7705 A 4 7708 A 1 7711 A 1



7712 A 1 7709 A 1 7706 A 4 7703 A 2 6708 A 1 6705 A 2 6701 A 2 3729 A 1 3726 A 1 3723 A 5 3720 A 1 3717 A 2 3713 A 2 3706 A 4 3702 A 2 2703 A 2 1721 A 2 1706 A 1 1703 A 1
7710 A 1 7707 A 1 7704 A 5 6709 A 1 6706 A 6 6702 A 2 3730 A 1 3727 A 1 3724 A 5 3721 A 1 3718 A 1 3715 A 1 3707 A 3 3704 A 3 2705 A 1 2701 A 2 1707 A 6 1704 A 1
7711 A 1 7708 A 1 7705 A 4 6710 A 5 6707 A 6 6704 A 2 3731 A 1 3728 A 1 3725 A 1 3722 A 1 3719 A 1 3716 A 2 3712 A 2 3705 A 2 3701 A 2 2702 A 2 1708 A 1 1705 A 6



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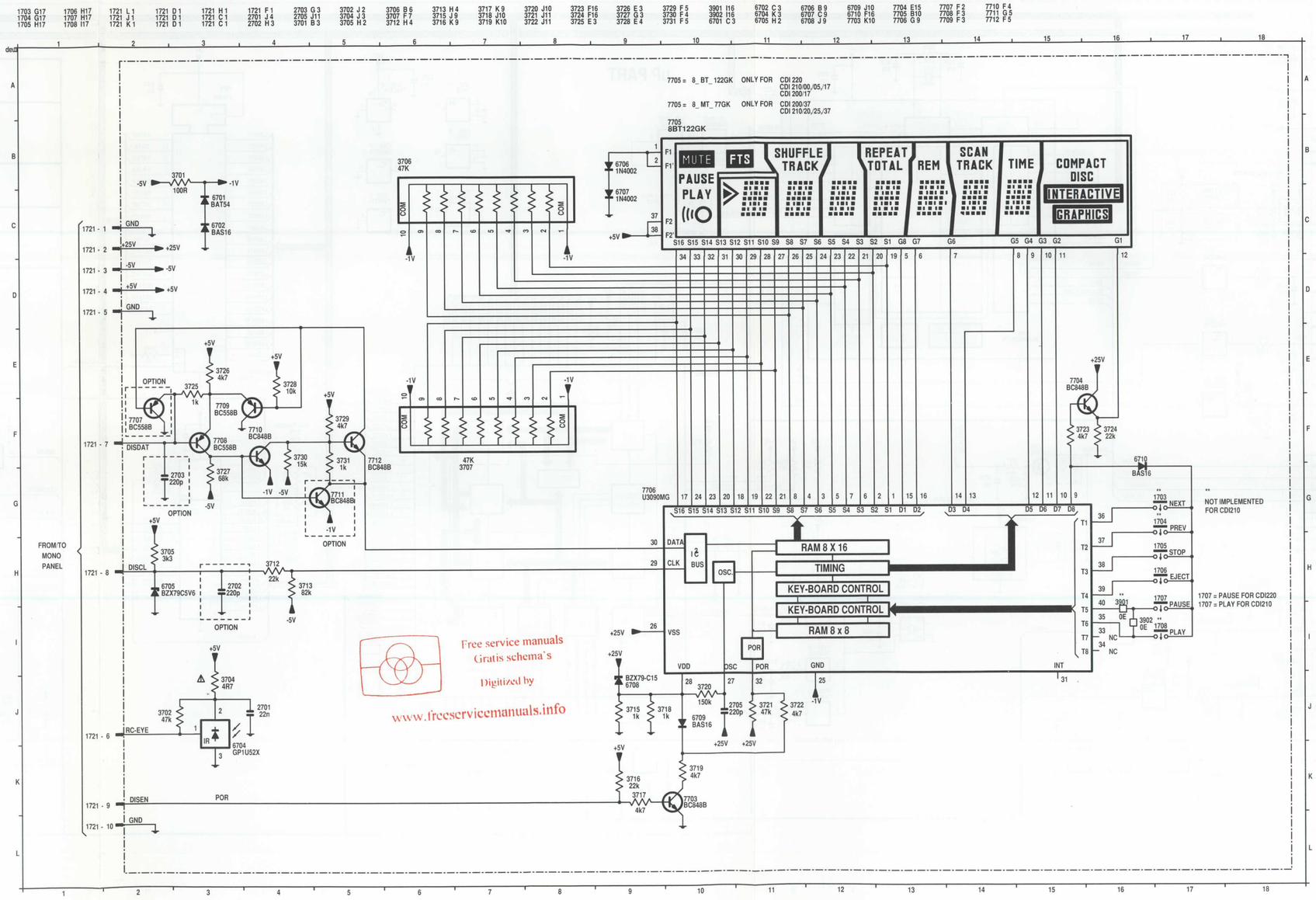
6.4.2 Control & Display Circuit diagram



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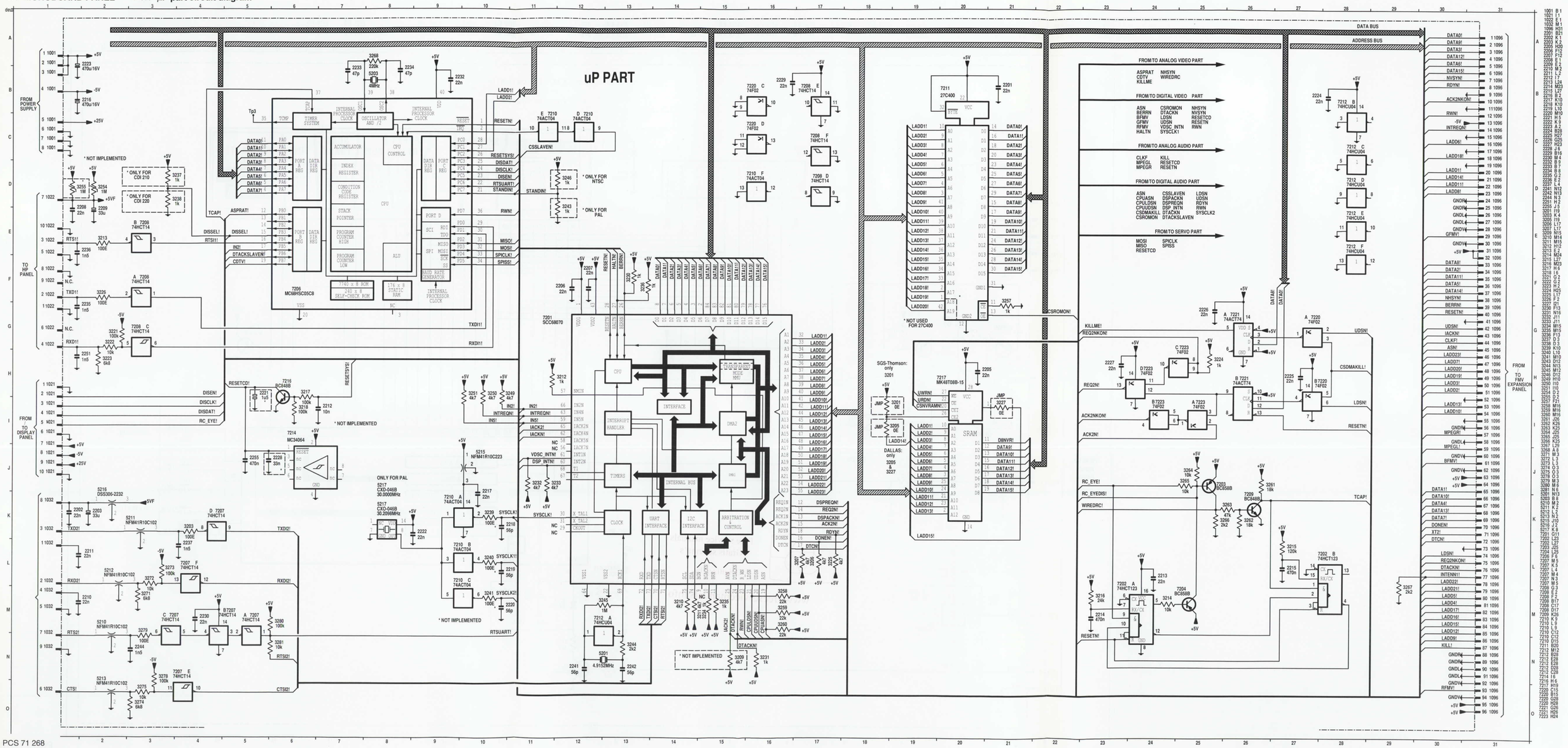
6.6 MONOBOARD PANEL 6.6.1 µP part circuit diagram



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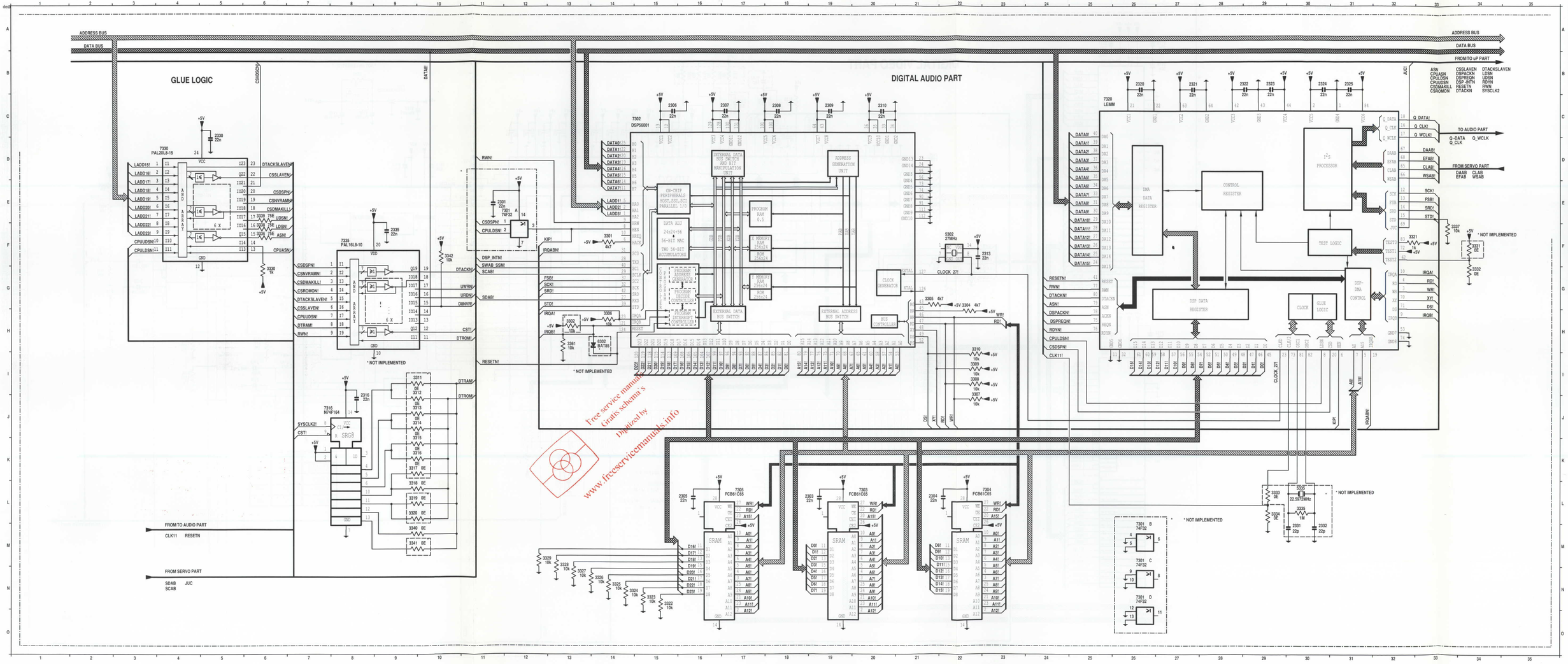
6.6.2 Gluelogic, digital audio part circuit diagram



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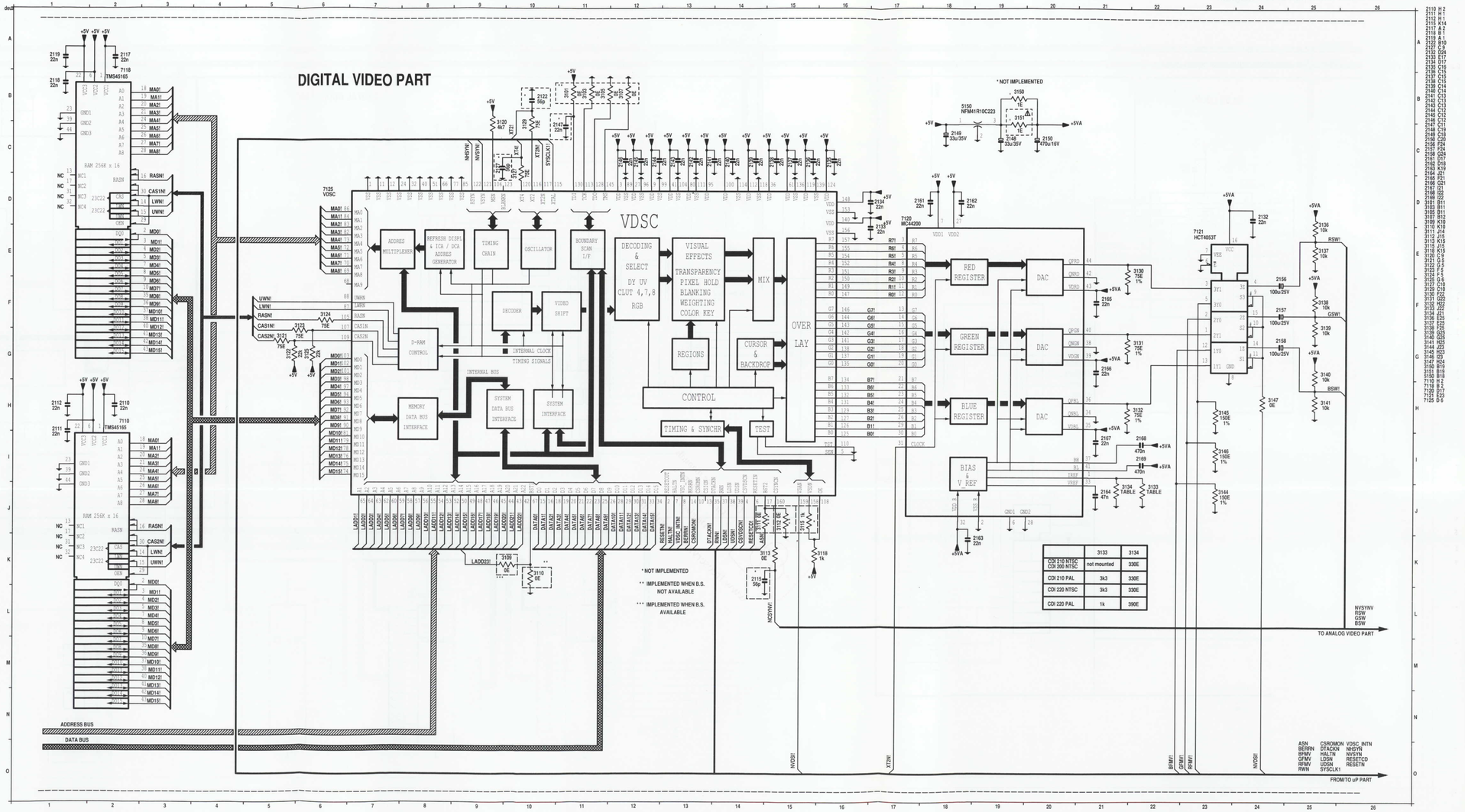
6.6.3 Digital video part circuit diagram



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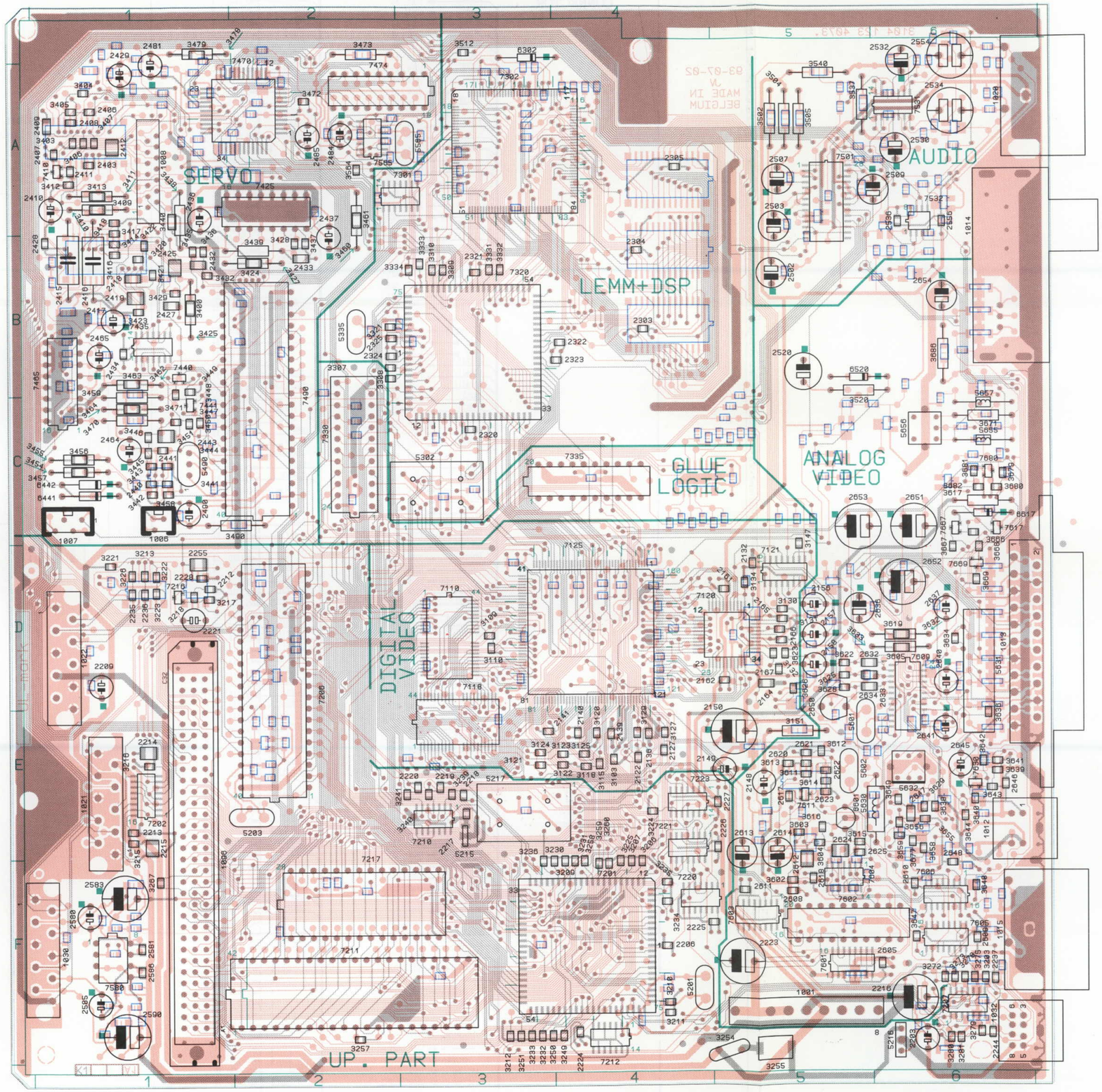
6.6.4 Mono board PCB layout



1001 F 5	2324 B 2	2618 F 5	3249 F 4	3442 C 1	3566 A 2	5215 E 3	7631 E 6
1006 C 1	2325 B 2	2620 E 5	3250 F 3	3443 C 1	3567 A 2	5216 F 6	7632 E 6
1007 C 1	2330 C 2	2621 E 5	3251 F 3	3444 C 1	3568 A 2	5217 E 3	7633 F 6
1008 A 1	2331 B 3	2622 E 5	3254 F 5	3445 C 1	3569 A 3	5302 C 3	7634 C 6
1012 E 6	2332 B 3	2623 E 5	3255 F 5	3446 C 1	3570 A 6	5335 B 2	7638 E 6
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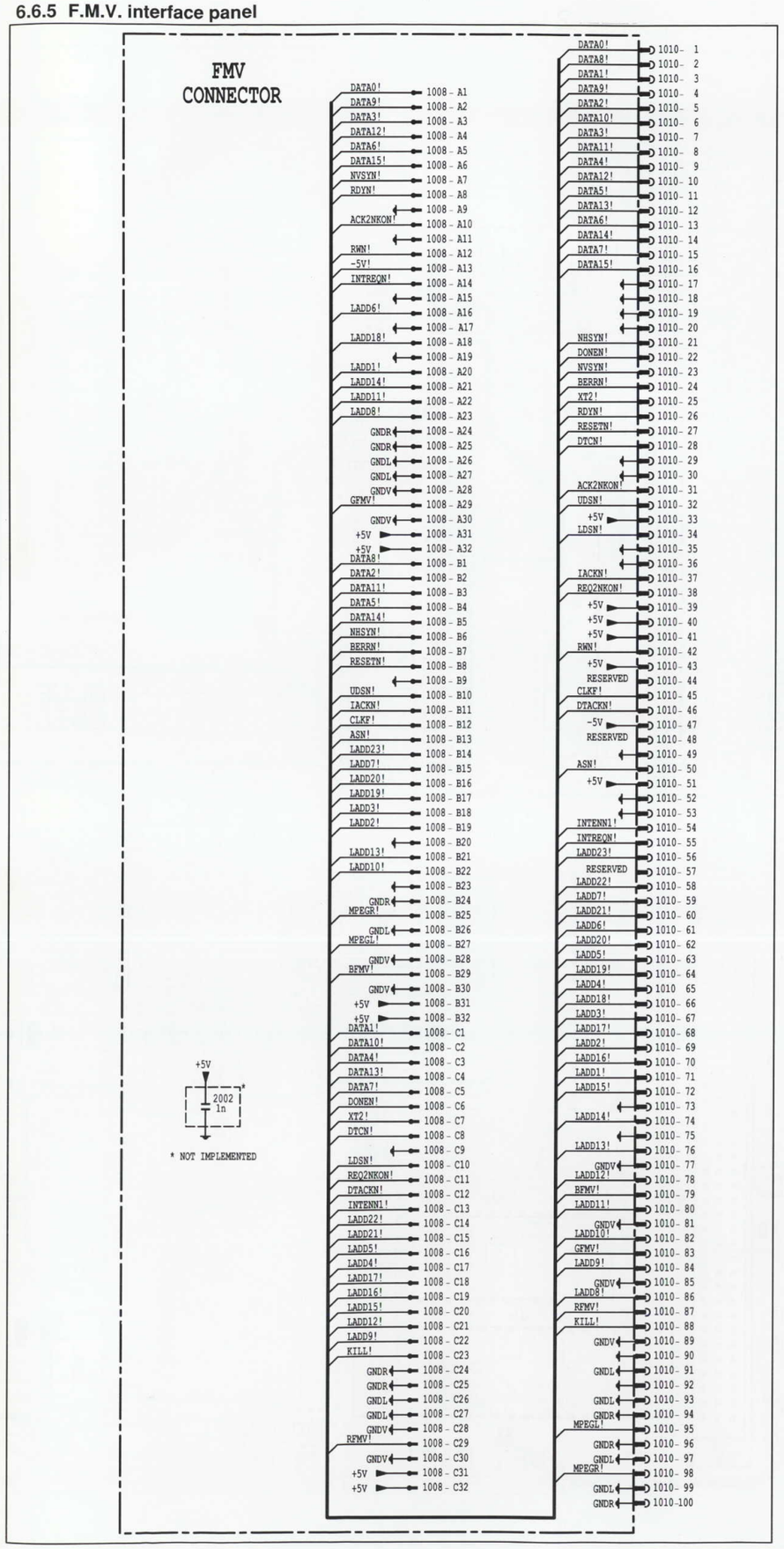
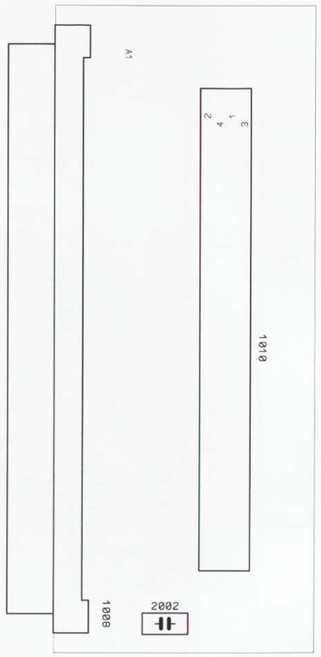
6.6.5 F.M.V. interface panel



F.M.V. expansion



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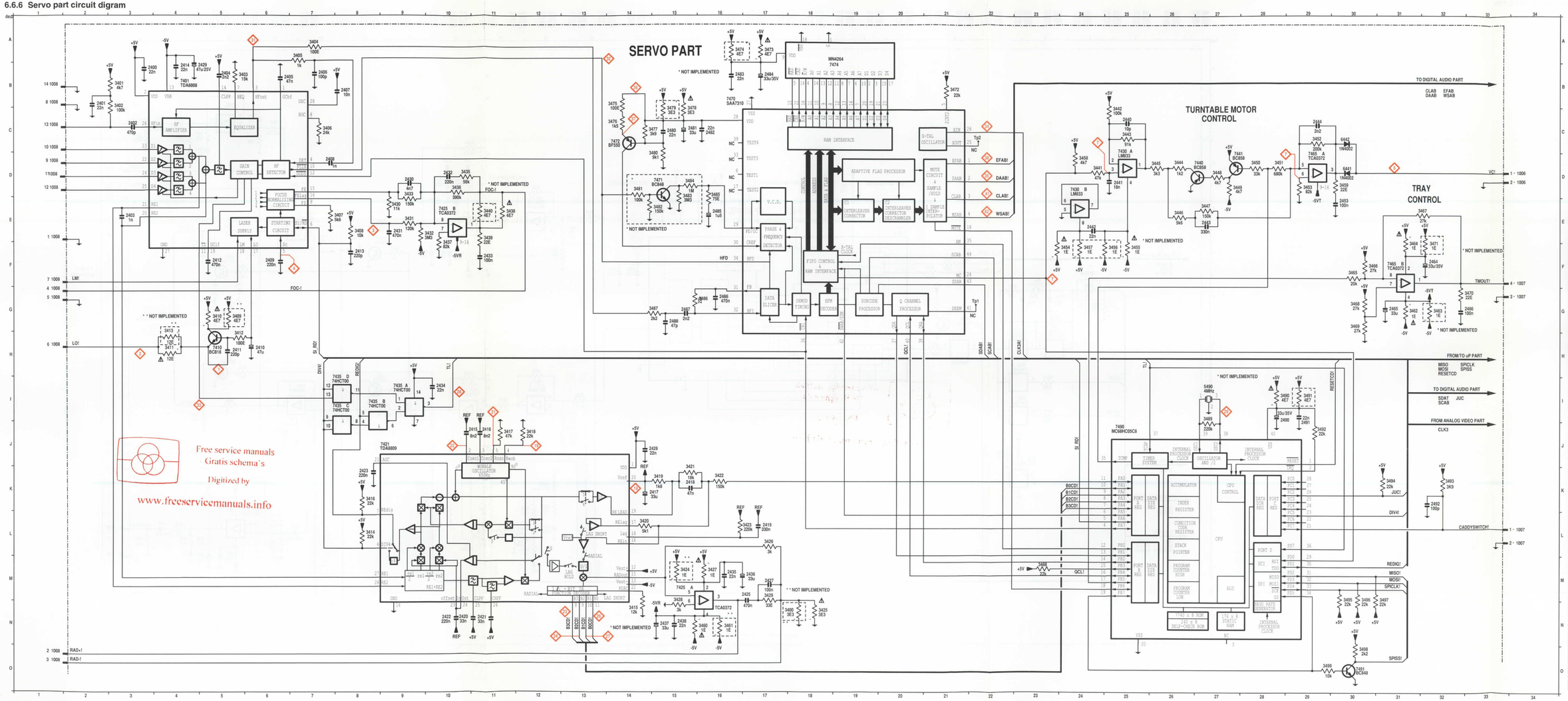
6.6.6 Servo part circuit digram



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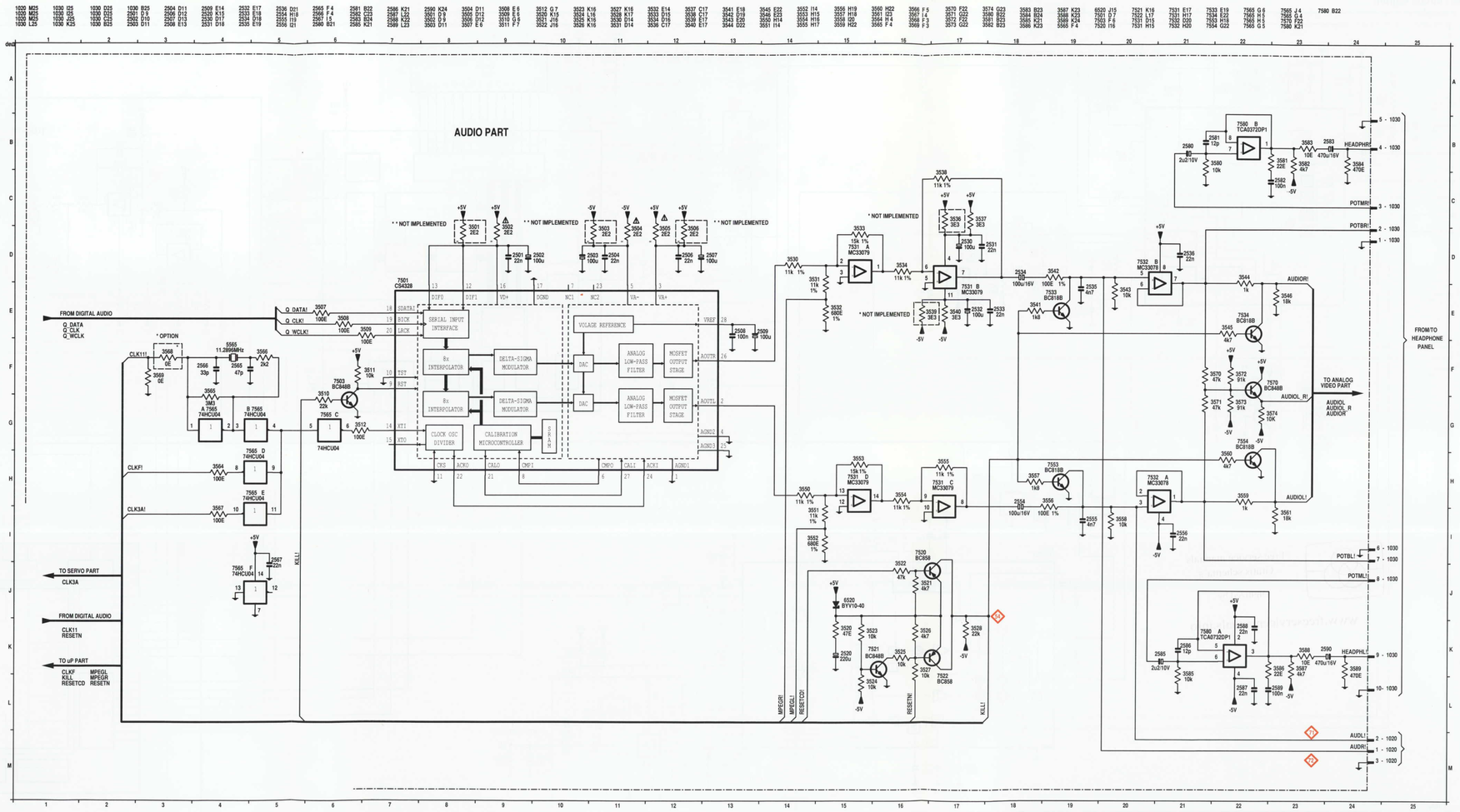
6.6.7 Analog audio part circuit diagram



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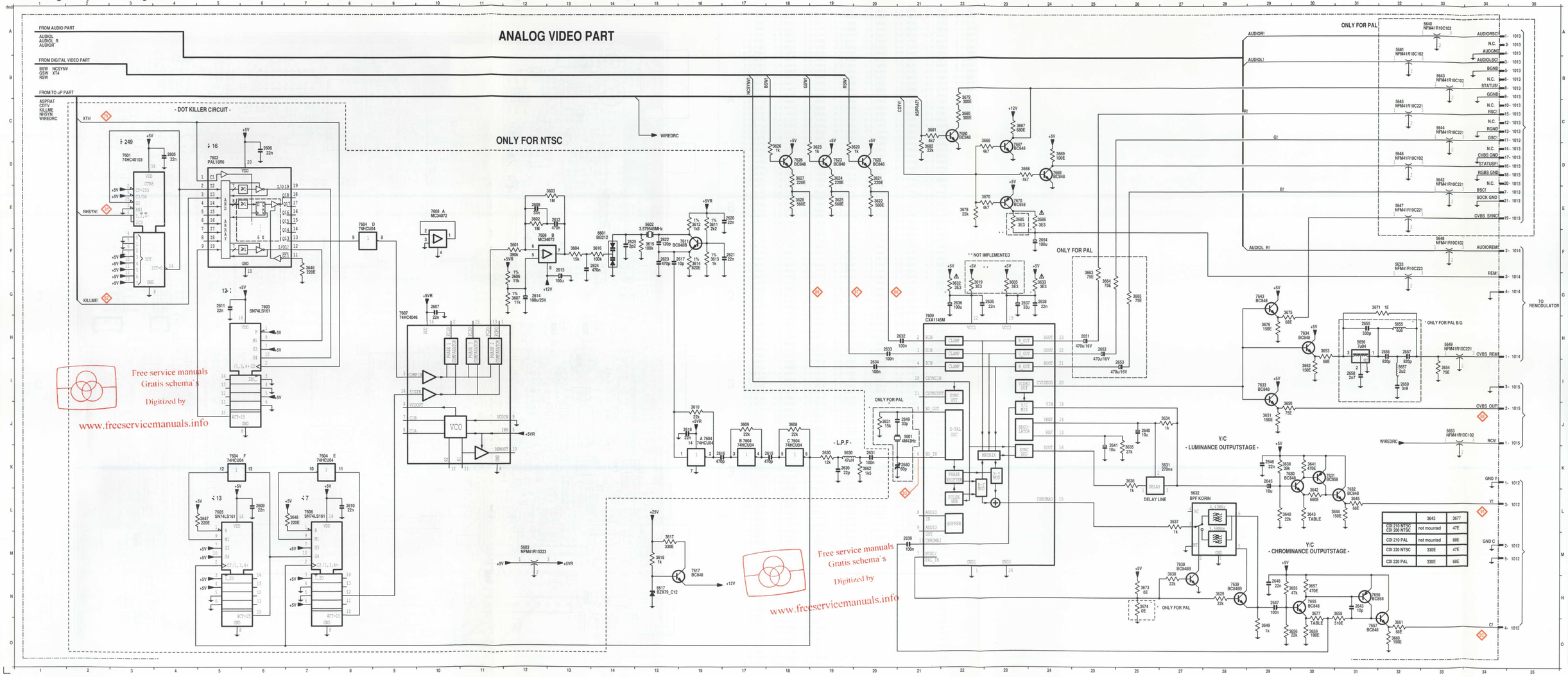
6.6.8 Analog video part circuit diagram



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6.6.9 Mono board PCB layout

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7632	E 6	5216	F 6	3507	A 2	3443	C 1	3250	F 3	2620	E 5	2325	B 2	1006	C 1
7633	F 6	5217	E 3	3508	A 2	3444	C 1	3251	F 3	2621	E 5	2330	C 2	1007	C 1
7634	C 6	5302	C 3	3509	A 3	3445	C 1	3254	F 5	2622	E 5	2331	B 3	1008	A 1
7638	E 6	5335	B 2	3570	A 6	3446	C 1	3255	F 5	2623	E 5	2332	B 3	1012	E 6
7639	E 6	5400	C 1	3571	B 6	3447	C 1	3257	F 2	2624	E 5	2335	C 4	1013	D 6
7643	D 6	5505	A 3	3572	A 6	3448	C 1	3258	F 4	2625	E 5	2400	A 1	1014	B 6
7655	E 6	5601	E 5	3573	B 6	3449	B 1	3259	F 4	2630	E 6	2401	A 1	1015	F 6
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7669	D 6	5631	D 6	3582	F 1	3453	B 1	3263	E 2	2634	D 6	2405	A 1	1030	F 1
7678	B 6	5632	E 6	3583	F 1	3454	C 1	3264	D 2	2635	D 6	2406	A 1	1032	F 6
7680	C 6	5633	B 6	3584	F 1	3455	C 1	3265	D 2	2636	D 5	2407	A 1	1090	E 1
Tp1	A 2	5640	D 6	3585	F 1	3456	C 1	3266	E 2	2637	D 6	2408	A 1	2110	D 3
Tp2	A 1	5641	D 6	3586	F 1	3457	C 1	3267	F 1	2638	D 6	2409	A 1	2111	D 3
Tp3	E 1	5642	D 6	3587	F 1	3458	C 1	3268	E 2	2639	E 6	2410	A 1	2112	D 3
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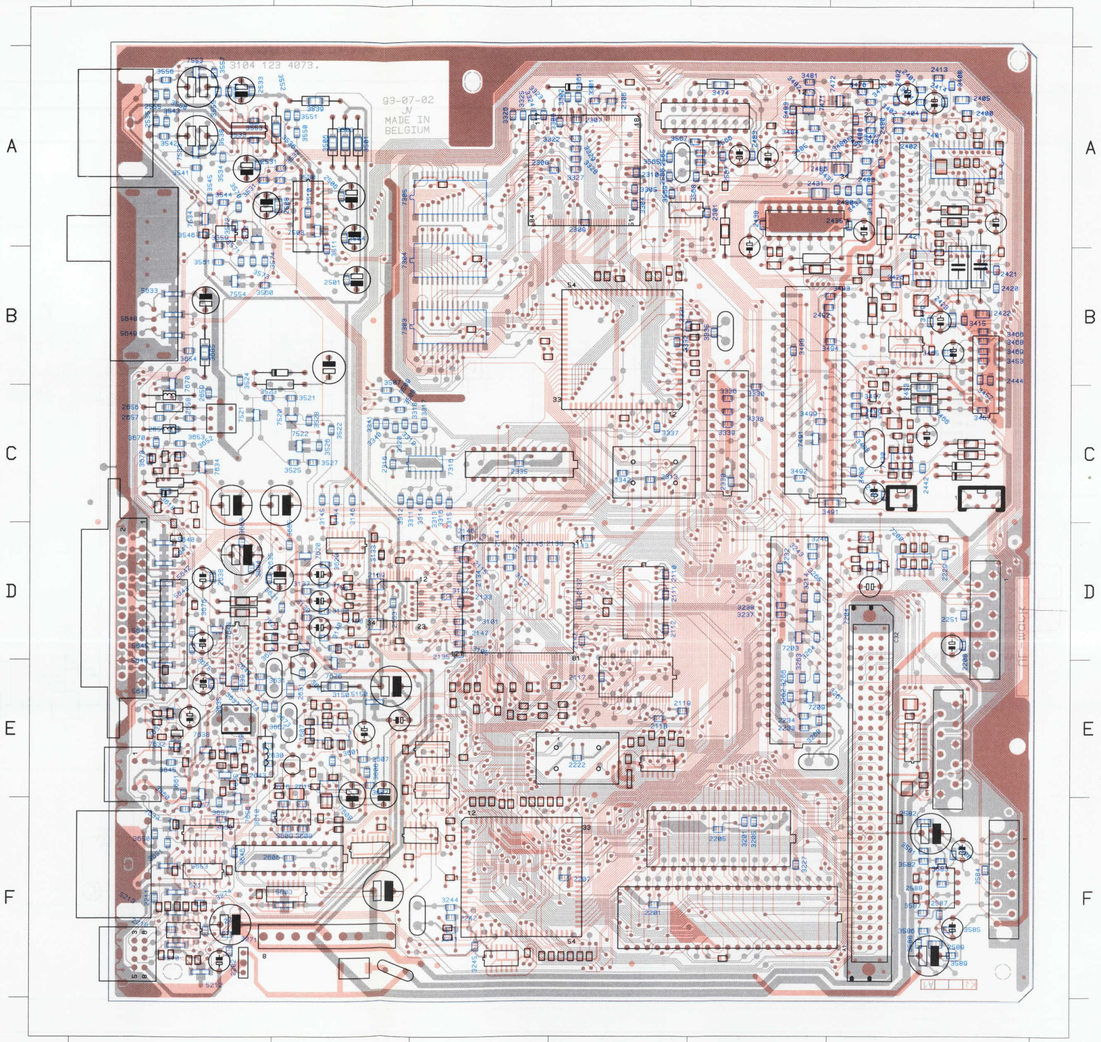
		7441	C 1	3654	B 6	3522	C 5	3404	A 1	3203	F 6	2520	B 5	2220	E 3
		7465	B 1	3655	E 6	3523	C 6	3405	A 1	3205	F 2	2530	A 6	2221	D 1
		7470	A 2	3656	E 6	3524	B 6	3406	A 1	3206	F 4	2531	A 6	2222	E 3
		7471	A 2	3657	F 6	3525	C 5	3407	A 1	3207	F 4	2532	A 6	2223	F 5
		7472	A 1	3658	E 6	3526	C 5	3408	A 1	3209	F 4	2533	A 6	2224	F 4
		7474	A 2	3659	E 6	3527	C 5	3409	A 1	3210	F 4	2534	A 6	2225	F 5
		7490	C 2	3660	F 6	3528	C 5	3410	A 1	3211	F 4	2535	A 6	2226	E 5
		7491	C 2	3661	E 6	3530	A 5	3411	A 1	3212	F 3	2536	A 6	2227	E 5
		7501	A 5	3662	E 6	3531	A 6	3412	A 1	3213	D 1	2554	A 6	2228	D 1
		7503	A 5	3663	D 6	3532	A 5	3413	A 1	3214	D 2	2555	A 6	2229	D 1
		7520	C 5	3664	D 6	3533	A 6	3414	B 1	3215	E 1	2556	A 6	2230	F 6
		7521	C 6	3665	D 5	3534	A 6	3415	B 1	3216	E 1	2565	A 3	2232	D 2
		7522	C 5	3666	C 6	3535	A 5	3416	B 1	3217	D 1	2566	A 3	2233	E 2
		7531	A 6	3667	D 6	3537	A 5	3417	A 1	3218	D 1	2567	A 2	2234	E 2
		7532	A 6	3668	D 6	3538	A 6	3418	A 1	3221	D 1	2580	F 1	2235	D 1
		7533	A 6	3669	D 6	3539	A 5	3419	B 1	3222	D 1	2581	F 1	2236	D 1
		7534	A 6	3670	C 6	3540	A 5	3420	B 1	3223	D 1	2582	F 1	2237	F 6
		7553	A 6	3671	C 6	3541	A 6	3421	B 1	3224	E 4	2583	F 1	2241	F 4
		7554	B 6	3673	E 5	3542	A 6	3422	B 1	3225	F 4	2585	F 1	2242	F 4
		7565	A 2	3674	E 6	3543	A 6	3423	B 1	3226	D 1	2586	F 1	2244	F 6
		7570	A 6	3675	D 6	3544	A 6	3424	B 2	3227	F 2	2587	F 1	2251	D 1
		7580	F 1	3676	D 6	3545	A 6	3425	B 1	3230	F 3	2588	F 1	2255	D 1
		7601	F 5	3677	E 6	3546	A 6	3426	B 1	3231	F 4	2589	F 1	2301	A 2
		7602	F 5	3678	C 6	3550	A 5	3427	B 2	3232	F 3	2590	F 1	2303	B 4
		7603	F 5	3679	C 6	3551	A 5	3428	B 2	3233	F 3	2605	F 6	2304	B 4
		7604	F 5	3680	C 6	3552	A 5	3429	B 1	3234	F 4	2606	F 5	2305	A 4
		7605	F 6	3681	C 6	3553	A 6	3430	A 1	3235	F 4	2607	E 5	2306	A 3
		7606	F 6	3682	C 6	3554	A 6	3431	A 1	3236	F 3	2608	F 5	2307	A 3
		7607	E 5	3685	B 6	3555	A 6	3432	B 1	3237	D 2	2609	F 6	2308	A 3
		7608	F 5	3686	B 6	3556	A 6	3433	A 1	3238	D 2	2610	F 6	2309	A 3
		7609	D 6	5158	E 5	3557	A 6	3435	B 1	3239	E 3	2611	F 5	2310	A 3
		7611	E 5	5201	F 4	3558	A 6	3436	B 1	3240	E 3	2612	F 5	2313	C 3
		7617	C 6	5203	E 2	3559	A 6	3437	B 2	3241	E 3	2613	E 5	2316	C 5
		7620	D 5	5210	F 6	3560	B 6	3438	A 1	3243	D 2	2614	E 5	2320	C 3
		7623	D 5	5211	F 6	3561	B 6	3439	B 2	3244	F 4	2615	F 5	2321	B 3
		7626	E 5	5212	F 6	3564	A 2	3440	A 1	3245	F 4	2616	F 5	2322	B 4
		7630	E 6	5213	F 6	3565	A 2	3441	C 1	3246	D 2	2617	E 5	2323	B 4



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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 Analog Audio section 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 equivalent) to test the functioning of the MMC section. The Service Shell provides tests for the Analog Video, CD Servo, and Analog Audio circuits. Section 5.2 covers all the Service Shell test procedures.

The powersupply board assembly, the display board assembly, the analog video circuitry, the analog audio circuitry and the the CD servo circuitry can be serviced to the component level. Due to the complexity of the MMC circuit, replacement is recommended when defective.
The MMC circuitry consists of the uP part circuitry, digital video circuitry, LEMM + DSP circuitry and the GLUE Logic circuitry. The CDM-9 CD Mechanism is also replaced as an assembly. Disassembly instructions are provided on the exploded views.

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).

7.1.2 Troubleshooting and Service the MMC panel

The monoboard is replaced as a module when parts of the Multi Media Controller are defective. The technician must know the functions of the MMC parts 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 complete mainboard. If the test Cannot be initiated, check the power sources and main clock signals on the MMC section. If all supplies and clock signals are present, replace the Mainboard.

7.1.3 CD-servo 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 analog audio 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 servo 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 servo 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 CD DRIVE test in the Service Shell or Low Level test. Also check for activity on the JUC-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 Focusunit, turntable and swing arm electronics and mechanics. 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).
When the servo and decoder circuits are functioning properly, there may be a problem in the Analog Audio circuit.

7.1.4 Video Section Troubleshooting

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

Symptom 1: the player shell is displayed, but video from the disc cannot be displayed. If this condition exists, the Digital Video section 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 section, since this is where the video decoding takes place. Thus the problem is isolated to the video decoding section on the MMC section.

Symptom 2: no video. This symptom may be caused by either the Digital Video part or by the Analog Video circuit. 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. If these signals are present, the Digital Video circuits are functional. Further checks of the Analog Video circuit can isolate the problem further. Check the Video Encoder IC. Also check Vcc1 and Vcc2 to the Video Encoder IC.

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, IC7609 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 (IC7609).

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7.2 MEASUREMENTS & ADJUSTMENTS

In the circuit diagrams and on the drawings of the panels measuring points are marked with : ⟨1⟩
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

7.2.1 Powersupply section

The main signal in this section is the +5V, to be adjusted with potmeter 3807 up to 5,3V. All other voltages are stated in the circuit diagram.

7.2.2 Servo section

7.2.2.1 Lasercurrent.

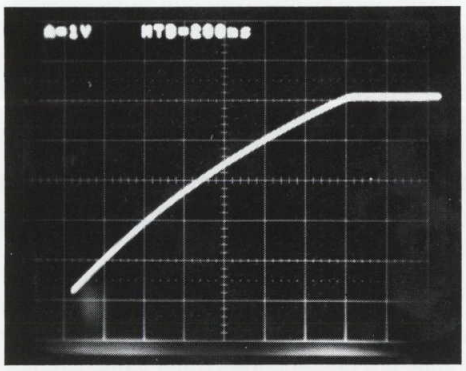
The lasercurrent is adjusted in the CDM9 and is a factory adjustment. After replacing a defective CDM the laser current does not need to be adjusted.
Play track 1 of testdisc 5, the voltage accross item 3411(measuring point 1 and point 2) on the CD panel should be : 0,7 V / DC ± 10 %.

7.2.2.2 Focus signal.

Play track 1 of testdisc 5, the voltage accross item 2431 (measuring point 3 and GND) on the CD panel should be : + 400 mV / DC ± 10%.

7.2.2.3 Starting signal.

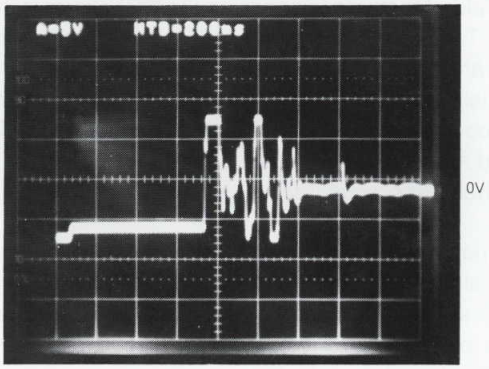
Insert a disc and measure accross item 2409 (measuring point 4 and GND).
After pushing the play button the next picture appears on the oscilloscoop :



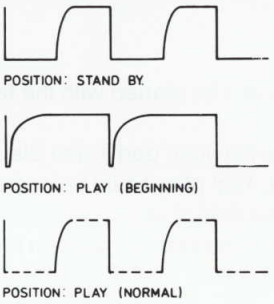
The signal is triggered by the Si/RD signal on IC7401pin 6.

7.2.2.4 Motorcontrol signals.

Insert testdisc 5.
Measure accross IC7465A pin3 and GND, after pushing the play button the next picture should appear on the oscilloscope.

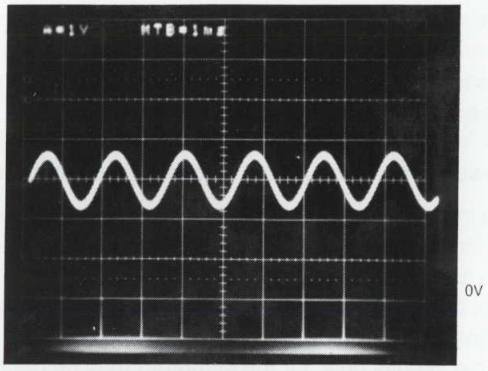


After a while, when playing track 1, the voltage should be:
- 1.7 V DC ± 10%
Signal accross measuring point 7 and GND should be :



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 denpending on playing mode, 0 V if LOW or 5 V if HIGH

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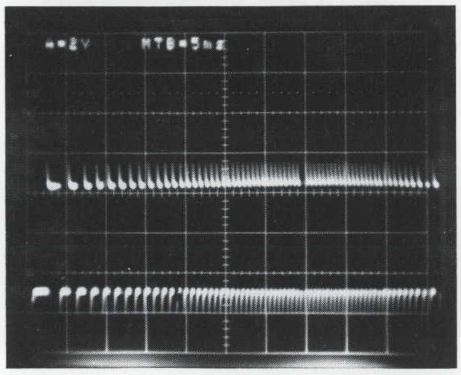
For measuring point 28 and 33 put the player in the service shell on CD drive test mode 2. The voltage accross point 28 and GND should be :

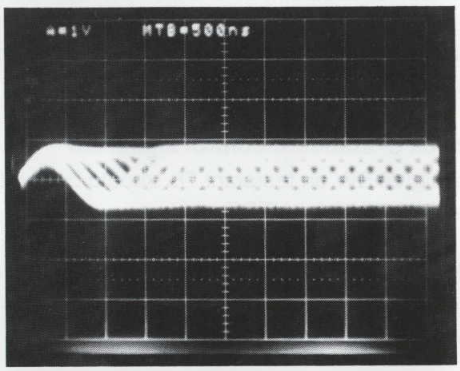


7.2.2.6 Clock signal µP IC7490

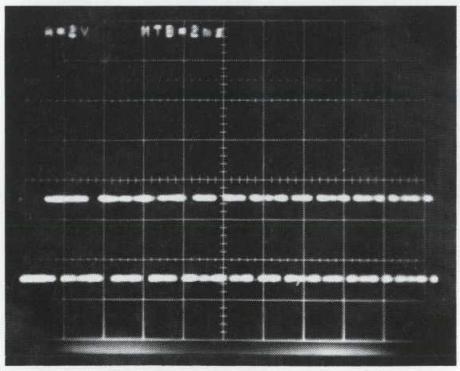
Measuring point 29 : clock signal f = 4MHz.

7.2.2.7 Decoder signals

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



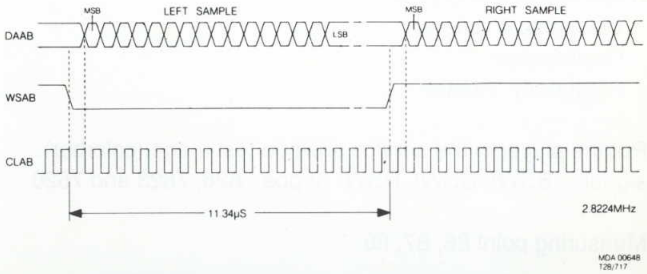
Insert testdisc 5 and put the player in the service shell on CD drive test mode 2.
The signal accross measuring point 32 should be :



Measuring point 34 : clock signal f = 11.289.600 Hz.
Voltage accross measuring point 36 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.

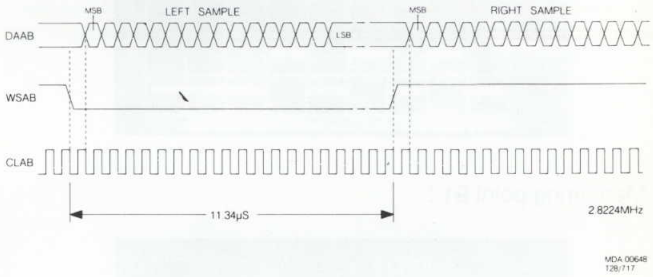
Measuring point 39, 41 and 42 :



7.2.3 Audio section

7.2.3.1 I²S signals

Check whether the signals, given below, appear on the test points 35 - 41 - 42
Time base related only to CD-DA.



7.2.3.2 Xin clock signal

testpoint 34
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.

7.2.3.3 KILL signal

(testpoint 54)
This KILL signal must be +12V during reset.
In normal/play position this signal is - 8 V.

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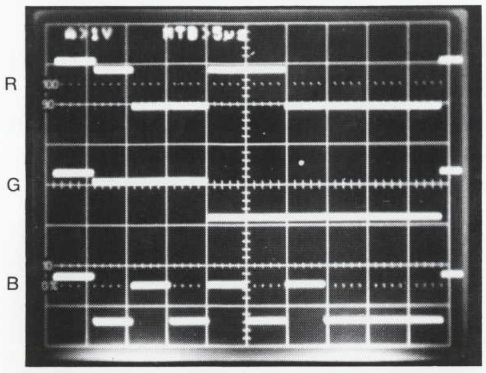
7.2.4 Video section

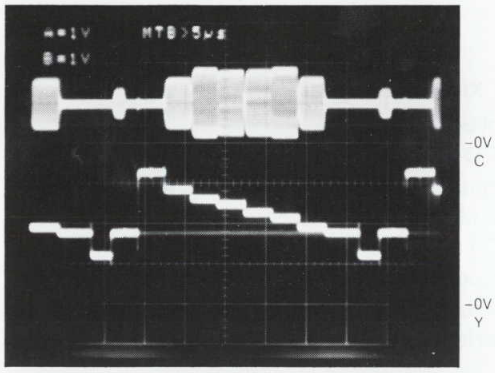
Required test equipment.
- Electronic voltmeter
- Oscilloscope
- Frequency counter

Put the player in the service shell on testimage (colorbar).
signals : BSW!, GSW!, RSW! At pos 7626, 7623 and 7620

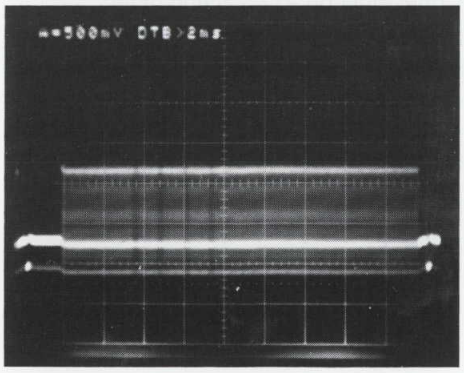
Measuring point 86, 87, 88 :



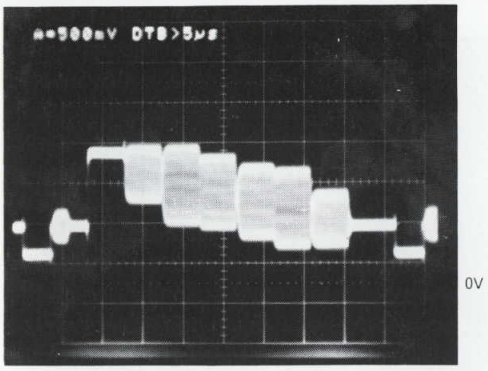
Measuring point 91 :



Measuring point 92 :



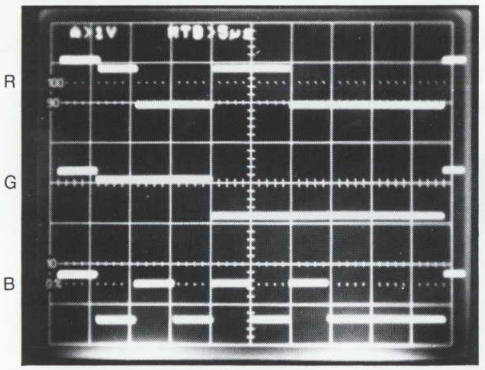
Measuring point 89 :



7.2.4.1 Check of subcarrier.
- Player switched off.
- Connect frequency counter to testpoint 83, (pin 6 IC 7609) and turn on the player.
- The frequency on testpoint 83 should be;
  PAL = 4 433 618 Hz. ± 50 Hz.
  NTSC = 3 579 545 Hz. ± 7 Hz.
- The amplitude on testpoint 83 should be in between; 400 mV and 1000 mV_{pp}
- If for PAL the frequency of this signal deviates, perform alignment of trimmer 2650.

7.2.4.2 Check of standard control signal SW
The control signal SW on testpoint 78, should be low (0 V) for PAL and high (5 V) for NTSC.

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 and 88.



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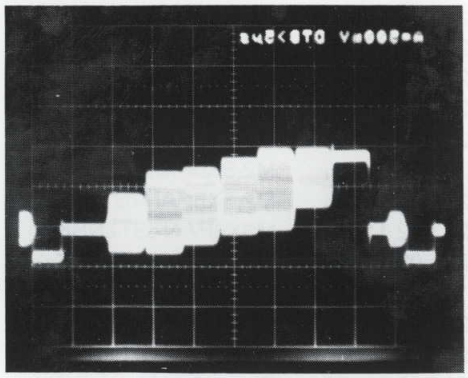
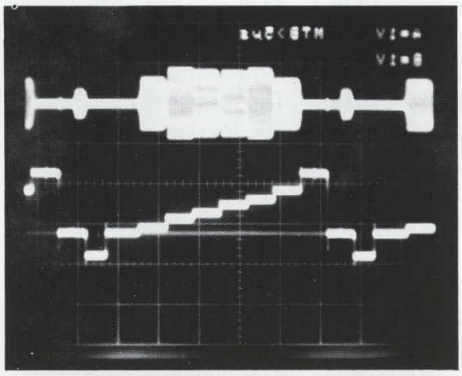
Check of Output signals for CVBS - Y / C.



CVBS signals Testpoint 89

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



Y/C Sign. Testpoint 91/92

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

7.2.5 Multi Media Controller section

Required equipment:

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

7.2.5.1 Supply voltages

Check if the following voltages are present at connector 1001 :

pin 1,2,3	: + 5 V ± 5%
pin 4	: – 5 V ± 5%
pin 5	: + 25 V ± 5%
pin 6,7,8	: GROUND

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)
30.2098 MHz ± 600 Hz (NTSC)

This system clock must be present at the following points:

IC7201 pin 30
IC7125 pin 115

At IC 7201 pin 29 Clock divided by two must be present :

15.0000 MHz (= 30.000 : 2 for PAL)
15.1049 MHz (NTSC)

At IC7201 pin 69 the UART clock of 68070 must be present :

Frequency 4.9152 MHz ± 250 Hz

At IC7206 pin 39 clock of '68HC05' must be present.

Frequency 4.000 MHz ± 100 Hz

At pin 127 of IC 7302 the DSP clock must be present:

Frequency 27.00 MHz ± 100Hz

At pin 23 of IC 7320 the LEMM clock must be present:

Frequency 27.00 MHz ± 100Hz

7.2.5.3 I^2S interface

FILTERN	: 0V
DAAB	: Blockwave signal
CLAB	: frequency 2.8224 MHz (only for CD-DA)
WSAB	: frequency 44.1 kHz (only for CD-DA)
DEEM	: 0V (only for CD-DA and only if de-emphasis 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 to the UART of microprocessor 68070 via connector at rear side port 2 (= BU-2).
Settings of the terminal:

Baudrate	: 9600
start bit	: 1
data bists	: 8
stop bits	: 1

no parity/ no handshake

For the test sequence of the low level test see chapter 5.1.

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8 PARTSLIST

8.1 Partslist of the cabinet

Item	Codenumber	Description
1	4822 444 40638	Front assy /57
1	4822 444 40608	Front assy /40/41/45
9	4822 410 62316	Powerknob assy
22	4822 502 30408	PL3X10PAN<STZNBK
23	4822 502 30408	PL3X10PAN<STZNBK
24	4822 502 30408	PL3X10PAN<STZNBK
25	4822 502 30408	PL3X10PAN<STZNBK
26	4822 502 30408	PL3X10PAN<STZNBK
27	4822 502 30408	PL3X10PAN<STZNBK
30	4822 502 30408	PL3X10PAN<STZNBK
31	4822 502 30408	PL3X10PAN<STZNBK
44	4822 413 51434	Volume knob
65	4822 444 40607	Tray front
75	4822 502 12795	M2,5X5PAN<STZNBK
76	4822 502 12795	M2,5X5PAN<STZNBK
77	4822 502 12795	M2,5X5PAN<STZNBK
78	4822 502 12795	M2,5X5PAN<STZNBK
81	Tray loader	SEE SEPARATE LIST
151	4822 444 60898	Cover
171	4822 502 12795	M2,5X5PAN<STZNBK
172	4822 502 12795	M2,5X5PAN<STZNBK
173	4822 502 12795	M2,5X5PAN<STZNBK
174	4822 502 12795	M2,5X5PAN<STZNBK
175	4822 502 12795	M2,5X5PAN<STZNBK
178	4822 502 12795	M2,5X5PAN<STZNBK
181		Frame assy
182		Trafo support
183		Spacer locking
184		Spacer locking
185		Remod. bracket
186	4822 402 61422	Spacer
187	4822 402 61422	Spacer
188	4822 402 61422	Spacer
189		DVC box
200		Taptide M3X36
201		Taptide M3X36
202	4822 502 12795	M2,5X5PAN<STZNBK
203	4822 502 12795	M2,5X5PAN<STZNBK
207		ZN 3X6 TORX
208		ZN 3X6 TORX
209	4822 502 12795	M2,5X5PAN<STZNBK
210	4822 502 12795	M2,5X5PAN<STZNBK
211	4822 502 30408	PL3X10PAN<STZNBK
212	4822 502 30408	PL3X10PAN<STZNBK
213	4822 502 30408	PL3X10PAN<STZNBK
214	4822 502 30408	PL3X10PAN<STZNBK
215	4822 530 80522	2,8X5,5
216	4822 530 80522	2,8X5,5
217	4822 502 12795	M2,5X5PAN<STZNBK
218	4822 502 12795	M2,5X5PAN<STZNBK
219	4822 502 12795	M2,5X5PAN<STZNBK
220	4822 502 12795	M2,5X5PAN<STZNBK
221	4822 530 80522	2,8X5,5
222	4822 530 80522	2,8X5,5
223	4822 502 30438	PL3X6PAN<STZNBK
224	4822 502 30438	PL3X6PAN<STZNBK
225		M3X4PAN<STZNBK
226		M3X4PAN<STZNBK
251	4822 462 41992	Foot
252	4822 462 41992	Foot
255	4822 462 40409	Plate for foot
256	4822 462 40409	Plate for foot
257	4822 462 40409	Plate for foot
259	4822 502 12795	M2,5X5PAN<STZNBK
260	4822 502 12795	M2,5X5PAN<STZNBK
268	4822 502 12795	M2,5X5PAN<STZNBK
269	4822 502 12795	M2,5X5PAN<STZNBK
270	4822 502 12795	M2,5X5PAN<STZNBK
271	4822 502 11667	M3X6PAN<STZNBK
272	4822 502 11667	M3X6PAN<STZNBK
273		M3X4PAN<STZNBK
274	4822 502 11667	M3X6PAN<STZNBK
275	4822 502 11667	M3X6PAN<STZNBK
278	4822 502 30408	PL3X10PAN<STZNBK
279	4822 502 30408	PL3X10PAN<STZNBK
281		Cap
284	4822 272 10361	Votage selector
301	4822 321 10249	Mainscord /40
301	4822 321 10886	Mainscord /45
301	4822 321 10249	Mainscord /41
301	4822 321 10788	Mainscord /57
302	4822 321 20308	Audio cord set
309	4822 736 21919	Dir. for use /57
309	4822 736 21936	Dir. for use /40/41/45
315	4822 321 61579	Video cord set
316	4822 321 61849	TPX 3500 cord
317	4822 320 11096	Antenna cable /57
1001	4822 214 52145	Monopanel assy /57
1001	4822 214 52163	Monopanel assy /40
1001	4822 214 52164	Monopanel assy /41
1001	4822 214 52165	Monopanel assy /45
	These monoboards to be repaired via PCS-repair procedure !	
1001	See also separate partslist Monoboard	
1002	See separate list Display/powersupply panel.	
1003	4822 214 52048	FMV expansion panel
1800	4822 253 30421	Fuse T600mA ../57
1800	4822 070 38001	Fuse T800mA ../51
1800	4822 070 33151	Fuse T315mA ../40/41/45
5802	4822 146 31201	Transformer ../57
5802	4822 146 31208	Transformer ../40/45
5802	4822 146 31321	Transformer ../41

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8.2 PARTS LIST OF THE TRAY LOADER

Item	Codenumber	Description
	4822 691 30294	COMPLETE LOADER WITHOUT CDM
1	4822 464 50934	CHASSIS
2	4822 444 30457	TRAY
3	4822 464 50908	SUB CHASSIS
4	4822 444 60861	COVER
5	4822 402 61412	CLAMPER ASSY
6	4822 466 93065	SUSPENSION
7	4822 466 93065	SUSPENSION
8	4822 466 93065	SUSPENSION
9	4822 466 93065	SUSPENSION
10	4822 271 30707	MICROSWITCH
11	4822 361 21492	MOTOR ASSY
12	4822 502 12001	M2X4 STZN
13	4822 502 12001	M2X4 STZN
14	4822 528 81465	PULLEY
15	4822 528 81464	DRIVE PINION
16	4822 535 93319	SPINDLE
17	4822 535 93319	SPINDLE
18	4822 358 31168	BELT
20	4822 691 30275	CDM9 UNIT
20	4822 691 30277	CDM9 UNIT + SUB CHASSIS + SUSPENSIONS !
33	4822 466 62109	TRANSPORT PROTECTION
40	4822 325 60379	DAMPING TULE
41	4822 325 60379	DAMPING TULE
42	4822 325 60379	DAMPING TULE
43	4822 325 60379	DAMPING TULE
44	4822 466 93163	DAMPING PLATE

8.3 PARTSLIST OF THE DISPLAY AND POWERSUPPLY PANEL

Item	Codenumber	Description			
2		Heat sink			
4		Bracket for conn.			
6		FTD-holder			
7		Insulating plate			
8		Factory plate			
10		Shielding cap			
101	4822 492 63076	Spring clip			
103	4822 492 63076	Spring clip			
107	4822 492 63076	Spring clip			
201	4822 325 20188	Mica isulator			
202	4822 325 20188	Mica isulator			
1201	4822 267 31572	socket 3p hor. fem.			
1202	4822 267 51216	minidin socket 8p FEM TCS			
1206	4822 267 50994	Conn. 10p grey			
1220	4822 267 50994	Conn. 10p grey			
1221		Earth spring			
1703	4822 276 13114	Switch tact H=4,3			
1704	4822 276 13114	Switch tact H=4,3			
1705	4822 276 13114	Switch tact H=4,3			
1706	4822 276 13114	Switch tact H=4,3			
1707	4822 276 13114	Switch tact H=4,3			
1708	4822 276 13114	Switch tact H=4,3			
1721		Conn. 10p hor male			
1801		Conn. 5p ver male			
1802		Conn. 8p ver male			
1803	4822 265 31015	AC socket /40/41/45/51			
1803	4822 265 31016	AC socket /57			
1804		Conn. 3p top entry			
1805	4822 253 10128	Fuse T2A Rad			
1806	4822 253 10138	Fuse T1A Rad			
1807	4822 256 30495	Fuseholder			
1809	4822 256 30495	Fuseholder			
1810	4822 265 40596	Conn. 2p male			
1901	4822 276 11309	Powerswitch			
1902	4822 265 40596	Conn. 2p male			
2701	5322 122 32654	22nF	10%	X7R	63V
2705	4822 122 33575	220pF	5%	NPO	50V
2802	4822 124 80148	220µF	20%		16V
2803	4822 124 80047	1000µF	20%		35V
2804	5322 122 32654	22nF	10%	X7R	63V
2805	4822 122 33496	100nF	10%	X7R	63V
2806	4822 124 41596	22µF	20%		50V
2807	4822 124 41596	22µF	20%		50V
2808		4700µF	20%		6V3
2809		1000µF	20%		6V3
2810	4822 126 12522	1,5nF	20%		400V
2811	4822 126 12522	1,5nF	20%		400V
2812	4822 122 10289	22nF			100V
2813	4822 122 10289	22nF			100V
2814	5322 122 32654	22nF	10%	X7R	63V
2815	5322 122 32654	22nF	10%	X7R	63V
2816	5322 122 32654	22nF	10%	X7R	63V
2817	5322 122 32654	22nF	10%	X7R	63V
2818	4822 126 10454	3,3nF	20%		400V
2820	4822 124 41598	33µF	20%		35V

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Item	Codenumber	Description		
3201	4822 101 21199	2X10K POTM. CARB0N		
3701	4822 051 20101	100R00	5%	0,1W
3702	4822 051 20473	47K00	5%	0,1W
3704	4822 052 10478	4R70	5%	0,33W
3705	4822 051 20332	3K30	5%	0,1W
3706	4822 116 90857	4R7X8		
3707	4822 116 90857	4R7X8		
3712	4822 051 20223	22K00	5%	0,1W
3713	4822 051 20823	82K00	5%	0,1W
3715	4822 050 21002	1K00	1%	0,6W
3716	4822 051 20223	22K00	5%	0,1W
3717	4822 051 20472	4K70	5%	0,1W
3718	4822 050 21002	1K00	1%	0,6W
3719	4822 051 20472	4K70	5%	0,1W
3720	4822 051 20154	150K00	5%	0,1W
3721	4822 051 20473	47K00	5%	0,1W
3722	4822 051 20472	4K70	5%	0,1W
3723	4822 051 20472	4K70	5%	0,1W
3724	4822 051 20223	22K00	5%	0,1W
3725	4822 050 21002	1K00	1%	0,6W
3726	4822 051 20472	4K70	5%	0,1W
3727	4822 051 20683	68K00	5%	0,1W
3728	4822 051 20103	10K00	5%	0,1W
3729	4822 051 20472	4K70	5%	0,1W
3730	4822 051 20153	15K00	5%	0,1W
3731	4822 050 21002	1K00	1%	0,6W
3801	4822 051 20821	820R00	5%	0,1W
3802	4822 051 20008	0R00	5%	0,1W
3803	4822 051 20271	270R00	5%	0,1W
3804	4822 051 20683	68K00	5%	0,1W
3805	4822 116 83776	220K	1%	0,1W
3806	4822 051 20123	12K00	5%	0,1W
3807	4822 100 11633	47K TRIM CARBON		
3808	4822 051 10102	1K00	2%	0,25W
5203		EMI FILTER	1nF	100V
5204		EMI FILTER	1nF	100V
5207		EMI FILTER	1nF	100V
5208		EMI FILTER	1nF	100V
5209		EMI FILTER	22nF	16V
5210		EMI FILTER	1nF	100V
5211		EMI FILTER	1nF	100V
5801	4822 338 33030	MAINS FILTER		
5803		FXC INDUCTOR		
5804	5322 157 52513	10µH	20%	
6701	4822 130 80622	BAT54		
6702	5322 130 31928	BAS16		
6704	4822 214 52009	IR RECEIVER GP1U58XP		
6705	4822 130 34173	BZX79-C5V6		
6706	5322 130 30684	1N4002		
6707	5322 130 30684	1N4002		
6708	4822 130 34281	BZX79-C15		
6709	5322 130 31928	BAS16		
6801	4822 130 82985	BYD14G		
6802	4822 130 82985	BYD14G		
6803	5322 130 30684	1N4002		
6804	5322 130 30684	1N4002		
6805	5322 130 30684	1N4002		
6807	4822 209 81758	MBR1545CT		
6808	4822 130 34173	BZX79-C5V6		
6810	4822 130 20279	2N6397PH		

Item	Codenumber	Description
7703	5322 130 41982	BC848B
7704	5322 130 41982	BC848B
7705	4822 130 91194	FTD DISPLAY
7706	4822 209 72226	U3090M-40P
7708	5322 130 41983	BC858B
7709	5322 130 41983	BC858B
7710	5322 130 41982	BC848B
7712	5322 130 41982	BC848B

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8.4 PARTS LIST MONOBOARD

Item	Codenumber	Description			
1001		conn. 8p hor. male			
1006	4822 265 30525	conn. 2p vert. male			
1007	4822 265 40474	conn. 4p vert. male			
1008	4822 267 51152	conn. 14p zif straight			
1013	4822 267 60326	EUROCONN SCART BLUE			
1014	4822 214 52071	RF modulator /45			
1014	4822 214 52046	RF modulator/37 MCB8VU3428			
1015		socket 2p female YKC21-550			
1020		socket 2p female YKC21-528			
1021	4822 265 40442	conn. 10p vert. male			
1022	4822 265 40442	conn. 10p vert. male			
1032	4822 267 51216	minidin socket 8p FEM TCS			
1096	4822 267 70325	conn. 96p hor. female			
1206	4822 255 40129	IC socket 40p			
1211	4822 255 40129	IC socket 40p			
1490	4822 255 40129	IC socket 40p			
2110	5322 122 32654	22nF	10%		63V
2111	5322 122 32654	22nF	10%		63V
2112	5322 122 32654	22nF	10%		63V
2117	5322 122 32654	22nF	10%		63V
2118	5322 122 32654	22nF	10%		63V
2119	5322 122 32654	22nF	10%		63V
2132	5322 122 32654	22nF	10%		63V
2133	5322 122 32654	22nF	10%		63V
2134	5322 122 32654	22nF	10%		63V
2135	5322 122 32654	22nF	10%		63V
2136	5322 122 32654	22nF	10%		63V
2137	5322 122 32654	22nF	10%		63V
2138	5322 122 32654	22nF	10%		63V
2139	5322 122 32654	22nF	10%		63V
2140	5322 122 32654	22nF	10%		63V
2141	5322 122 32654	22nF	10%		63V
2142	5322 122 32654	22nF	10%		63V
2143	5322 122 32654	22nF	10%		63V
2144	5322 122 32654	22nF	10%		63V
2145	5322 122 32654	22nF	10%		63V
2146	5322 122 32654	22nF	10%		63V
2147	5322 122 32654	22nF	10%		63V
2148	4822 124 41598	33µF	20%		35V
2149	4822 124 41598	33µF	20%		35V
2150	4822 124 41989	470µF	20%		16V
2156	4822 124 41528	100µF			25V
2157	4822 124 41528	100µF			25V
2158	4822 124 41528	100µF			25V
2161	5322 122 32654	22nF	10%		63V
2162	5322 122 32654	22nF	10%		63V
2163	5322 122 32654	22nF	10%		63V
2164	4822 122 32542	47nF	10%		63V
2165	5322 122 32654	22nF	10%		63V
2166	5322 122 32654	22nF	10%		63V
2167	5322 122 32654	22nF	10%		63V
2168	4822 126 12549	470nF	10%		25V
2169	4822 126 12549	470nF	10%		25V
2201	5322 122 32654	22nF	10%		63V
2202	5322 122 32654	22nF	10%		63V
2203	4822 124 41598	33µF	20%		35V
2205	5322 122 32654	22nF	10%		63V
2206	5322 122 32654	22nF	10%		63V
2207	5322 122 32654	22nF	10%		63V
2208	5322 122 32654	22nF	10%		63V
2209	5322 122 32654	22nF	10%		63V
2210	5322 122 32654	22nF	10%		63V
2211	5322 122 32654	22nF	10%		63V
2212	4822 017 01031	10nF	20%		50V
2216	4822 124 41989	470µF	20%		16V
2217	5322 122 32654	22nF	10%		63V
2222	5322 122 32654	22nF	10%		63V
2223	4822 124 41989	470µF	20%		16V
2224	5322 122 32654	22nF	10%		63V
2225	5322 122 32654	22nF	10%		63V
2226	5322 122 32654	22nF	10%		63V
2227	5322 122 32654	22nF	10%		63V
2229	5322 122 32654	22nF	10%		63V
2230	5322 122 32654	22nF	10%		63V
2232	5322 122 32654	22nF	10%		63V
2233	5322 122 32452	47pF	5%	NPO	63V
2234	5322 122 32452	47pF	5%	NPO	63V
2235	5322 122 31865	1,5nF	10%		63V
2236	5322 122 31865	1,5nF	10%		63V
2237	5322 122 31865	1,5nF	10%		63V
2241	5322 122 32661	56pF	5%		50V
2242	5322 122 32661	56pF	5%		50V
2244	5322 122 31865	1,5nF	10%		63V
2251	5322 122 31865	1,5nF	10%		63V
2255	4822 126 12549	470nF	10%		25V
2303	5322 122 32654	22nF	10%		63V
2304	5322 122 32654	22nF	10%		63V
2305	5322 122 32654	22nF	10%		63V
2307	5322 122 32654	22nF	10%		63V
2308	5322 122 32654	22nF	10%		63V
2309	5322 122 32654	22nF	10%		63V
2310	5322 122 32654	22nF	10%		63V
2313	5322 122 32654	22nF	10%		63V
2316	5322 122 32654	22nF	10%		63V
2317	5322 122 32452	47pF	5%	NPO	63V
2320	5322 122 32654	22nF	10%		63V
2321	5322 122 32654	22nF	10%		63V
2322	5322 122 32654	22nF	10%		63V
2323	5322 122 32654	22nF	10%		63V
2324	5322 122 32654	22nF	10%		63V
2325	5322 122 32654	22nF	10%		63V
2330	5322 122 32654	22nF	10%		63V
2335	5322 122 32654	22nF	10%		63V
2400	5322 122 32654	22nF	10%		63V
2401	5322 122 32654	22nF	10%		63V
2402	5322 122 32268	470pF	10%		50V
2403	5322 122 34123	1nF	10%		50V
2404	4822 122 33175	2,2nF	20%		50V
2405	4822 122 32542	47nF	10%		63V
2406	5322 122 32531	100pF	5%		50V
2407	4822 122 33177	10nF	20%		50V
2408	5322 122 34123	1nF	10%		50V
2409	5322 122 31865	1,5nF	10%		63V
2411	4822 122 32575	220pF	10%		500V
2412	4822 126 12549	470nF	10%		
2413	4822 122 32575	220pF	10%		500V
2414	5322 122 32654	22nF	10%		63V
2415	4822 121 51321	8,2nF	1%		63V
2416	4822 121 51321	8,2nF	1%		63V
2417	4822 124 41598	33µF	20%		35V
2418	4822 122 32542	47nF	10%		63V
2419	5322 121 42661	330nF	5%		63V
2420	4822 122 33342	33nF	10%		63V
2421	4822 122 33342	33nF	10%		63V

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Item	Codenumber	Description		
2422	4822 121 42408	220nF	5%	63V
2423	4822 121 42408	220nF	5%	63V
2425	4822 121 51252	470nF	5%	63V
2427	4822 122 33496	100nF	10%	63V
2428	5322 122 32654	22nF	10%	63V
2429	4822 124 41527	47µF		25V
2430	5322 126 10223	4,7nF	10%	63V
2431	4822 121 51252	470nF	5%	63V
2432	4822 122 32927	220nF	Y5V	50V
2433	4822 122 33496	100nF	10%	63V
2434	5322 122 32654	22nF	10%	63V
2435	5322 122 32654	22nF	10%	63V
2436	4822 124 41598	33µF	20%	35V
2437	4822 124 41598	33µF	20%	35V
2438	5322 122 32654	22nF	10%	63V
2440	5322 122 32448	10pF	5%	50V
2441	4822 122 33893	18nF	10%	63V
2442	5322 122 32654	22nF	10%	63V
2443	4822 126 12719	330nF	10%	25V
2444	4822 122 33175	2,2nF	20%	50V
2453	4822 122 33496	100nF	10%	63V
2464	4822 124 41598	33µF	20%	35V
2465	4822 124 41598	33µF	20%	35V
2466	4822 122 33496	100nF	10%	63V
2480	5322 122 32654	22nF	10%	63V
2481	4822 124 41598	33µF	20%	35V
2482	5322 122 32654	22nF	10%	63V
2483	5322 122 32654	22nF	10%	63V
2484	4822 124 41598	33µF	20%	35V
2485	4822 124 40243	1,5µF	20%	63V
2486	4822 126 12549	470nF	10%	25V
2487	4822 122 33175	2,2nF	20%	50V
2488	5322 122 32452	47pF	5%	63V
2490	4822 124 41598	33µF	20%	35V
2491	5322 122 32654	22nF	10%	63V
2492	5322 122 32531	100pF	5%	50V
2501	5322 122 32654	22nF	10%	63V
2502	4822 124 41528	100µF		25V
2503	4822 124 41528	100µF		25V
2504	5322 122 32654	22nF	10%	63V
2506	5322 122 32654	22nF	10%	63V
2507	4822 124 41528	100µF		25V
2508	4822 122 33496	100nF	10%	63V
2509	4822 124 41528	100µF		25V
2520	4822 124 80144	220µF	20%	25V
2530	4822 124 41528	100µF		25V
2531	5322 122 32654	22nF	10%	63V
2532	4822 124 41528	100µF		25V
2533	5322 122 32654	22nF	10%	63V
2535	5322 126 10223	4,7nF	10%	63V
2536	5322 122 32654	22nF	10%	63V
2554	4822 124 22339	100µF		16V
2555	5322 126 10223	4,7nF	10%	63V
2556	5322 122 32654	22nF	10%	63V
2565	5322 122 32452	47pF	5%	63V
2566	5322 122 32659	33pF	5%	50V
2567	5322 122 32654	22nF	10%	63V
2632	4822 122 33496	100nF	10%	63V
2633	4822 122 33496	100nF	10%	63V
2634	4822 122 33496	100nF	10%	63V
2635	5322 122 32654	22nF	10%	63V
2636	4822 124 41528	100µF		25V
2637	4822 124 41579	10µF	20%	50V
2638	5322 122 32654	22nF	10%	63V

Item	Codenumber	Description		
2639	4822 122 33496	100nF	10%	63V
2640	4822 124 41579	10µF	20%	50V
2641	4822 124 41579	10µF	20%	50V
2643	5322 122 32448	10pF	5%	50V
2647	4822 122 33496	100nF	10%	63V
2648	5322 122 32654	22nF	10%	63V
2649	5322 122 32659	33pF	5%	50V
2650		9,8pF-60pF		100V
2651	4822 124 41989	470µF		16V
2652	4822 124 41989	470µF		16V
2653	4822 124 41989	470µF		16V
2654	4822 124 41528	100µF		25V
3101	4822 051 20008	0R00 jumper		
3103	4822 051 20008	0R00 jumper		
3105	4822 051 20008	0R00 jumper		
3107	4822 051 20008	0R00 jumper		
3110	4822 051 20008	0R00 jumper		
3112	4822 051 20008	0R00 jumper		
3113	4822 051 20008	0R00 jumper		
3118	4822 051 10102	1K00	2%	0,25W
3120	4822 051 20472	4K70	5%	0,1W
3121		75R00	1%	
3122	4822 051 20223	22K00	5%	0,1W
3123		75R00	1%	
3124		75R00	1%	
3125	4822 051 20223	22K00	5%	0,1W
3127		75R00	1%	0,1W
3129		75R00	1%	
3130		75R00	1%	0,1W
3131		75R00	1%	0,1W
3132		75R00	1%	0,1W
3133	4822 051 20332	3K30	5%	0,1W
3134		330R00	1%	
3136	4822 051 20103	10K00	5%	0,1W
3137	4822 051 20103	10K00	5%	0,1W
3138	4822 051 20103	10K00	5%	0,1W
3139	4822 051 20103	10K00	5%	0,1W
3140	4822 051 20103	10K00	5%	0,1W
3141	4822 051 20103	10K00	5%	0,1W
3144		150R00	1%	
3145		150R00	1%	
3146		150R00	1%	
3201	4822 051 20008	0R00	5%	0,1W
3203	4822 051 20101	100R00	5%	0,1W
3206	4822 051 20472	4K70	5%	0,1W
3207	4822 051 20472	4K70	5%	0,1W
3210	4822 051 20472	4K70	5%	0,1W
3211	4822 051 20472	4K70	5%	0,1W
3212	4822 050 21002	1K00	1%	0,1W
3213	4822 051 20101	100R00	5%	0,1W
3218	4822 051 20472	4K70	5%	0,1W
3221	4822 051 20104	100K00	5%	0,1W
3222	4822 051 20103	10K00	5%	0,1W
3223	4822 051 20682	6K80	5%	0,1W
3224	4822 050 21002	1K00	1%	0,1W
3225	4822 051 20472	4K70	5%	0,1W
3226	4822 051 20101	100R00	5%	0,1W
3230	4822 050 21002	1K00	1%	0,1W
3231	4822 050 21002	1K00	1%	0,1W
3232	4822 051 20472	4K70	5%	0,1W
3233	4822 051 20472	4K70	5%	0,1W
3234	4822 050 21002	1K00	1%	0,1W
3235	4822 050 21002	1K00	1%	0,1W

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Item	Codenumber	Description		
3236	4822 050 21002	1K00	1%	0,1W
3237	4822 051 10102	1K00	2%	0,25W
3239	4822 051 20101	100R00	5%	0,1W
3240	4822 051 20101	100R00	5%	0,1W
3241	4822 051 20101	100R00	5%	0,1W
3243	4822 051 10102	1K00	2%'	0,25W
3244	4822 051 20222	2K20	5%	0,1W
3245	4822 051 20105	1M00	5%	0,1W
3249	4822 051 20472	4K70	5%	0,1W
3250	4822 051 20472	4K70	5%	0,1W
3251	4822 051 20472	4K70	5%	0,1W
3254	4822 051 20008	0R00	5%	0,1W
3257	4822 050 21002	1K00	1%	0,1W
3258	4822 051 20223	22K00	5%	0,1W
3259	4822 051 20223	22K00	5%	0,1W
3260	4822 051 20223	22K00	5%	0,1W
3261	4822 051 20183	18K00	5%	0,1W
3262	4822 051 20183	18K00	5%	0,1W
3263	4822 051 20473	47K00	5%	0,1W
3264	4822 051 20103	10K00	5%	0,1W
3265	4822 051 20103	10K00	5%	0,1W
3266	4822 051 20222	2K20	5%	0,1W
3267	4822 051 20222	2K20	5%	0,1W
3268	4822 051 20224	220K00	5%	0,1W
3271	4822 051 20682	6K80	5%	0,1W
3272	4822 051 20103	10K00	5%	0,1W
3273	4822 051 20104	100K00	5%	0,1W
3274	4822 051 20682	6K80	5%	0,1W
3275	4822 051 20103	10K00	5%	0,1W
3278	4822 051 20104	100K00	5%	0,1W
3279	4822 051 20101	100R00	5%	0,1W
3280	4822 051 20104	100K00	5%	0,1W
3281	4822 051 20103	10K00	5%	0,1W
3301	4822 051 20472	4K70	5%	0,1W
3304	4822 051 20472	4K70	5%	0,1W
3305	4822 051 20472	4K70	5%	0,1W
3306	4822 051 20103	10K00	5%	0,1W
3307	4822 051 20103	10K00	5%	0,1W
3308	4822 051 20103	10K00	5%	0,1W
3309	4822 051 20103	10K00	5%	0,1W
3310	4822 051 20103	10K00	5%	0,1W
3318	4822 051 20008	0R00	5%	0,1W
3321	4822 050 21002	1K00	1%	0,1W
3322	4822 051 20103	10K00	5%	0,1W
3323	4822 051 20103	10K00	5%	0,1W
3324	4822 051 20103	10K00	5%	0,1W
3325	4822 051 20103	10K00	5%	0,1W
3326	4822 051 20103	10K00	5%	0,1W
3327	4822 051 20103	10K00	5%	0,1W
3328	4822 051 20103	10K00	5%	0,1W
3329	4822 051 20103	10K00	5%	0,1W
3330	4822 050 21002	1K00	1%	0,1W
3332	4822 051 20008	0R00	5%	0,1W
3334	4822 051 20008	0R00	5%	0,1W
3336		75R00	1%	
3337	4822 051 20103	10K00	5%	0,1W
3338		75R00	1%	
3339		75R00	1%	
3340	4822 051 20008	0R00	5%	0,1W
3342	4822 051 20103	10K00	5%	0,1W
3361	4822 051 20103	10K00	5%	0,1W
3400		3R3		
3401	4822 051 20472	4K70	5%	0,1W
3402	4822 051 20104	100K00	5%	0,1W

Item	Codenumber	Description		
3403	4822 116 83933	15K	1%	0,1W
3404	4822 051 20101	100R00	5%	0,1W
3405	4822 050 21002	1K00	1%	0,1W
3406	4822 116 83705	24K	2%	0,2W
3407	4822 051 20562	5K60	5%	0,1W
3408	4822 051 20103	10K00	5%	0,1W
3409	4822 052 10478	4R70	5%	0,33W
3412	4822 051 20101	100R0	5%	0,1W
3413		12R		
3414	4822 051 20223	22K00	5%	0,1W
3415	4822 051 20123	12K00	5%	0,1W
3416	4822 051 20223	22K00	5%	0,1W
3417	4822 051 20473	47K00	5%	0,1W
3418	4822 051 20223	22K00	5%	0,1W
3419	4822 051 20182	1K80	5%	0,1W
3420	4822 116 83706	5K1	2%	0,2W
3421	4822 051 20183	18K00	5%	0,1W
3422	4822 051 20154	150K00	5%	0,1W
3423	4822 051 20224	220K00	5%	0,1W
3424		1R		
3426	4822 051 20302	3K00	5%	0,1W
3428	4822 051 20302	3K00	5%	0,1W
3429	4822 051 20339	33R00	5%	0,1W
3430	4822 051 20113	11K00	5%	0,1W
3431	4822 051 20124	120K00	5%	0,1W
3432		3M3	5%	0,1W
3433	4822 051 20154	150K00	5%	0,1W
3435	4822 051 20563	56K00	5%	0,1W
3436	4822 051 20394	390K00	5%	0,1W
3437	4822 051 20823	82K00	5%	0,1W
3439	4822 116 52186	22E	5%	0,5W
3440		4R7		
3441	4822 051 20473	47K00	5%	0,1W
3442	4822 051 20104	100K00	5%	0,1W
3443	4822 051 20913	91K00	5%	0,1W
3444	4822 051 20122	1K20	5%	0,1W
3445	4822 051 20332	3K30	5%	0,1W
3446	4822 051 20562	5K60	5%	0,1W
3447	4822 051 20154	150K00	5%	0,1W
3448	4822 051 20472	4K70	5%	0,1W
3449	4822 051 20472	4K70	5%	0,1W
3450	4822 051 20333	33K00	5%	0,1W
3451	4822 051 20684	680K00	5%	0,1W
3452	4822 051 20204	200K00	5%	0,1W
3453	4822 051 20823	82K00	5%	0,1W
3456		1R00		
3457		1R00		
3458	4822 051 20472	4K70	5%	0,1W
3459	4822 116 52186	22E	5%	0,5W
3461		1R00		
3463		1R00		
3465	4822 051 20203	20K00	5%	0,1W
3466	4822 116 83084	27K	2%	0,2W
3467	4822 116 83084	27K	2%	0,2W
3468	4822 116 83084	27K	2%	0,2W
3469	4822 116 83084	27K	2%	0,2W
3470	4822 116 52186	22E	5%	0,5W
3471		1R00		
3472	4822 051 20223	22K00	5%	0,1W
3474		4R7		
3475	4822 051 20101	100R00	5%	0,1W
3476	4822 051 20152	1K50	5%	0,1W
3477	4822 051 20392	3K90	5%	0,1W
3479		3R3		

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Item	Codenumber	Description		
3480	4822 051 20912	9K10	5%	0,1W
3485		75R	1%	
3486	4822 051 20223	22K00	5%	0,1W
3487	4822 051 20222	2K20	5%	0,1W
3488	4822 051 20223	22K00	5%	0,1W
3489	4822 051 20224	220K00	5%	0,1W
3491		4R7		
3492	4822 051 20223	22K00	5%	0,1W
3493	4822 051 20392	3K90	5%	0,1W
3494	4822 051 20223	22K00	5%	0,1W
3495	4822 051 20223	22K00	5%	0,1W
3496	4822 051 20223	22K00	5%	0,1W
3497	4822 051 20223	22K00	5%	0,1W
3498	4822 051 20222	2K20	5%	0,1W
3499	4822 051 20103	10K00	5%	0,1W
3501		2R2		
3503		2R2		
3506		2R2		
3507	4822 051 20101	100R00	5%	0,1W
3508	4822 051 20101	100R00	5%	0,1W
3509	4822 051 20101	100R00	5%	0,1W
3510	4822 051 20223	22K00	5%	0,1W
3511	4822 051 20103	10K00	5%	0,1W
3520	4822 052 10479	47R	5%	0,33W
3521	4822 051 20472	4K7	5%	0,1W
3522	4822 051 20473	47K00	5%	0,1W
3523	4822 051 20103	10K00	5%	0,1W
3524	4822 051 20103	10K00	5%	0,1W
3525	4822 051 20103	10K00	5%	0,1W
3526	4822 051 20472	4K70	5%	0,1W
3527	4822 051 20103	10K00	5%	0,1W
3528	4822 051 20223	22K00	5%	0,1W
3530	4822 050 21103	11K00	1%	0,6W
3531	4822 050 21103	11K00	1%	0,6W
3532	4822 051 20681	680R00	5%	0,1W
3533	4822 050 21503	15K00	1%	0,6W
3534	4822 050 21103	11K00	1%	0,6W
3536		3R3		
3538	4822 050 21103	11K00	1%	0,6W
3539		3R3		
3541		1K80	1%	0,1W
3542	4822 051 20101	100R00	5%	0,1W
3543	4822 051 20103	10K00	5%	0,1W
3544	4822 050 21002	1K00	1%	0,1W
3545	4822 051 20472	4K70	5%	0,1W
3546	4822 051 20183	18K00	5%	0,1W
3550	4822 050 21103	11K00	1%	0,6W
3551	4822 050 21103	11K00	1%	0,6W
3552	4822 051 20681	680R00	5%	0,1W
3553	4822 050 21503	15K00	1%	0,6W
3554	4822 050 21103	11K00	1%	0,6W
3555	4822 050 21103	11K00	1%	0,6W
3556	4822 051 20101	100R00	5%	0,1W
3557		1K80	1%	0,1W
3558	4822 051 20103	10K00	5%	0,1W
3559	4822 050 21002	1K00	1%	0,1W
3560	4822 051 20472	4K70	5%	0,1W
3561	4822 051 20183	18K00	5%	0,1W
3570	4822 051 20473	47K00	5%	0,1W
3571	4822 051 20473	47K00	5%	0,1W
3572	4822 051 20913	91K00	5%	0,1W
3573	4822 051 20913	91K00	5%	0,1W
3574	4822 051 20103	10K00	5%	0,1W
3605		3R3		

Item	Codenumber	Description		
3617	4822 050 23301	330R00	1%	0,6W
3618	4822 051 10102	1K00	2%	0,25W
3619		3R3		
3620	4822 051 10102	1K00	2%	0,25W
3621	4822 051 20221	220R00	5%	0,1W
3622	4822 051 20561	560R00	5%	0,1W
3623	4822 051 10102	1K00	2%	0,25W
3624	4822 051 20221	220R00	5%	0,1W
3625	4822 051 20561	560R00	5%	0,1W
3626	4822 051 10102	1K00	2%	0,25W
3627	4822 051 20221	220R00	5%	0,1W
3628	4822 051 20561	560R00	5%	0,1W
3629	4822 051 20223	22K00	5%	0,1W
3631	4822 116 83933	15K	1%	0,1W
3634	4822 051 10102	1K00	2%	0,25W
3635	4822 051 20273	27K00	5%	0,1W
3636	4822 051 10102	1K00	2%	0,25W
3637	4822 051 10102	1K00	2%	0,25W
3638	4822 051 20223	22K00	5%	0,1W
3649	4822 051 10102	1K00	2%	0,25W
3650		75R00	1%	
3651	4822 051 20151	150R00	5%	0,1W
3652	4822 051 20151	150R00	5%	0,1W
3653		75R00	1%	
3654		75R00	1%	
3655	4822 051 54730	47K00	5%	0,1W
3656	4822 051 20223	22K00	5%	0,1W
3657	4822 051 20471	470R00	5%	0,1W
3658	4822 051 20511	510R00	5%	0,1W
3659	4822 051 20181	180R00	5%	0,1W
3663		75R00	1%	
3664		75R00	1%	
3665		75R00	1%	
3666	4822 051 20472	4K70	5%	0,1W
3667	4822 117 10361	680R	1%	0,1W
3668	4822 051 20472	4K70	5%	0,1W
3669	4822 051 20101	100R00	5%	0,1W
3670	4822 051 20472	4K70	5%	0,1W
3674	4822 051 20008	0R00 JUMPER		
3675		75R00	1%	
3677	4822 051 20689	68R00	5%	0,1W
3678	4822 051 20223	22K00	5%	0,1W
3679	4822 051 20301	300R00	5%	0,1W
3680	4822 051 20301	300R00	5%	0,1W
3681	4822 051 20472	4K70	5%	0,1W
3682	4822 051 20223	22K00	5%	0,1W
3685		3R3		
5150	4822 157 90252	EMI FILTER	22nF	100V
5201	4822 242 81398	4.915 000 MC		
5203	4822 242 81396	4.000 000 MC		
5210		EMI FILTER	1nF	100V
5211		EMI FILTER	1nF	100V
5212		EMI FILTER	1nF	100V
5213		EMI FILTER	1nF	100V
5215	4822 157 90252	EMI FILTER	22nF	100V
5216	4822 157 70378	EMI FILTER	22nF	16V
5217	4822 242 81419	30 MC		
5302		27 MC		
5490	4822 242 72527	CST 4,00MGW-TF01		
5631	4822 320 40247	DELAY LINE 275 nSEC		
5632		FILTER 3M5814M43		
5640		EMI FILTER	1nF	100V
5641		EMI FILTER	1nF	100V

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Item	Codenumber	Description
5642		EMI FILTER 220p 100V
5643		EMI FILTER 1nF 100V
5644		EMI FILTER 220pF 100V
5645		EMI FILTER 220pF 100V
5646		EMI FILTER 1nF 100V
5647		EMI FILTER 220pF 100V
5648		EMI FILTER 1nF 100V
5649		EMI FILTER 220pF 100V
5653		EMI FILTER 1nF 100V
6441	5322 756 20683	1N4002
6442	5322 756 20683	1N4002
6520	5322 130 34885	1N5817
6617	4822 130 34197	BZX79-C12
7110	4822 209 52465	HM514270ATT-7
7120	4822 209 31292	MC44200
7121	5322 209 60189	PC74HCT4053T
7125		GXCT38307CI15
7201		SCC68070CCA84
7203	5322 130 41983	BC858B
7206	4822 209 52462	SLAVE PROC µP
7207	5322 209 71568	PC74HCT14T
7208	5322 209 71568	PC74HCT14T
7209	5322 130 41982	BC848B
7210	4822 209 30704	MC74HCU04D
7211	4822 209 52461	SYSTEM E-PROM
7212	4822 209 30704	MC74HCU04D
7216	5322 130 41982	BC848B
7217	4822 209 30554	MK48T08B15
7220	5322 209 61434	N74F02D
7221	4822 209 30696	MC74ACT74DR2
7223	5322 209 61434	N74F02D
7302		DSP56001FC27
7303	4822 209 32036	FCB61C65L-70T
7304	4822 209 32036	FCB61C65L-70T
7305	4822 209 32036	FCB61C65L-70T
7316	4822 209 52466	N74F164D
7320		GSC38LG307P156
7330		IC SELECT PAL
7335		IC DTACK PAL
7401	4822 209 73234	TDA8808T/C3
7410	4822 130 42696	BC818-25
7421	4822 209 31973	TDA8809T/C2/S1/13
7425	4822 209 72587	TCA0372D2
7430	4822 209 30095	LM833D
7435	5322 209 60299	PC74HCT00T
7440	5322 130 41983	BC858B
7441	5322 130 41983	BC858B
7465	4822 209 72587	TCA0372D2
7470	4822 209 61759	SAA7310GP/H5
7472	4822 130 42131	BF550
7474	4822 209 70422	MN4264-15
7490	4822 209 52463	IC SERVO-CD µP
7491	5322 130 41982	BC848B
7501	4822 209 32072	CS4328KS
7503	4822 130 41982	BC848B
7520	5322 130 41983	BC858B
7521	5322 130 41982	BC848B
7522	5322 130 41983	BC858B
7531	4822 209 32071	MC33079D
7532	4822 209 62312	MC33078P
7533	4822 130 42696	BC818-25
7534	4822 130 42696	BC818-25

Item	Codenumber	Description
7553	4822 130 42696	BC818-25
7554	4822 130 42696	BC818-25
7565	4822 209 30704	MC74HCU04D
7570	5322 130 41982	BC848B
7609	4822 209 31908	CXA1145M
7617	5322 130 41982	BC848B
7620	5322 130 41982	BC848B
7623	5322 130 41982	BC848B
7626	5322 130 41982	BC848B
7633	5322 130 41982	BC848B
7634	5322 130 41982	BC848B
7638	5322 130 41982	BC848B
7639	5322 130 41982	BC848B
7643	5322 130 41982	BC848B
7655	5322 130 41982	BC848B
7656	5322 130 41983	BC858B
7667	5322 130 41982	BC848B
7669	5322 130 41982	BC848B
7670	5322 130 41983	BC858B
7680	4822 130 41982	BC848B

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8.5 LIST OF ACCESSORIES AND SERVICE TOOLS

Item	Codenumber	Description
1	4822 395 50145	TORX SCREW DRIVER SET
2	4822 214 52007	LOW-LEVEL TEST PANEL ASSY
3	4822 321 61677	CABLE FOR TEST PANEL
4	4822 264 50263	PLUG FOR STARTUP OF SERVICESHELL ON PORT 2 (BU 2)
5	4822 397 30096	AUDIO TESTDISC SET
6	4822 397 30155	TESTDISC WITH CONTINOUS 1kHz SIGNAL 70 MIN.
7	4822 397 30184	AUDIOSIGNALSDISC
8	4822 701 11922	SKEW DISC 0,6
9	4822 701 11923	EXCENTRICITY DISC 150 I
10	4822 691 30293	ROLLER CONTROLLER
11	4822 691 30309	TRACKER BALL
12	4822 691 30328	TOUCH PAD
13	4822 691 30297	MOUSE

PARTSLIST FOR THE ROLLERCONTROLLER

Item	Codenumber	Description
1	4822 321 61841	CABLE ASSY
2	4822 413 90093	BALL
3	4822 276 13359	SWITCH
4	4822 410 62427	KEYTOP-LEFT
4	4822 410 62428	KEYTOP-RIGHT
5	4822 492 42645	SPRING

PARTSLIST FOR THE TOUCH PAD

Item	Codenumber	Description
1	4822 321 62311	CABLE ASSY
2	4822 498 91048	STICK

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Compact disc interactive player

CDI 220/60/61/65/77

Service
Service
Service

Interactive
Media
Systems

CDI

Service Manual

SURVEY OF PLAYERS

Version	Description
/60	PAL player without RF-modulator
/61	Multivoltage PAL player with RF-modulator
/65	PAL player with RF-modulator for the UK-system
/77	NTSC player with RF-modulator for the USA-system

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COMPACT disc Interactive

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PHILIPS MEDIA©

These sets are equiped with Compact Disc Mechanism type CDM12.4; service code 4822 691 30354.
This CDM is also used in CDI210/40/41/45.
Service information is included in this manual.

SURVEY OF MAINPANELS

Version	Mainpanel	Version	Mainpanel
/20	4822 214 52065	/40	4822 214 52163
/25	4822 214 52068	/41	4822 214 52164
/37	4822 214 52056	/45	4822 214 52165
/39	4822 214 52066	/57	4822 214 52145

The mainpanels must be repaired via the central repair procedure, if the defective item is on the circuitry of the µP section,digital audio (LEMM+DSP) section, GLUE logic section or digital video section.
If the defective item is in the circuitry of the SERVO section, analog audio section or analog video section, then the panel can be repaired up to component level.
All above mentioned players are equiped with CDM9.

Version	Mainpanel
/60	These mainpanels must be repaired down to component level in a local central repairshop ,see chapter 3.6.
/61	
/65	
/77	

(SF) Varioitus!
Laite sisältaa laserdiodin, joka lähettää näkymätöntä silmille vaarallista lasersäteilyä.

(S) Varning!
Osynlig laserstrålning när denna del är öppnad och spärren ar urkopplad. Betakta ej strålen.

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

(GB)
Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.
Safety components are marked by the symbol ⚠.

CLASS 1
LASER PRODUCT
3122 110 03420

Published by P.S. 1094 Service & Support Interactive Media Systems Printed in The Netherlands © Copyright reserved Subject to modification 4822 725 24754

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2. PRODUCT INFORMATION
2.1 TECHNICAL SPECIFICATION

System • Système • Sistema • Systeem • System • Sistema • Sistema
CD-Interactive
CD-Interactif

Usable discs • Disques utiliables • Discos utilizables • Discos Utiliable • Te gebruiken discs • Verwendbare discs • Dischi usabili

CD-I	*CD-I*
CD-DA	*CD-Audio*
PHOTO-CD	*Photo-CD*
CD-I READY	*CD-I READY*
CD BRIDGE	*CD BRIDGE*
CD+GRAPHICS	*CD+GRAPHICS*

Power requirement • Alimentation • Alimentacion • Alimentación Voedingsspanning • Netzanschluß • Alimentazione
Europe: 220-230 V/50 Hz UK: 240 V/50 Hz

Power consumption • Consommation • Consume de corriente Opgenomen vermogen • Leistungsaufname • Consumo di corrente • Consomo de Corriente
Europe: 22 W with, 17 W without DVC (22ER9956)
Europe: 22 W avec, 17 W sans DVC (22ER9956)
UK: 23 W with, 18 W without DVC (22ER9956)
UK: 23 W avec; 18 W sans DVC (22ER9956)

Operating temperature • Temperature de fonctionnement Temperatura de operacion • Bedrijfstemperatuur Betriebstemperatur • Temperatura di fonzionamento • Temperatura de funcionamiento
41°F(5°C) to 95°F(35°C)
5°C à 35°C

Relative humidity • Humidité relative • Humedad relative Relatieve vochtigheid • Relative Feuchtigkeit • Umidità relativa • Humedad relativa
5% to 95% (no condensation)
5% à 95% (sans condensation)

Weight • Poids • Peso • Gewicht • Gewicht • Peso • Peso
With DVC: 3,750 kg
Avec DVC: 3,750 kg
Without DVC: 3,500 kg
Sans DVC: 3,500 kg

Dimensions (w x h x d) • Dimensions (l x h x p) Dimensiones (a x a x p) • Afmetingen (b x h x d) Abmessungen (B x H x T) • Dimensioni (l x h x p) • Dimensiones (anch. x alt. x prof.)
420 mm x 90 mm x 286 mm
16.55" x 3.55" x 11.25"

Input • Entrée • Entrada • Ingang • Eingang • Ingresso • Entradas

input (1 ports) 8-pin mini-DIN
(1 entrées) mini DIN 8 broches

REAR

pin *Broche*	signal *Signal*	I/O *E/S*
1	nc	-
2	rxd	I / *E*
3	txd	O / *S*
4	nc	-
5	ground / *Masse*	-
6	cts	I / *E*
7	rts	O / *S*
8	+5V (100 mA max)	

FRONT

pin *Broche*	signal *Signal*	I/O *E/S*
1	rxd1	I / *E*
2	rxd2	I / *E*
3	tx2	O / *S*
4	rts1	O / *S*
5	ground / *Masse*	-
6	nc	-
7	rts2	O / *S*
8	+5V (100 mA max)	

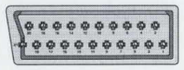
Note: Pointing device speed of 1200 baud is supported.
Remarque: Vitesse de transmission jusqu' à 1200 baud. • Nota: Se admite un dispositivo de puntero de 1200 baudios de velocidad. • Opmerking: Voor de aanwijsapparaten is een snelheid van 1200 baud mogelijk. • Hinweis: Die Geschwindigkeit der Zeigevorrichtung von 1200 baud wird unterstützt • Nota: Tollera la velocità dell'accessorio di comando di 1200 baud. • Nota: Velocidad del dispositivo de apunta admitida: 1200 baudios.

Output • Sortie • Salida • Uitgang • Ausgang • Uscita • Saídas • Salidas

Audio 2 Vrms
2 channel individual RCA pin cinch sockets
2 Veff
2 prises cinch (une par canal)

video (PAL) 1 Vpp (75 Ohm load, sync neg) RCA pin jack
1 Vc-c (charge 75 Ohm, sync. nég.) Prise cinch

AV/Euroconnector
Péritélévision A/V



pin *Broche*	signal *Signal*
1	audio R / *audio R (droite)*
2	nc / *non connecté*
3	audio L / *audio L (gauche)*
4	audio ground / *masse audio*
5	blue ground / *masse bleu*
6	nc / *non connecté*
7	blue / *bleu*
8	function switching (0=Antenna ; 1A=A/V Euroconnector with aspect ratio 16:9; 1B=AV/Euroconnector with aspect ratio 4:3) *commutation fonction (0=Antenna 1=Péritélévision A/V avec ratio 16:9; 1B=Péritélévision A/V avec ratio 4:3)*
9	green ground / *masse vert*
10	nc / *non connecté*
11	green / *vert*
12	nc / *non connecté*
13	red ground / *masse rouge*
14	nc / *non connecté*
15	red / *rouge*
16	fast switching (RGB/CVBS) *commutation rapide (RVB/CVBS)*
17	CVBS ground / *masse CVBS (PAL)*
18	fast switching (ground) *commutation rapide (masse)*
19	CVBS/RGB sync / *CVBS/RVB sync.*
20	nc / *non connecté*
21	shield / *blindage*

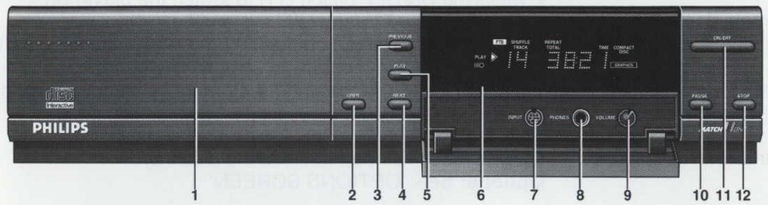
(Y/C-PAL)
y-output 1 Vpp (75 Ohms)
c-output 300 mVpp (75 Ohms)
S-video 4-pin miniDIN
Sortie Y 1 Vc-c (75 Ohm)
Sortie C 300 mVc-c (75 Ohm)
mini DIN 4 broche S-vidéo

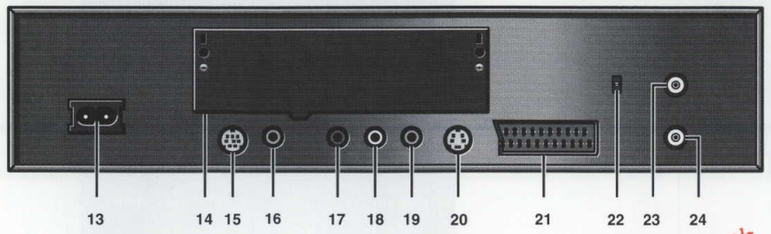
pin *Broche*	signal *Signal*
1	ground y / *Masse Y*
2	ground c / *Masse C*
3	y / *Y*
4	c / *C*

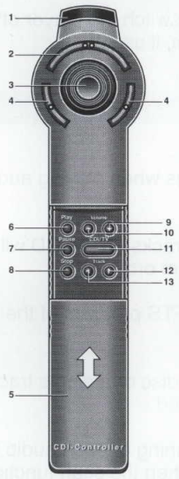
Designs and specifications are subject to change without notice. • *La conception et les spécifications de ce produit sont sujet à modifications sans avis préalable. • Los diseños y las especificaciones están sujetos a cambios sin previo aviso. • Concepten en specificaties kunnen gewijzigd worden zonder voorafgaande verwittigingen. • Änderungen von Ausführung und technische Daten vorbehalten. • I disegni e le specifiche tecniche sono soggette a modifiche senza preavviso. • As especificações descitas estão sujeitas a altreação sem aviso prévio. • El diseño y las especificaciones estás sujetos a cambios sin previo aviso.*

2.2 CONNECTION AND CONTROLS

CDI 220







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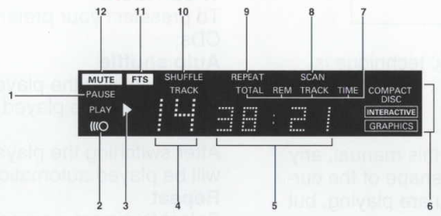


DESCRIPTION OF CONTROLS AND CONNECTIONS

FRONT
1 Disc loading tray.
2 Open/close button.
3 Previous track selection button
4 Next track selection button.
5 Play button.
6 Soft tone multifunction display with infra-red remote control receiver.
7 Input port for CD-I pointing devices.
8 Headphone jack.
9 Headphone volume control.
10 Pause button.
11 AC power on/off button.
12 Stop button.

REAR
13 Mains AC (alternating current) input socket.
14 Extension socket.
15 Input port for CD-I serial connections.
16 Digital out.
17 Audio output R.
18 Audio output L.
19 Video output (CVBS).
20 Y/C (S-Video) out*.
21 A/V Euroconnector*.
22 Channel selector*.
23 OUT TO TV*.
24 IN FROM ANTENNA*.

DISPLAY PANEL
1 CD pause active.
2 Remote control active (flashing indicator).
3 Disc playing (stepping indicator).
4 Track number (CD-Audio).
5 Elapsed or remaining time (CD-Audio).
6 Type of disc indicator.
7 Time indicators.
8 CD scan active.
9 CD repeat active.
10 CD shuffle active.
11 CD FTS active.
12 Mute indicator.

REMOTE CONTROL
1 Infra red remote control.
2 Action button.
3 Thumbpad.
4 Action buttons (for left or right handed operation).
5 Sliding Cover.
6 Play button.
7 Pause button (CD-Audio).
8 Stop button (CD-Audio).
9 Volume control up button.
10 Volume control down button.
11 CD-I/TV button.
12 Next track (CD-Audio).
13 Previous track (CD-Audio).

*Available on some player versions only.

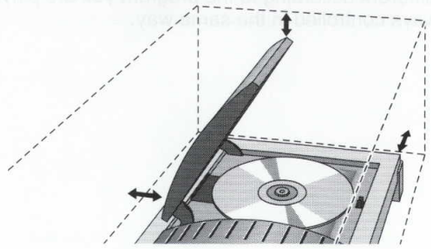
POWER CONNECTION

- Connect the female end of the AC (alternating current) cord supplied into the AC socket (13).
- Insert the male end of the cord into an AC outlet.
- **CAUTION: NEVER MAKE OR CHANGE CONNECTIONS WITH THE POWER SWITCHED ON.**

CAUTION
- **ONLY A QUALIFIED SERVICE PERSON SHOULD REMOVE THE COVER OR ATTEMPT TO SERVICE THIS DEVICE.**
- **USE OF CONTROLS OR ADJUSTMENTS OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE OR OTHER UNSAFE OPERATION.**
- **THE PLAYER AUTOMATICALLY ADJUSTS TO THE LOCAL MAINS VOLTAGE.**
- **WHEN THE PLAYER IS IN THE "OFF" POSITION, IT IS STILL CONSUMING SOME POWER. IF YOU WISH TO DISCONNECT YOUR PLAYER COMPLETELY FROM THE MAINS, THE MAINS-PLUG HAS TO BE DISCONNECTED.**

PLACEMENT

- Place the player on a firm, flat surface.
- Keep away from heat sources and direct sunlight.
- In a cabinet, allow 1 inch (2-3 cm) of free space all around the unit for adequate ventilation.



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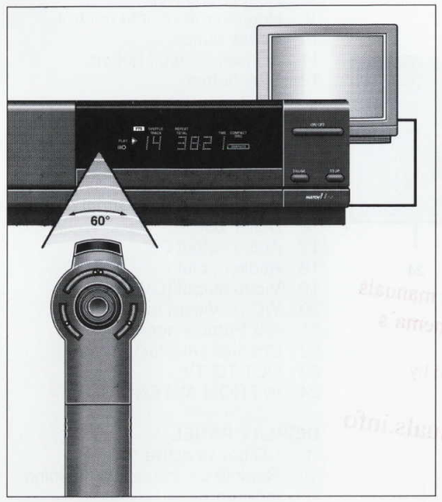
2.3 BEFORE USING YOUR CD-I PLAYER

REMOTE CONTROL INTERACTIVE OPERATION

For normal interactive operation, use the remote control to select functions displayed on the TV screen.

- Point the remote control at your CD-I player.
- Move the cursor in the direction you want by pressing in that direction on the "Thumbpad".
  The harder you press the faster the cursor arrow moves.
- Click on one of the action buttons.



The function selected by this 'point-and-click' technique is highlighted to confirm the selection.

NOTE

To 'point-and-click' on any screen shown in this manual, any one of the action buttons can be used. The shape of the cursor is different according to the program you are playing, but it is always controlled in the same way.

WIRED POINTING DEVICE OPERATION

Place the pointing device in front of the display screen, with the back (the cable end) pointed towards the screen.
Now, as you roll the mouse, the trackerball or the roller controller, the cursor moves in the corresponding direction on the screen.
When the cursor is positioned on the required function click on one of the action buttons.

The function selected by this 'point-and-click' technique is highlighted to confirm the selection.

NOTE

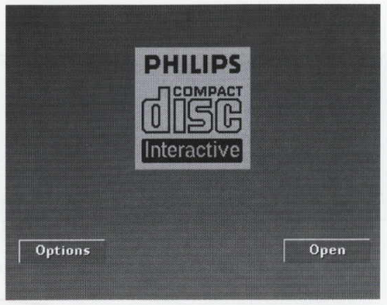
To 'point-and-click' on any screen shown in this manual, any one of the action buttons can be used. The shape of the cursor is different according to the program you are playing, but it is always controlled in the same way.

SETTINGS

- Press the ON/OFF button (11) to switch the player on.
- Switch on the TV (and HiFi system if used).
- Select the CD-I input on the TV (and HiFi system if used).

On the TV, the player start-up screen will appear.
This screen has the following system function icons to guide and assist you:

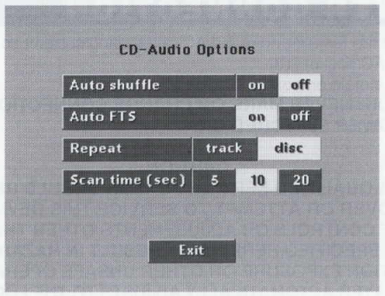
Open/Close: To open or close the disc tray.
Options: See: 'OPTIONS SCREEN'.



- Press the ON/OFF button (11) to switch the player off.
- Switch off the TV (and HiFi system, if used).

OPTIONS SCREEN

1. CD Audio
To preselect your preferred settings when playing audio CDs:
Auto shuffle
After switching the player on, the tracks on the CD will automatically be played in a random order.
Auto FTS
After switching the player on, the FTS program of the CD will be played automatically
Repeat
Select to repeat a complete audio disc or a single track when the repeat function is activated.
Scan time
Select the time you want the beginning of each audio track to play for (5, 10 or 20 seconds) when the scan function is activated.



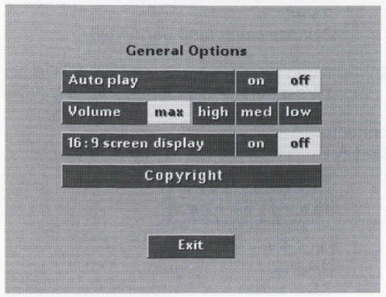
- When finished, point-and-click on 'Exit'.

2. General
To change the player general settings:
Auto play
After switching the player on, playback will start automatically when a disc is loaded.
Volume
Selecting the player default volume setting.

2.4 SETTING UP

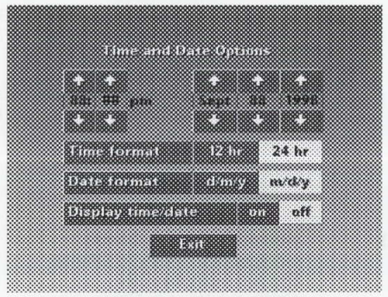
OPTIONS SCREEN CONTINUATION

16 : 9 screen display
Selecting 16 : 9 screen display, when you have your player connected to a TV with a 16 : 9 screen.



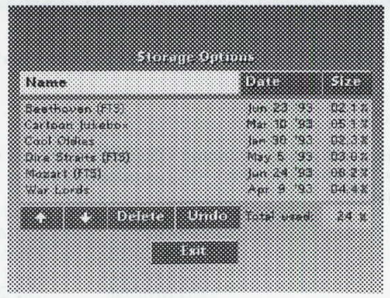
- When finished, point-and-click on 'Exit'.

3. Time and Date
To change the player time/date settings:
Time/Date set
If the time or date shown on the screen is wrong, select the appropriate ▲ and ▼ arrows to set hours, minutes, day, month and year in turn, as required.
Time format
Select 24 hour or 12 hour clock.
Date format
Select d/m/y to present the date in day-month-year sequence. Select m/d/y to present the date in month-day year sequence.
Display time/date
Select whether time and date will displayed on the TV screen or not.



- When finished, point-and-click on 'Exit'.

4. Storage
To refer to the intermediate results of CD-I titles and of programs created for your audio and Photo CDs.
The 'Storage' screen shows the information held in memory: titles, dates and percentage of memory used.
Clicking on 'Name', 'Date', or 'Size' sorts the information accordingly.
- Use the scroll arrows to move up and down the list.
- To delete an item, click on its title and then click on 'Delete'. If you change your mind after deleting, click on 'Undo'.

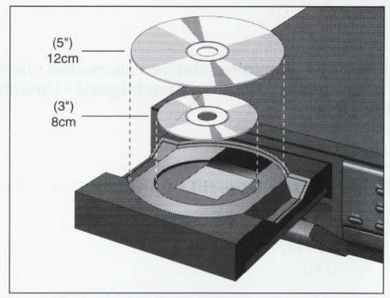


- When finished, point-and-click on 'Exit'.

LOADING AND UNLOADING

Loading:
- Point and click on 'Open' (you may also press the OPEN /CLOSE button (2) on the player) to open the disc tray (1).
- Take the disc from its holder and place it on the tray with the label up.
- Point and click on 'Close' (you may also press the OPEN/CLOSE button (2) on the player, or gently push the front of the tray) to close the tray.

The TV screen changes according to the type of disc.



CAUTION
NEVER PUT MORE THAN ONE DISC AT A TIME INTO THE CD-I PLAYER

Unloading:
- Point and click on 'Open' (you may also press the OPEN /CLOSE button (2) to open the disc loading tray. The player start-up screen reappears on the TV.
- Take the disc from the tray and replace it in its holder.
- Point and click on 'Close' (you may also press the OPEN/CLOSE button (2) on the player, or gently press the front of the tray) to close the tray with or without a new disc.

NOTE

You may unload the disc at any time by pressing the OPEN/CLOSE button (2).
Unloading a CD-I disc while the CD-I program is running, will terminate the CD-I program abruptly. 'Bookmarks' or intermediate results, if used by the CD-I program, might not be updated to the latest situation.

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2.5 DISC PLAY

PLAYING A CD-I DISC

NOTE

This procedure is equal for CD BRIDGE discs, CD-I READY discs and PHOTO CDs. And for Digital Video discs and Video CD's when a Digital Video Cartridge has been installed.

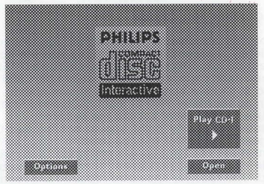
CAUTION

– NEVER LEAVE A STILL PICTURE ON THE SCREEN FOR ANY LENGTH OF TIME. THIS CAN CAUSE BURNING-IN OF THE PICTURE TUBE. IN SUCH A CASE SWITCH OFF THE PLAYER OR REMOVE THE DISC.

Playing a CD-I disc depends on the value of Autoplay (see settings). The factory setting is default "OFF".

1. When autoplay is "OFF":
   After loading the disc, the CD-I start-up screen appears on the TV.
   To start the CD-I program, select the 'Play' icon on the screen and click on it.

2. When autoplay is "ON":
   After loading the disc, the CD-I program will start up automatically.
   The opening screen of the CD-I program now appears on the TV. From this point, all interaction is between you and the program. To stop at any time, select the STOP or EXIT function provided by the CD-I program.

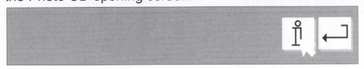


PLAYING A PHOTO CD

After loading the disc, the CD-I start-up screen appears on the TV.

- To start the Photo CD program, select the 'PLAY CD-I' icon on the screen; you may also press the PLAY button (5) on the player or remote control (6).
  The opening screen of the Photo CD program now appears on the TV.
  At the bottom of this screen a menu bar with icons is shown.

- Select the icon.
  The 'Options' screen will now appear.
- To select a language click on the box, the flag or the name of a country.
  The previous setting will be replaced automatically.
- Select the icon (Return) of this screen to go back to the Photo CD opening screen.



- Select the icon (Information) and the INFORMATION screen, explaining the control buttons of the menu bar in the selected language, appears.
- From this point, all interaction is between you and the program.

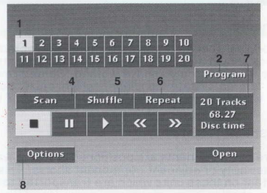
CAUTION

NEVER LEAVE A STILL PICTURE ON THE SCREEN FOR ANY LENGTH OF TIME. THIS CAN CAUSE BURNING-IN OF THE PICTURE TUBE. IN SUCH A CASE SWITCH OFF THE PLAYER OR REMOVE THE DISC.

PLAYING A CD-AUDIO DISC — 1. Using the audio screen

NOTE: This procedure can also be used for audio sections on 5 inch (12 cm) laser discs.

After loading the disc, the CD-Audio screen appears on the TV.



1. **Play track bar:**
   Shows the total number of tracks (up to 30). You can 'point-and-click' to select any track. For discs with more than 30 tracks, the right » and left « scroll arrows are used to move through the track list.

2. **PROGRAM:** Allows you to program a list of special tracks called a Favorite Track Selection. When you select PROGRAM, the FTS track bar and the FTS icon will appear.

3. **FTS:** Allows you to play Favorite Track Selections. This icon only appears if a Favorite Track Selection has been created for the disc that is loaded in the player.

4. **SCAN:** Allows you to listen to the beginning of every track listed in the play track bar. You can set the scan time to 5, 10 or 20 seconds in the 'Options' screen.

5. **SHUFFLE:** Allows you to play the tracks in the play track bar in a random order.

6. **REPEAT:** Allows you to repeat either a track or the entire disc. You can change the repeat mode in the 'Options' screen.

7. **TRACK/TIME** window:
   – After loading, and in STOP mode, this shows the total number of tracks and the total playing time. When you click at this window (7), the track time of the selected track is displayed.

   – In PLAY and PAUSE modes, the window shows the track number and either the elapsed or the remaining track playing time. To change between elapsed and remaining time, 'point-and-click' at the time shown in the window.

8. All the disc play control functions are shown on the screen, and can be selected as desired by 'point-and-clik' with yuor remote control.

DISC PLAY

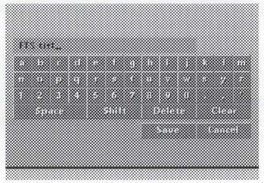
The operation of the functions is briefly explained in the following table.

NOTE

If auto SHUFFLE or auto FTS has been selected on the 'CD Audio' screen, this function will be activated automatically.

PLAYING A CD-AUDIO DISC — 2. Creating FTS titles

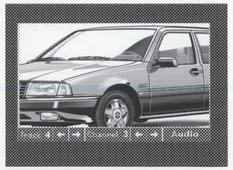
- After creating a Favorite Track Selection for a disc, you can compose a title of up to 30 characters (depending on the character width) for the selection using the keyboard screen.
  The title then appears on the CD-Audio screen whenever the disc is loaded.
- At the CD-Audio screen, 'point-and-click' on the program button, then 'point-and-click' on the "Save FTS" button.
  The CD-Audio screen will change to the keyboard screen.
- Select each character of the title in turn, using shift to change between upper and lower case characters and space to separate words.



Delete erases the last selected character.
Clear erases the complete (or partially complete) title.
Cancel returns to the CD-Audio screen without saving the title.
OK saves the title and returns to the CD-Audio screen.

PLAYING A CD-AUDIO DISC — 3. CD graphics

When an audio CD with graphics is played, the CD Graphics screen will appear automatically.



- To let the picture channel bar appear/disappear click on the action button anywhere outside the channel bar.
- You can select another track number by clicking on 'Track' or either arrow next to it.
  Depending on the disc, other channel numbers might give you other information, such as the lyrics in a different language.
- Refer to the instructions that come with the disc for their functions.
- To play audio only, click on the 'audio' icon.

CAUTION

NEVER LEAVE A STILL PICTURE ON THE SCREEN FOR ANY LENGTH OF TIME. THIS CAN CAUSE BURNING-IN OF THE PICTURE TUBE. IN SUCH A CASE SWITCH OFF THE PLAYER OR REMOVE THE DISC.

OPERATION	SELECT
Start play	▶ **play** play starts at the beginning of track 1, or any other preselected track number. If a track is already playing, it is re-started.
Select a track	**track** number if the disc contains more than 30 tracks, use the left « and right » scroll arrows to move through the track numbers as required.
Pause	❚❚ **pause** use to interrupt play.
Exit pause	**pause** or **play** play restarts at exactly the same point as pause was selected.
Forward search	**forward** searches forward through disc.
Reverse search	**reverse** searches backwards through disc.
Stop play	**stop** stops playing. If play is restarted, it begins at the first track.
Scan the disc	**scan** plays the beginning of each track on the disc.
Exit scan	**scan** normal play starts from this point.
Shuffle play	**shuffle** shuffle sequence appears in track bar.
Exit shuffle	**shuffle** normal play starts from this point.
Repeat	**repeat** repeats the entire disc (or FTS program), or the track being played, as selected on the "Options" screen.
Play FTS	**FTS** only available when an FTS program has already been created for the disc in the player.
Exit FTS	**FTS** normal play starts from this point.
Program FTS	**program** • point to tracks as required on the play track bar, and in each case click on any action button to record the track in the FTS track bar. • To cancel an unwanted track, point to it in the FTS track bar and click on any action button. • To cancel the entire FTS program, point to the first track in the FTS track bar and click on any action button repeatedly until all the tracks disappear.
Store FTS	**Save FTS** the keyboard screen replaces the CD-Audio screen. See 'CREATING FTS TITLES'.

2.6 ACCESSORIES • ACCESSOIRES

SUPPLIED ACCESSORIES • ACCESSOIRES FOURNIS

These accessories are provided to help you use or set-up your CD-I Player.

AC Cord

Three Batteries

Euroconnector *

Antenna Cable * (RF coaxial cable)

"Thumbpad" Remote Control Handset

Digital out Cable

Y/C (S-Video)* Cable

OPTIONAL ACCESSORIES • ACCESSOIRES EN OPTION

Maximize your pleasure with state-of-the-art accessories designed specifically for your CD-I Player.

The optional accessories shown here may be purchased from your supplier.

CD-I Mouse 22ER9011

Roller Controller 22ER9012

CD-I Trackball 22ER9013

Touchpad 22ER9017

Audio L-R Cable

Video (CVBS) Cable

Audio Stereo Splitter 22ER9209

Splitter 22ER9208

Digital Video Cartridge 22ER9956

* *available on some player versions only*

The products and services described herein are not necessarily available in all countries.

Due to continuous product improvements this document is subject to change without notice.

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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.

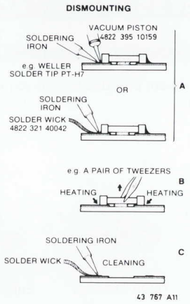


Fig. 1

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).

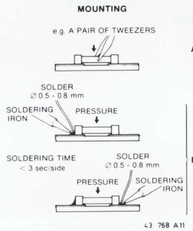


Fig. 2

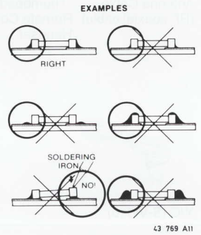


Fig. 3

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)

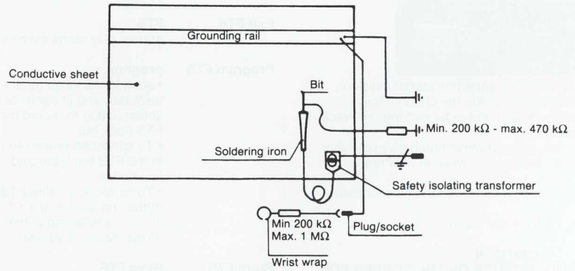
To prevent permanent damages as a result of switch-on phenomena, no ESD-sensitive components, or PCBs populated with these components, should be inserted in or removed from test-sockets or systems with the supply voltage on.
Prevent switching peeks on the mains as a consequence of switching electric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



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

SAFETY GUIDELINES FOR THE PROFESSIONAL SERVICE TECHNICIAN

Important

Proper service and repair is important to the safe, reliable operation of all Philips equipment. The service procedures recommended by Philips and described in this service manual are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It also is important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Philips could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Philips has not undertaken any such broad evaluation. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Philips must first satisfy himself thoroughly that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

Safety Checks

After the original service problem has been corrected, a complete safety check should be made. Be sure to check over the entire set, not just the areas where you have worked. Some previous servicer may have left an unsafe condition, which could be unknowingly passed on to your customer. Be sure to check all of the following:

Fire and Shock Hazard

1. Be sure all components are positioned in such a way as to avoid the possibility of adjacent component shorts. This is especially important on those units which are transported to and from the service shop.
2. Never release a repaired unit unless all protective devices such as insulators, barriers, covers, strain reliefs, and other hardware have been installed according to the original design.
3. Soldering and wiring must be inspected to locate possible cold solder joints, solder splashes, sharp solder points, frayed leads, pinched leads, or damaged insulation (including the ac cord). Be certain to remove loose solder balls and all other loose foreign particles.
4. Check across-the-line components and other components for physical evidence of damage or deterioration and replace if necessary. Follow original layout, lead length, and dress.
5. No lead or component should touch a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces or edges must be avoided.
6. Critical components having special safety characteristics are identified with a ⚠ by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol ⚠ on the schematic diagrams and/or exploded views.

   Replacement parts without the same safety characteristics may create shock, fire, or other hazards.
7. When servicing any unit, always use a separate isolation transformer for the chassis. Failure to use a separate isolation transformer may expose you to possible shock hazard, and may cause damage to servicing instruments.
8. Many electronic products use a polarized ac line cord (one wide pin on the plug). Defeating this safety feature may create a potential hazard to the servicer and the user. Extension cords which do not incorporate the polarizing feature should never be used.

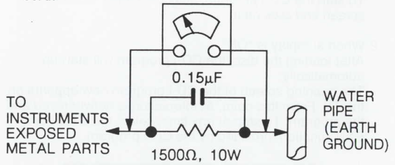
Fire and Shock Hazard (Continued)

9. After reassembly of the unit, always perform an ac leakage test or resistance test from the line cord to all exposed metal parts of the cabinet. Also, check all metal control shafts (with knobs removed), antenna terminals, handles, screws, etc. to be sure the unit is safe to operate without danger of electrical shock.

* Broken line:

Leakage Current Cold Check

1. Unplug the ac line cord and connect a jumper between the two prongs of the plug.
2. Turn on the power switch.
3. Measure the resistance value between the jumpered ac plug and all exposed cabinet parts of the receiver, such as screw heads, antennas, and control shafts. When the exposed metallic part has a return path to the chassis, the reading should be between 1 megohm and 5.2 megohms. When the exposed metal does not have a return path to the chassis, the reading must be infinity. Remove the jumper from the ac line cord.



Leakage Current Hot Check

1. Do not use an isolation transformer for this test. Plug the completely reassembled unit directly into the ac outlet.
2. Connect a 1.5k, 10W resistor paralleled by a 0.15uF. capacitor between each exposed metallic cabinet part and a good earth ground such as a water pipe, as shown above.
3. Use an ac voltmeter with at least 5000 ohms/volt sensitivity to measure the potential across the resistor.
4. The potential at any point should not exceed 0.75 volts. A leakage current tester may be used to make this test; leakage current must not exceed 0.5 milliamps. If a measurement is outside of the specified limits, there is a possibility of shock hazard. The receiver should be repaired and rechecked before returning it to the customer.
5. Repeat the above procedure with the ac plug reversed. (Note: An ac adapter is necessary when a polarized plug is used. Do not defeat the polarizing feature of the plug.)

Parts Replacement

1. Many electrical and mechanical parts in Philips equipment have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. The use of a substitute part which does not have the same safety characteristics as the Philips recommended replacement part shown in this service manual may create shock, fire, or other hazards. Under no circumstances should the original design be modified or altered without written permission from Philips. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.
2. All ICs and many other semiconductor parts are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce the life of the part drastically.

LASER NOTE:

DANGER - Invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.
CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
CAUTION - The use of optical instruments with this product will increase eye hazard.

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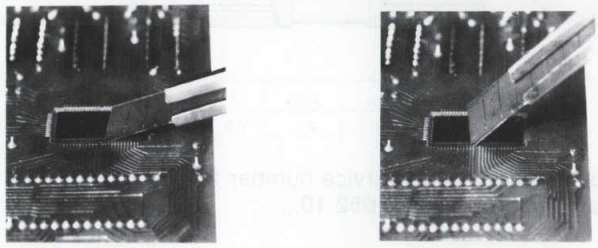
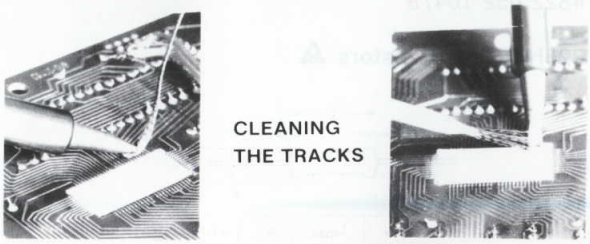
TOOLS TO BE USED

DISMOUNTING



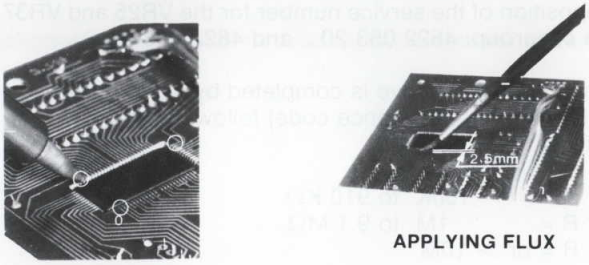
CUTTING THE LEADS

WRONG TRACKS WILL BE DAMAGED



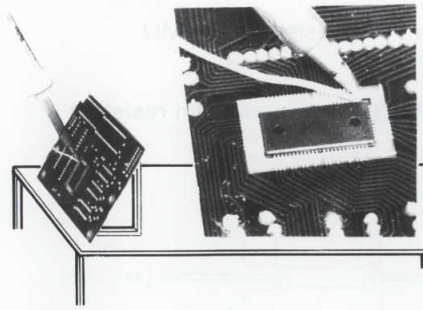
CLEANING THE TRACKS

MOUNTING



APPLYING FLUX

FIXING IC AT THE CORNERS

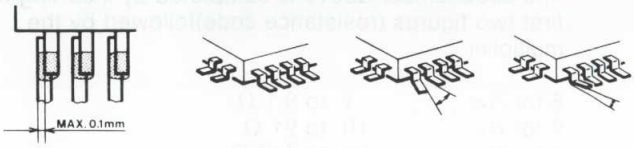


SOLDERING: SPEED 1 CM IN 5 SEC.

DRYING

VISUAL CHECK

ALIGNING THE LEADS



RIGHT WRONG WRONG

SOLDERING

RIGHT WRONG WRONG

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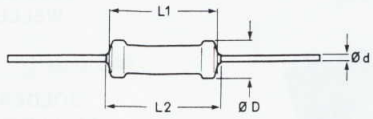
3.4 CODENUMBERS FOR STANDARDIZED RESISTORS

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...

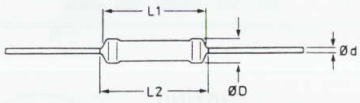
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

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

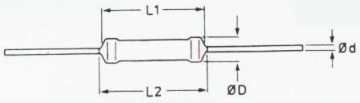
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ is 4822 053 21336

PR01, PR02 and PR03 power metal film resistors

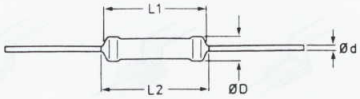
ϕD_{max}	L1	$L2_{max}$	ϕd
2.5	6.5	8.0	0.6



ϕD_{max}	$L1_{max}$	$L2_{max}$	ϕd
3.9	10	11	0.8



ϕD_{max}	$L1_{max}$	$L2_{max}$	ϕd
5.2	16.7	17.9	0.8



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

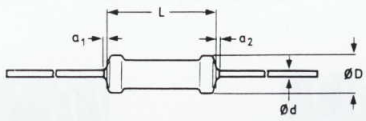
Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

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

NFR25 fusible resistors ⚠



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

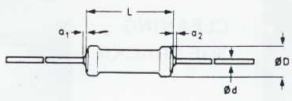
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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

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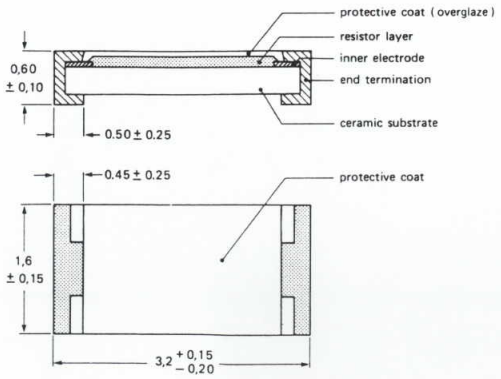
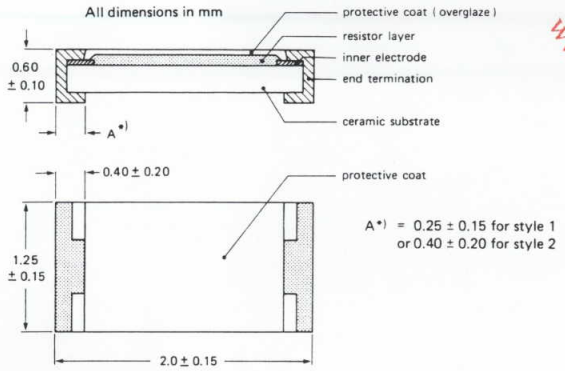
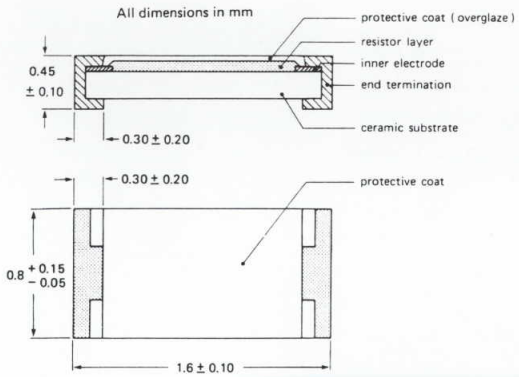
RC-01, RC-11 AND RC-21 chip resistors







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

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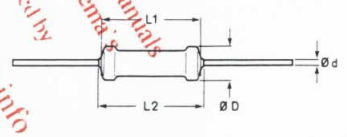
Circuit schema's

MRS16T metal film resistors with low-inductance



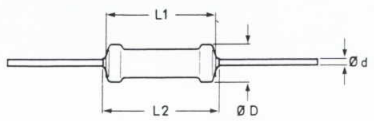
D	L	L2 max.	d
1,7 +0,2 −0,1	3,5 +0,2 −0,15	3,7	0,5 −0,04

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....

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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 CENTRAL REPAIR PROCEDURE OF THE MAINBOARD

If the defective item is in the circuitry of the µP section, CIAP section or digital video section, then the complete main board must be replaced and sent back to a local central repairshop.
Relevant sections are displayed when using the diagnostic programme (chapter 5) and are marked by silkscreening in the layout of the board.
Dealers must contact the national Service Centers for this procedure. See further on in this chapter 3.6 for instructions and addresses.

If the defective item is in the circuitry of the SERVO section, analog audio or analog video section then the main panel can be repaired by the authorized dealer down to component level.
For partslist see chapter 8 .

Remark :
The defect on the board can be isolated and found by means of built-in diagnostics :
(See chapter **5 SERVICE SOFTWARE**)

1. Low Level test (in short LLtest)
2. Service Shell

3.6 REPAIR PROCEDURE OF THE MAINBOARD IN YOUR COUNTRY

3.6.1 Repair procedure for NORTH AMERICA Customers

- Return defective Main boards to the following address :

PHILIPS SERVICE COMPANY
907 SNAPP FERRY ROAD
GREENEVILLE, TN 37743

- Re-use original packaging to return the part to Philips.
- Use standard NARDA form to receive Warranty credit, Dud credit or Defective shelf stock credit. Form must be filled out completely.
  Describe the defect condition in detail.
- ALL RETURN ITEMS ARE SUBJECT TO INSPECTION FOR MISUSE OR ABUSE. PHILIPS RESERVES THE RIGHT TO REFUSE CREDIT ON SUCH ITEMS
- Damaged or cracked boards will be refused for credit.

3.6.2 Procedura di Riparazione ITALIA

Nel caso in cui il prodotto non funzioni correttamente o sia difettoso si prega di contattare il Centro Assistenza Tecnica Autorizzato di zona (consultare l'elenco telefonico provincia alla voce Philips Service).
Si raccomanda di leggere attentamente le istruzioni d'uso prima di interpellare il Centro Assistenza Autorizzato. Per ulteriori informazioni si consiglia di interpellare :

SERVIZIO CONSUMATORI PHILIPS
PIAZZA IV NOVEMBRE 3
20124 MILANO

FAX: 02 - 67 52 26 60
TEL.: 167 - 82 00 26 (Linea verde)

3.6.3 Reparatur Prozedur OSTERREICH

Bitte richten Sie alle weiteren Fragen an den PHILIPS SERVICE ZENTRALE:

Osterreichische Philips Industrie GmbH
Service Zentrale
Gutheil - Schodergasse 12
A-1100 WIEN

TEL.: (0222) 60 101-0
FAX: (0222) 60 101-5596

3.6.4 Reparatur Prozedur SCHWEIZ Procedura di Riparazione SVIZZERA Procédure de réparation SUISSE

Bitte richten Sie alle weiteren Fragen an Ihr "Philips info Center":
Per qualunque domanda in questione rivogetevi p.f. al vostro "Centro Philips d'Informazione":
Pour toustes autres questions, veuillez vous adresser à "Philips Info Center":

PHILIPS INFO CENTER
c/o SERLOG SERVICE + LOGISTIK AG
FEGISTRASSE 5
CH-8957 SPREITENBACH

TEL.NR. 056/70 72 70
FAX.NR. 056/70 75 75

3.6.5 Proceso de Reparación ESPAÑA

Para el proceso centralizado de reparaciónes de CD-i puede ud. Tomar contacto con el Sr. J.J. Morillas o Sr. Lluch. Dirección :

EUROSERVICE (SERVICE SPAIN)
BRUCH 147 - 149
08037 BARCELONA

TEL.NR. 34 3 2070100
FAX.NR. 34 3 4574894

3.6.6 Reparaturabwicklung DEUTSCHLAND

Das fehlerhafte Mainboard muss in ESD-sicherer Verpackung mit detaillierter Fehlerbeschreibung an die hierunter genannte Adresse gesandt werden.
Die Rücksendung des defekten Mainboards erfolgt an folgende Adresse:

PHILIPS CE GmbH
CONSUMER ELECTRONICS
SERVICE ORDERDESK
z.Hd. Frau Billert
ALEXANDERSTR. 1
20099 HAMBURG

3.6.7 Procédure de réparation FRANCE

- Commander le circuit principal
- ré-utiliser l'emballage initial pour retourner la pièce à SERVICE SA
- Retourner les principales pièces défectueuses à l'adresse suivante :

SERVICE SA
Service Retours / Pièces Détachées
Rue des Vieilles Vignes - BP 02
77311 - CROISSY BEAUBOURG

- Joindre le ticket de prélèvement de la pièce livrée
- Si la réparation est sous garanti, joignez une demande de remboursement

Remarque : Si le circuit défectueux n'est pas retourné dans les 8 jours qui suivent la livraison de la piéce de remplacement, une facture complémentaire sera établie.

3.6.8 Other countries

For the **not** above mentioned countries please contact your local PHILIPS organization via the usual channels to obtain instructions "how and where" to send the mainboards.

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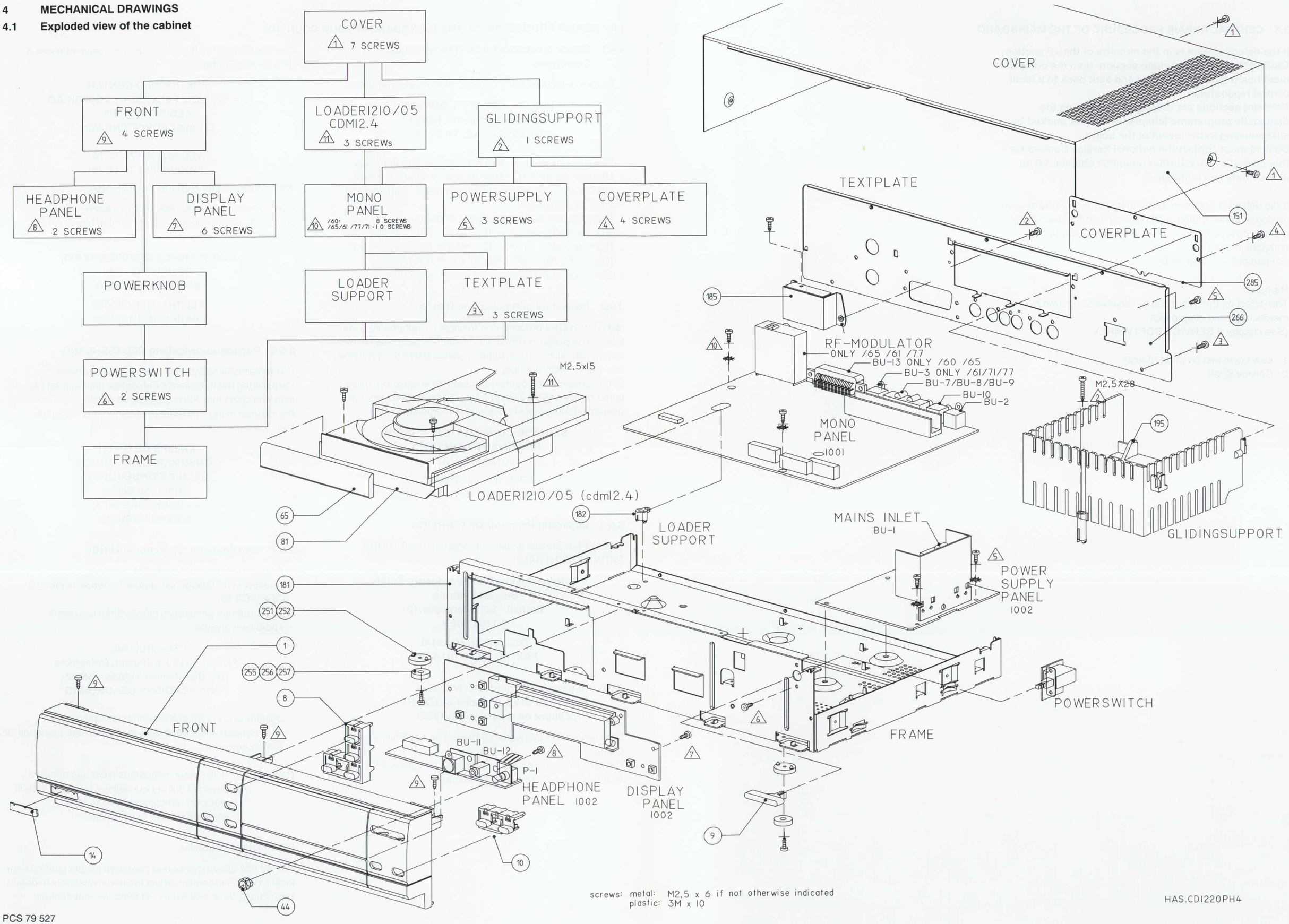
4 MECHANICAL DRAWINGS

4.1 Exploded view of the cabinet



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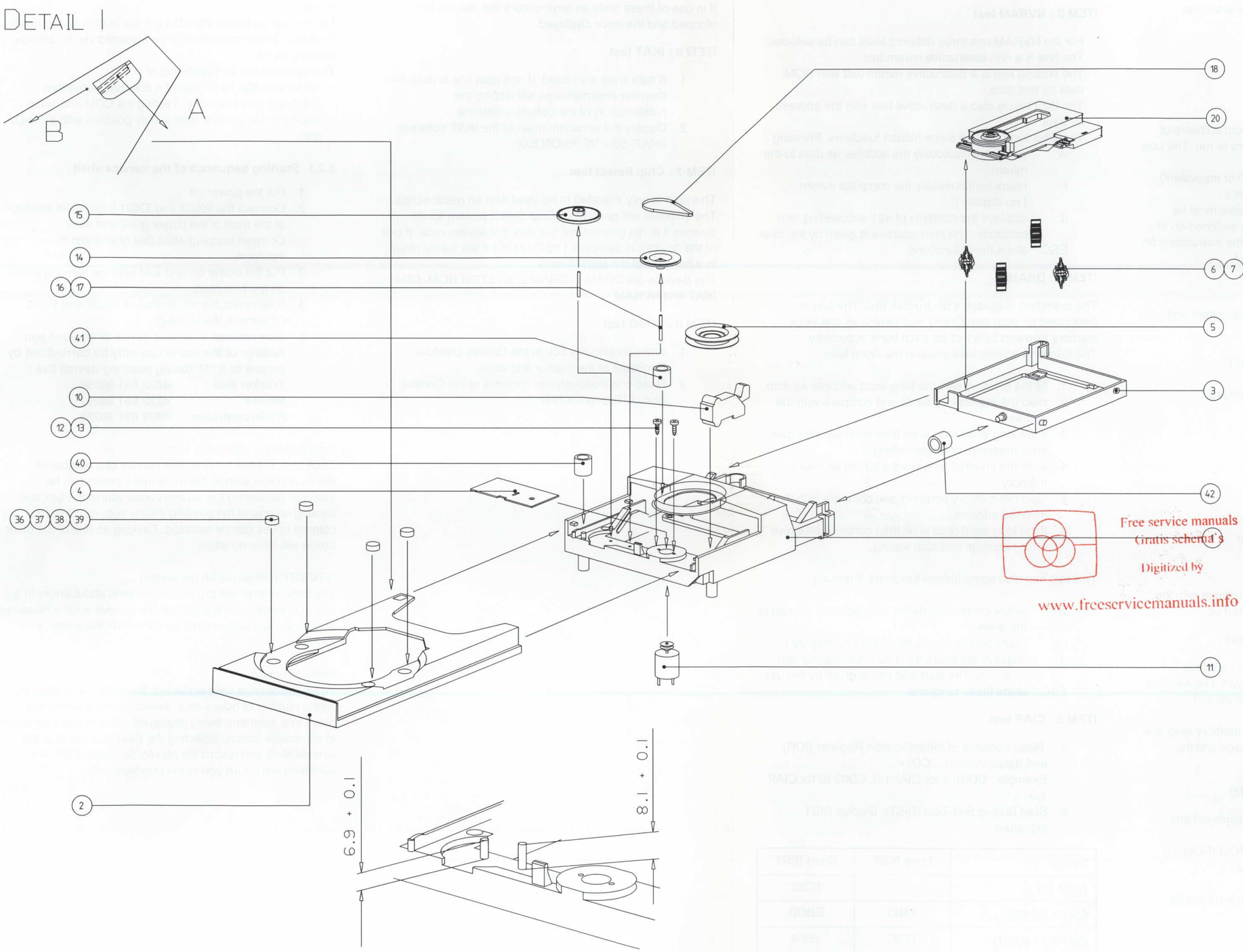
4.2 Exploded view of the loader



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5 SERVICE SOFTWARE

In the set there are 2 different testsoftware available:

1. Low Level test
2. Service Shell

5.1 THE LOW LEVEL TEST

Scope
This test is standard implemented in the boot software of CD-RTOS. It doesn't need a lot of hardware to run. The Low Level test is Menu driven.
To run the low level test a terminal (VT100 or equivalent) must be connected to the inputport via Port 2.
To start the test the space-bar on the terminal must be pushed at the same time that the power is switched-on at the CDI-player. To continue with the test, the instructions on the screen of the terminal must be followed.

5.1.1 Testsequence

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

STEP	ACTION/TEST PERFORMED
0	Exit Low Level test
1	Writing to a default RAM address
2	ROM parity check
3	NVRAM test (32K)
4	DRAM test
5	CIAP test
6	IKAT-CD60-DSIC2 test
7	Chip Select test
8	VDSC test

Display LLtest header and release number

ITEM 0 : Exit Low Level test

Selecting this item will end the lltest and continue with the boot. After the boot the player shell is started up.

ITEM 1 : Writing to a default 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 and the system will hang up.

ITEM 2: ROM parity check (System 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.
  If the checksum is not ok then a specific error will be displayed.

ITEM 3 : NVRAM test

- For the NVRAM test three different tests can be selected:
- The first is a non destructive nvram 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 continueously the address as data to the nvram.
  - r : reads continueously 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.

ITEM 4 : DRAM

The dram test is always a destructive test. The test is performed for both ram CHIP1 and CHIP2 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 continueously the long address as data to the dram.
- r : reads continueously 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.

ITEM 5 : CIAP test

1. Read contents of Indentification Register (IDR) and diplay version : "CDxx"
   Example : CD01 is for CIAP1.0, CD02 IS for CIAP 1.5
2. Start Built-in Self-Test (BIST). Display BIST signature :

Device	Long BIST	Short BIST
CIAP 1.0		F286
CIAP1.5(ES2)	75B0	BBCD
CIAP1.5 - (MOT)	1F5C	1BF4

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

ITEM 6 : IKAT test

1. 8 data lines are tested. If one data line is defective then the errormessage will display the number(0..7) of the defective dataline.
2. Display the versionnumber of the IKAT software. (IKAT: 50 = VERSION 5.0)

ITEM 7 : Chip Select test

This step is only intended to be used with an oscilloscope. The software will generate a Chip Select pattern for All devices.It is not guaranteed that this test always runs. If one of the devices is defective (no DTACK) it will surely result in a hang-up of the testsoftware.
The devices are DRAM 1, DRAM 2, SYSTEM ROM, CIAP, IKAT and NVRAM.

ITEM 8 : VDSC test

1 Write continously $00 to the Display Decoder Registers of the master and slave.
2 Read continueously the contents of the Control Status Register (CSR).

5.2 THE SERVICE SHELL

Introduction.
For service purposes the CD-I set has built-in testsoftware 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 testpa tern
- CDM and servo circuitry. Testing the CDM and servo cicuitry in the service shell is only possible with a CD-DA disc.

5.2.1 Starting sequence of the service shell

1. Put the power off
2. Connect the RXD2 and TXD1 lines of the inputport at the front of the player (pin2 and pin3).
   Or insert testplug 4822 264 50263 into the inputport.
3. Put the power on and wait until the menu appears on the tv-screen.
4. Disconnect the shortcircuit of RXD2 and TXD1.
   Or remove the testplug.
5. Now connect a pointing device to the input port:
   Access of the menu can only be carried out by means of a "M"(ouse) pointing device like :

Tracker Ball	**4822 691 30298**
Mouse	**4822 691 30297**
Rollercontroller	**4822 691 30293**

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 pointing device 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 about errors in a box at the bottom of the screen. To remove such a message and continue a button must be clicked on the pointing device.

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.

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5.2.2 Subject dependent information

Main menu
The main menu contains three item boxes.

1. TEST IMAGE
2. CD DRIVE
3. EXIT

Selecting TEST IMAGE will give immediate action.
Selecting CD DRIVE will start the CD DRIVE test submenu.
Selecting EXIT will return to the normal usershell.

Test image
A video (75%)colorbar with 750 mV level white bar is generated and send to the video output.

CD drive test

1. First of all the communication with the CD part is checked then after clicking on one of the buttons the IKAT version is displayed.
2. After clicking on one of the buttons the CD drive test menu will appear. The CD drive test will perform the service loop as implemented in the Philips CD audio players. A CDDA disc is needed for this test. Results of this test will be displayed on the tv-screen.
3. When the cd drive test is selected, the next items can be selected:
   - ARM OUT. Clicking on this item will result in a movement of the sledge with laser and the optical pickup to the outside area of the disc if the sledge is at the centre area of the disc.
   - ARM IN. Selecting this item will return the sledge to the centre area of the disc if it is at the outside.
   - NEXT MODE. Selecting this item will put the servo circuit into some modes (or steps). The modes are displayed in the red box on the right at the top of the screen, while messages are displayed in the red box on the left. The drive test consist of the following steps:

   MODE 0
   In mode 0, the ARM IN and ARM OUT buttons can be selected to move the sledge with the optical unit inwards and outwards.
   Selecting NEXT MODE will bring the player in mode 1.

   MODE 1
   In mode 1 the IKAT processor will try to focus. If it manages to do so (a disc must be present!), the message IN FOCUS will appear in the left box. Otherwise, the message NO FOCUS will appear after the processor has tried to focus 3 times. 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. The message MOTOR OK will appear. If an error occurs, the message MOTOR ERROR APEARS and the test will return to mode 0.
   Selecting NEXT STEP in mode 2 will bring the player in mode 3.

   MODE 3
   The radialservo is now activated and the message RADIAL TEST OK appears. The optical pick up will follow the tracks now and the sound is muted.
   If an error occurs, an error message will be displayed and the test will return to mode 0.
   NEXT STEP in mode 3 will bring the player in normal playing mode, but if something goes wrong at the bottom of the screen an error code ("CD error x")will be displayed.
   The meaning of the "x" is in the next list :

   0 = no error
   1 = focus found
   2 = focus error
   3 = radial error
   4 = turntable motor error
   5 = search time error
   6 = subcode error
   7 = TOC error
   8 = fatal sledge error

To exit the SERVICE SHELL the power must be switched off.

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6 ELECTRICAL DRAWINGS

6.1 BLOCKDIAGRAM with FUNCTIONAL SURVEY

The circuitry is build up on one double sided 4-layer main board and consists of the following functional parts and blocks:

Processor part
- CPU (SCC68070)
- IKAT (MC68HC05I8)
- System ROM (27C400)
- NVRAM/CLOCK

CD Interface and Audio Processor part
- CIAP 1.5 (-)

Digital Video part
- VDSC (Video Decoder and System Controller)
- CALVIN(Video Encoder)
- 1MB DRAM with two banks of 512 KB
- CVBS video out
- RGB video out (only for /40/45)
- Y/C video out

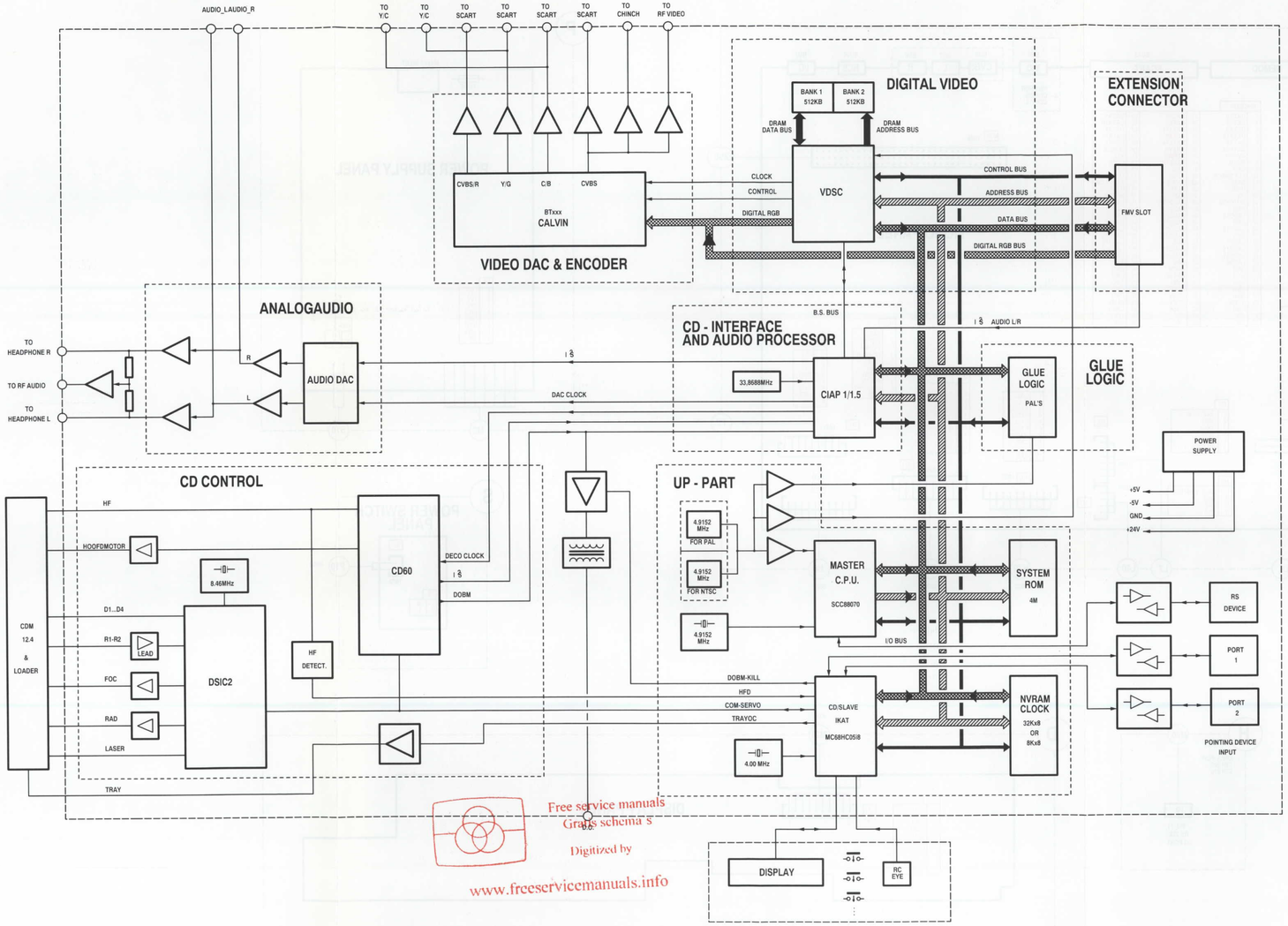
Chip Select and DTACKN generating glue logic
- PAL 16L8-10
- PAL 16R4-10

CD Control part
- CDM 12.1
- TDA 1301 (DSIC 2; Digital Servo IC for Controlling 2 stage 3 beam servo mechanisms)
- Additional discrete HFD and defect detector circuits
- CD 60 (CD Decoder)

Audio part
- DAC (CS4303)
- Audio outputs L/R
- Audio headphone output L/R

Power Supply
- +25V / +5V / -5V

Interfaces
- CDM 12 interface (flex conn. pos.1008)
- Power supply inlet (pos.1001)
- Pointing device input/output front (pos.1022)
- Pointing device input/output rear (pos.1033)
- Extension connector (pos.1096)
- Audio headphone output L/R (pos.1030)
- Audio outputs L/R (pos.1015)
- Video CVBS output (pos.1015)
- Video RGB output (pos.1013) (only for /40/45)
- Video Y/C output (pos.1006) (only for /51)
- RF modulator power outlet (pos.1016)



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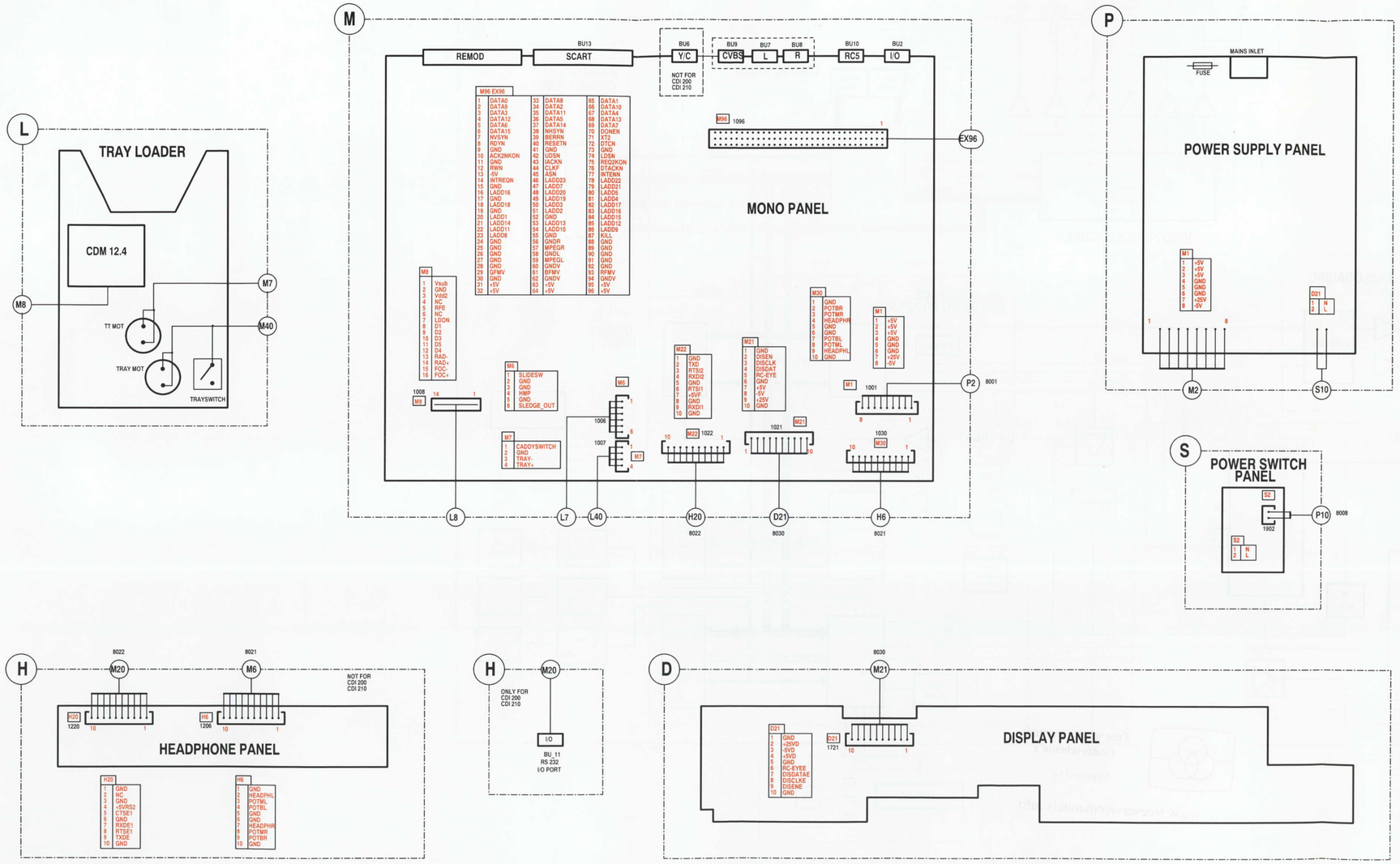
6.2 WIRING DIAGRAM



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6.3 Alphabetical list of abbreviations

Remark: The list contains all abbreviations, which are ever used in CDI electrical circuitry

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
ACK2NKON : DMA REQUEST ACKNOWLEDGE (96-pins connector, channel2 :FMV)
ADEN : (=ADENA)ADDRESS ENABLE NOT. When low,the address ADENA coming from the bus (68070)
ADOCLK : output clock from the ADOC (11.2896 MHz)
AM : ADDITIONAL MUTE
ASN : ADDRESS STROBE (active low, tristate) indicates whwn an address is valid on the bus for the system
ASNP : ADDRESS STROBE from processor (active low)
ASPRAT : Aspect ratio switch signal (16:9 or 4:3)
AUDGND : Audio ground (SCART)
AUDL : >>AUDIO LEFT
AUDIOL : >>
AUDIOLSC : >> (scart)
AUDIOREM : Audio signal to remodulator
AUDR : >>AUDIO RIGHT
AUDIOR : >>
AUDIORSC : >> (scart)
AUDIO_CLK : 16.93MHz clock (33.86MHz:2) from CIAP to CD60 and audio DAC
AVN : AUTOVECTORED INTERRUPTS (active low),can be used by an extension
A0..15 : Local addressbus of the audio DSP-processor
B0..7 : digital video (blue) from VDSC DRAM
B0CD..B3CD : input control bits for off-,catch-,play status and DAC output current for radial motor
B,G,R : output colours of the VSD
BERRN : >>BUS ERROR (active low,open drain)
BFMV : blue color coming from the FMV-extension
BGACKN : Bus Grant Acknowledge (active low)
BGN : Bus Grant (active low) access from the cartridge to the base system via bus-mastership
BGND : Blue color ground (SCART)
BIN : blue color input for the CXA1145 encoder
BLANI : (=BLAN1M) BLANKING OUTPUT (active low,tristate) of the VSC
BRN : Bus Request (active low) access from the cartridge to the basecase system via bus- mastership
BSC : blue color (scart)
BSW : blue color coming from the switch CDI/external (FMV) video
BUGCD60 : CD60 anti - hangup line
BUSYLED : signal to control green busy LED - driver
C : Chrominance singnal (Y/C)
CADDYIN : high when reading data
CADDYSWITCH : control signal for position tray
CAS1N : column address strobe 1 (VDSC)
CAS2N : column address strobe 2 (VDSC)
CBA : 68070 bus tranceiver latch (rising edge)
CBSC : CHROMA for S-VHS (Y/C) or BLUE for SCART
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)
CD60_V2 : CD60 -status information line from CD60 to IKAT
CIAPACKN : DMA channel 1;CIAP acknowledge (active low)
CIAPJUC : CIAP Jump Complete
CIAPREQN : DMA channel 2;CIAP request (active low)
CIAP_INTN : CIAP interrupt request (active low)
CL : serial communication clock to DSIC2 and CD60
CLAB=CLAB2 : bitclock for the SAA 7220 chip
CLABCD : bitclock from the 7310 chip
CLK=2BLCK : CLOCK (11,2896 Mhz)
CLKDAC : CLOCK DAC,the clock used to send serial data to the volume adjustment
CLKF : 2B-clock (11,2896 MHz) for the FMV-extension
CLK1 : the clock on which the DSP operates (7,5264 MHz)
CLK11 : not used (connected to ground)
CLK3A : 11.2896 MHz clock for the SAA7310 decoder
CLOCK_27 : 27 MHz clock :used as system clock by the DSP and the LEMM
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
COXNDSP : clock DSP, the clock used to send serial data on the X-bus
CSDMAKILL : generates killme :Dot killer enable signal (active for NTSC) and functions as DMA enable for the FMV extension
CSDSPN : signal used by LEMM to generate the DSP chip select signal (KIP) (active low)
CST : combined chipselect signal for NVRAM/system ROM
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
CRI-DODS : counter reset inhibit of the 7310 chip
CS : CHIP SELECT
CSCDICN : CHIP SELECT CDIC (active low) bus information is intended for or coming from CDIC
CSCIAPN : CHIP SELECT CIAP NOT
CSIKATN : chip selekt for IKAT (active low)
CSIKATP : modified chip select for IKAT for testing purposes
CSKILL-MEMM : chip select for kill and DMA circuit.
CSKILL-MEMMS : >> syncronized
CSDAC1N : (=CSDAC2N)(if selected,low)it means that data will be adjusted on that channel
CSNVRAMN : CHIP SELECT NVRAM (active low) information is intended for or coming from the NVRAM
CSROMN : >>
CSROM0N : CHIP SELECT ROM (active low) information is coming from the ROM'S
CSSLAVEN : CHIP SELECT SLAVES (active low)
CSON : CHIP SELECT (active low) for the 8Kx8 SRAM'S
CSVDSCN : CHIP SELECT for the VDSC (active low)
CSYN : COMPOSITE SYNCHRONIZATION input from the VSC'S (active low)
CTS1..4 : CLEAR TO SEND (active low) it indicates that the remote receiving device is ready
CTS#2 : >>
CTSE1..2 : CLEAR TO SEND input
CTSI1..2 : >>
CVBS : CVBS output
CVBS-OUT : >>
CVBS-GND : CVBS ground (SCART)
CVBS-REM : CVBS input signal for the remodulator
CVBS-SYNC : composite sync input for the SCART connector
D0..D23 : Local data bus of the audio DSP-processor
D8NVR : data bit 8 (least significant bit) signal for the NVRAM
DA : serial communication data to DSIC2 and CD60
DAAB : (DAAB2,DAABCD) serial data output of the X-bus I^2S standard
DATA0..15 : DATA LINES
DATADAC : data which will be send to the DAC('S) for volume adjustment
DDTACKN : DATA TRANSFER ACKNOWLEDGE (active low) from CDIC
DEEMP : DEEMPHASIS
DIG OUT : DIGITAL OUTPUT
DIRN : DIRECTION CONTROL. indicates the direction of data transfer through the transievers
DISCL : DISPLAY CLOCK
DISCLK : (DISCLKE) DISPLAY CLOCK >>
DISDAT : (DISDATAE) DISPLAY DATA >>
DISEN : (DISENE) DISPLAY ENABLE >>
DISSEL : software selection signal (CDI210/220)
DIV4 : DIVIDE BY 4 signal
DMAEN : DMA enable for the FMV extension
DOBM : Digital Out from CD60
DOBM_KILL : DIGITAL OUT KILL signal
DS : Data memory select output of the DSP-processor (active low)
DSPACKN : DMA acknowledge (Channel 1) : 68070 -- LEMM (active low)
DSPREQN : DMA request (Channel 1) : LEMM -- 68070 (active low)
DSP-INTN : interrupt request DSP -- 68070 (active low)
DTACKN : data transfer acknowledge (68070) (active low)
DTCNC : data transfer completed corrected (CDIC)
DTRAM : DTACKN generation signal for NVRAM acces
DTROM : DTACKN generation signal for system ROM acces
DTCN : Data transfer completed (active low; 68070)
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 DSP
DSN2N : DATA STROBE (active low) of the DSP
DATACK ROM : DATA TRANSFER ACKNOWLEDGE of the ROM
DTACKSLAVEN : DATA TRANSFER ACKNOWLEDGE of the SLAVE processor
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
DZF : DATA ZERO FLAG
D1...5 : CDM photo diodes inputs
D8NVR : DATA 8 to NVRAM
EFAB : ERROR FLAG
EFLAG : ERROR FLAG input to CIAP
EFLAGCD60 : ERROR FLAG output from CD60
FILTERN : filter select when high:levelC,when low:level A
FOC- : >>focus out to CDM
FOC+ : >>
FSB : Frame select line output of the LEMM -- DSP :this line is asserted for every WSAB (pin 66 of the LEMM) transition
GFMV : green color coming from from the FMV-extension
GGND : Green color ground (SCART)
GIN : green color input for the CXA1145 encoder
GN : when low:the outputs and inputs of the trancievers are enabled
GNDC : Ground for the color signal (Y/C)

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GNDL : Ground for MPEG audio left (96-pins connector)
GNDR : Ground for MPEG audio right (96-pins connector)
GNDV : Ground for MPEG video (96-pins connector)
GNDY : Ground for the luminance
GSC : green color (SCART)
GSW : green color coming from the switch CDI/external (FMV) video
G0..7 : digital video (green) from VDSC DRAM
HALTN : active low,open drain,biderectional.if low together whit the resetn it couses the 68070 to enter the reset state.
HEADPHL : (HPL)headphone audio left
HEADPHR : (HPR)headphone audio right
HFD : High Frequency Detect signal
HFDDEF : signal that indicates when the last session of a multisession-disc has ended
HFIN : HF current input
HMP : Spindle Motor Plus
HSYN : (active low) horizontal synchronisation input from the VSC
HSYNCOUT : (active low) horizontal synchronisation output for monitor or tv
HVID0..7S : 8bit pixel bus for channel 1 VSD from VSC
IACK2 : Interrupt acknowledge from 68070 (active low) -- AVN line of the 68070 (auto-vector interrupt) -- the 68070 generates this signal (IACK2) when the slave proc. as- serts IN2
IACKN : interrupt acknowledge for the FMV-extension
IACKIN2N : >>
IACKIN4N : >>decoded interrupt acknowledge (active low).
IACKIN5N : >>asserted during an interrupt 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
IFDN2 : main channel word-flag to the DSP
IN2 : interrupt request from slave proc. --68070 (active low)
IN5 : interrupt request input 5 of the 68070 (not used)
INTENN1 : interrupt enable for the FMV-extension
INTENN : >>when low,no extensions use the interupts,when high interupt devices are daisy chained

INTENN2 : >>
INTENN3 : >>
INTENN4 : >>
INTIKATN : INTERRUPT from IKAT (from IKAT to UP)
INTREQN : interrupt request from the FMV-extension
IN2IN : (=IN2OUT)>>
IN4IN : (=IN4OUT)>> 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
IN4OUT2 : >>
IN5OUT2 : >>
IN2OUT3 : >>
IRQA : interrupt request from LEMM -- DSP (active low) and mode A pin of the DSP (after the DSP reset, the DSP reads the level on this pin to define the mode of operation)
IRQABN : logical AND of the IRQA and the IRQB line (lemm output pin -- DSP)
IRQB : interrupt request from LEMM -- DSP (active low) and mode B pin of the DSP (after the DSP reset, the DSP read the level on this pin to define the mode of operation)
IRQIN : interrupt request for IKAT (not used)
ISELIN : pin of CIAP (always pulled up)
JUC : jump completed signal from servo proc. --LEMM
KILL : to mute audio outputs by power on and off
KILLME : (KILL-ME)dot killer enable signal (active for NTSC)
KIP : host enable input pin of the DSP-processor :this signal enables a transfer on the DSP host bus DATA0..7 (active low)
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
LDON : switches laser on (5V) & off (0V) (LASER DRIVE ON)
LDSN : LOWER DATA STROBE of the bus
LIDSWITCH : Lid detection switch
LM : LASER MONITOR diode input
LO : laser amplifier current OUTPUT
LRDN : when low select,the ROM'S or NVRAM read the lower data byte
LS : switches between DOUBLE (0V) & SINGLE (5V) SPEED

LTAP : >>for HPL volume control
LTOP : >>
LVID0IN..7IN : >>8 bit pixel-bus for channel 2 (VSC-SLAVE)
LVID0OUT..7OUT : >>
LWN : read/write enable (for the lower part of the data: MD0..7) for the DRAM (VDSC)
LWRSN : R/W lower memory data to DRAM from VSC slave
LWRMN : R/W lower memory data to DRAM from VSC master
MA0..8 : VDSC DRAM address bus
MC : MOTOR CONTROL signal
MD0..15 : VDSC DRAM data bus
MISO : MASTER IN SLAVE OUT
MOSI : MASTER OUT SLAVE IN
MPEGL : left audio signal color coming from the FMV-extension goes the adder CDI/FMV audio
MPEGR : right audio signal color coming from the FMV-extension goes the adder CDI/FMV AUDIO
MSM : master slave selection input
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
NCSYNV : composite sync for the VDSC
NHSYN : active low horizontal sync input for the FMV-extension
NPORE : Power on Reset for CD60 (active low)
NRESET : when low the video synthesizer is in reset
NVDS : digital output to control an external switch for TV overlays (active low)
NVDSI : >>synchronized with NXT2
NVDSN : Digital video switch - line (active low)
NVSYN : (active low) vertical sync input for the FMV-extesion
OTD : Off Track Detection from DSIC2
PCLK1IN : PIXEL CLOCK for channel 1
PCLK2IN : PIXEL CLOCK for channel 2
PLAYSEL : SELECTION of PLAYER type
PLOIN1 : input clock for CDIC (22,5792 MHz)
PLOIN2 : input clock for CDIC (19,3536 MHz)
PLOIN : clock signals for emulator panel
PLOINE : >>
POTBL : headphone left volume control
POTBR : headphone right volume control
POTML : headphone left volume control
POTMR : headphone right volume control
PRTS11 : request to send from main processor
QCL : Q-channel CLOCK
QDA : Q-channel DATA
QRA : Q-channel REQUEST INPUT/ACKNOWLEDGE OUTPUT
Q22 : output to PLL (22,5792 MHz) devided by 14

Q21 : output to PLL (19,3536 MHz) devided by 12
Q_DATA : I^2S data from LEMM -- audio DAC
Q_CLK : I^2S bit clock from LEMM -- audio DAC
Q_WCLK : I^2S word clock from LEMM -- audio DAC
RAB : hand shake protocol signal for CD60
RAD+ : >>RADIAL OUT to CDM
RAD- : >>
RASN : row address valid (active low) for the VDSC DRAM'S
RBOT : for HPR volume control
RC5 : wired RC input (cinch)
RC-EYEDIS : RC-EYE DISABLE signal (not used)
RCEYE : (RCEYEE)REMOTE CONTROL EYE
RCLED : REMOTE CONTROL LED
RD : READ signal DSP : this signal is asserted to read external memory (three SRAM'S FCB61C65) on the data bus D0..23 (active low)
RDN : READY signal, starting up procedure finished
RDYN : READY (active low) of the DMA channel
REDIG : RADIAL ERROR DIGITAL
REFHCA : reference voltage pin of CD60
REFLCA : reference voltage pin of CD60
REM : power supply remodulator
RESETCD : when low resetsequence starts
RESETINN : when low VSC is in reset
RESETN : this is the rest for all other ic's on MMC
RESETSYS : system reset (controlled by the slave-processor)
REQ2N : DMA-request of channel 2
REQ2NKON : DMA-request (96-pins connector, channel 2 : FMV
REQ2KON : DMA-request of channel 2 via DMA 2 on/off circuit
RFE : high-frequent signal coming from CDM (disc)
RFMV : red color coming from the FMV-extension
RGBS_GND : incoming video SCART (not used) ground
RGND : red color ground (SCART)
RIN : red color input for the CXA1145 encoder
RSC : red color (scart)
RSTOUT : RESET OUT of the slave processor when high resetsequence starts
RSW : red color coming from the switch CDI/external (FMV) video
RTAP : >>for HPR volume control
RTOP : >>
RTS12 : REQUEST TO SEND 2 from IKAT
RTSE1..2 : REQUEST TO SEND
RTSI1..2 : REQUEST TO SEND
RTSUART : REQUEST TO SEND from the slave processor to the UART of the 68070 processor
RST1..4 : >>REQUEST TO SEND (active low)
RST#1..2 : >>
RWN : READ - WRITE (low is write) signal

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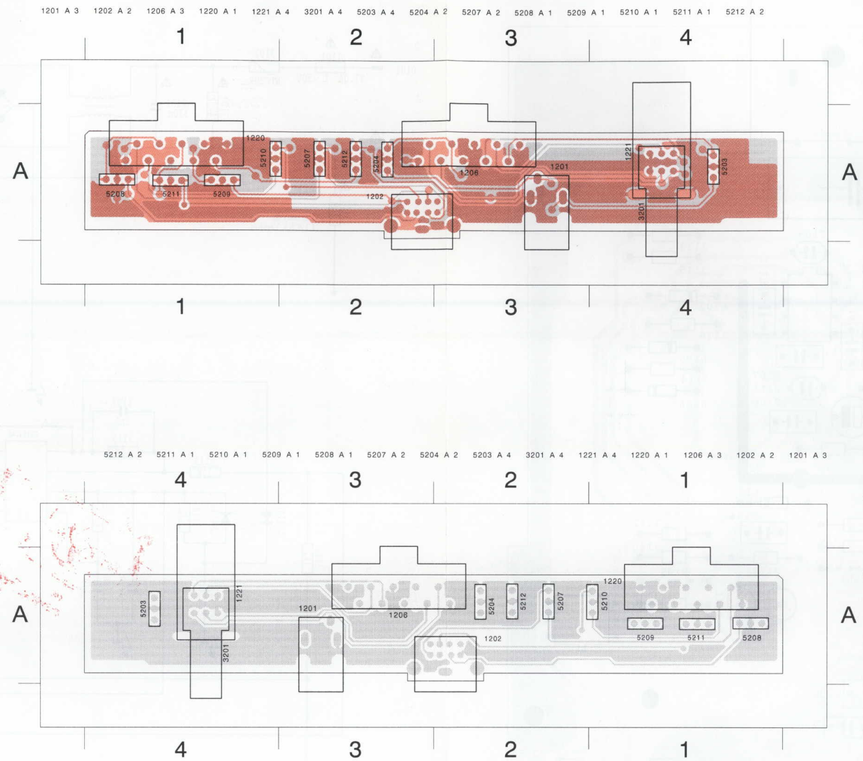
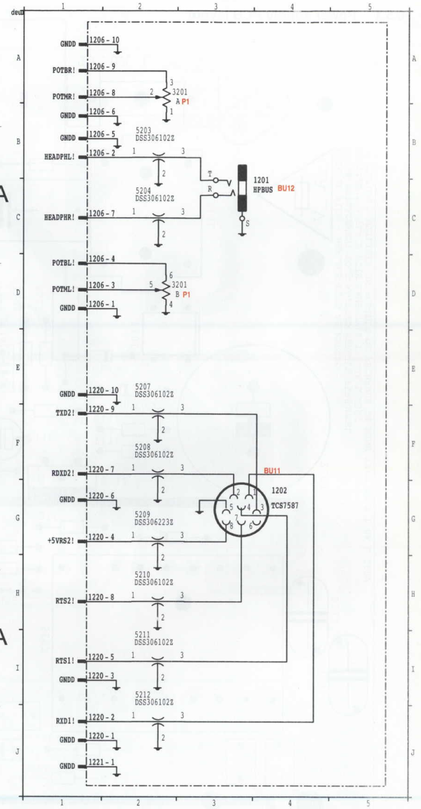
RWN2 : READ - WRITE (low is write) signal from CDIC to the DSP
RWRAM : READ - WRITE signal from the CDIC to the S RAM'S
RXDE1..2 : RECIEVE DATA
RXDI1..2 : RECIEVE DATA
R0..7 : digital video (red) from VDSC DRAM
RXD1..4 : >>RECIEVE DATA RXD is data input
XD#1..2 : >>
SCAB : subcode data clock (2,8224 MHz) from the 7310
SCK : serial clock output from the LEMM -- DSP :the data and frame select for the DSP is clocked out on the rising edge of this clock
SCL : I^2C clock to HOBBES
SCLK : I^2S clock out from CD60
SDA : I^2C data to HOBBES
SDAB : subcode data from the 7310
SDATA : signal from CD60 data
SDAT : I^2S data out from CD60
SERVORESETN : Reset for DSIC2 from IKAT
SI : on - off control for laser supply and focus circuit
SI-RD : on - off control for laser supply and focus circuit/ready signal,starting up procedure finished
SILD : Serial communication Load to DSIC2
SLEDGE : sledge motor control
SLEDGE_OUT : power signal for activating the sledge motor
SLEEPAUDN : Audio kill line (active low)
SLEEPVID : Video kill line (active low)
SLIDESW : SLIDE SWITCH ;detection of sledge - endposition
SLMA0..8 : VSC-slave memory address bus to the DRAM'S
SLMD0..15 : VSC-slave memory data bus to the DRAM'S
SOCKGND : socket ground (SCART)
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 : (SPISSN) SERIAL PERIPHERAL INTERFACE SLAVE SELECT
SRD : serial data from LEMM -- DSP
SRTS1 : request to send 1 from IKAT
STAND : NTSC or PAL selection signal
STANDARDOUT : software choise between PAL and NTSC
STANDARDSW : handware choise between PAL and NTSC
STANDEM : status from emulator,input for DUART
STANDEMEN : enable signal for switch signal on emulator

STANDIN : NTSC or PAL selection signal (input for slave)
STATUS : RF/external video selection signal
STATUSF : CVBS/RGB video selection signal
STD : serial data from DSP -- LEMM
SSCLKIN : pin of CIAP (always pulled up)
SSM : START STOP MOTOR
SWAB : SUBCODING WORD CLOCK INPUT
SWAB-SSM : subcoding word clock output and start/stop input of the 7310
SWCLK : I^2S Word Select Clock out from CD60
SWEM : software dat to switch on the emulator
SYSCLK : >>SYSTEM CLOCK
SYSCLKA : >>
SYSCLK1 : >>
SYSCLK2 : >>
SYSCLK3 : 33.86MHz system clock to CIAP
TCAP : input capture feature for the on-chip timer
TCMP : output for the output compare feature of the on chip timer
TCK : scan clock boundary
TDI : boundary scan input
TDOCIAP : boundary scan output of CIAP
TDOVDSC : boundary scan output of VDSC
TL : TRACK LOSS of the TDA8808 combined with the radial error signal of the TDA8809
TMOUT : TRAY MOTOR OUT
TMS : boundary scan control line
TRAY : tray open/close signal
TRAYOC : TRAY open/close
TRAYSWITCH : tray open/close detection signal
TX2 : transmit data from IKAT
TXDE1..2 : transmit data
TXDI1..2 : transmit data
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)
UWN : read/write enable (for the upper part of the data: MD8..15) fir the DRAM (VDSC)
UWRN : Upper Write Read Not for NVRAM
UWRSN : read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-SLAVE
VC : output DC-motor (VOLTAGE CONTROL)
VDSC-INTN : interrupt request of the VDSC
V-FLAG : output to the DSP
VREFA : Reference Voltage on audio DAC
Vsub : substrate voltage
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
V1 : off track detection from DSIC2 to CD60
WIREDRC : see RC5
WR : write enable output of the DSP :this signal is asserted to write external memory (three SRAM'S FCB61C65) on the data bus D0..23 (active low)
WRMN : read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-MASTER
WRN : WRITE UPPER DATA BYTE (active when low)
WRPN1M..S : control input for channel 1 or 2 (active low) of the VSD
WSAB : >>WORD SELECT from A to B CHIP
WSAB2 : >>
WSABCD : 11.2896 MHz bitclock (I^2S)
XINB : delayed clock XIN from CDIC goes back to CDIC
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 : (XT2N) the system clock devided by two
XT4 : >>the system clock devided by four
XT41N : >>
XY : this DSP output signal selects which external memory space (X or Y) is selected
X_CLK : external audio I^2S -clock
X_DATA : external audio I^2S -data
X_WSIN : external audio I^2S -word select
Y : luminance signal (Y/C)
Y_GSC : Y (luminance) S-VHS (Y/C) or G for SCART
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 2 B-chip
12A..15A : ADDRESS BUS between CDIC and DSP

6.4 HEADPHONE PANEL





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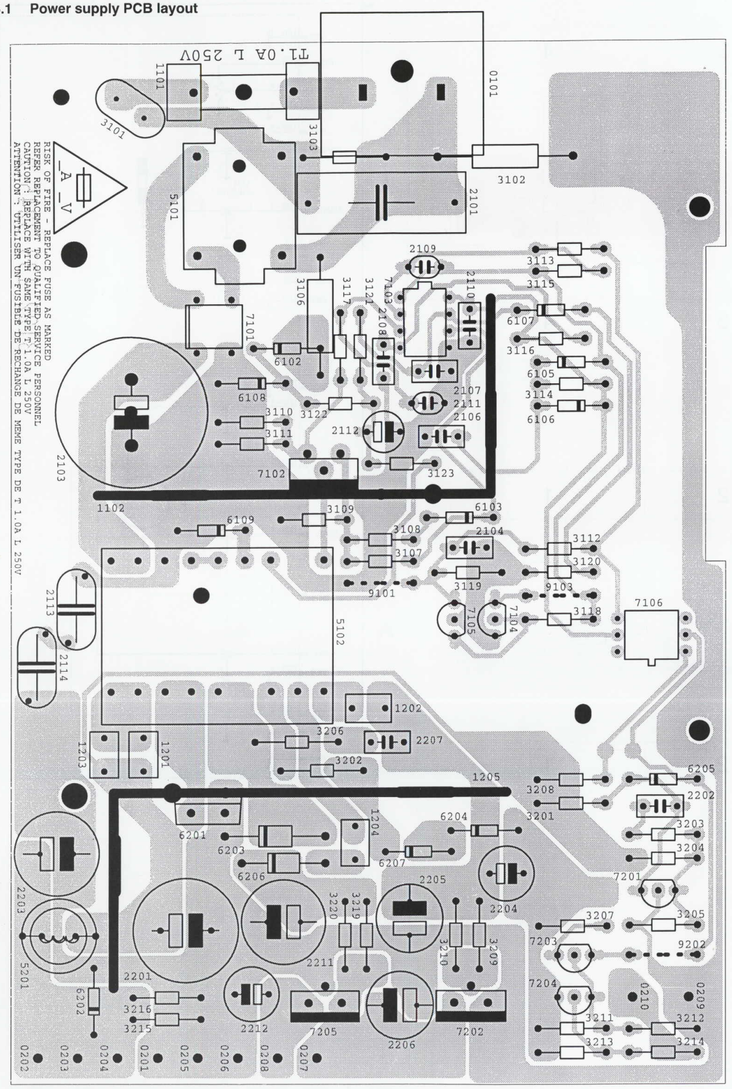
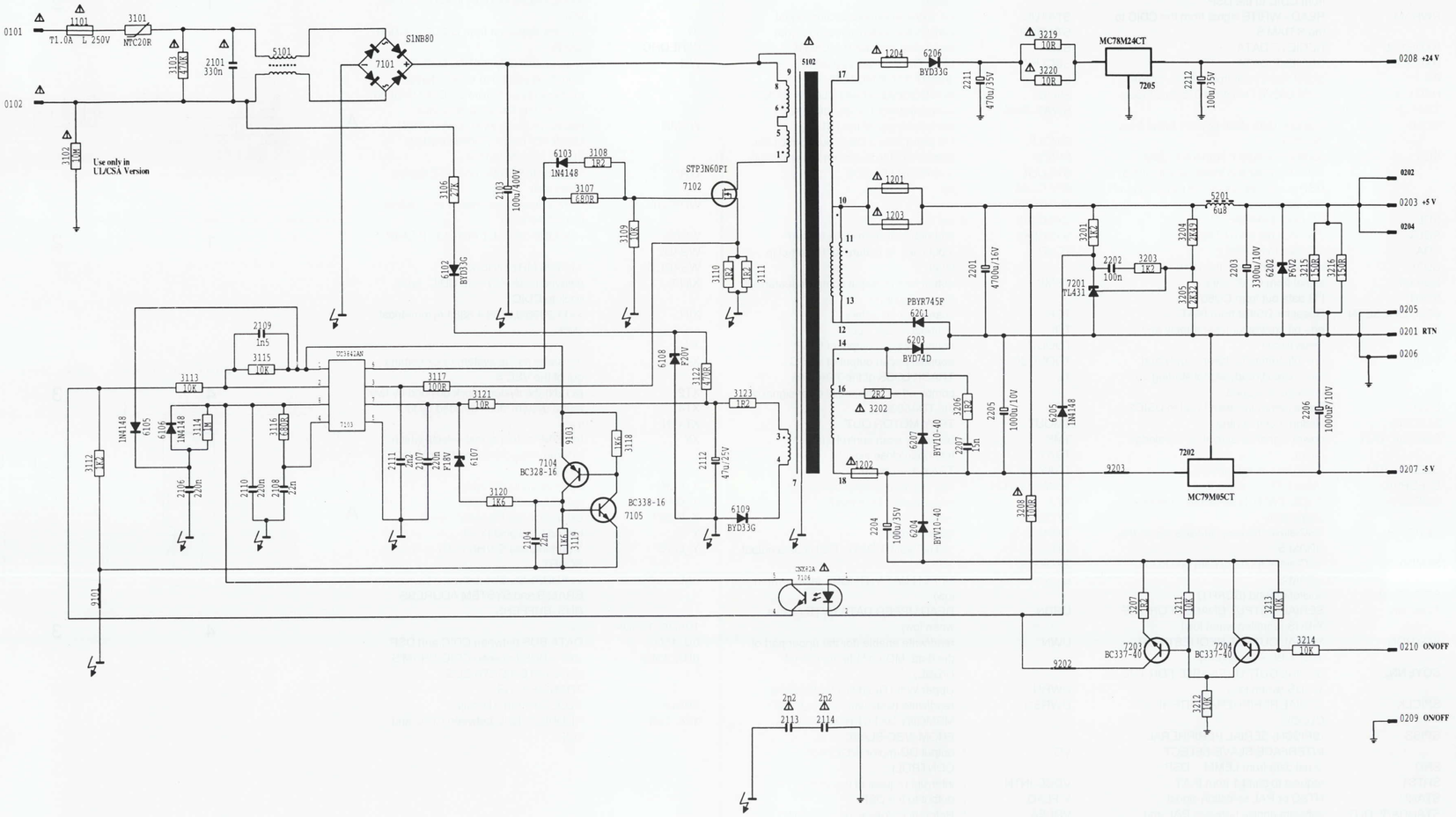
6.5 POWER SUPPLY UNIT

6.5.1 Power supply PCB layout



6.5.2 Powersupply circuit diagram



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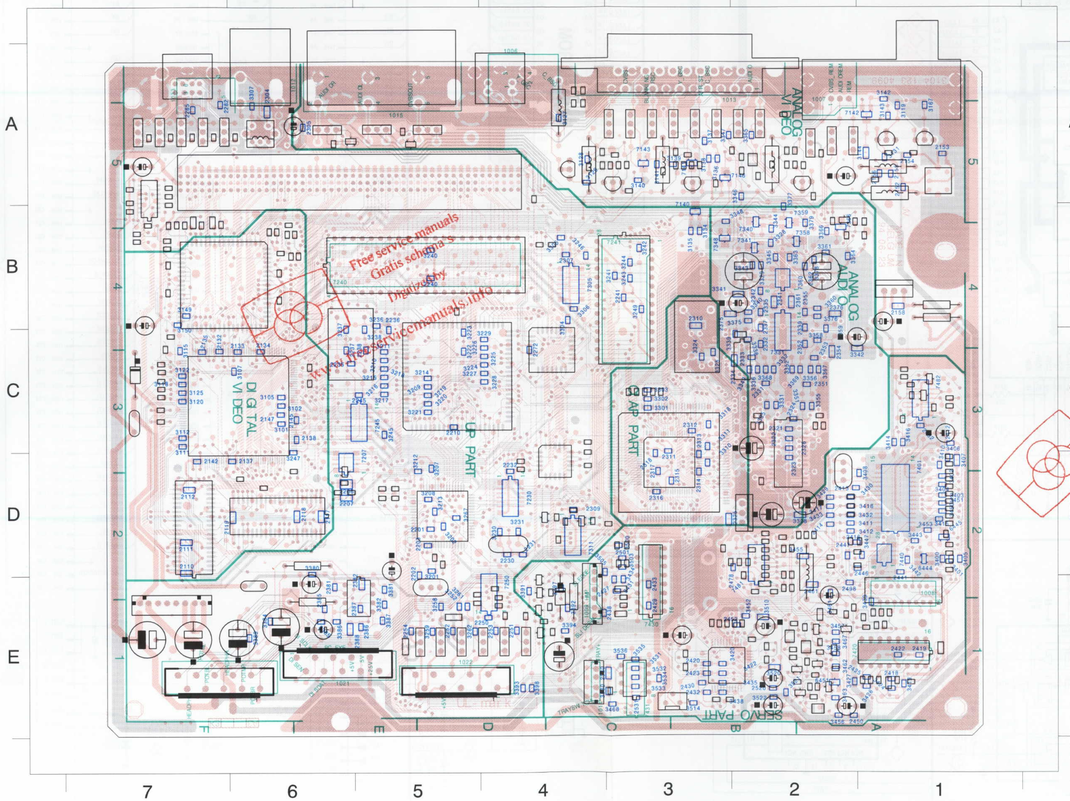
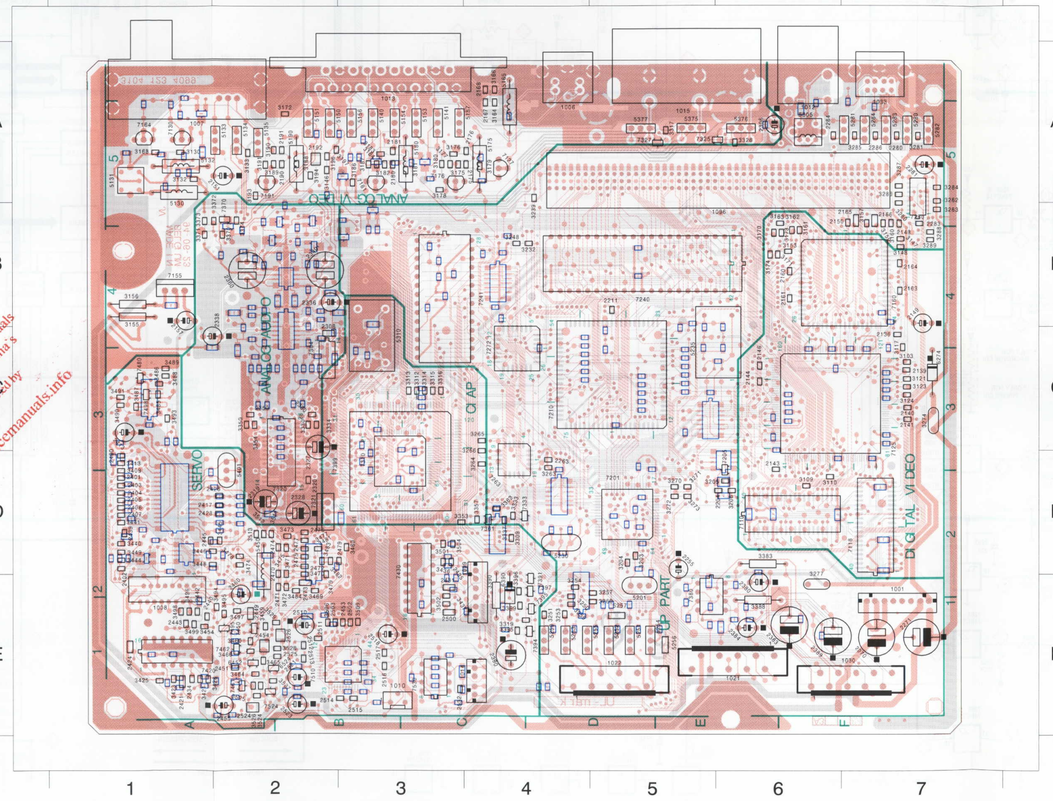
6.6 MAINPANEL

6.6.1 Mainpanel PCB layout, Tracks side



6.6.2 Mainpanel PCB layout, Component side



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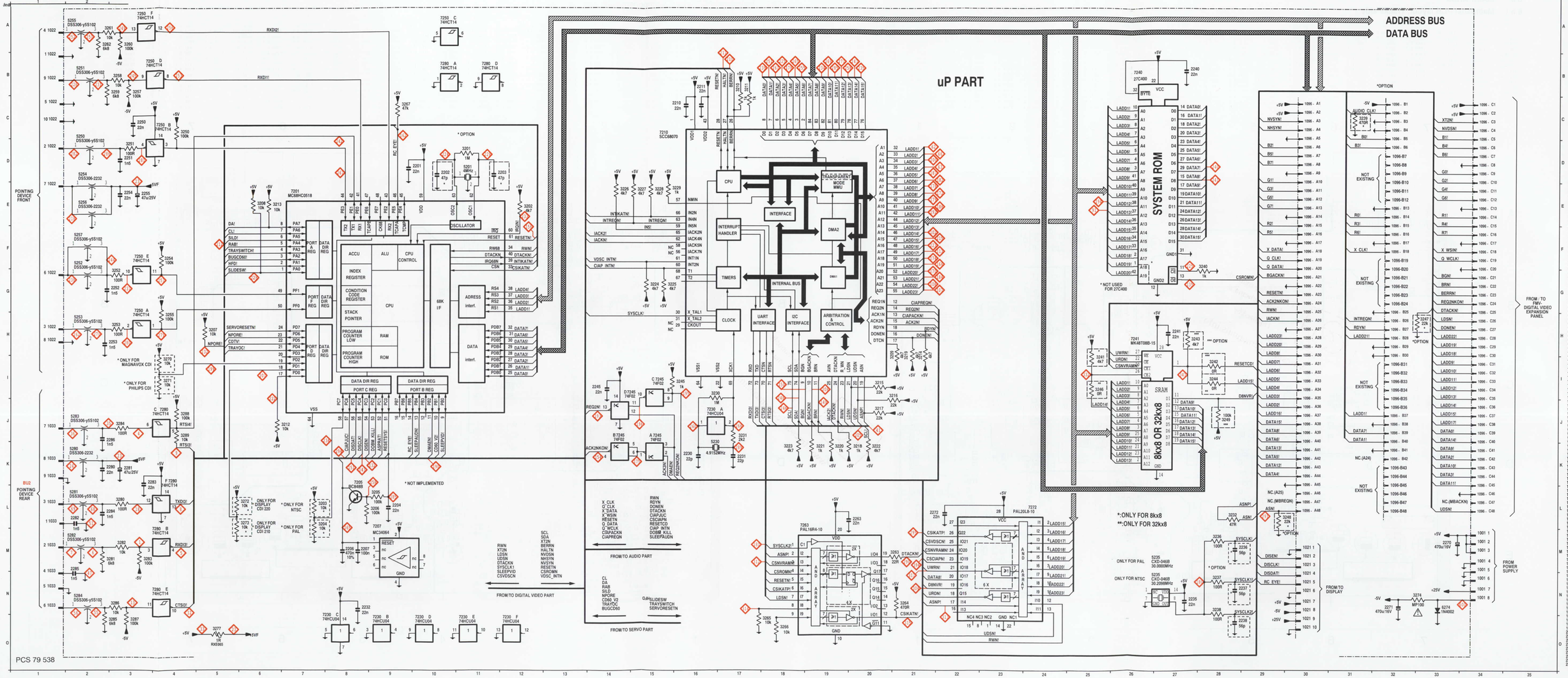
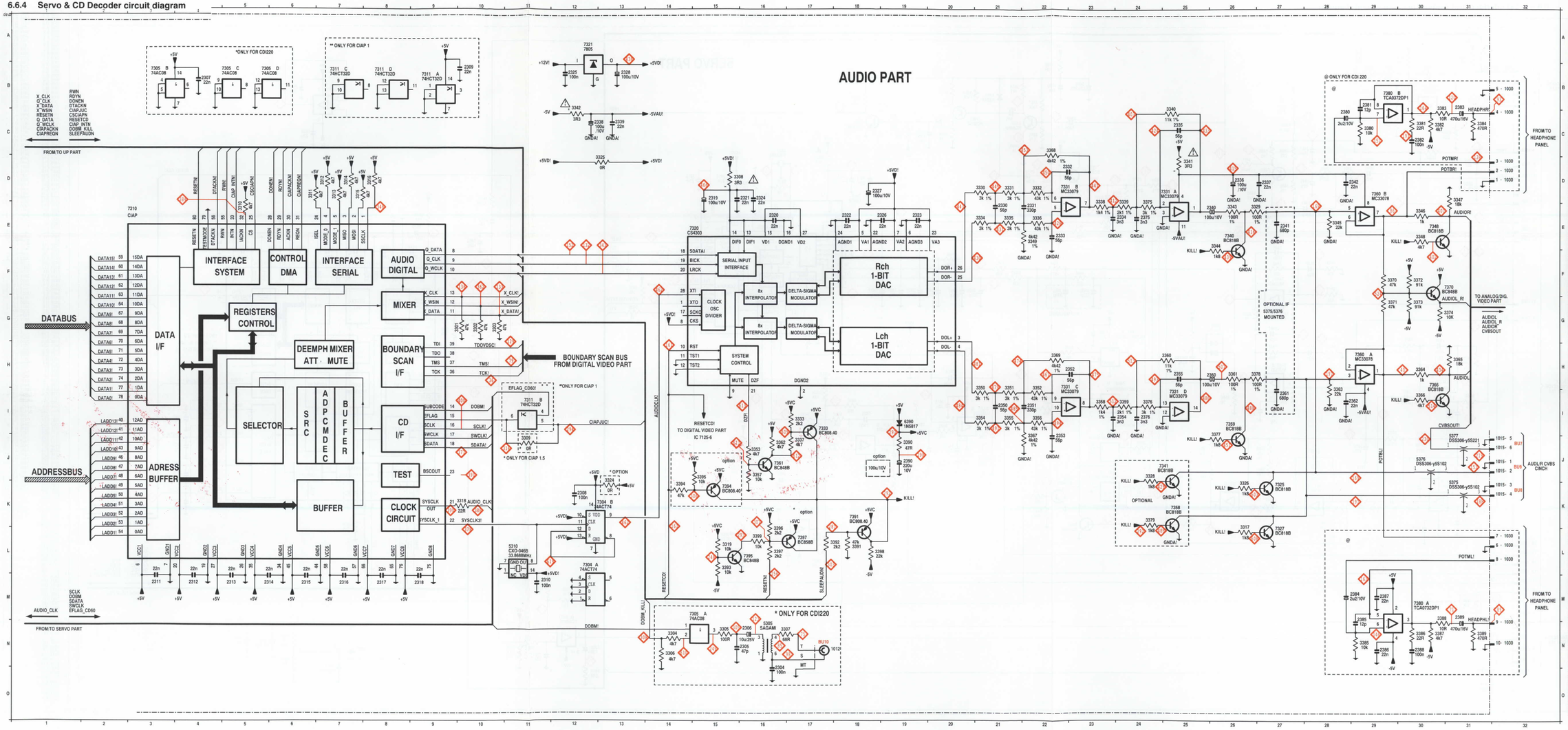
6.6.3 µP part circuit diagram



6.6.4 Servo & CD Decoder circuit diagram



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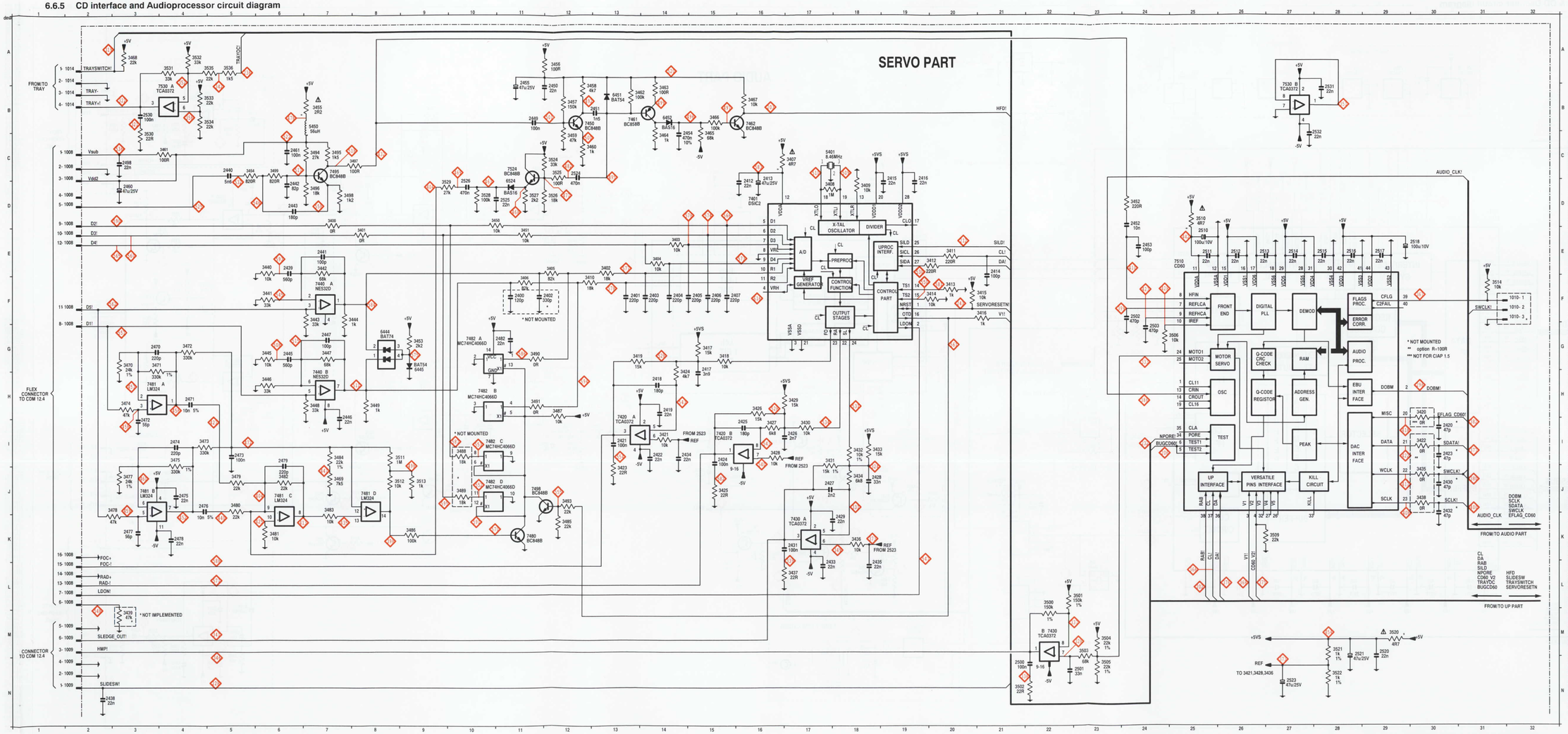
6.6.5 CD interface and Audioprocessor circuit diagram



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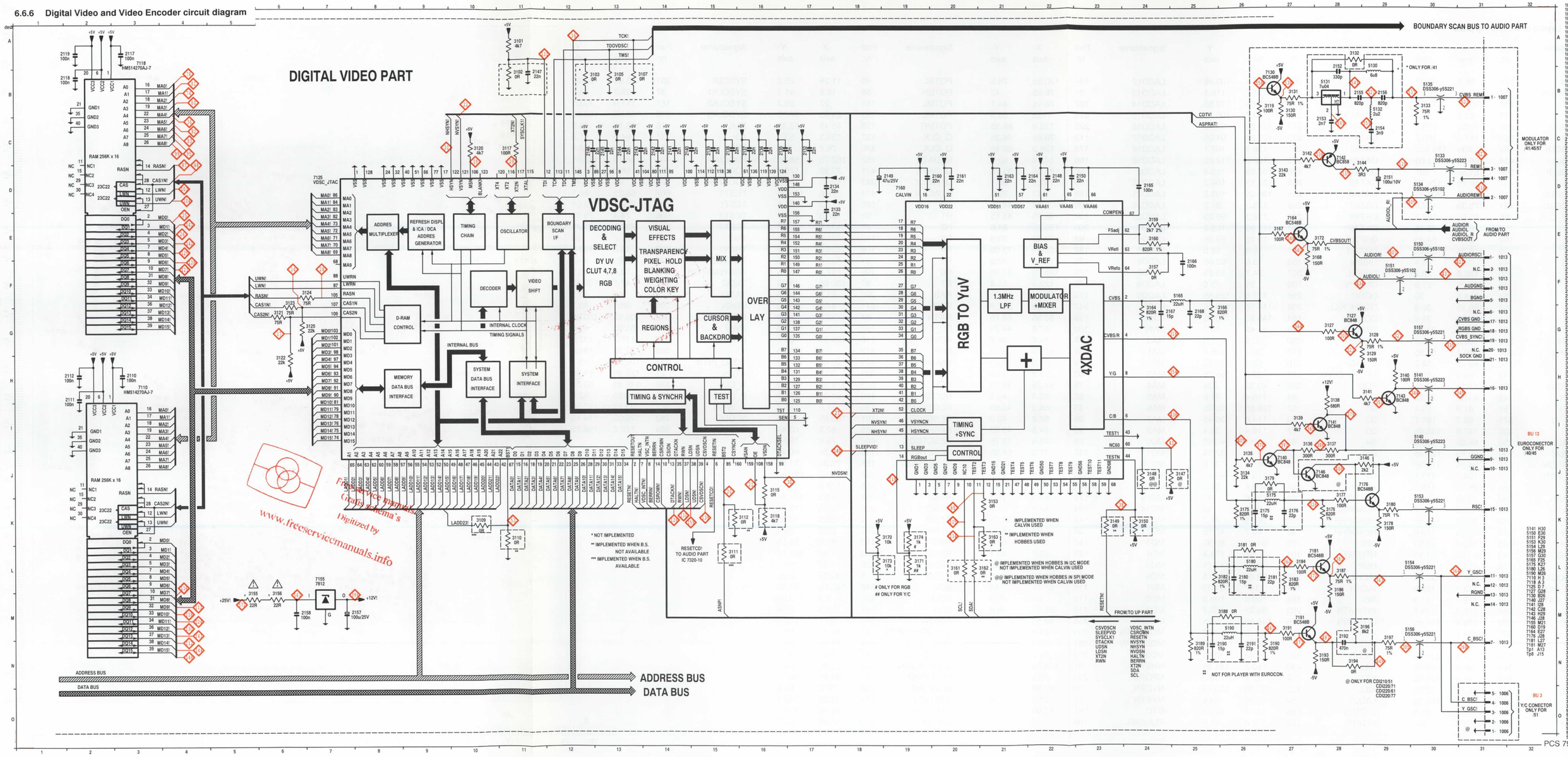
6.6.6 Digital Video and Video Encoder circuit diagram



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6.6.7 Layout of Measuring pads

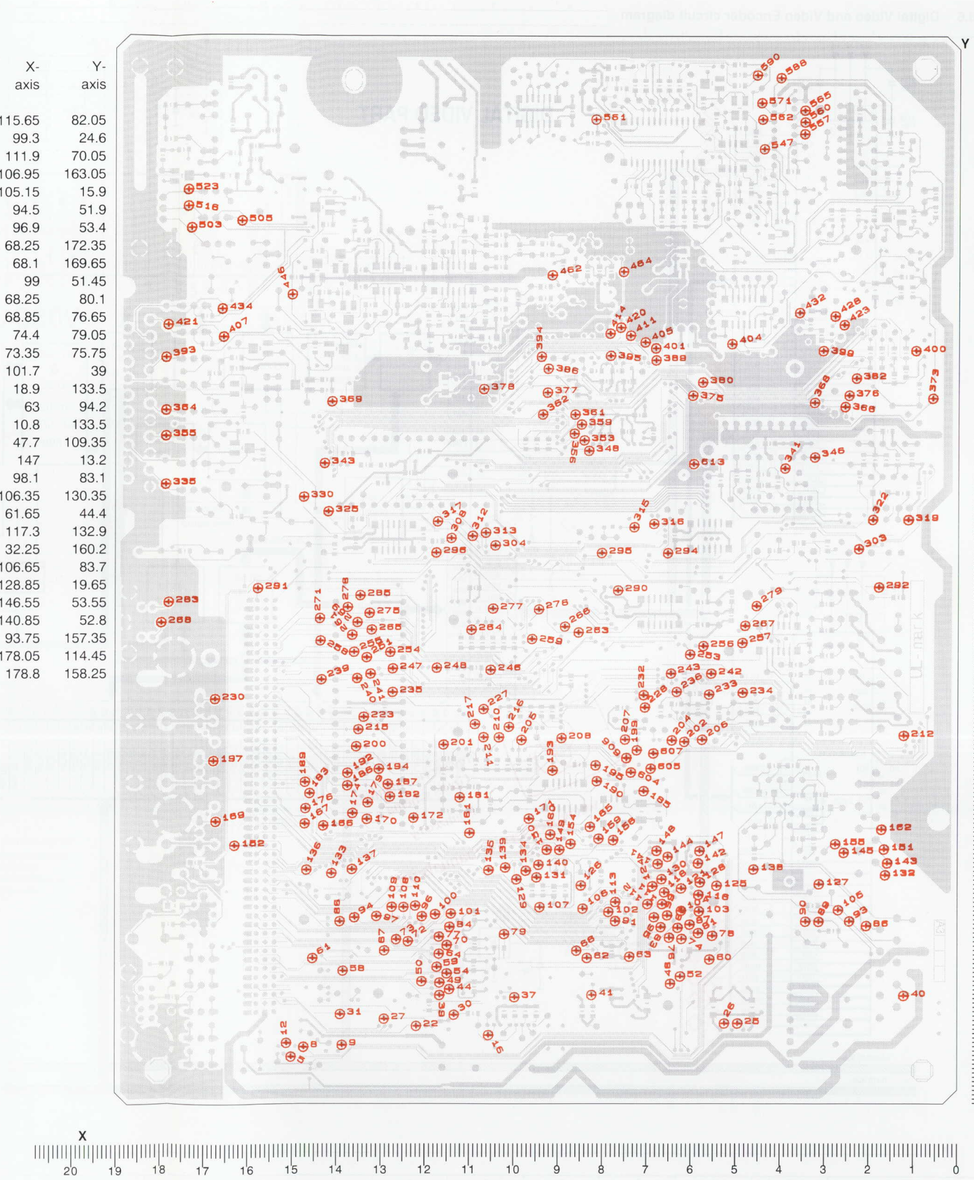
Signalname	Pad nr.	X-axis	Y-axis
ACK2N	171	96.3	65.25
ACK2NKON	154	86.85	59.55
ASN	291	157.8	117.6
ASNP	41	81.9	25.2
ASPRAT	405	70.65	173.7
ASPRAT	369	141.3	160.2
AUDIOCLK	462	91.695	188.805
AUDIOL	434	166.05	181.05
AUDIOL_R	505	161.55	201
AUDIOR	407	165.75	174.75
AUDIOREM	516	173.85	204.45
AUDIORSC	421	178.35	177.6
AUDIO_CLK	386	92.55	167.7
AUDL	197	167.7	78.15
AUDR	169	167.1	64.35
B0	39	116.25	25.05
B1	44	114	26.4
B2	50	120.3	28.2
B3	49	116.25	27.9
B4	54	114.6	30
B5	58	138.15	30.6
B6	59	116.85	31.5
B7	61	145.05	33.45
BERRN	210	103.2	83.7
BGACKN	208	89.1	83.55
BGN	150	92.25	58.2
BRN	149	89.4	58.2
BUGCD60	206	57.15	83.25
CAS1N	48	64.05	27.75
CAS2N	52	61.8	29.4
CD60_V2	375	59.7	161.7
CDTV	330	147.6	138.45
CIAPACKN	259	95.85	106.2
CIAPJUC	294	65.25	125.85
CIAPREQN	276	94.35	112.95
CIAP_INTN	277	104.7	113.1
CL	366	25.35	159.3
CSCIAPN	394	94.05	170.4
CSIKATN	315	72.9	131.7
CSIKATP	295	80.25	125.85
CSNVRAMN	312	109.35	129.6
CSROMN	135	105.3	53.55
CSVDSCN	139	101.55	54.15
CTSI3	12	150.9	14.1
CVBSOUT	230	167.4	92.25
CVBS_REM	503	173.1	199.5
CVBS_SYNC	335	178.8	141.3
C_BSC	268	179.7	109.8
C_BSC	393	178.8	170.25
D1	557	34.8	221.25
D2	590	45.75	234.6
D3	560	34.8	223.95
D4	565	34.8	226.65
D5	562	44.4	224.55
D8NVR	304	104.25	127.5
DA	376	24.45	161.85
DATA0	239	143.4	96.9
DATA1	251	133.2	102

Signalname	Pad nr.	X-axis	Y-axis
DATA10	269	135.3	109.95
DATA11	285	134.7	116.1
DATA12	271	143.85	110.85
DATA13	258	143.7	105.75
DATA14	247	127.35	99.45
DATA15	235	127.35	94.05
DATA2	261	136.5	107.1
DATA3	275	132.6	112.05
DATA4	278	137.55	113.4
DATA5	265	132.15	108.3
DATA6	255	136.05	103.2
DATA7	240	135.3	97.2
DATA8	241	132.3	98.25
DATA9	254	127.95	103.2
DISCLK	143	15.15	55.35
DISDAT	151	15.9	58.5
DISEN	132	15.6	52.65
DISSEL	207	74.7	83.25
DMAEN	190	81	73.8
DOBM	296	117.6	125.85
DOBM_KILL	308	114.15	129.15
DONEN	183	145.95	70.95
DTACKN	126	84.45	50.1
DTACKP	290	76.5	117.3
DZF	613	59.4	146.1
EFLAG	316	68.4	132.45
EFLAG_CD60	382	22.8	165.75
FOC-	588	40.35	234
G0	64	116.4	34.5
G1	67	128.85	35.25
G2	70	114.6	36.45
G3	77	116.4	38.4
G4	84	114	40.65
G5	72	123.45	37.35
G6	73	126.15	37.8
G7	101	113.7	43.65
HALTN	217	108.6	86.7
HEADPHL	89	30.6	42
HEADPHL	90	33.6	42
HEADPHR	105	26.25	44.7
HEADPHR	93	23.7	42.15
HFD	203	54.45	82.95
HFDDEF	404	51	173.4
HMP	346	32.1	147.75
IACK2	227	106.65	90.15
IACKN	167	147	64.05
IN5	264	109.5	108.3
INTIKATN	263	85.35	107.7
INTREQN	176	146.85	67.5
IREF	428	27.75	179.7
IRQIN	233	55.65	93.6
ISELIN	395	78.42	170.63
KILL	446	150.3	184.35
KILL	292	17.4	118.2
KILL	325	142.05	135.15
LADD1	62	82.95	33.6
LADD10	186	137.4	72.75
LADD11	192	137.4	75.6

Signalname	Pad nr.	X-axis	Y-axis
LADD12	194	130.35	76.5
LADD13	91	76.65	42
LADD14	102	78.15	44.1
LADD15	215	135	85.5
LADD16	223	133.8	88.35
LADD17	113	76.65	46.35
LADD18	174	136.2	66.45
LADD19	166	142.8	63.6
LADD2	66	85.35	35.25
LADD20	170	132.9	65.1
LADD21	189	147	73.5
LADD22	106	84	44.85
LADD23	107	93.75	45.15
LADD3	200	135.45	81.6
LADD4	63	73.35	33.9
LADD5	187	128.25	73.05
LADD6	182	127.8	70.2
LADD7	178	129.75	67.95
LADD8	172	122.4	65.4
LADD9	179	132.75	68.85
LDON	547	43.95	217.8
LDSN	159	80.55	60.75
LWN	103	57.6	44.25
MA0	78	54.6	38.7
MA1	81	57.75	39.3
MA2	74	61.5	37.95
MA3	60	55.2	33.3
MA4	76	64.35	38.25
MA5	82	62.4	40.5
MA6	83	66.3	40.65
MA7	95	67.8	42.9
MA8	99	64.8	43.35
MD0	25	48.9	18.75
MD1	147	57.6	58.05
MD10	124	68.25	49.95
MD11	130	66.15	51.6
MD12	141	67.05	55.05
MD13	112	69.3	45.9
MD14	144	64.8	56.7
MD15	148	67.35	58.05
MD2	26	51.9	18.75
MD3	142	57.9	55.2
MD4	125	53.7	50.1
MD5	128	57.45	50.85
MD6	121	61.65	49.5
MD7	116	57.75	48
MD8	111	66	45.9
MD9	118	65.55	48.6
MISOIN	356	86.55	153
MODE_0IN	359	84.9	155.1
MODE_1IN	361	86.4	157.35
MOSIIN	353	84.3	151.5
NHSYN	31	138.75	20.7
NPORE	232	70.5	93.45
NVDSN	30	112.95	20.55
NVSYN	22	121.5	18
OTD	561	82.05	224.4
PLAYSEL	199	72	80.85

Signalname	Pad nr.	X-axis	Y-axis
POTBL	40	11.25	25.2
POTBR	86	19.8	41.1
POTML	155	27	59.7
POTML	145	25.05	57.75
POTMR	138	45.45	53.85
Q_CLK	137	136.2	53.7
Q_CLK	420	76.2	177
Q_DATA	152	162.75	58.95
Q_DATA	411	73.95	175.2
Q_WCLK	343	142.95	146.1
Q_WCLK	414	78.6	175.65
R0	100	117.3	43.5
R1	96	120.3	43.05
R2	88	138.9	41.85
R3	110	121.8	45.45
R4	108	124.5	45.15
R5	94	135.6	42.75
R6	109	127.2	45.15
R7	97	130.65	43.05
RAB	202	61.2	82.8
RAD-	571	44.7	228.3
RASN	87	59.7	41.25
RC_EYE	162	16.5	63
RDYN	216	100.95	86.1
REF	373	5.4	161.25
REFHCA	423	25.65	177.75
REFLCA	399	30.3	171.9
REM	523	173.85	208.2
REQ2N	193	91.05	76.2
REQ2NKON	195	81.3	77.4
RESETCD	161	109.65	61.95
RESETCD	165	82.5	63.45
RESETCD	464	75.6	189.6
RESETN	156	77.25	60.45
RESETSYS	185	70.35	71.55
RFE	432	35.7	180.45
RSC	355	178.8	152.4
RTSI1	257	48.3	105.45
RTSI2	279	45.15	113.85
RTSI3	9	138.3	13.65
RTSI4	242	55.2	98.4
RWN	160	91.5	61.65
RXDI1	253	60	102.75
RXDI2	256	57	104.7
RXDI3	5	149.85	10.95
SCL	246	105.15	99.15
SCLK	400	9.3	172.05
SDA	248	117.3	99.6
SDATA	377	92.7	162.3
SERVORESETN	243	64.35	98.4
SILD	212	11.55	84.3
SLEDGE_OUT	341	38.85	145.2
SLEEPAUDN	303	22.05	126.9
SLEEPVID	140	94.05	54.75
SLIDESW	228	70.2	90.6
SSCLKIN	348	83.25	149.1
STANDIN	234	48.15	94.05
SWCLK	380	57.45	164.7

Signalname	Pad nr.	X-axis	Y-axis
SYSCLK	201	115.65	82.05
SYSCLK1	37	99.3	24.6
SYSCLK2	181	111.9	70.05
SYSCLK3	378	106.95	163.05
TCK	16	105.15	15.9
TDI	131	94.5	51.9
TDI	134	96.9	53.4
TDOCIAP	401	68.25	172.35
TDOCIAP	389	68.1	169.65
TDOVDSC	129	99	51.45
TEST1	607	68.25	80.1
TEST1	605	68.85	76.65
TEST2	606	74.4	79.05
TEST2	604	73.35	75.75
TMS	79	101.7	39
TRAY+	322	18.9	133.5
TRAYOC	236	63	94.2
TRAYSWITCH	319	10.8	133.5
TXDI2	267	47.7	109.35
TXDI3	8	147	13.2
UDSN	205	98.1	83.1
URDN	313	106.35	130.35
UWN	104	61.65	44.4
UWRN	317	117.3	132.9
V1	368	32.25	160.2
VDSC_INTN	211	106.65	83.7
XT2N	27	128.85	19.65
X_CLK	136	146.55	53.55
X_DATA	133	140.85	52.8
X_WSIN	362	93.75	157.35
Y_GSC	283	178.05	114.45
Y_GSC	364	178.8	158.25



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6.7 CONTROL & DISPLAY PANEL

6.7.1. Control & Display PCB

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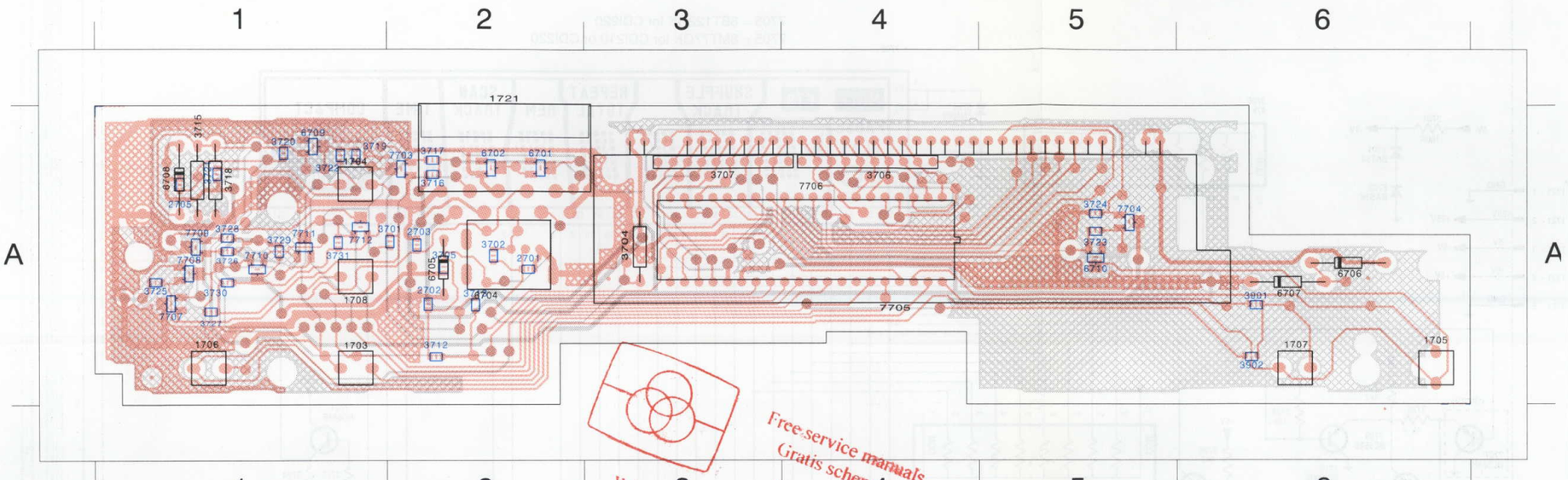
1705 A 6 1708 A 1 2702 A 2 3701 A 2 3705 A 2 3712 A 2 3716 A 2 3719 A 1 3722 A 1 3725 A 1 3728 A 1 3731 A 1 6701 A 2 6705 A 2 6708 A 1 7703 A 2 7706 A 4 7709 A 1 7712 A 1



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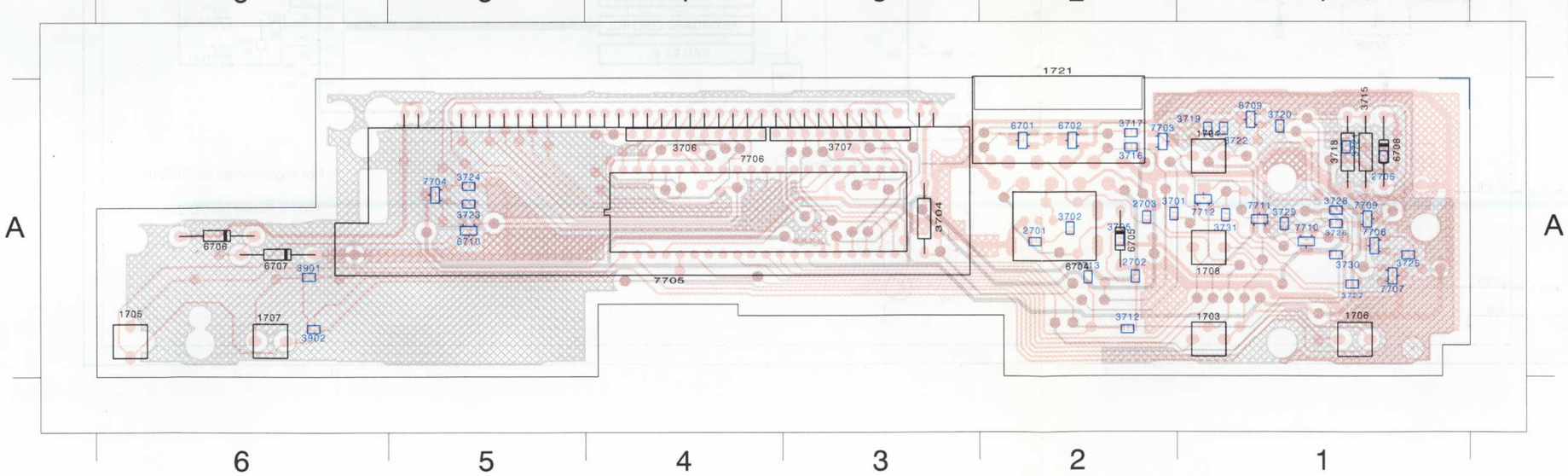
7710 A 1 7707 A 1 7704 A 5 6709 A 1 6706 A 6 6702 A 2 3901 A 6 3729 A 1 3726 A 1 3723 A 5 3720 A 1 3717 A 2 3713 A 2 3706 A 4 3702 A 2 2703 A 2 1721 A 2 1706 A 1 1703 A 1
7711 A 1 7708 A 1 7705 A 4 6710 A 5 6707 A 6 6704 A 2 3902 A 6 3730 A 1 3727 A 1 3724 A 5 3721 A 1 3718 A 1 3715 A 1 3707 A 3 3704 A 3 2705 A 1 2701 A 2 1707 A 6 1704 A 1
7712 A 1 7709 A 1 7706 A 4 7703 A 2 6708 A 1 6705 A 2 6701 A 2 3731 A 1 3728 A 1 3725 A 1 3722 A 1 3719 A 1 3716 A 2 3712 A 2 3705 A 2 3701 A 2 2702 A 2 1708 A 1 1705 A 6



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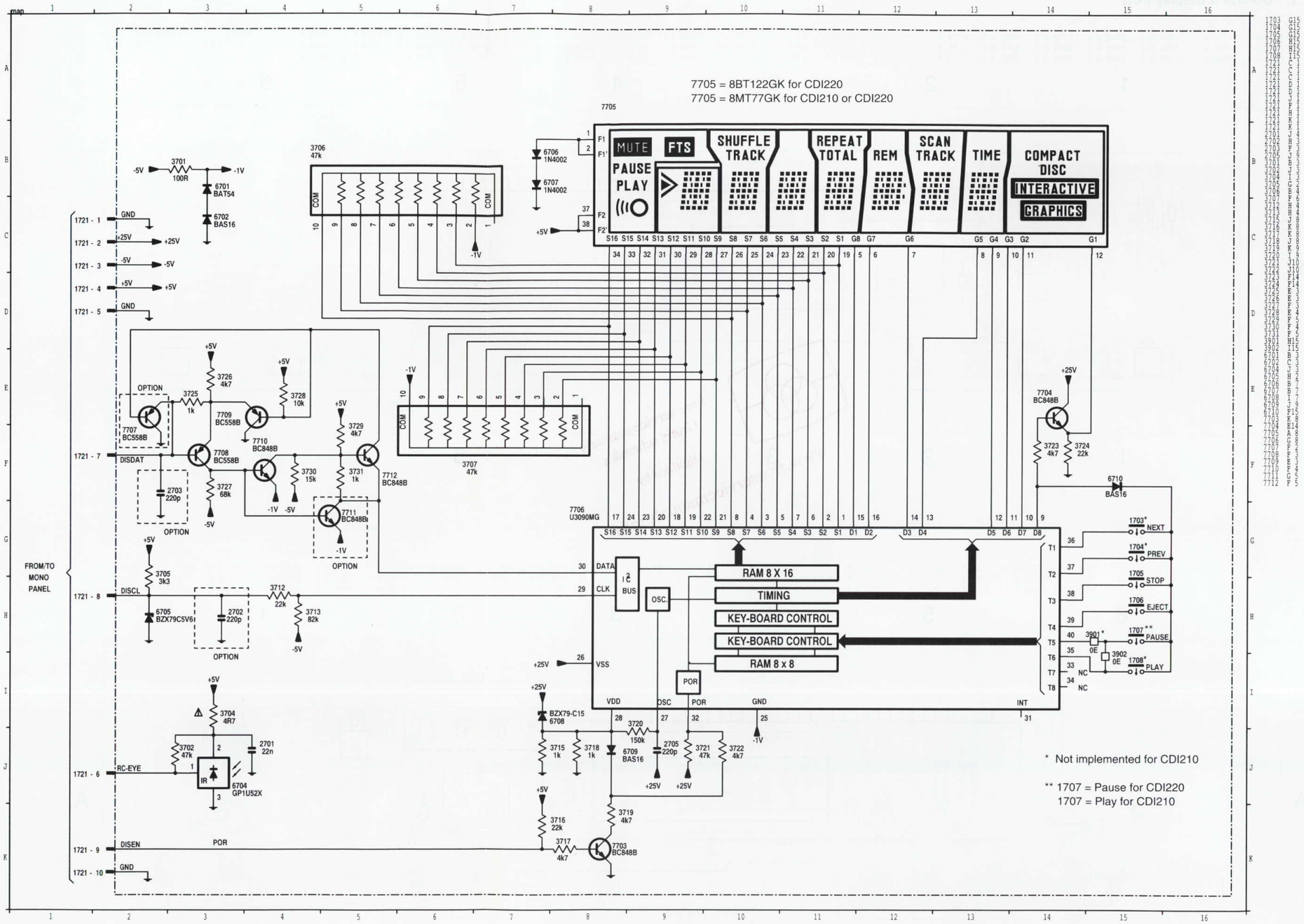
6.7.2. Control & Display circuit diagram



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7 DIAGNOSTICS AND SHORT DESCRIPTIONS

7.1 SHORT DESCRIPTION OF THE KEYCOMPNENTS

7.1.1 CPU SCC68070

- Microcontroller (UART, I/O-bus, I^2C-bus, 2 DMA-channels, memory management unit)
- 16 datalines (D0 .. D15) and 24 addresslines (A0 .. A23)
- 16 MByte addressrange:
  - 5 MByte for the monoboard
  - The rest for the extension
- Clockfrequency :
  30 MHz for PAL
  30.2 MHz for NTSC
  This **systemclock** is also a clock for the 'video chip' (VDSC) and PAL 7302 (16R4-10).
- The UART works on 4.9 MHz and provides in the communication between processor and terminal.

7.1.2 VDSC : Video Decoder and System Controller

System Interface

- Direct interface for 680X0 bus compatible devices
- 1 MByte ROM control
- 1 kByte I/O control
- Reset sequencer, including ROM shadowing
- Watchdog timer
- Generates chip selects for the systemrom

DRAM Interface

- On chip DRAM controller
- 4 MByte direct drive
  For CD-i 450 this is 1 MByte spread over 2 DRAM banks of 512 kByte.

Video Interface

- Up to 768 x 560 screen resolution
- Capability to display run-length coded files
- Mosaic effects
- 256 Color Look Up Table (CLUT)
- Two Delta YUV decoders
- Cursor shape, color and blink control
- Overlaying of four planes (cursorplane, plane A, plane B and backdrop plane)
- Special effects via weight control, priority control, etc.
- Dynamic programmable registers and CLUT reload in retrace period
- Digital RGB output (8 bit per component)
- Synchro generator for 50 and 60 Hz scan
- Synchronization with external video

General

- CMOS technology
- 160-pin QFP package

The DRAM banks are constantly being read by the VDSC to generate video. The VDSC has the highest priority but the DRAM is also a kind of system- memory (which is asynchronously read by the CPU).

7.1.3 SYSTEMROM 27C400

- 4 Mbit (EP)ROM
- Contains boot, operating system, hardware drivers and the player shell.

7.1.4 IKAT MC68HC05I8

- Integration of servo- and slave processor
  - Generates chip select for DSIC2 (servo controller) and CD60 (CD decoder)
  - Communication with and control of DSIC2
  - Control of the pointing device port and the player control keys.
- Works on 4 MHz.
- CMOS technology, 64 pin QFP

7.1.5 CIAP : CD-Interface and Audio Processor

- Establishes the link between the 'standard' CD- part and the CD-i part of the player.
- Decoding of the ADPCM-audio (base case audio).
- To perform audio mixing functions (as described in the Green Book).
- To be able to add external audio to the base case audio.
- At the CD-side the CIAP has to interface with the CD 60 for both main channel and subchan nel data.
- The CIAP does not control the servo but it can, via the Q-channel data, indicate which sector is currently read.
- it interfaces directly to the 68070.
- Works on 33 MHz; the devided by two clock is fed to the CD60 decoder and the audio DAC.

7.1.6 NVRAM + CLOCK

- 8Kx8 SRAM
- Time keeper
- Contains CSD-files (Configuration Status Description: info about system set-up) and FTS-files (files for the player shell and applications).

7.1.7 CALVIN

- Digital RGB to video encoder
- Four DAC's on chip
- Two NTSC/PAL Composite outputs
- Y/C outputs
- Analog RGB outputs
- Digital RGB inputs
- Automatic detection and support of PAL and NTSC modes
- Automatic detection and support of interlaced/noninterlaced modes
- Internal voltage reference available
- 68-pin PLCC

7.1.8 PAL's

- Glue logic
- Generates chip selects for IKAT, VDSC, NVRAM and CIAP. PAL 16L8-10]
- Generates DTACKN for the NVRAM and the SYSTEMROM [PAL 16R4-10].

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7.1.9 DSIC2 Digital Servo IC

- Sophisticated digital servo controller which provides all servo functions needed in a two stage three spot CD-system.
  [two stage means fine control by the actuator and coarse control by the sledge]
- Provides in all servo functions except the spindle motor control (which is done by the CD60).
- Special functions to improve the playability, to perform reliable access and to realize a high degree of shock insensitivity.
- 'Programmable' servo characteristics
- a three wire microprocessor interface
- Works on 8.46 MHz

7.1.10 CD60 CD-decoder

- Complete CD decoder
- HF is being transformed into a I^2S-format and digital out.
- Errorcorrection
- Spindle motor control with programmable motorloop bandwidths.
- On chip AGC for the EFM input signal
- On chip front end 6 bits ADC
- Subcode data processing
- Audio data interpolation processing
- Digital audio interface (EBU)

7.2 TROUBLESHOOTING AND REPAIR

This section contains some guides to aid the technician in troubleshooting the CDI player. The CD servo section and Analog Audio section are similar to any CD player. Thus, the same techniques for troubles hooting 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 equivalent) to run and test the functioning of the µP section, CIAP section or digital video section.
The Service Shell provides tests for the Video and Servo and Decoder circuits. Section 5.3 covers all the Service Shell test procedures.
The analog video/audio and servo & CD decoder circuitry can be serviced to the component level, the CD Mechanism (CDM12) is also replaced as an assembly. Disassembly instructions are provided on the exploded views.
If the defective item is in the circuitry of the µP section, CIAP section or digital video section, then the complete main board must be replaced and sent back to a local central repairshop. See section 3.5 and 3.6.

Troubleshooting hints:

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

7.2.2 Troubleshooting and Service the µP section, CIAP section or digital video section

The mainboard is replaced as a module when parts of the µP section, CIAP section or digital video section are defective. The technician must know the functioning of those sections 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 test indicates a fault, replace the complete mainboard. If the test cannot be initiated, check the power sources and main clock signals on the µP section. If all supplies and clock signals are present, replace the mainpanel.

7.2.3 Servo & CD Decoder 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.
Also if a disc is inserted and the disc type is recognized it is obvious that the Servo and CD decoder circuit is functioning When there is a symptom indicating a fault in the Servo 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 Servo & CD decoder schematic diagrams). If the CDM does not start, check for Vdd, clock, and reset on the IKAT, DSIC2 and CD60.
If these signals are present, perform the CD drive test in the Service Shell or Low Level test. If there is a communication failure, proceed with the 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 CD drive test modes. These modes are the standard CD servo test modes to test the Focus, radial and turntable control functions. If there is a failure in the servo test modes, further checks with measurements should reveal the fault If the servo circuits are functioning, check the decoder circuits. Activity should be seen on the (SDATA, SWCLK and SCLK) and DOBM. If there is no activity, check the supply (Vdd) and input signals (HF, AUDIO_CLK).
When the servo and decoder circuits are functioning properly, there may be a problem in the CD interface & Audio Processor circuitry (CIAP)

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7.2.4 Video Section Troubleshooting

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

Symptom 1:
the player shell is displayed, and the disc is recognized, but video from the disc cannot be displayed. If this condition exists, the Digital Video section, Servo and analog video circuits are functioning. Since the player shell is displayed, the video synthesizer circuit is functioning. However, there must be a fault on the CD interface section, because the video data from the disc comes via this section in the first place.

Symptom 2:
no video, while audio is functioning. This symptom may be caused by either the Digital Video part or by the Analog Video circuit. A few voltage and signal measurements can quickly isolate the problem.

Symptom 3:
no color. This symptom is most likely caused by a problem in the CALVIN ic. Check the CVBS output on pin 2 of IC7160

7.3 MEASUREMENTS

All signals, which are refered to a name and/or to a pin number of an IC can be measured at certain measuring pads on the board. Use these pads on the board, to prevent short circuiting caused by the metal point of measuring probes. See drawing 6.4.6 LAYOUT OF THE MEASURING PADS

7.3.1 A general check of the main panel

Test of the DC power supply voltages

Measurement method
Check if the voltages on the key-components listed below are within the tolerance range.

component pos. nr.	name	pin	voltage
7210	68070	1, 43	+5V ± 10%
7201	IKAT (MC68HC05I8)	59	+5V ± 10%
7240	SYSROM (27C400)	22	+5V ± 10%
7241	NVRAM	28	+5V ± 10%
7125	VDSC	3, 9, 27, 36, 41, 61, 80, 95, 100, 112, 119, 124, 130, 140, 148	+5V ± 10%
7160	CALVIN	16, 22, 51, 57, 61, 65, 66	+5V ± 10%
7310	CIAP	6, 20, 27, 35, 45, 58, 66, 76	+5V ± 10%
7401	DSIC2	12, 20, 28	+5V ± 5%
7510	CD60	11, 15, 17, 29, 31, 42, 44	+5V ± 5%

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7.3.2 Test of the clocksignals

Measurement method
These measurements have to be carried out just after hardware reset. This is done each time after opening the lid or after power-on.
Use a FET-probe to minimalise the oscillator-loads.

System clock

30.2098 MHz ± 20 ppm (NTSC)
30.0000 MHz ± 50 ppm (PAL)

This system clock must be present at the following points:

IC 7210 on pin 30
IC 7125 on pin 115
IC 7302 on pin 1

At IC 7210 pin 29 the Clock divided by two must be present:

15.0000 MHz ± 50 ppm (PAL)
15.1049 MHz ± 20 ppm (NTSC)

At IC 7210 pin 69 the UART-clock must be present:

4.9152 MHz ± 50 ppm

At IC 7201 the clock of the 68HC05I8 must be present:

4.000 MHz ± 55 ppm

At connector 1096 on pin C3 the XT2N-clock must be present:

15.1049 MHz ± 20 ppm (NTSC)
15.0000 MHz ± 50 ppm (PAL)

At IC 7310 on pin 22 the CIAP-clock must be present:

33.8688 MHz ± 50 ppm

At IC 7401 on pin 19 the DSIC2-clock must be present:

8.4672 MHz ± 50 ppm

At IC 7510 on pin 13 the AUDIO_CLK-clock must be present:

16.9344 MHz ± 50 ppm

7.3.3 Test of the I2S Interface

SDATA IC 7510, pin 21 : block wave signal
SWCLK IC 7510, pin 22 : 44.1 kHz (CDDA)
SCLK IC 7510, pin 23 : 2.8224 MHz (CDDA)

7.3.4 Test of the microcontroller 68070

Check after power on and RESET = +5V.
HALTN IC 7210, pin 27 : +5V
RESETN IC 7210, pin 28 : +5V
DTACKN IC 7210, pin 24 : changing +5V/0V
BERRN IC 7210, pin 26 : +5V

7.3.5 Test of the hardware with the Low Level Test

This test makes it possible to test the hardware with software.
Connect a terminal to the UART of the microcontroller 68070 via connector 1032.

Settings of the terminal:
Baudrate : 9600
start bit : 1
data bits : 8
stop bits : 0
no parity/no handshake

To start the low level test, hit the space bar while putting the power on.
To test the PCB you only have to follow the instructions on the screen.

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8 PARTSLIST

8.1 Partslist of the cabinet

Item	Codenumber	Description
1	4822 444 40608	Front assy
1	4822 444 40638	Front assy /77
9	4822 410 62316	Powerknob assy
22	4822 502 30408	PL3X10PAN<STZNBK
23	4822 502 30408	PL3X10PAN<STZNBK
24	4822 502 30408	PL3X10PAN<STZNBK
25	4822 502 30408	PL3X10PAN<STZNBK
26	4822 502 30408	PL3X10PAN<STZNBK
27	4822 502 30408	PL3X10PAN<STZNBK
30	2511 076 50011	PL3X6PAN<STZNBK
31	2511 076 50011	PL3X6PAN<STZNBK
44	4822 413 51434	Volume knob
63		Bracket
65	4822 444 40802	Tray front
70	4822 502 12795	M2,5X5PAN<STZNBK
75	4822 502 12795	M2,5X5PAN<STZNBK
76	4822 502 12795	M2,5X5PAN<STZNBK
77	4822 502 12795	M2,5X5PAN<STZNBK
81	Tray loader	SEE SEPARATE LIST
100		Sticker
151	4822 444 60898	Cover
171	4822 502 12795	M2,5X5PAN<STZNBK
172	4822 502 12795	M2,5X5PAN<STZNBK
173	4822 502 12795	M2,5X5PAN<STZNBK
174	4822 502 12795	M2,5X5PAN<STZNBK
175	4822 502 12795	M2,5X5PAN<STZNBK
177	4822 502 12795	M2,5X5PAN<STZNBK
178	4822 502 12795	M2,5X5PAN<STZNBK
181		Frame assy
182		Loader support
183		Spacer locking
184		Spacer locking
185		Remod. bracket
186	4822 402 61422	Spacer
187	4822 402 61422	Spacer
188	4822 402 61422	Spacer
191		ZN 3X6 TORX
192		ZN 3X6 TORX
195		Gliding support
196	2511 077 00031	ZN M2,5X28 TORX
200	2511 077 00031	ZN M2,5X28 TORX
202	4822 502 12795	M2,5X5PAN<STZNBK
203	4822 502 12795	M2,5X5PAN<STZNBK
207		ZN 3X6 TORX
208		ZN 3X6 TORX
209	4822 502 12795	M2,5X5PAN<STZNBK
210	4822 502 12795	M2,5X5PAN<STZNBK
211	4822 502 30408	PL3X10PAN<STZNBK
212	4822 502 30408	PL3X10PAN<STZNBK
213	4822 502 30408	PL3X10PAN<STZNBK
214	4822 502 30408	PL3X10PAN<STZNBK
217	4822 502 12795	M2,5X5PAN<STZNBK
218	4822 502 12795	M2,5X5PAN<STZNBK
219	4822 502 12795	M2,5X5PAN<STZNBK
220	4822 502 12795	M2,5X5PAN<STZNBK
223	4822 502 30438	PL3X6PAN<STZNBK
224	4822 502 30438	PL3X6PAN<STZNBK
225		M3X4PAN<STZNBK
226		M3X4PAN<STZNBK
251	4822 462 41992	Foot
252	4822 462 41992	Foot
255	4822 462 40409	Plate for foot
256	4822 462 40409	Plate for foot
259	4822 502 12795	M2,5X5PAN<STZNBK
260	4822 502 12795	M2,5X5PAN<STZNBK
266		Textplate
268	4822 502 12795	M2,5X5PAN<STZNBK
269	4822 502 12795	M2,5X5PAN<STZNBK
270	4822 502 12795	M2,5X5PAN<STZNBK
274	4822 502 12795	M2,5X5PAN<STZNBK
275	4822 502 11667	M3X6PAN<STZNBK
276	4822 502 30408	PL3X10PAN<STZNBK
277	4822 502 30408	PL3X10PAN<STZNBK
278	4822 502 30408	PL3X10PAN<STZNBK
279	4822 502 30408	PL3X10PAN<STZNBK
280	4822 502 30408	PL3X10PAN<STZNBK
282		Earth plate
285		Cover plate assy
286	3104 128 91091	M2,5X6 TRX SLT
287	3104 128 91091	M2,5X6 TRX SLT
301	4822 321 10249	Mainscord /40
301	4822 321 10886	Mainscord /45
302	4822 321 20308	Audio cord set
309	4822 736 22247	Dir. for use
313	4822 321 61452	Digital Out cable
315	4822 321 61579	Video cord set
316	4822 321 61849	TPX 3500 cord
317	4822 320 11096	Antenna cable /77
318	4822 218 10523	IR-remote Control
1005	4822 214 52229	Power supply unit \60\61\65
1005	4822 214 52235	Power supply unit \77
BU-11	4822 267 51216	MINIDINN socket
BU-12	4822 267 31572	Headphone socket
P-1	4822 101 21199	10 kΩ Log.

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8.2 Parts List Of The Tray Loader

Item	Codenumber	Description
1	4822 464 50896	Chassis assy
2	4822 444 50679	Slide assy
3	4822 464 50895	Subchassis
4		Cover plate
5	4822 402 61412	Clamper assy
6	4822 325 50215	Suspension
7	4822 325 50215	Suspension
8	4822 325 50215	Suspension
9	4822 325 50215	Suspension
10	4822 276 13222	Switch assy
11	4822 361 21492	Motor assy
12		Screw M2,2x4
13		Screw M2,2x4
14	4822 528 81465	Pulley gear
15	4822 528 81464	Drive pinion
16	see item 1	Spindle
17	see item 1	Spindle
18	4822 358 31168	Drive belt
20	4822 691 30354	CDM 12.4
21		Lead assy
24		Polylub. GLY801
25		Familysheet
35		Fondam FM3
36	see item 2	Ornamental tule
37	see item 2	Ornamental tule
38	see item 2	Ornamental tule
39	see item 2	Ornamental tule
40	4822 325 60379	Damping grommet
41	4822 325 60379	Damping grommet
42	4822 325 60379	Damping grommet
61		Lead assy

8.3 Partslist of the display and powersupply panel

Item	Codenumber	Description		
1703	4822 276 13114	TACT SWITCH		
1704	4822 276 13114	TACT SWITCH		
1705	4822 276 13114	TACT SWITCH		
1706	4822 276 13114	TACT SWITCH		
1707	4822 276 13114	TACT SWITCH		
1708	4822 276 13114	TACT SWITCH		
1721		CONN 10P M RFK1		
2701	5322 122 32654	22n	X7R	PM10
2705	4822 122 33575	220p	50V	
3701	4822 122 33575	100R		PM5
3702	4822 051 20473	47k		PM5
3704	4822 052 10478	4R7		PM5
3705	4822 051 20332	3k3		PM5
3706	4822 116 90857	8x 47k		PM5
3707	4822 116 90857	8x 47k		PM5
3712	4822 051 20223	22k		PM5
3713	4822 051 20823	82k		PM5
3715	4822 050 21002	1k0	1/8W	PM5
3716	4822 051 20223	22k		PM5
3717	4822 051 20472	4k7		PM5
3718	4822 050 21002	1k0	1/8W	PM5
3719	4822 051 20472	4k7		PM5
3720	4822 051 20154	150k		PM5
3721	4822 051 20473	47k		PM5
3722	4822 051 20472	4k7		PM5
3723	4822 051 20472	4k7		PM5
3724	4822 051 20223	22k		PM5
3725	4822 051 10102	1k		PM5
3726	4822 051 20472	4k7		PM5
3727	4822 051 20333	33k		PM5
3728	4822 051 20103	10k		PM5
3729	4822 051 20472	4k7		PM5
3730	4822 051 20153	15k		PM5
3731	4822 051 10102	1k		PM5
3902	4822 051 20008	0R05		
3999		PROCES SCHIP RP		
6701	4822 130 80622	BAT54		
6702	5322 130 31928	BAS16		
6704	4822 214 52009	GP1U58XP		
6705	4822 130 34173	BZX79-C5V6		
6706	5322 130 30684	1N4002GP		
6707	5322 130 30684	1N4002GP		
6708	4822 130 34281	BZX79-C15		
6709	5322 130 31928	BAS16		
6710	5322 130 31928	BAS16		
7703	5322 130 41982	BC848B		
7704	5322 130 41982	BC848B		
7705	4822 130 91194	DISPLAY FTD		
7706	4822 209 72226	U3090MG-40P		
7708	5322 130 41983	BC858B		
7709	5322 130 41983	BC858B		
7710	5322 130 41982	BC848B		
7712	5322 130 41982	BC848B		

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Item	Codenumber	Description		
1	4822 265 31015	SOC SUPP		
1011		HEATSINK		
1112	4822 492 70143	SPRING1		
1213		HEATSINK		
1314	4822 492 70143	SPRING1		
1101	4822 256 30517	FUSE HOLDER		
1201	4822 252 51179	PROT DEV 65V 4A		
1202	4822 252 51179	PROT DEV 65V 4A		
1203	4822 252 51179	PROT DEV 65V 4A		
1204	4822 252 51179	PROT DEV 65V 4A		
2101	5322 121 44222	330n	250V	PM20
2103	4822 124 42191	100µ	400V	PM20
2104	4822 121 41856	22n	100V	PM5
2106	4822 121 42408	220n	50V	PM10
2107	4822 121 42408	220n	50V	PM10
2108	4822 121 41856	22n	100V	PM5
2109		1n5	50V	PM10
2110	4822 121 42408	220n	50V	PM10
2111	5322 122 32818	2n2	63V	P80M20
2112		47µ	25V	PM20
2113	4822 122 32576	2n2	400V	PM20
2114	4822 122 32576	2n2	400V	PM20
2201	4822 124 23183	4700µ	16V	PM20
2202	5322 121 42386	100n	50V	PM10
2203		3300µ	10V	PM20
2205		1000µ	10V	PM20
2206		1000µ	10V	PM20
2207		15n	100V	P50M20
2211	4822 124 41334	470µ	35V	PM20
2212		100µ	35V	PM20
3101		20R	NTC	PM20
3103	4822 053 20474	470k		PM5
3106	4822 053 11273	27k		PM5
3107	4822 116 52228	680R		PM5
3108		1R2		PM5
3109	4822 116 52233	10k	1/6W	PM5
3110		1R2		PM5
3111		1R2		PM5
3112	4822 116 52207	1k2	1/6W	PM5
3113	4822 116 52233	10k	1/6W	PM5
3114	4822 116 52235	1M0	1/6W	PM5
3115	4822 116 52233	10k	1/6W	PM5
3116	4822 116 52228	680R	1/6W	PM5
3117	4822 116 52175	100R	1/6W	PM5
3118	4822 116 52246	1k6	1/6W	PM5
3119	4822 116 52246	1k6	1/6W	PM5
3120	4822 116 52246	1k6	1/6W	PM5
3121	4822 116 52176	10R	1/6W	PM5
3122	4822 116 83883	470R		PM5
3123		1R2		PM5
3201		1K2		PM5
3202	4822 052 10228	2R2		PM5
3203		1k2		PM5
3204		2k49		PM1
3205		2k32		PM1
3206		1R2		PM5
3207		1R2		PM5
3208	4822 052 10101	100R		PM5
3211	4822 116 52233	10k	1/6W	PM5
3212	4822 116 52233	10k	1/6W	PM5
3213	4822 116 52233	10k	1/6W	PM5
3214	4822 116 52233	10k	1/6W	PM5
3215	4822 116 83868	150R		PM5
3216	4822 116 83868	150R		PM5
3219	4822 052 10229	22R		PM5
3220	4822 052 10229	22R		PM5
5101	4822 157 71268	FILTER CHOKE		
5102		TRANSFORMER		
5201		6µ8		PM20
6102	4822 130 42489	BYD33G		
6103	4822 130 30621	1N4148		
6105	4822 130 30621	1N4148		
6106	4822 130 30621	1N4148		
6107	4822 130 31024	BZX79-F18		
6108	4822 130 34499	BZX79-F20		
6109	4822 130 42489	BYD33G		
6201	4822 130 83073	PBYR745F		
6202	4822 130 34167	BZX79-F6V2		
6203	4822 130 82035	BYD74D		
6204	4822 130 32245	BYV10-40		
6205	4822 130 30621	1N4148		
6206	4822 130 42489	BYD33G		
6207	4822 130 32245	BYV10-40		
7101	4822 130 83707	S1NB80		
7102	4822 130 63689	STP3N60FI		
7103	4822 209 83909	UC3842AN		
7104	4822 130 41023	BC328-16		
7105	4822 130 40892	BC338-16		
7106	4822 130 10025	CNX82A		
7201	4822 209 81397	TL431CLPRM		
7202	4822 209 11079	MC79M05CT		
7203	4822 130 41344	BC337-40		
7204	4822 130 41344	BC337-40		
7205	5322 209 60027	MC78M24CT		

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8.4 Parts list of the mainboard

Item	Codenumber	Description			
1001	4822 265 41119	CON V 08P M			
1007	4822 214 52064	RF modulator /61			
1007	4822 214 52046	RF modulator /77			
1007	4822 214 52071	RF modulator /65			
1008		CON H 16P F			
1009		CON V 06P M			
1012		CINCH H 1P			
1013		CON EURO H 21P			
1014		CON V 04P M			
1015		CINCH H 3P F			
1021		CON V 10P M			
1022		CON V 10P M			
1030		CON V 10P M			
1033	4822 267 51216	MDIN V FEM 8P			
1096		CON V 120PM			
2110	4822 122 33496	100n	X7R	PM10	
2111	4822 122 33496	100n	X7R	PM10	
2112	4822 122 33496	100n	X7R	PM10	
2117	4822 122 33496	100n	X7R	PM10	
2118	4822 122 33496	100n	X7R	PM10	
2119	4822 122 33496	100n	X7R	PM10	
2132	5322 122 32654	22n	X7R	PM10	
2133	5322 122 32654	22n	X7R	PM10	
2134	5322 122 32654	22n	X7R	PM10	
2135	5322 122 32654	22n	X7R	PM10	
2136	5322 122 32654	22n	X7R	PM10	
2137	5322 122 32654	22n	X7R	PM10	
2138	5322 122 32654	22n	X7R	PM10	
2139	5322 122 32654	22n	X7R	PM10	
2140	5322 122 32654	22n	X7R	PM10	
2141	5322 122 32654	22n	X7R	PM10	
2142	5322 122 32654	22n	X7R	PM10	
2143	5322 122 32654	22n	X7R	PM10	
2144	5322 122 32654	22n	X7R	PM10	
2145	5322 122 32654	22n	X7R	PM10	
2146	5322 122 32654	22n	X7R	PM10	
2148	5322 122 32654	22n	X7R	PM10	
2149	4822 124 80483	47µ	6V3	PM20	
2150	5322 122 32654	22n	X7R	PM10	
2157	4822 124 41584	100µ	10V	PM20	COL
2158	4822 122 33496	100n	X7R	PM10	
2160	5322 122 32654	22n	X7R	PM10	
2161	5322 122 32654	22n	X7R	PM10	
2163	5322 122 32654	22n	X7R	PM10	
2164	5322 122 32654	22n	X7R	PM10	
2166	4822 122 33496	100n	X7R	PM10	
2201	5322 122 32654	22n	X7R	PM10	
2204	5322 122 32654	22n	X7R	PM10	
2206	4822 126 12549	470n	25V	PM10	
2207	4822 122 33496	100n	X7R	PM10	
2210	5322 122 32654	22n	X7R	PM10	
2211	5322 122 32654	22n	X7R	PM10	
2230	5322 122 32658	22p	50V		COL
2231	5322 122 32658	22p	50V		COL
2232	5322 122 32654	22n	X7R	PM10	
2235	5322 122 32654	22n	X7R	PM10	
2240	5322 122 32654	22n	X7R	PM10	
2241	5322 122 32654	22n	X7R	PM10	
2245	5322 122 32654	22n	X7R	PM10	
2250	5322 122 32654	22n	X7R	PM10	
2251	5322 122 31865	1n5	X7R	PM10	
2252	5322 122 31865	1n5	X7R	PM10	
2253	5322 122 31865	1n5	X7R	PM10	
2254	5322 122 32654	22n	X7R	PM10	
2255	4822 124 40433	47µ	25V	PM20	COL
2263	5322 122 32654	22n	X7R	PM10	
2270	4822 124 41989	470µ	16V	PM20	
2271	4822 124 41989	470µ	16V	PM20	
2272	5322 122 32654	22n	X7R	PM10	
2280	5322 122 32654	22n	X7R	PM10	
2281	4822 124 80483	47µ	6V3	PM20	
2282	5322 122 31865	1n5	X7R	PM10	
2283	5322 122 32654	22n	X7R	PM10	
2284	5322 122 31865	1n5	X7R	PM10	
2285	5322 122 31865	1n5	X7R	PM10	
2286	5322 122 31865	1n5	X7R	PM10	
2304	4822 122 33496	100n	X7R	PM10	
2305		47p	50V		COL
2306		10µ	50V	PM20	COL
2307	5322 122 32654	22n	X7R	PM10	
2308	4822 122 33496	100n	X7R	PM10	
2310	4822 122 33496	100n	X7R	PM10	
2311	5322 122 32654	22n	X7R	PM10	
2312	5322 122 32654	22n	X7R	PM10	
2313	5322 122 32654	22n	X7R	PM10	
2314	5322 122 32654	22n	X7R	PM10	
2315	5322 122 32654	22n	X7R	PM10	
2316	5322 122 32654	22n	X7R	PM10	
2317	5322 122 32654	22n	X7R	PM10	
2318	5322 122 32654	22n	X7R	PM10	
2319	4822 124 41584	100µ	10V	PM20	COL
2320	5322 122 32654	22n	X7R	PM10	
2321	5322 122 32654	22n	X7R	PM10	
2322	5322 122 32654	22n	X7R	PM10	
2323	5322 122 32654	22n	X7R	PM10	
2324	5322 122 32654	22n	X7R	PM10	
2325	4822 122 33496	100n	X7R	PM10	
2326	5322 122 32654	22n	X7R	PM10	
2327	4822 124 41584	100µ	10V	PM20	COL
2328	4822 124 41584	100µ	10V	PM20	COL
2330	5322 122 32661	56p	50V		COL
2331	5322 122 31863	330p	50V		COL
2332	5322 122 32661	56p	50V		COL
2333	5322 122 32661	56p	50V		COL
2334	5322 122 33897	3n3	63V	PM5	
2335	5322 122 32661	56p	50V		COL
2336	4822 124 41584	100µ	10V	PM20	COL
2337	5322 122 32654	22n	X7R	PM10	
2338	4822 124 41584	100µ	10V	PM20	COL
2339	5322 122 32654	22n	X7R	PM10	
2340	4822 124 22339	100µ	BIP 16V	PM20	
2342	5322 122 32654	22n	X7R	PM10	
2350	5322 122 32661	56p	50V		COL
2351	5322 122 31863	330p	50V		COL
2352	5322 122 32661	56p	50V		COL
2353	5322 122 32661	56p	50V		COL
2354	5322 122 33897	3n3	63V	PM5	
2355	5322 122 32661	56p	50V		COL
2360	4822 124 22339	100µ	BIP 16V	PM20	

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Item	Codenumber	Description			
2362	5322 122 32654	22n	X7R	PM10	
2375	5322 122 33897	3n3	63V	PM5	
2376	5322 122 33897	3n3	63V	PM5	
2380	4822 124 41576	2µ2	50V	PM20	COL
2381	4822 122 32139	12p	50V		COL
2382	4822 122 33496	100n	X7R	PM10	
2383	4822 124 41989	470µ	16V	PM20	
2384	4822 124 41576	2µ2	50V	PM20	COL
2385	4822 122 32139	12p	50V		COL
2386	5322 122 32654	22n	X7R	PM10	
2387	5322 122 32654	22n	X7R	PM10	
2388	4822 122 33496	100n	X7R	PM10	
2389	4822 124 41989	470µ	16V	PM20	
2390	4822 124 40196	220µ	10V	PM20	COL
2401	4822 122 33575	220p	50V		COL
2403	4822 122 33575	220p	50V		COL
2404	4822 122 33575	220p	50V		COL
2405	4822 122 33575	220p	50V		COL
2406	4822 122 33575	220p	50V		COL
2407	4822 122 33575	220p	50V		COL
2412	5322 122 32654	22n	X7R	PM10	
2413	4822 124 40433	47µ	25V	PM20COL	
2414	5322 122 32531	100p	50V		COL
2415	5322 122 32654	22n	X7R	PM10	
2416	5322 122 32654	22n	X7R	PM10	
2417	5322 126 10465	3n9	X7R	PM10	
2418	4822 126 10326	180p	50V		COL
2419	5322 122 32654	22n	X7R	PM10	
2421	4822 122 33496	100n	X7R	PM10	
2422	5322 122 32654	22n	X7R	PM10	
2424	4822 122 33496	100n	X7R	PM10	
2425	4822 126 10326	180p	50V		COL
2426	4822 122 32627	2n7	X7R	PM10	
2427	4822 122 33175	2n2	X7R	PM10	
2428	4822 122 33342	33n	X7R	PM10	
2429	5322 122 32654	22n	X7R	PM10	
2431	4822 122 33496	100n	X7R	PM10	
2433	5322 122 32654	22n	X7R	PM10	
2434	5322 122 32654	22n	X7R	PM10	
2435	5322 122 32654	22n	X7R	PM10	
2438	5322 122 32654	22n	X7R	PM10	
2439	5322 116 80853	560p	50V		COL
2440	4822 122 32646	5n6	X7R	PM10	
2441	5322 122 32531	100p	50V		COL
2442	5322 122 32531	100p	50V		COL
2443	4822 126 10326	180p	50V		COL
2445	5322 116 80853	560p	50V		COL
2446	5322 122 32654	22n	X7R	PM10	
2447	5322 122 32531	100p	50V		COL
2449	4822 122 33496	100n	X7R	PM10	
2450	5322 122 32654	22n	X7R	PM10	
2451	5322 122 31865	1n5	X7R	PM10	
2452	4822 122 33177	10n	X7R	PM10	
2453	5322 122 32531	100p	50V		COL
2454	4822 126 12549	470n	25V	PM10	
2455	4822 124 40433	47µ	25V	PM20	COL
2460	4822 124 40433	47µ	25V	PM20	COL
2461	4822 122 33496	100n	X7R	PM10	
2470	4822 122 33575	220p	50V		COL
2471	4822 122 33177	10n	X7R	PM10	

Item	Codenumber	Description			
2472	5322 122 32661	56p	50V		COL
2473	4822 122 33496	100n	X7R	PM10	
2474	4822 122 33575	220p	50V		COL
2475	5322 122 32654	22n	X7R	PM10	
2476	4822 122 33177	10n	X7R	PM10	
2477	5322 122 32661	56p	50V		COL
2478	5322 122 32654	22n	X7R	PM10	
2479	4822 122 33575	220p	50V		COL
2482	5322 122 32654	22n	X7R	PM10	
2498	5322 122 32654	22n	X7R	PM10	
2500	4822 122 33496	100n	X7R	PM10	
2501	4822 122 33342	33n	X7R	PM10	
2502	5322 122 32268	470p	50V		COL
2503	5322 122 32268	470p	50V		COL
2510	4822 124 41584	100µ	10V	PM20	COL
2511	5322 122 32654	22n	X7R	PM10	
2512	5322 122 32654	22n	X7R	PM10	
2513	5322 122 32654	22n	X7R	PM10	
2514	5322 122 32654	22n	X7R	PM10	
2515	5322 122 32654	22n	X7R	PM10	
2516	5322 122 32654	22n	X7R	PM10	
2517	5322 122 32654	22n	X7R	PM10	
2518	4822 124 41584	100µ	10V	PM20	COL
2520	5322 122 32654	22n	X7R	PM10	
2521	4822 124 40433	47µ	25V	PM20	COL
2523	4822 124 40433	47µ	25V	PM20	COL
2524	4822 126 12549	470n	25V	PM10	
2525	5322 122 32654	22n	X7R	PM10	
2526	4822 126 12549	470n	25V	PM10	
2530	4822 122 33496	100n	X7R	PM10	
2531	5322 122 32654	22n	X7R	PM10	
2532	5322 122 32654	22n	X7R	PM10	
3101	4822 051 20472	4k7	0,1W	5%	
3109	4822 051 20008	0R05			
3111	4822 051 20008	0R05			
3115	4822 051 20008	0R05			
3117	4822 051 20101	100R	0,1W	5%	
3120	4822 051 20472	4k7	0,1W	5%	
3121		75R		1%	
3122	4822 051 20223	22k	0,1W	5%	
3123		75R		1%	
3124		75R		1%	
3125	4822 051 20223	22k	0,1W	5%	
3127	4822 051 20101	100R	0,1W	5%	
3128		75R		1%	
3129	4822 051 20151	150R	0,1W	5%	
3134	4822 051 20223	22k	0,1W	5%	
3135	4822 051 20472	4k7	0,1W	5%	
3136	4822 051 20301	300R	0,1W	5%	
3137	4822 051 20301	300R	0,1W	5%	
3138	4822 051 20681	680R	0,1W	5%	
3139	4822 051 20472	4k7	0,1W	5%	
3140	4822 051 20101	100R	0,1W	5%	
3141	4822 051 20472	4k7	0,1W	5%	
3143	4822 051 20223	22k	0,1W	5%	
3150	4822 051 20008	0R05			
3153	4822 051 20008	0R05			
3155	4822 052 10229	22R	0,1W	5%	
3156	4822 0521 0229	22R	0,1W	5%	

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Item	Codenumber	Description		
3157	4822 051 20008	0R05		
3159	4822 051 20272	2k7		PM2
3160	4822 117 11454	820R		1%
3163	4822 051 20008	0R05		
3164	4822 117 11454	820R		1%
3166	4822 117 11454	820R		1%
3167	4822 051 20101	100R	0,1W	5%
3168	4822 051 20151	150R	0,1W	5%
3170	4822 051 20103	10k	0,1W	5%
3172		75R		1%
3174	4822 051 10102	1k	0,1W	5%
3175		510R		1%
3176		510R		1%
3177	4822 051 20101	100R	0,1W	5%
3178	4822 051 20151	150R	0,1W	5%
3179	4822 051 20008	0R05		
3180		75R		1%
3181	4822 051 20008	0R05		
3182		510R		1%
3183		510R		1%
3184	4822 051 20101	100R	0,1W	5%
3186	4822 051 20151	150R	0,1W	5%
3187		75R		1%
3188	4822 051 20008	0R05		
3189		510R		1%
3190		510R		1%
3191	4822 0512 0101	100R	0,1W	5%
3193	4822 0512 0151	150R	0,1W	5%
3194	4822 0512 0008	0R05		
3197		75R		1%
3201	4822 051 20105	1M	0,1W	5%
3202	4822 051 20472	4k7	0,1W	5%
3204	4822 051 20103	10k	0,1W	5%
3205	4822 051 20104	100k	0,1W	5%
3206	4822 051 20104	100k	0,1W	5%
3207	4822 051 20103	10k	0,1W	5%
3208	4822 051 20103	10k	0,1W	5%
3209	4822 051 20472	4k7	0,1W	5%
3210	4822 051 10102	1k	0,1W	5%
3211	4822 051 10102	1k	0,1W	5%
3212	4822 051 20103	10k	0,1W	5%
3213	4822 051 20103	10k	0,1W	5%
3214	4822 051 20472	4k7	0,1W	5%
3215	4822 051 20223	22k	0,1W	5%
3216	4822 051 20223	22k	0,1W	5%
3217	4822 051 20223	22k	0,1W	5%
3218	4822 051 10102	1k	0,1W	5%
3219	4822 051 20472	4k7	0,1W	5%
3220	4822 051 10102	1k	0,1W	5%
3221	4822 051 10102	1k	0,1W	5%
3222	4822 051 20472	4k7	0,1W	5%
3223	4822 051 20472	4k7	0,1W	5%
3224	4822 051 20472	4k7	0,1W	5%
3225	4822 051 20472	4k7	0,1W	5%
3226	4822 051 20472	4k7	0,1W	5%
3227	4822 051 20472	4k7	0,1W	5%
3228	4822 051 20472	4k7	0,1W	5%
3229	4822 051 10102	1k	0,1W	5%
3230	4822 051 20105	1M	0,1W	5%
3231	4822 051 20222	2k2	0,1W	5%
3232	4822 051 20479	47R	0,1W	5%
3236	4822 051 20101	100R	0,1W	5%

Item	Codenumber	Description		
3237	4822 051 20101	100R	0,1W	5%
3238	4822 051 20101	100R	0,1W	5%
3240	4822 051 10102	1k	0,1W	5%
3244	4822 051 20008	0R05		
3245	4822 051 10102	1k	0,1W	5%
3246	4822 051 20008	0R05		
3250	4822 051 20104	100k	0,1W	5%
3251	4822 051 20101	100R	0,1W	5%
3252	4822 051 20101	100R	0,1W	5%
3253	4822 051 20101	100R	0,1W	5%
3254	4822 051 20104	100k	0,1W	5%
3255	4822 051 20104	100k	0,1W	5%
3257	4822 051 20104	100k	0,1W	5%
3258	4822 051 20103	10k	0,1W	5%
3259	4822 051 20682	6k8	0,1W	5%
3260	4822 051 20104	100k	0,1W	5%
3261	4822 051 20103	10k	0,1W	5%
3262	4822 051 20682	6k8	0,1W	5%
3263	4822 051 20229	22R	0,1W	5%
3264	4822 051 20471	470R	0,1W	5%
3265	4822 051 20103	10k	0,1W	5%
3266	4822 051 20103	10k	0,1W	5%
3267	4822 051 20473	47k	0,1W	5%
3271	4822 051 20103	10k	0,1W	5%
3272	4822 051 20103	10k	0,1W	5%
3254	4822 051 20104	100k	0,1W	5%
3255	4822 051 20104	100k	0,1W	5%
3257	4822 051 20104	100k	0,1W	5%
3258	4822 051 20103	10k	0,1W	5%
3259	4822 051 20682	6k8	0,1W	5%
3260	4822 051 20104	100k	0,1W	5%
3261	4822 051 20103	10k	0,1W	5%
3262	4822 051 20682	6k8	0,1W	5%
3263	4822 051 20229	22R	0,1W	5%
3264	4822 051 20471	470R	0,1W	5%
3265	4822 051 20103	10k	0,1W	5%
3266	4822 051 20103	10k	0,1W	5%
3267	4822 051 20473	47k	0,1W	5%
3271	4822 051 20103	10k	0,1W	5%
3272	4822 051 20103	10k	0,1W	5%
3274	4822 252 51173	MP100	65V	1A
3277	4822 116 40264	0R81	60V	PTC
3280	4822 051 20101	100R	0,1W	5%
3281	4822 051 20682	6k8	0,1W	5%
3282	4822 051 20103	10k	0,1W	5%
3283	4822 051 20104	100k	0,1W	5%
3284	4822 051 20101	100R	0,1W	5%
3285	4822 051 20682	6k8	0,1W	5%
3286	4822 051 20103	10k	0,1W	5%
3287	4822 051 20104	100k	0,1W	5%
3288	4822 051 20104	100k	0,1W	5%
3289	4822 051 20103	10k	0,1W	5%
3301	4822 051 20473	47k	0,1W	5%
3302	4822 051 20473	47k	0,1W	5%
3303	4822 051 20473	47k	0,1W	5%
3304	4822 051 20472	4k7	0,1W	5%
3305	4822 051 20101	100R	0,1W	5%
3306	4822 051 20472	4k7	0,1W	5%
3307	4822 051 20689	68R	0,1W	5%
3308		3R3	0,1W	5%
3309	4822 051 20008	0R05		
3310	4822 051 20472	4k7	0,1W	5%

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Item	Codenumber	Description		
3311	4822 051 20472	4k7	0,1W	5%
3312	4822 051 20472	4k7	0,1W	5%
3313	4822 051 20472	4k7	0,1W	5%
3314	4822 051 20472	4k7	0,1W	5%
3315	4822 051 20472	4k7	0,1W	5%
3316	4822 051 20472	4k7	0,1W	5%
3317	4822 051 20182	1k8	0,1W	5%
3318	4822 051 20229	22R	0,1W	5%
3319	4822 051 20103	10k	0,1W	5%
3324	4822 051 20008	0R05		
3326	4822 051 20182	1k8	0,1W	5%
3329	4822 117 11373	100R		1%
3330	4822 117 11143	3k		1%
3331	4822 117 11143	3k		1%
3332		43k		1%
3333	4822 051 20222	2k2	0,1W	5%
3334	4822 117 11143	3k		1%
3335	4822 117 11143	3k		1%
3336		43k		1%
3337	4822 051 20472	4k7	0,1W	5%
3338		1k4		1%
3339		2k1		1%
3340		11k		1%
3341		3R3	0,1W	5%
3342		3R3	0,1W	5%
3343	4822 117 11373	100R		1%
3344	4822 051 20182	1k8	0,1W	5%
3345	4822 051 20223	22k	0,1W	5%
3346	4822 051 10102	1k	0,1W	5%
3347	4822 051 20183	18k	0,1W	5%
3348	4822 051 20472	4k7	0,1W	5%
3349		4k42		1%
3350	4822 117 11143	3k		1%
3351	4822 117 11143	3k		1%
3352		43k		1%
3353	4822 051 20472	4k7	0,1W	5%
3354	4822 117 11143	3k		1%
3355	4822 117 11143	3k		1%
3356		43k		1%
3357	4822 051 20103	10k	0,1W	5%
3358		1k4		1%
3359		2k1		1%
3360		11k		1%
3361	4822 117 11373	100R		1%
3362	4822 051 20472	4k7	0,1W	5%
3363	4822 051 20223	22k	0,1W	5%
3364	4822 051 10102	1k	0,1W	5%
3365	4822 051 20183	18k	0,1W	5%
3366	4822 051 20472	4k7	0,1W	5%
3367		4k42		1%
3368		4k42		1%
3369		4k42		1%
3375	4822 117 11143	3k		1%
3376	4822 117 11143	3k		1%
3377	4822 051 20182	1k8	0,1W	5%
3378	4822 117 11373	100R		1%
3380	4822 051 20103	10k	0,1W	5%
3381	4822 051 20229	22R	0,1W	5%
3382	4822 051 20472	4k7	0,1W	5%
3383	4822 052 10109	10R	0,1W	5%
3384	4822 051 20471	470R	0,1W	5%
3385	4822 051 20103	10k	0,1W	5%
3386	4822 051 20229	22R	0,1W	5%
3387	4822 051 20472	4k7	0,1W	5%
3388	4822 052 10109	10R	0,1W	5%
3389	4822 051 20471	470R	0,1W	5%
3390	4822 050 14709	47R	0,4W	1%
3391	4822 051 20473	47k	0,1W	5%
3392	4822 051 20222	2k2	0,1W	5%
3393	4822 051 20103	10k	0,1W	5%
3394	4822 051 20473	47k	0,1W	5%
3395	4822 051 20103	10k	0,1W	5%
3396	4822 051 20222	2k2	0,1W	5%
3397	4822 051 20222	2k2	0,1W	5%
3398	4822 051 20223	22k	0,1W	5%
3399	4822 051 20103	10k	0,1W	5%
3400	4822 051 20008	0R05		
3401	4822 051 20008	0R05		
3402	4822 051 20183	18k	0,1W	5%
3403	4822 051 20103	10k	0,1W	5%
3404	4822 051 20103	10k	0,1W	5%
3405	4822 051 20823	82k	0,1W	5%
3406	4822 051 20823	82k	0,1W	5%
3407	4822 117 11152	4R7	0,1W	5%
3408	4822 051 20105	1M	0,1W	5%
3409	4822 051 20103	10k	0,1W	5%
3410	4822 051 20183	18k	0,1W	5%
3411	4822 051 20221	220R	0,1W	5%
3412	4822 051 20221	220R	0,1W	5%
3413	4822 051 10102	1k	0,1W	5%
3414	4822 051 20103	10k	0,1W	5%
3415	4822 051 20103	10k	0,1W	5%
3416	4822 051 10102	1k	0,1W	5%
3417	4822 051 20153	15k	0,1W	5%
3418	4822 051 20103	10k	0,1W	5%
3419	4822 051 20153	15k	0,1W	5%
3421	4822 051 20103	10k	0,1W	5%
3422	4822 051 20008	0R05		
3423	4822 051 20229	22R	0,1W	5%
3424	4822 051 20472	4k7	0,1W	5%
3425	4822 051 20229	22R	0,1W	5%
3426	4822 051 20153	15k	0,1W	5%
3427	4822 051 20682	6k8	0,1W	5%
3428	4822 051 20103	10k	0,1W	5%
3429	4822 051 20153	15k	0,1W	5%
3430	4822 051 20103	10k	0,1W	5%
3431	4822 051 20153	15k	0,1W	5%
3432	4822 051 20103	10k	0,1W	5%
3433	4822 051 20153	15k	0,1W	5%
3434	4822 051 20682	6k8	0,1W	5%
3435	4822 051 20008	0R05		
3436	4822 051 20103	10k	0,1W	5%
3437	4822 051 20229	22R	0,1W	5%
3438	4822 051 20008	0R05		
3440	4822 051 20103	10k	0,1W	5%
3441	4822 051 20333	33k	0,1W	5%
3442	4822 051 20683	68k	0,1W	5%
3443	4822 051 20333	33k	0,1W	5%
3444	4822 051 10102	1k	0,1W	5%
3445	4822 051 20103	10k	0,1W	5%
3446	4822 051 20333	33k	0,1W	5%
3447	4822 051 20683	68k	0,1W	5%
3448	4822 051 20333	33k	0,1W	5%
3449	4822 051 10102	1k	0,1W	5%

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Item	Codenumber	Description		
3450	4822 051 20103	10k	0,1W	5%
3451	4822 051 20103	10k	0,1W	5%
3452	4822 051 20221	220R	0,1W	5%
3453	4822 051 20222	2k2	0,1W	5%
3454	4822 051 20821	820R	0,1W	5%
3455		2R2	0,1W	5%
3456	4822 051 20101	100R	0,1W	5%
3457	4822 051 20154	150K	0,1W	5%
3458	4822 051 20472	4k7	0,1W	5%
3459	4822 051 20473	47K	0,1W	5%
3460	4822 051 10102	1k	0,1W	5%
3461	4822 051 20101	100R	0,1W	5%
3462	4822 051 20104	100k	0,1W	5%
3463	4822 051 20101	100R	0,1W	5%
3464	4822 051 10102	1k	0,1W	5%
3465	4822 051 20683	68k	0,1W	5%
3466	4822 051 20104	100k	0,1W	5%
3467	4822 051 20103	10k	0,1W	5%
3468	4822 051 20223	22k	0,1W	5%
3469	4822 117 10362	7k5		1%
3470	4822 117 10507	24k		1%
3471	4822 117 11537	330k		1%
3472	4822 051 20334	330k	0,1W	5%
3473	4822 051 20334	330k	0,1W	5%
3474	4822 051 20473	47k	0,1W	5%
3475	4822 117 11537	330k		1%
3477	4822 117 10507	24k		1%
3478	4822 051 20473	47k	0,1W	5%
3479	4822 051 20223	22k	0,1W	5%
3480	4822 051 20223	22k	0,1W	5%
3481	4822 051 20103	10k	0,1W	5%
3482	4822 051 20223	22k	0,1W	5%
3483	4822 051 20103	10k	0,1W	5%
3484	4822 117 10354	22k		1%
3485	4822 051 20223	22k	0,1W	5%
3486	4822 051 20104	100k	0,1W	5%
3487	4822 051 20103	10k	0,1W	5%
3490	4822 051 20008	0R05		
3491	4822 051 20008	0R05		
3493	4822 051 20223	22k	0,1W	5%
3494	4822 051 20273	27k	0,1W	5%
3495	4822 117 11139	1k5	0,1W	5%
3496	4822 051 20183	18k	0,1W	5%
3497	4822 051 20101	100R	0,1W	5%
3498	4822 051 20122	1k2	0,1W	5%
3499	4822 051 20821	820R	0,1W	5%
3500		150k		1%
3501		150k		1%
3502	4822 051 20229	22R	0,1W	5%
3503	4822 051 20683	68k	0,1W	5%
3504	4822 117 10354	22k		1%
3505	4822 117 10354	22k		1%
3506	4822 051 20103	10k	0,1W	5%
3509	4822 051 20223	22k	0,1W	5%
3510	4822 117 11152	4R7	0,1W	5%
3514	4822 051 20103	10k	0,1W	5%
3520	4822 117 11152	4R7	0,1W	5%
3521	4822 117 11154	1k		1%
3522	4822 117 11154	1k		1%
3524	4822 051 20333	33k	0,1W	5%

Item	Codenumber	Description		
3525	4822 051 20101	100R	0,1W	5%
3526	4822 051 20183	18k	0,1W	5%
3527	4822 051 20222	2k2	0,1W	5%
3528	4822 051 20104	100k	0,1W	5%
3529	4822 051 20273	27k	0,1W	5%
3530	4822 051 20229	22R	0,1W	5%
3531	4822 051 20333	33k	0,1W	5%
3532	4822 051 20333	33k	0,1W	5%
3533	4822 051 20223	22k	0,1W	5%
3534	4822 051 20223	22k	0,1W	5%
3535	4822 051 20223	22k	0,1W	5%
3536	4822 117 11139	1k5	0,1W	5%
5140	4822 157 70378	22n	16V	
5141	4822 157 70378	22n	16V	
5150		1n	EMI FIL	
5151		1n	EMI FIL	
5153		220p	EMI FIL	
5154		220p	EMI FIL	
5156		220p	EMI FIL	
5157		220p	EMI FIL	
5165	4822 157 50961	22µH		
5201	4822 242 72527	4MHz	RESCER	
5230	4822 242 81873	4MHz9152	RES XTAL	
5235	4822 242 81419	30.0000MHz for /60/61/65	X-TAL OSC	
5235	4822 242 81394	30.2089MHz for /77	X-TAL OSC	
5250		1n	EMI FIL	
5251		1n	EMI FIL	
5252		1n	EMI FIL	
5253		1n	EMI FIL	
5254	4822 157 70378	22n	EMI FIL	
5255		1n	EMI FIL	
5280	4822 157 70378	22n	EMI FIL	
5281		1n	EMI FIL	
5282		1n	EMI FIL	PM20
5283		1n	EMI FIL	PM20
5284		1n	EMI FIL	PM20
5305	4822 157 70601	100µH	10%	
5310	4822 242 81872	33,8688 MHz	X-TAL OSC	
5375		1n	EMI FIL	PM20
5376		1n	EMI FIL	PM20
5377		220p	EMI FIL	PM20
5401	4822 242 73557	8MHZ467	RES CER	
5450		56µH	10%	
6200	5322 130 34885	1N5817		
6274	4822 130 80291	1N4002GP		
6390	5322 130 34885	1N5817		
6444	5322 130 80948	BAT74		
6445	4822 130 80622	BAT54		
6451	4822 130 80622	BAT54		
6452	5322 130 31928	BAS16		
6524	5322 130 31928	BAS16		
7110		UPD424270LE-80		
7118		UPD424270LE-80		
7125		VDSC-JTAG		
7127	4822 130 40937	BC548B		

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Item	Codenumber	Description
7140	5322 130 41982	BC848B
7141	5322 130 41982	BC848B
7143	5322 130 41982	BC848B
7155	4822 209 81726	L7812CV
7160	4822 209 52561	BT9106KPJ-(PLCC68)
7164	482 213 040937	BC548B
7176	482 213 040937	BC548B
7181	482 213 040937	BC548B
7191	482 213 040937	BC548B
7201		IKAT CDI220/PH.IV
7205	532 213 041982	BC848B
7207	482 220 931275	MC34064D-5
7210		SCC68070CCA84
7230	532 220 911517	PC74HCU04T
7240		SYSTEM EPROM
7241		ASSY NVRAM 32k x8
7245	5322 209 61434	N74F02D
7250	5322 209 71568	74HCT14D
7263	4822 209 52683	PAL16R4-10MONO3
7272	4822 209 52682	CSPAL CDI220/PH.IV
7280	5322 209 71568	74HCT14D
7304	4822 209 30696	MC74ACT74DR2
7305	5322 209 33102	MC74AC08DR2
7310		CIAP1.5 QFP80
7320	4822 209 33867	CS4303-KS
7321	4822 209 80817	L7805CV
7325	4822 130 42696	BC818-25
7327	4822 130 42696	BC818-25
7331	4822 209 32071	MC33079D
7333	5322 130 41979	BC808
7340	4822 130 42696	BC818-25
7348	4822 130 42696	BC818-25
7359	4822 130 42696	BC818-25
7360	4822 209 62312	MC33078D
7361	5322 130 41982	BC848B
7366	4822 130 42696	BC818-25
7380	4822 209 62059	TCA0372DP1
7391	5322 130 41979	BC808
7394	5322 130 41979	BC808
7395	5322 130 41982	BC848B
7397	5322 130 41983	BC858B
7401	4822 209 31064	TDA1301T/N1
7420	4822 209 72587	TCA0372DP2
7430	4822 209 72587	TCA0372DP2
7440	5322 209 71553	NE532D
7450	5322 130 41982	BC848B
7461	5322 130 41982	BC858B
7462	4822 130 41982	BC848B
7480	5322 130 41982	BC848B
7481	4822 209 31615	LM324AD
7482	5322 209 61482	74HC4066D
7495	5322 130 41982	BC848B
7498	5322 130 41982	BC848B
7510	4822 209 33414	CD60QFP44
7524	5322 130 41982	BC848B
7530	4822 209 62059	TCA0372DP1

8.5 List of accessories and service tools

Item	Codenumber	Description
1	4822 395 50145	TORX SCREW DRIVER SET
2	4822 264 50263	PLUG FOR STARTUP OF SERVICE SHELL
3	4822 397 30096	AUDIO TESTDISC SET
4	4822 397 30155	TESTDISC WITH CONTINOUS 1 kHz SIGNAL 70 MIN.
5	4822 397 30184	AUDIOSIGNALSDISC
6	4822 701 11922	SKEW DISC 0,6
7	4822 701 11923	EXCENTRICITY DISC 150l
8	4822 691 30293	ROLLER CONTROLLER
9	4822 691 30309	TRACKER BALL
10	4822 691 30328	TOUCH PAD
11	4822 691 30297	MOUSE

Partslist for rollercontroller

Item	Codenumber	Description
1	4822 321 61841	CABLE ASSY
2	4822 413 90093	BALL
3	4822 276 13359	SWITCH
4	4822 410 62427	KEYTOP-LEFT
4	4822 410 62428	KEYTOP-RIGHT
5	4822 492 42645	SPRING

Partslist for the touch pad

Item	Codenumber	Description
1	4822 321 62311	CABLE ASSY
2	4822 498 91048	STICK

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Compact disc interactive player

CDI 220/80/85/97

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Service
Service
Service

Service Manual

COMPACT disc Interactive

SURVEY OF PLAYERS

Version	Description
/80	PAL player without RF-modulator
/85	PAL player with RF-modulator for the UK-system
/97	NTSC player with RF-modulator for the USA-system

These sets are equiped with Compact Disc Mechanism type CDM12.1; service code 4822 691 30278.
This CDM is also used in CDI210/40/41/45 and CDI470/00/05/06.
Service information is included in this manual.

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SURVEY OF MAINPANELS

Version	Mainpanel	Version	Mainpanel
/20	4822 214 52065	/40	4822 214 52163
/25	4822 214 52068	/41	4822 214 52164
/37	4822 214 52056	/45	4822 214 52165
/39	4822 214 52066	/57	4822 214 52145

The mainpanels must be repaired via the central repair procedure, if the defective item is on the circuitry of the µP section,digital audio (LEMM+DSP) section, GLUE logic section or digital video section.
If the defective item is in the circuitry of the SERVO section, analog audio section or analog video section, then the panel can be repaired up to component level.
All above mentioned players are equiped with CDM9.

Version		Mainpanel
/60	/85	These mainpanels must be repaired down to component level in a local central repairshop ,see chapter 3.6.
/61	/97	
/65		
/77		
/80		

(SF) Varioitus!
Laite sisältaa laserdiodin, joka lähettää näkymätöntä silmille vaarallista lasersäteilyä.

(S) Varning!
Osynlig laserstrålning när denna del är öppnad och spärren ar urkopplad. Betakta ej strålen.

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

(GB)
Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.
Safety components are marked by the symbol ⚠.

CLASS 1
LASER PRODUCT
3122 110 03420

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PCS 86 011

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2. PRODUCT INFORMATION
2.1 TECHNICAL SPECIFICATION

System • Système • Sistema • Systeem • System • Sistema • Sistema
CD-Interactive
CD-Interactif

Usable discs • Disques utiliables • Discos utilizables • Discos Utiliable • Te gebruiken discs • Verwendbare discs • Dischi usabili

CD-I	*CD-I*
CD-DA	*CD-Audio*
PHOTO-CD	*Photo-CD*
CD-I READY	*CD-I READY*
CD BRIDGE	*CD BRIDGE*
CD+GRAPHICS	*CD+GRAPHICS*

Power requirement • Alimentation • Alimentacion • Alimentación Voedingsspanning • Netzanschluß • Alimentazione
Europe: 220-230 V/50 Hz UK: 240 V/50 Hz

Power consumption • Consommation • Consume de corriente Opgenomen vermogen • Leistungsaufname • Consumo di corrente • Consomo de Corriente
Europe: 22 W with, 17 W without DVC (22ER9956)
Europe: 22 W avec, 17 W sans DVC (22ER9956)
UK: 23 W with, 18 W without DVC (22ER9956)
UK: 23 W avec; 18 W sans DVC (22ER9956)

Operating temperature • Temperature de fonctionnement Temperatura de operacion • Bedrijfstemperatuur Betriebstemperatur • Temperatura di fonzionamento • Temperatura de funcionamiento
41°F(5°C) to 95°F(35°C)
5°C à 35°C

Relative humidity • Humidité relative • Humedad relative Relatieve vochtigheid • Relative Feuchtigkeit • Umidità relativa • Humedad relativa
5% to 95% (no condensation)
5% à 95% (sans condensation)

Weight • Poids • Peso • Gewicht • Gewicht • Peso • Peso
With DVC: 3,750 kg
Avec DVC: 3,750 kg
Without DVC: 3,500 kg
Sans DVC: 3,500 kg

Dimensions (w x h x d) • Dimensions (l x h x p) Dimensiones (a x a x p) • Afmetingen (b x h x d) Abmessungen (B x H x T) • Dimensioni (l x h x p) • Dimensiones (anch. x alt. x prof.)
420 mm x 90 mm x 286 mm
16.55" x 3.55" x 11.25"

Input • Entrée • Entrada • Ingang • Eingang • Ingresso • Entradas

input (1 ports) 8-pin mini-DIN
(1 entrées) mini DIN 8 broches

REAR

pin *Broche*	signal *Signal*	I/O *E/S*
1	nc	-
2	rxd	I / *E*
3	txd	O / *S*
4	nc	-
5	ground / *Masse*	-
6	cts	I / *E*
7	rts	O / *S*
8	+5V (100 mA max)	

FRONT

pin *Broche*	signal *Signal*	I/O *E/S*
1	rxd1	I / *E*
2	rxd2	I / *E*
3	tx2	O / *S*
4	rts1	O / *S*
5	ground / *Masse*	-
6	nc	-
7	rts2	O / *S*
8	+5V (100 mA max)	

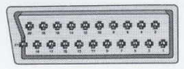
Note: Pointing device speed of 1200 baud is supported.
Remarque: Vitesse de transmission jusqu' à 1200 baud. • Nota: Se admite un dispositivo de puntero de 1200 baudios de velocidad. • Opmerking: Voor de aanwijsapparaten is een snelheid van 1200 baud mogelijk. • Hinweis: Die Geschwindigkeit der Zeigevorrichtung von 1200 baud wird unterstützt • Nota: Tollera la velocità dell'accessorio di comando di 1200 baud. • Nota: Velocidad del dispositivo de apunta admitida: 1200 baudios.

Output • Sortie • Salida • Uitgang • Ausgang • Uscita • Saídas • Salidas

Audio 2 Vrms
2 channel individual RCA pin cinch sockets
2 Veff
2 prises cinch (une par canal)

video (PAL) 1 Vpp (75 Ohm load, sync neg) RCA pin jack
1 Vc-c (charge 75 Ohm, sync. nég.) Prise cinch

AV/Euroconnector
Péritélévision A/V



pin *Broche*	signal *Signal*
1	audio R / *audio R (droite)*
2	nc / *non connecté*
3	audio L / *audio L (gauche)*
4	audio ground / *masse audio*
5	blue ground / *masse bleu*
6	nc / *non connecté*
7	blue / *bleu*
8	function switching (0=Antenna ; 1A=A/V Euroconnector with aspect ratio 16:9; 1B=AV/Euroconnector with aspect ratio 4:3) *commutation fonction (0=Antenna 1=Péritélévision A/V avec ratio 16:9; 1B=Péritélévision A/V avec ratio 4:3)*
9	green ground / *masse vert*
10	nc / *non connecté*
11	green / *vert*
12	nc / *non connecté*
13	red ground / *masse rouge*
14	nc / *non connecté*
15	red / *rouge*
16	fast switching (RGB/CVBS) *commutation rapide (RVB/CVBS)*
17	CVBS ground / *masse CVBS (PAL)*
18	fast switching (ground) *commutation rapide (masse)*
19	CVBS/RGB sync / *CVBS/RVB sync.*
20	nc / *non connecté*
21	shield / *blindage*

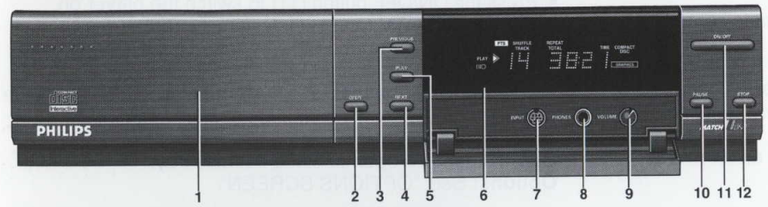
(Y/C-PAL) y-output 1 Vpp (75 Ohms)
c-output 300 mVpp (75 Ohms)
S-video 4-pin miniDIN
Sortie Y 1 Vc-c (75 Ohm)
Sortie C 300 mVc-c (75 Ohm)
mini DIN 4 broche S-vidéo

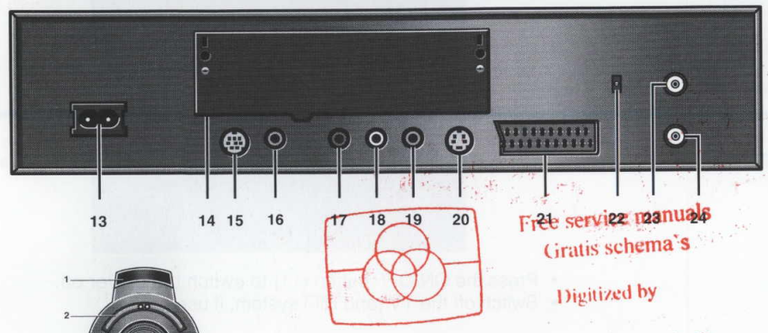
pin *Broche*	signal *Signal*
1	ground y / *Masse Y*
2	ground c / *Masse C*
3	y / *Y*
4	c / *C*

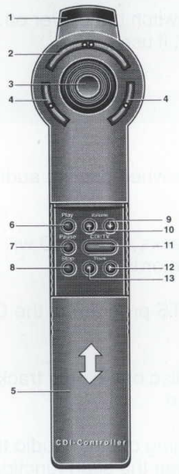
Designs and specifications are subject to change without notice. • *La conception et les spécifications de ce produit sont sujet à modifications sans avis préalable.* • *Los diseños y las especificaciones están sujetos a cambios sin previo aviso.* • *Concepten en specificaties kunnen gewijzigd worden zonder voorafgaande verwittigingen.* • *Änderungen von Ausführung und technische Daten vorbehalten.* • *I disegni e le specifiche tecniche sono soggette a modifiche senza preavviso.* • *As especificações descitas estão sujeitas a altreação sem aviso prévio.* • *El diseño y las especificaciones estás sujetos a cambios sin previo aviso.*

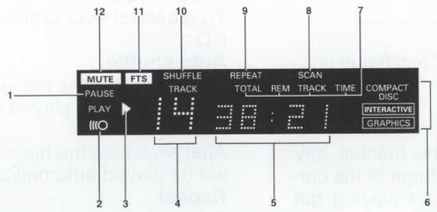
2.2 CONNECTION AND CONTROLS

CDI 220









DESCRIPTION OF CONTROLS AND CONNECTIONS

FRONT
1 Disc loading tray.
2 Open/close button.
3 Previous track selection button
4 Next track selection button.
5 Play button.
6 Soft tone multifunction display with infra-red remote control receiver.
7 Input port for CD-I pointing devices.
8 Headphone jack.
9 Headphone volume control.
10 Pause button.
11 AC power on/off button.
12 Stop button.

REAR
13 Mains AC (alternating current) input socket.
14 Extension socket.
15 Input port for CD-I serial connections.
16 Digital out.
17 Audio output R.
18 Audio output L.
19 Video output (CVBS).
20 Y/C (S-Video) out*.
21 A/V Euroconnector*.
22 Channel selector*.
23 OUT TO TV*.
24 IN FROM ANTENNA*.

DISPLAY PANEL
1 CD pause active.
2 Remote control active (flashing indicator).
3 Disc playing (stepping indicator).
4 Track number (CD-Audio).
5 Elapsed or remaining time (CD-Audio).
6 Type of disc indicator.
7 Time indicators.
8 CD scan active.
9 CD repeat active.
10 CD shuffle active.
11 CD FTS active.
12 Mute indicator.

REMOTE CONTROL
1 Infra red remote control.
2 Action button.
3 Thumbpad.
4 Action buttons (for left or right handed operation).
5 Sliding Cover.
6 Play button.
7 Pause button (CD-Audio).
8 Stop button (CD-Audio).
9 Volume control up button.
10 Volume control down button.
11 CD-I/TV button.
12 Next track (CD-Audio).
13 Previous track (CD-Audio).

*Available on some player versions only.

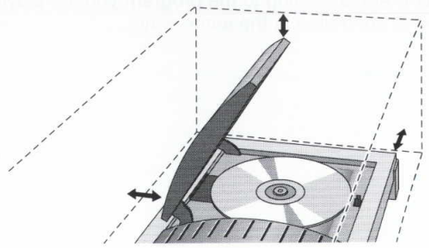
POWER CONNECTION

- Connect the female end of the AC (alternating current) cord supplied into the AC socket (13).
- Insert the male end of the cord into an AC outlet.
- **CAUTION: NEVER MAKE OR CHANGE CONNECTIONS WITH THE POWER SWITCHED ON.**

CAUTION
- **ONLY A QUALIFIED SERVICE PERSON SHOULD REMOVE THE COVER OR ATTEMPT TO SERVICE THIS DEVICE.**
- **USE OF CONTROLS OR ADJUSTMENTS OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE OR OTHER UNSAFE OPERATION.**
- **THE PLAYER AUTOMATICALLY ADJUSTS TO THE LOCAL MAINS VOLTAGE.**
- **WHEN THE PLAYER IS IN THE "OFF" POSITION, IT IS STILL CONSUMING SOME POWER. IF YOU WISH TO DISCONNECT YOUR PLAYER COMPLETELY FROM THE MAINS, THE MAINS-PLUG HAS TO BE DISCONNECTED.**

PLACEMENT

- Place the player on a firm, flat surface.
- Keep away from heat sources and direct sunlight.
- In a cabinet, allow 1 inch (2-3 cm) of free space all around the unit for adequate ventilation.



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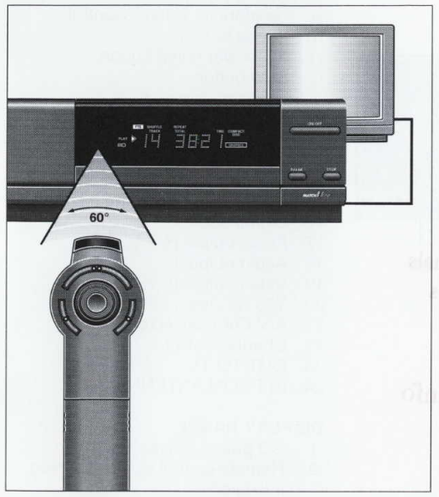
2.3 BEFORE USING YOUR CD-I PLAYER

REMOTE CONTROL INTERACTIVE OPERATION

For normal interactive operation, use the remote control to select functions displayed on the TV screen.

- Point the remote control at your CD-I player.
- Move the cursor in the direction you want by pressing in that direction on the "Thumbpad".
  The harder you press the faster the cursor arrow moves.
- Click on one of the action buttons.



The function selected by this 'point-and-click' technique is highlighted to confirm the selection.

NOTE

To 'point-and-click' on any screen shown in this manual, any one of the action buttons can be used. The shape of the cursor is different according to the program you are playing, but it is always controlled in the same way.

WIRED POINTING DEVICE OPERATION

Place the pointing device in front of the display screen, with the back (the cable end) pointed towards the screen.
Now, as you roll the mouse, the trackerball or the roller controller, the cursor moves in the corresponding direction on the screen.
When the cursor is positioned on the required function click on one of the action buttons.

The function selected by this 'point-and-click' technique is highlighted to confirm the selection.

NOTE

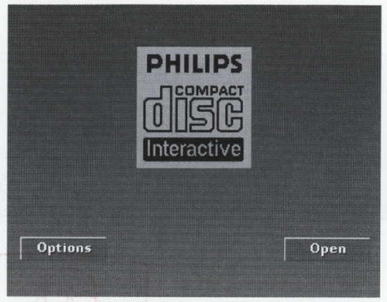
To 'point-and-click' on any screen shown in this manual, any one of the action buttons can be used. The shape of the cursor is different according to the program you are playing, but it is always controlled in the same way.

SETTINGS

- Press the ON/OFF button (11) to switch the player on.
- Switch on the TV (and HiFi system if used).
- Select the CD-I input on the TV (and HiFi system if used).

On the TV, the player start-up screen will appear.
This screen has the following system function icons to guide and assist you:

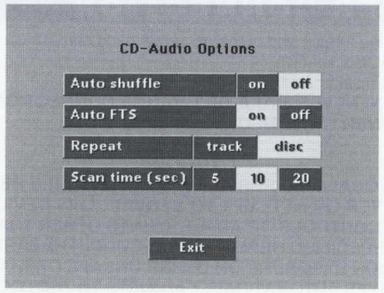
Open/Close: To open or close the disc tray.
Options: See: 'OPTIONS SCREEN'.



- Press the ON/OFF button (11) to switch the player off.
- Switch off the TV (and HiFi system, if used).

OPTIONS SCREEN

1. CD Audio
To preselect your preferred settings when playing audio CDs:
Auto shuffle
After switching the player on, the tracks on the CD will automatically be played in a random order.
Auto FTS
After switching the player on, the FTS program of the CD will be played automatically
Repeat
Select to repeat a complete audio disc or a single track when the repeat function is activated.
Scan time
Select the time you want the beginning of each audio track to play for (5, 10 or 20 seconds) when the scan function is activated.



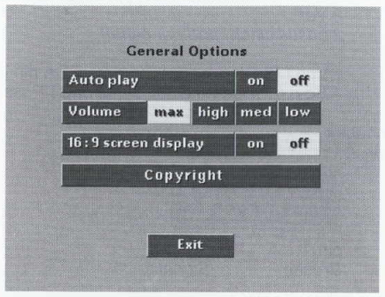
- When finished, point-and-click on 'Exit'.

2. General
To change the player general settings:
Auto play
After switching the player on, playback will start automatically when a disc is loaded.
Volume
Selecting the player default volume setting.

2.4 SETTING UP

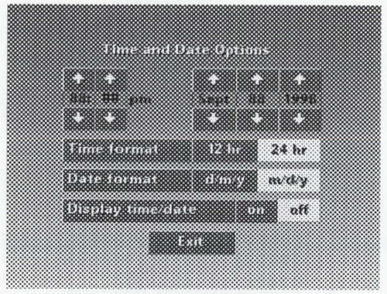
OPTIONS SCREEN CONTINUATION

16 : 9 screen display
Selecting 16 : 9 screen display, when you have your player connected to a TV with a 16 : 9 screen.



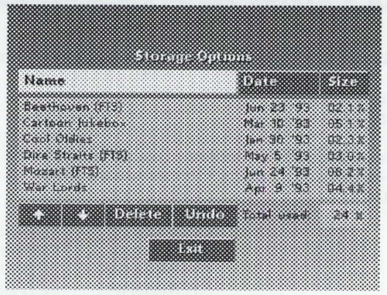
- When finished, point-and-click on 'Exit'.

3. Time and Date
To change the player time/date settings:
Time/Date set
If the time or date shown on the screen is wrong, select the appropriate ▲ and ▼ arrows to set hours, minutes, day, month and year in turn, as required.
Time format
Select 24 hour or 12 hour clock.
Date format
Select d/m/y to present the date in day-month-year sequence. Select m/d/y to present the date in month-day year sequence.
Display time/date
Select whether time and date will displayed on the TV screen or not.



- When finished, point-and-click on 'Exit'.

4. Storage
To refer to the intermediate results of CD-I titles and of programs created for your audio and Photo CDs.
The 'Storage' screen shows the information held in memory: titles, dates and percentage of memory used.
Clicking on 'Name', 'Date', or 'Size' sorts the information accordingly.
- Use the scroll arrows to move up and down the list.
- To delete an item, click on its title and then click on 'Delete'. If you change your mind after deleting, click on 'Undo'.

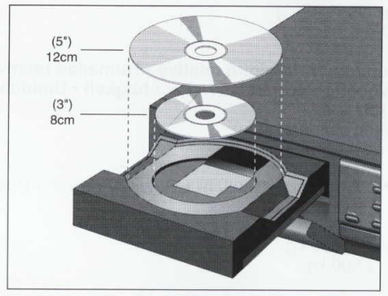


- When finished, point-and-click on 'Exit'.

LOADING AND UNLOADING

Loading:
- Point and click on 'Open' (you may also press the OPEN /CLOSE button (2) on the player) to open the disc tray (1).
- Take the disc from its holder and place it on the tray with the label up.
- Point and click on 'Close' (you may also press the OPEN/CLOSE button (2) on the player, or gently push the front of the tray) to close the tray.

The TV screen changes according to the type of disc.



CAUTION
NEVER PUT MORE THAN ONE DISC AT A TIME INTO THE CD-I PLAYER

Unloading:
- Point and click on 'Open' (you may also press the OPEN /CLOSE button (2) to open the disc loading tray. The player start-up screen reappears on the TV.
- Take the disc from the tray and replace it in its holder.
- Point and click on 'Close' (you may also press the OPEN/CLOSE button (2) on the player, or gently press the front of the tray) to close the tray with or without a new disc.

NOTE

You may unload the disc at any time by pressing the OPEN/CLOSE button (2).
Unloading a CD-I disc while the CD-I program is running, will terminate the CD-I program abruptly. 'Bookmarks' or intermediate results, if used by the CD-I program, might not be updated to the latest situation.

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2.5 DISC PLAY

PLAYING A CD-I DISC

NOTE

This procedure is equal for CD BRIDGE discs, CD-I READY discs and PHOTO CDs. And for Digital Video discs and Video CD's when a Digital Video Cartridge has been installed.

CAUTION

– NEVER LEAVE A STILL PICTURE ON THE SCREEN FOR ANY LENGTH OF TIME. THIS CAN CAUSE BURNING-IN OF THE PICTURE TUBE. IN SUCH A CASE SWITCH OFF THE PLAYER OR REMOVE THE DISC.

Playing a CD-I disc depends on the value of Autoplay (see settings). The factory setting is default "OFF".

1. When autoplay is "OFF":
   After loading the disc, the CD-I start-up screen appears on the TV.
   To start the CD-I program, select the 'Play' icon on the screen and click on it.

2. When autoplay is "ON":
   After loading the disc, the CD-I program will start up automatically.
   The opening screen of the CD-I program now appears on the TV.
   From this point, all interaction is between you and the program.
   To stop at any time, select the STOP or EXIT function provided by the CD-I program.

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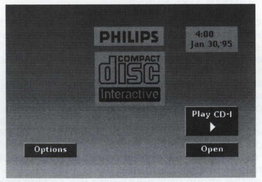
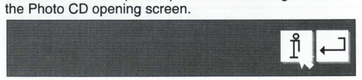


PLAYING A PHOTO CD

After loading the disc, the CD-I start-up screen appears on the TV.

- To start the Photo CD program, select the 'PLAY CD-I' icon on the screen; you may also press the PLAY button (5) on the player or remote control (6).
  The opening screen of the Photo CD program now appears on the TV.
  At the bottom of this screen a menu bar with icons is shown.

- Select the icon.
  The 'Options' screen will now appear.
- To select a language click on the box, the flag or the name of a country.
  The previous setting will be replaced automatically.
- Select the icon (Return) of this screen to go back to the Photo CD opening screen.



- Select the icon (Information) and the INFORMATION screen, explaining the control buttons of the menu bar in the selected language, appears.
- From this point, all interaction is between you and the program.

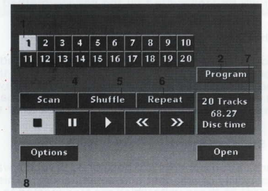
CAUTION

NEVER LEAVE A STILL PICTURE ON THE SCREEN FOR ANY LENGTH OF TIME. THIS CAN CAUSE BURNING-IN OF THE PICTURE TUBE. IN SUCH A CASE SWITCH OFF THE PLAYER OR REMOVE THE DISC.

PLAYING A CD-AUDIO DISC — 1. Using the audio screen

NOTE: This procedure can also be used for audio sections on 5 inch (12 cm) laser discs.

After loading the disc, the CD-Audio screen appears on the TV.



1. **Play track bar:**
   Shows the total number of tracks (up to 30). You can 'point-and-click' to select any track. For discs with more than 30 tracks, the right » and left « scroll arrows are used to move through the track list.

2. **PROGRAM:** Allows you to program a list of special tracks called a Favorite Track Selection. When you select PROGRAM, the FTS track bar and the FTS icon will appear.

3. **FTS:** Allows you to play Favorite Track Selections. This icon only appears if a Favorite Track Selection has been created for the disc that is loaded in the player.

4. **SCAN:** Allows you to listen to the beginning of every track listed in the play track bar. You can set the scan time to 5, 10 or 20 seconds in the 'Options' screen.

5. **SHUFFLE:** Allows you to play the tracks in the play track bar in a random order.

6. **REPEAT:** Allows you to repeat either a track or the entire disc. You can change the repeat mode in the 'Options' screen.

7. **TRACK/TIME:**
   – In STOP mode, this shows the total number of tracks and the total playing time. When you click at this window (7), the track time of the selected track is displayed.

   – In PLAY and PAUSE modes, the window shows the track number and either the elapsed or the remaining track playing time. To change between elapsed and remaining time, 'point-and-click' at the time shown in the window.

8. All the disc play control functions are shown on the screen, and can be selected as desired by 'point-and-click' with your remote control. The operation of the functions is briefly explained in the following table.

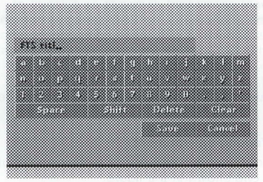
DISC PLAY

NOTE

If auto SHUFFLE or auto FTS has been selected on the 'CD Audio' screen, this function will be activated automatically.

PLAYING A CD-AUDIO DISC — 2. Creating FTS titles

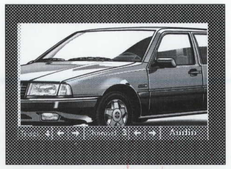
- After creating a Favorite Track Selection for a disc, you can compose a title of up to 30 characters (depending on the character width) for the selection using the keyboard screen.
  The title then appears on the CD-Audio screen whenever the disc is loaded.
- At the CD-Audio screen, 'point-and-click' on the program button, then 'point-and-click' on the "Save FTS" button.
  The CD-Audio screen will change to the keyboard screen.
- Select each character of the title in turn, using shift to change between upper and lower case characters and space to separate words.



Delete erases the last selected character.
Clear erases the complete (or partially complete) title.
Cancel returns to the CD-Audio screen without saving the title.
Save the title and returns to the CD-Audio screen.

PLAYING A CD-AUDIO DISC — 3. CD graphics

When an audio CD with graphics is played, the CD Graphics screen will appear automatically.



- To make the picture channel bar appear/disappear click on the action button anywhere outside the channel bar.
- You can select another track number by clicking on 'Track' or either arrow next to it.
  Depending on the disc, other channel numbers might give you other information, such as the lyrics in a different language.
- For information about the actual graphics functions, refer to the instructions that come with the disc.
- To play audio only, click on the 'audio' icon.

CAUTION

NEVER LEAVE A STILL PICTURE ON THE SCREEN FOR ANY LENGTH OF TIME. THIS CAN CAUSE BURNING-IN OF THE PICTURE TUBE. IN SUCH A CASE SWITCH OFF THE PLAYER OR REMOVE THE DISC.

OPERATION	SELECT
Start play	▶ **play** play starts at the beginning of track 1, or any other preselected track number. If a track is already playing, it is re-started.
Select a track	**track** number if the disc contains more than 30 tracks, use the left » and right « scroll arrows to move through the track numbers as required.
Pause	❚❚ **pause** use to interrupt play.
Exit pause	**pause** ❚❚ or **play** ▶ play restarts at exactly the same point as pause was selected.
Forward search	**forward** ▶▶ searches forward through disc.
Reverse search	**reverse** ◀◀ searches backwards through disc.
Stop play	**stop** stops playing. If play is restarted, it begins at the first track.
Scan the disc	**scan** plays the beginning of each track on the disc.
Exit scan	**scan** normal play starts from this point.
Shuffle play	**shuffle** shuffle sequence appears in track bar.
Exit shuffle	**shuffle** normal play starts from this point.
Repeat	**repeat** repeats the entire disc (or FTS program), or the track being played, as selected on the "Options" screen.
Play FTS	**FTS** only available when an FTS program has already been created for the disc in the player.
Exit FTS	**FTS** normal play starts from this point.
Program FTS	**program** • point to tracks as required on the play track bar, and in each case click on any action button to record the track in the FTS track bar. • To cancel an unwanted track, point to it in the FTS track bar and click on any action button. • To cancel the entire FTS program, point to the first track in the FTS track bar and click on any action button repeatedly until all the tracks disappear.
Store FTS	**Save FTS** the keyboard screen replaces the CD-Audio screen. See 'CREATING FTS TITLES'.

2.6 ACCESSORIES • ACCESSOIRES

SUPPLIED ACCESSORIES • ACCESSOIRES FOURNIS

These accessories are provided to help you use or set-up your CD-I Player.

Ces accessoires sont fournis pour vous permettre d'utiliser ou d'installer votre lecteur de CD-I.

"Thumbpad" Remote Control Handset
Télécommande à manette

Three Batteries
Trois piles R6

Euroconnector * Cable
Câble péritélévision/ CINCH
SBC 5510

Antenna Cable * (RF coaxial cable)
Câble d'antenne (Câble RF)

AC Cord
Cordon d'alimentation

Digital Video Cartridge*
Cartoûche Digital Vidéo
22ER9956

* available on some player versions only * disponible uniquement sur certains modèles de lecteurs * disponible únicamente en determinadas versiones de reproductor * slechts op enkele versies aanwezig * nicht für alle Player-Modelle lieferbar * disponibile solo su alcune versioni di lettore * apenas disponível nalgunas versões

type no. of product • Numéro de série du produit

Date of purchase • Date d'achat • Kaufdatum • Koopdatum • Fecha de compra • Data da compra • Data di acquisto • Købsdato • Kjøpedato • Inköpsdato • Ostopäivä • Ημερομηνια αγοράζ

day • Jour month • Mois year • Année **19**

The products and services described herein are not necessarily available in all countries.

OPTIONAL ACCESSORIES • ACCESSOIRES EN OPTION

Maximize your pleasure with state-of-the-art accessories designed specifically for your CD-I Player.
The optional accessories shown here may be purchased from your supplier.

Augmentez votre plaisir grâce aux accessoires d'avant-garde spécialement conçus pour votre lecteur CD-I.
Les accessoires en option présentés ici peuvent être acquis auprès de votre revendeur.

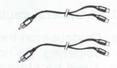
CD-I Mouse
Souris CD-I
22ER9011

Roller Controller
Boule de commande
22ER9012

CD-I Trackball
Trackball pour CD-I
22ER9013

Gamepad
Clavier de jeux
22ER9021

I/O Port Splitter for 2 devices
Doubleur pour dispositif de pointage pour 2 commandes
22ER9208



Audio Stereo Splitter
Doubleur pour Audio Stéréo
22ER9209

Audio L-R Cable
Double câble audio stéréo
SBA2135A01

Video (CVBS) Cable
Câble vidéo (CVBS)
SBV1127A01

Dealer's name, address and signature • Nom, adresse et signature du revendeur • Name, Anschrift und Unterschrift des Händlers • Naam, adres en handtekening van de handelaar • Nombre, dirección y firma del distribuidor • Nome, indirizzo e firma del fornitore • Nome, morada e assinatura do vendedor • Forhandlerens navn, adresse og underskrift • Återförsäljarens namn, adress och namnteckning • Myyjän nimi, osoite ja allekirjoitus • Όνομα/Επώνυμο Αντιπροσώπο

Due to continuous product improvements this document is subject to change without notice.

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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.

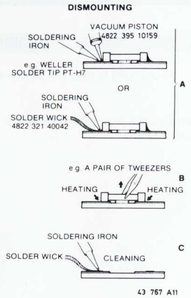


Fig. 1

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).

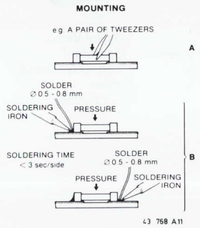


Fig. 2

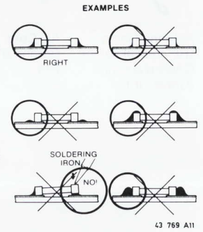


Fig. 3

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

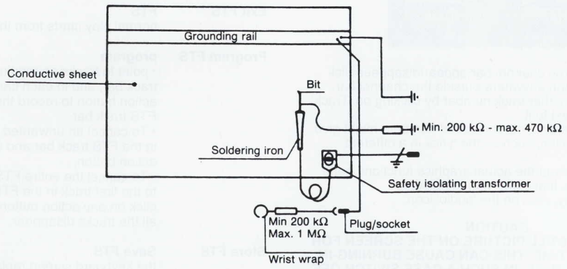
Transport and store the circuits and PCBs in their original packages.
As an alternative to the original package one may use a conductive material or special IC package which short-circuits all the pins of the component with one another.
Always discharge the package before opening it.

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.



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

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.

SAFETY GUIDELINES FOR THE PROFESSIONAL SERVICE TECHNICIAN

Important

Proper service and repair is important to the safe, reliable operation of all Philips equipment. The service procedures recommended by Philips and described in this service manual are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It also is important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Philips could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Philips has not undertaken any such broad evaluation. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Philips must first satisfy himself thoroughly that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

Safety Checks

After the original service problem has been corrected, a complete safety check should be made. Be sure to check over the entire set, not just the areas where you have worked. Some previous servicer may have left an unsafe condition, which could be unknowingly passed on to your customer. Be sure to check all of the following:

Fire and Shock Hazard

1. Be sure all components are positioned in such a way as to avoid the possibility of adjacent component shorts. This is especially important on those units which are transported to and from the service shop.
2. Never release a repaired unit unless all protective devices such as insulators, barriers, covers, strain reliefs, and other hardware have been installed according to the original design.
3. Soldering and wiring must be inspected to locate possible cold solder joints, solder splashes, sharp solder points, frayed leads, pinched leads, or damaged insulation (including the ac cord). Be certain to remove loose solder balls and all other loose foreign particles.
4. Check across-the-line components and other components for physical evidence of damage or deterioration and replace if necessary. Follow original layout, lead length, and dress.
5. No lead or component should touch a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces or edges must be avoided.
6. Critical components having special safety characteristics are identified with a ⚠ by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol ⚠ on the schematic diagrams and/or exploded views.

   Replacement parts without the same safety characteristics may create shock, fire, or other hazards.
7. When servicing any unit, always use a separate isolation transformer for the chassis. Failure to use a separate isolation transformer may expose you to possible shock hazard, and may cause damage to servicing instruments.
8. Many electronic products use a polarized ac line cord (one wide pin on the plug). Defeating this safety feature may create a potential hazard to the servicer and the user. Extension cords which do not incorporate the polarizing feature should never be used.

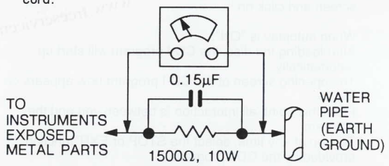
Fire and Shock Hazard (Continued)

9. After reassembly of the unit, always perform an ac leakage test or resistance test from the line cord to all exposed metal parts of the cabinet. Also, check all metal control shafts (with knobs removed), antenna terminals, handles, screws, etc. to be sure the unit is safe to operate without danger of electrical shock.

* Broken line: ▬ ▪ ▬ ▪ ▬ ▪ ▬ ▪ ▬

Leakage Current Cold Check

1. Unplug the ac line cord and connect a jumper between the two prongs of the plug.
2. Turn on the power switch.
3. Measure the resistance value between the jumpered ac plug and all exposed cabinet parts of the receiver, such as screw heads, antennas, and control shafts. When the exposed metallic part has a return path to the chassis, the reading should be between 1 megohm and 5.2 megohms. When the exposed metal does not have a return path to the chassis, the reading must be infinity. Remove the jumper from the ac line cord.



Leakage Current Hot Check

1. Do not use an isolation transformer for this test. Plug the completely reassembled unit directly into the ac outlet.
2. Connect a 1.5k, 10W resistor paralleled by a 0.15uF. capacitor between each exposed metallic cabinet part and a good earth ground such as a water pipe, as shown above.
3. Use an ac voltmeter with at least 5000 ohms/volt sensitivity to measure the potential across the resistor.
4. The potential at any point should not exceed 0.75 volts. A leakage current tester may be used to make this test; leakage current must not exceed 0.5 milliamps. If a measurement is outside of the specified limits, there is a possibility of shock hazard. The receiver should be repaired and rechecked before returning it to the customer.
5. Repeat the above procedure with the ac plug reversed. (Note: An ac adapter is necessary when a polarized plug is used. Do not defeat the polarizing feature of the plug.)

Parts Replacement

1. Many electrical and mechanical parts in Philips equipment have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. The use of a substitute part which does not have the same safety characteristics as the Philips recommended replacement part shown in this service manual may create shock, fire, or other hazards. Under no circumstances should the original design be modified or altered without written permission from Philips. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.
2. All ICs and many other semiconductor parts are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce the life of the part drastically.

LASER NOTE:

DANGER - Invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.
CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
CAUTION - The use of optical instruments with this product will increase eye hazard.

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3.3.9 Advises on replacement of large surface mounted components (SMC's)

3.3.9.1 General

The usual trend development in complexity on ICs and µPs has to make the handling for service workshops as normal practice.

Parts like the VDSC and CIAP are 160 pins plastic Quad Flat Packages (QFP) with :
Lead widt = 0,3 mm
Pitch = 0,65 mm

Replacing the QFPs with fine pitch requires careful handling and good workmanship preventing a damage of the QFP leads, leadpads on the PCB-substrate and the adjacent parts with their solder connections.

3.3.9.2 Advises

- Work carefully
- Apply appropriate equipment
- Use proper lighting
- Apply a magnifying-glass for visual inspections
- Do not cut with a knife
- Leads are sensitive for bending or damage during handling
- Take care for ESD

3.3.9.3 Workmanship

- Keep temperature as low as possible
- Keep time of desoldering restricted
- Pay attention to the differences in desoldering and resoldereing
- Do not apply mechanical forces to lift the QFP from the PCB
- Select good flux and solder
- Look with attention and monitor your process
- Clean after desoldering

3.3.9.4 Methods for removal by desoldering

- By contact heating
- By hot air flow

3.3.9.4.1 Desoldering by contact heating

Advantages :

* Heat is directly introduced in the leads
* Adjacent components will not be heated

Disadvantages :

* Proper contact on all leads simultaneously sometimes problematic
* Risk of damage of leads

Method:

* Select proper desolder tip according to the instruction for use
* Use solder for improving thermal contact
* Temperature : from 250°C for 6 sec. to 300°C for 3sec.
  Max. temp. : 320°C for 3 sec. max.
* Remove excessive solder with solderwick or litze
* Clean after desoldering
* Inspect lead pads on PCB

3.3.9.4.2 Desoldering by heated air

Remark: The hot air for these methods has a temperature far over 400°C. Keep in mind the proper distance to prevent burning of material and keep the time as short as possible.
Advise: With lower air temperature the risk on burned material is less !

Advantages:

* No contact necessary
* No damage of leads

Disadvantage:

* Adjacent components to be protected from hot air flow
* Overheating, risk of burning and fatal damage

Method:

* Read and follow precisely the instructions from the equipment
* Select nozzle with related temperature and air flow setting
* Shield adjacent parts from heat, also do not touch adjacent parts during heating
* Use NO-CLEAN flux for proper solder process
* Keep nozzle e.g. 5 mm above QFP leads according to instructions of the equipment
* Desoldering time in between 3-5 sec.
* Lift QFP
* Remove excessive solder instructions with solderwick or litze
* Clean after desoldering

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3.3.9.5 Methods for soldering QFPs

- By hot air
- By conventional soldering iron

3.3.9.5.1 Soldering QFP's by hot air

This method requires a high degree of experience and process control. For soldering a paste is used containing solder particles. The handling of paste is critical as the final control of the total of soldering quality is difficult to be carried out.
Unless with proven available experience this method is advised to be avoided.

3.3.9.5.2 Soldering QFP's with a soldering iron

Method

* Select and use appropriate soldering tip
* Do not touch leads by fingers
* Check the proper positioning of all leads
* Position QFP on cleaned location
* Check references of the position
* Apply NO-CLEAN flux
* use the appropriate thickness of soldering wire 0,3 - 0,5 mm
* Solder lead by lead by moving your solder + iron
* Monitor by magnifiying glass or microscope
* Remove excessive solder and short circuits

3.3.9.6 Equipment

Within PHILIPS the Netherlands the preferred supplier is PACE Inc. for various types of surface mount soldering equipment. This equipment can be applied also for all types of components.
Contact the PACE Inc. distributor in your country or else.Soldering material

3.3.9.7 Soldering material

The thickness of the wire is important for the solder/flux core relation for fine pitch QFP's. The line techniques require wire thickness of max. 0,5 mm.
Do not use usual types with diameter 0,8 or 1 mm

3.3.9.8 Flux material

The usual flux (like 4822 390 50025) leaves residues after desoldering and soldering. The residues usually can be aggressive and have negative influence on the sodering quality.
The NO-CLEAN flux types are less aggressive and do not require cleaning afterwards.
Contact the PACE Inc. distributor in your country or else.

3.3.9.9 Cleaning material

Use clean alcohol (or ethanol) with a little brush or special cleaning-kits.

3.3.9.10 Manual repair procedure for fine pitch.

This procedure is a guide to manually repair fine-pitch components with a pitch down to 0.4 mm. The equipment used is:

- MBT 250 from PACE, including:
  - TP-65 Thermopik thermode hand piece
  - SX-70 Desoldering hand piece
  - TT-65 Thermo Tweeze hand piece
  - TJ-70 Mini thermo jet hot air hand piece
  - IR-70 Soldering iron with "mini wave" tip
- Microscope magnification 2-20x
- Flux paste type 5-412-A
- Solder wire with 2% Ag
- Micro Care Pro-Clean

Since installation of a new component is the most difficult part of a fine-pitch repair job, this subject will get the most attention.

3.3.9.10.1 Board preparation

If the board is old and grimy, the component should be cleaned before removal, to make a proper contact to all the leads possible.

3.3.9.10.2 Removal

To remove a fine-pitch component, a component specific thermode is used. To improve the heat transfer from the thermode to the leads, all the leads are bridged together with a large amount of solder (use solder wire of 1.5mm diameter). The desoldering iron has a larger thermal mass so it is easier to use this tool to apply a string of solder, instead of the solder iron. By applying the solder to the leads instead of to the thermode, a larger amount of solder can be applied, and one can see if all the leads are covered with solder.

The temperature setting of the thermode hand piece is ± 340 °C. For large components the temperature of the thermode should be ± 350 °C; for smaller components a temperature of 330 °C is sufficient. Always clean the thermode just before use with a wet sponge. To remove the component, the thermode is placed over the component and pressed gently into the solder. By gently moving / rotating the thermode one can feel when the component is loose and vacuum of the thermo-pick hand piece can be turned on, and the component can be lifted. This should not take longer than 2-3 seconds.

Another method of removal is the use of the hot-air desoldering station from JBC. It uses shields around the component to prevent thermal influences to adjacent components. These shields have a small, spring loaded nozzle, to lift the component when all the joints are molten. A simple hot air gun is used as a heat source.

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3.3.9.10.3 Site preparation

After removal, there is a lot of solder left on the board. Before a new component can be installed, this has to be removed. With a desoldering iron (sucks the solder from the board) the solder is then removed. Remember to always clean the tip with a wet sponge before use. During the operation there is contact between the desoldering iron and the copper pads, so this has to be done gently and with a tip temperature of ± 300 °C. Do not move the tip of the desoldering iron perpendicular to the pads but with a corrugated profile (see Fig 1).

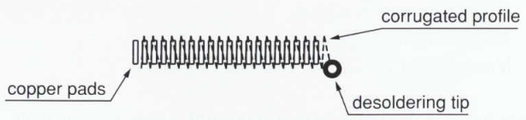


Fig 1 Removal of solder via a corrugated profile.

After the solder is removed, the pads are cleaned to remove flux residues and other irregularities.

3.3.9.10.4 Installing new component

Installation of fine-pitch components is the most difficult part of repair. The use of a microscope is needed to properly align the component to the pads. Handling of the component should be done very carefully to prevent bending of leads. Use a vacuum pipette to pick up the component from tray and place it on the board. Align the component to the pads, and hold one finger on it to keep it in place. Now flux two opposite corners, and fix it by soldering the two opposite corner leads. Use only a very small amount of solder on the solder iron to prevent bridging. When your finger, which holds the component in place, is a little bit sticky, put the solder iron on top of the body when lifting your finger. This prevents a force on the soldered leads when lifting your sticky finger away from the body.

Now the component is fixed in place, the rest of the leads can be soldered, using a tip temperature of 280 - 290 °C. Apply a string of flux paste from a syringe (see Fig 2) for good soldering results.

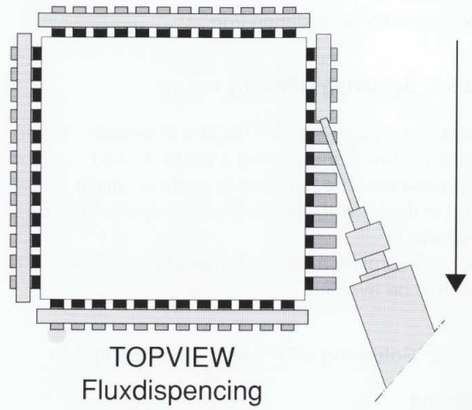


Fig 2 Applying flux to the component

First the component sides of which no leads are fixed have to be soldered. Use the same solder as with the reflow process, in this case solder with 2% Ag. Apply only a small amount of solder to the cleaned "mini- wave" tip, to prevent bridging. Place the tip onto the first lead of the row (see Fig 3) and gently move the tip over the leads.

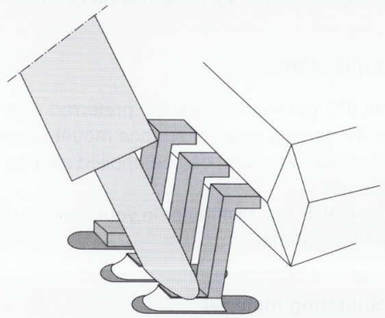


Fig 3 Start of soldering action

Make sure that the tip is flat on the leads (see Fig 4) during movement.

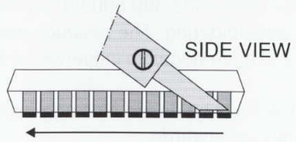


Fig 4 Movement of the soldering iron

The speed of movement is dependent on the melting speed of the solder and wetting of the leads. Typically an average speed of ± 1 mm/s is required. When the end of the row of leads is reached the tip has to be moved away from the body (see Fig 5).

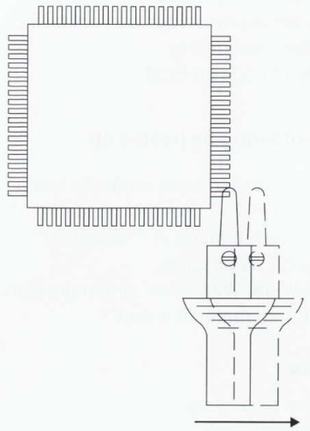


Fig 5 Movement of tip at end of row .

After the first side is finis hed, go to the opposite row of which no leads are fixed, and then finish the last two sides. If a bridge is formed between two leads, it can be removed quite easily. First apply fresh flux to the bridge. Then clean the tip and make sure it is free from solder. Place the tip on top of the bridge and, like at the end of a row, move the tip perpendicular to the body. By this method the excess of solder is pulled away on the tip.

3.9.10.5 Inspection

Most of the inspection is done during soldering, but lean joints can only be found when looking at an angle and not from the top. If a lean joint is found apply new flux, and try to put solder only to the lean joint.

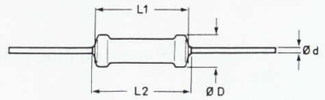
3.3.9.10.6 Completion

Because an excess of flux is used, it is preferred to clean the board. Also for cosmetic reasons.

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

ype	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...

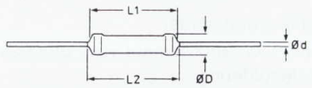
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

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

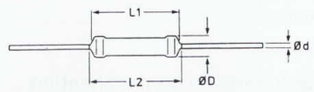
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ is 4822 053 21336

PR01, PR02 and PR03 power metal film resistors

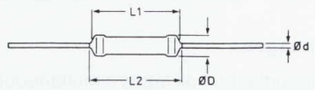
ϕD_{max}	L1	$L2_{max}$	ϕd
2.5	6.5	8.0	0.6



ϕD_{max}	$L1_{max}$	$L2_{max}$	ϕd
3.9	10	11	0.8



ϕD_{max}	$L1_{max}$	$L2_{max}$	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...

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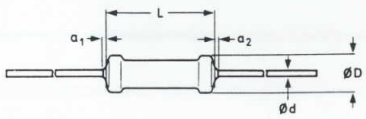
The codenumber above is completed by inserting the first two figures (resistance code)followed by the multiplier.

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

NFR25 fusible resistors ⚠



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

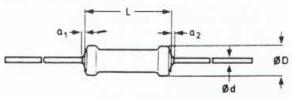
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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

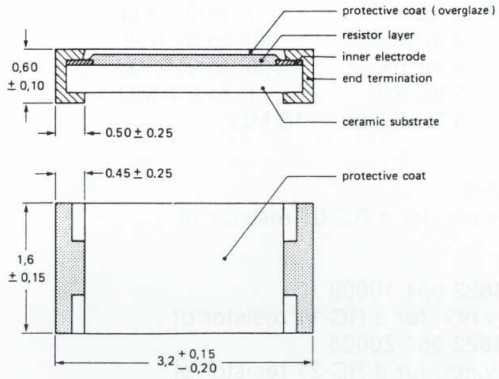
Composition of the service number for the NFR25H
Main subgroup: 4822 052 11...

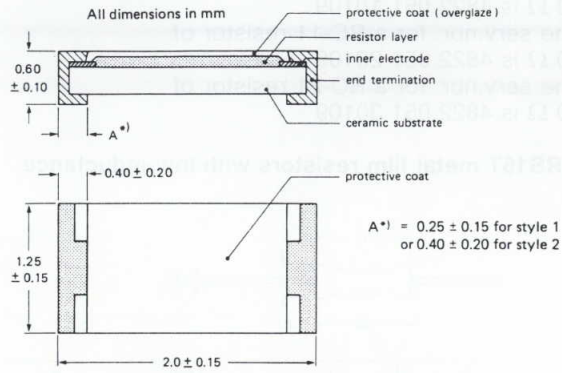
The codenumber above is completed by inserting the first two figures (resistance code)followed by the multiplier.

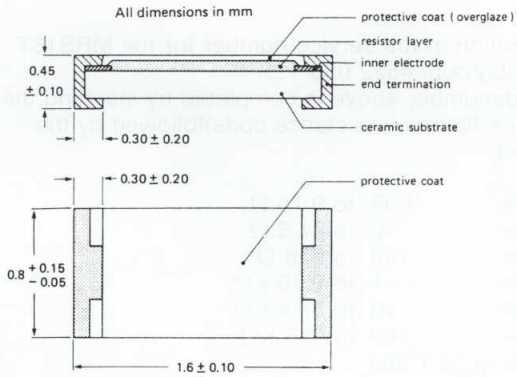
8 for R=	1	to 9,1 Ω
9 for R=	10	to 91 Ω
1 for R=	100	to 910 Ω
2 for R=	1	to 9,1 KΩ
3 for R=	10	to 91 KΩ

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.

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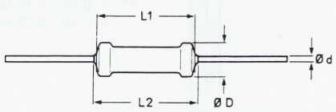
8 for R=	0	to 9.1 Ω
9 for R=	10	to 91 Ω
1 for R=	100	to 910 Ω
2 for R=	1	to 9.1 KΩ
3 for R=	10	to 91 KΩ
4 for R=	100	to 910 KΩ
5 for R=	1	to 9.1 MΩ
6 for R= or > 10 MΩ		

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



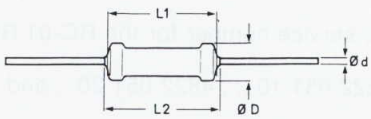
D	L	L2 max.	d
$1,7^{+0,2}_{-0,1}$	$3,5^{+0,2}_{-0,15}$	3,7	0,5 −0,04

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 CENTRAL REPAIR PROCEDURE OF THE MAINBOARD

If the defective item is in the circuitry of the µP **section, CIAP section or digital video section, then the complete main board must be replaced and sent back to a local central repairshop.**
Relevant sections are displayed when using the diagnostic programme (chapter 5) and are marked by silkscreening in the layout of the board.
Dealers must contact the national Service Centers for this procedure. See further on in this chapter 3.6 for instructions and addresses.

If the defective item is in the circuitry of the SERVO section, analog audio or analog video section then the main panel can be repaired by the authorized dealer down to component level.
For partslist see chapter 8 .

Remark :
The defect on the board can be isolated and found by means of built-in diagnostics :
(See chapter **5 SERVICE SOFTWARE**)

1. Low Level test (in short LLtest)
2. Service Shell

3.6 REPAIR PROCEDURE OF THE MAINBOARD IN YOUR COUNTRY

3.6.1 Repair procedure for NORTH AMERICA Customers

- Return defective Main boards to the following address :

PHILIPS SERVICE COMPANY
907 SNAPP FERRY ROAD
GREENEVILLE, TN 37743

- Re-use original packaging to return the part to Philips.
- Use standard NARDA form to receive Warranty credit, Dud credit or Defective shelf stock credit. Form must be filled out completely.
  Describe the defect condition in detail.
- ALL RETURN ITEMS ARE SUBJECT TO INSPECTION FOR MISUSE OR ABUSE. PHILIPS RESERVES THE RIGHT TO REFUSE CREDIT ON SUCH ITEMS
- Damaged or cracked boards will be refused for credit.

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3.6.2 Procedura di Riparazione ITALIA

Nel caso in cui il prodotto non funzioni correttamente o sia difettoso si prega di contattare il Centro Assistenza Tecnica Autorizzato di zona (consultare l'elenco telefonico provincia alla voce Philips Service).
Si raccomanda di leggere attentamente le istruzioni d'uso prima di interpellare il Centro Assistenza Autorizzato. Per ulteriori informazioni si consiglia di interpellare :

SERVIZIO CONSUMATORI PHILIPS
PIAZZA IV NOVEMBRE 3
20124 MILANO

FAX: 02 - 67 52 26 60
TEL.: 167 - 82 00 26 (Linea verde)

3.6.3 Reparatur Prozedur OSTERREICH

Bitte richten Sie alle weiteren Fragen an den PHILIPS SERVICE ZENTRALE:

Osterreichische Philips Industrie GmbH
Service Zentrale
Gutheil - Schodergasse 12
A-1100 WIEN

TEL.: (0222) 60 101-0
FAX: (0222) 60 101-5596

3.6.4 Reparatur Prozedur SCHWEIZ Procedura di Riparazione SVIZZERA Procédure de réparation SUISSE

Bitte richten Sie alle weiteren Fragen an Ihr "Philips info Center":
Per qualunque domanda in questione rivogetevi p.f. al vostro "Centro Philips d'Informazione":
Pour toustes autres questions, veuillez vous adresser à "Philips Info Center":

PHILIPS INFO CENTER
c/o SERLOG SERVICE + LOGISTIK AG
FEGISTRASSE 5
CH-8957 SPREITENBACH

TEL.NR. 056/70 72 70
FAX.NR. 056/70 75 75

3.6.5 Proceso de Reparación ESPAÑA

Para el proceso centralizado de reparaciónes de CD-i puede ud. Tomar contacto con el Sr. J.J. Morillas o Sr. Lluch. Dirección :

EUROSERVICE (SERVICE SPAIN)
BRUCH 147 - 149
08037 BARCELONA

TEL.NR. 34 3 2070100
FAX.NR. 34 3 4574894

3.6.6 Reparaturabwicklung DEUTSCHLAND

Das fehlerhafte Mainboard muss in ESD-sicherer Verpackung mit detaillierter Fehlerbeschreibung an die hierunter genannte Adresse gesandt werden.
Die Rücksendung des defekten Mainboards erfolgt an folgende Adresse:

PHILIPS CE GmbH
CONSUMER ELECTRONICS
SERVICE ORDERDESK
z.Hd. Frau Billert
ALEXANDERSTR. 1
20099 HAMBURG

3.6.7 Procédure de réparation FRANCE

- Commander le circuit principal
- ré-utiliser l'emballage initial pour retourner la pièce à SERVICE SA
- Retourner les principales pièces défectueuses à l'adresse suivante :

SERVICE SA
Service Retours / Pièces Détachées
Rue des Vieilles Vignes - BP 02
77311 - CROISSY BEAUBOURG

- Joindre le ticket de prélèvement de la pièce livrée
- Si la réparation est sous garanti, joignez une demande de remboursement

Remarque : Si le circuit défectueux n'est pas retourné dans les 8 jours qui suivent la livraison de la piéce de remplacement, une facture complémentaire sera établie.

3.6.8 Processo de Reparação Brasil

- Reutilizar a embalagem original para retornar o Palnel Principal para a Philips
- Painéis danificados ou quebrados devido más condicões de embalagem não serão aceitos para crédito.
- Todos os retomos estarão sujeitos à inspeção de mau uso ou uso indevido. A Philips se reserva ao direito de não conceder o crédito nosses casos.
- Se o circuito defeituoso não retornar à Philips dentro de 8 dias após a reparação, será emitido fatura correspondente à peça.

Retornar o painel defeituoso para:

PHILIPS DA AMAZÔNIA IND. ELETR. LTDA
AV. ERMANO MARCHETTI, 642
SÃO PAULO - SP - 05038-000
CGC: 04.182.861/0005-12
IE: 113.830.921.116

Em caso de dúvida, contatar o Help-Desk (PSC-Técnico).

3.6.9 Other countries

For the **not** above mentioned countries please contact your local SERVICE organization via the usual channels to obtain instructions "how and where" to send the mainboards.

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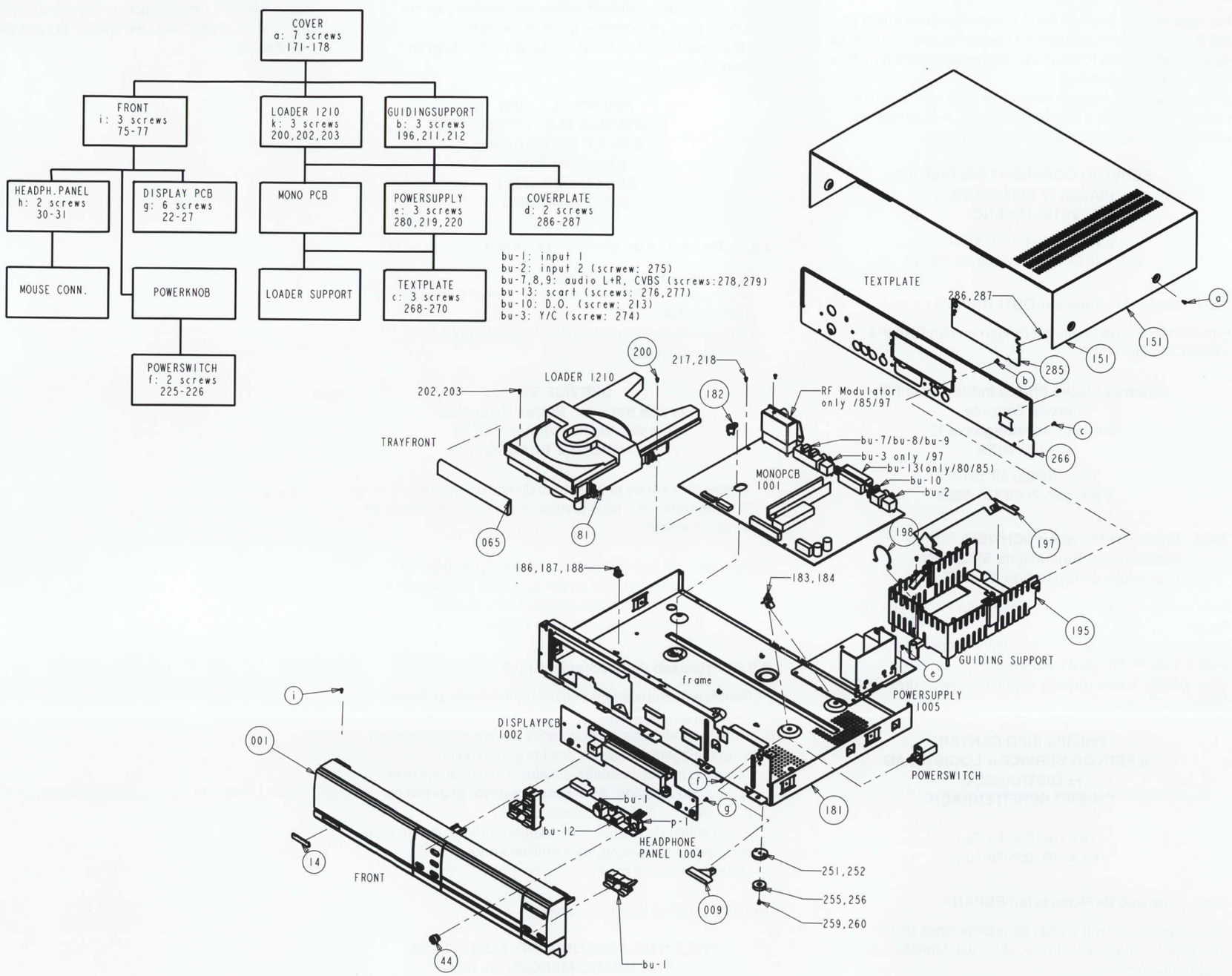
4 MECHANICAL DRAWINGS

4.1 Exploded view of the cabinet



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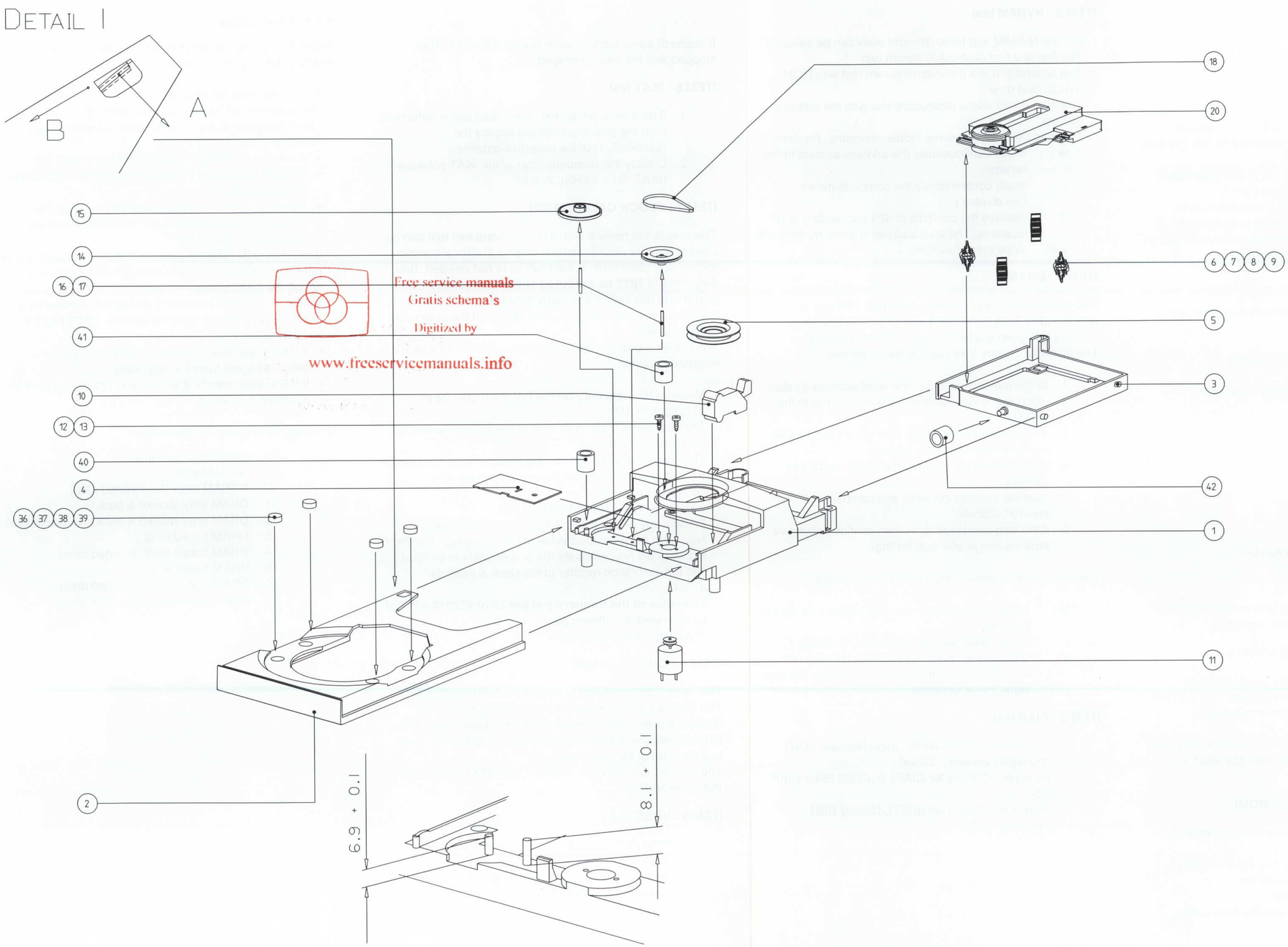
4.2 Exploded view of the loader



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5 SERVICE SOFTWARE

In the set there are 2 different testsoftware available:

1. Low Level test
2. Service Shell

5.1 THE LOW LEVEL TEST

Scope
This test is standard implemented in the boot software of CD-RTOS. It doesn't need a lot of hardware to run. The Low Level test is Menu driven.
To run the low level test a terminal (VT100 or equivalent) must be connected to the inputport via Port 2.
To start the test the space-bar on the terminal must be pushed at the same time that the power is switched-on at the CDI-player. To continue with the test, the instructions on the screen of the terminal must be followed.

5.1.1 Testsequence

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

STEP	ACTION/TEST PERFORMED
0	Exit Low Level test
1	Writing to a default RAM address
2	ROM parity check
3	NVRAM test (8K)
4	DRAM test
5	CIAP test
6	IKAT-CD7 test
7	Clock Calibration
8	Chip Select test
9	VDSC test

Display LLtest header and release number

ITEM 0 : Exit Low Level test

Selecting this item will end the lltest and continue with the boot. After the boot the player shell is started up.

ITEM 1 : Writing to a default 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 and the system will hang up.

ITEM 2: ROM parity check (System 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.
  If the checksum is not ok then a specific error will be displayed.

ITEM 3 : NVRAM test

- For the NVRAM test three different tests can be selected:
- The first is a non destructive nvram 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 continueously the address as data to the nvram.
  - r : reads continueously 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.

ITEM 4 : DRAM

The dram test is always a destructive test. The test is performed for both ram CHIP1 and CHIP2 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 continueously the long address as data to the dram.
- r : reads continueously 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.

ITEM 5 : CIAP test

1. Read contents of Indentification Register (IDR) and diplay version : "CDxx"
   Example : CD01 is for CIAP1.0, CD02 IS for CIAP 1.5
2. Start Built-in Self-Test (BIST). Display BIST signature : 07C1

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

ITEM 6 : IKAT test

1. 8 data lines are tested. If one data line is defective then the errormessage will display the number(0..7) of the defective dataline.
2. Display the versionnumber of the IKAT software. (IKAT: 50 = VERSION 5.0)

ITEM 7 : 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 NOT 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.

- Measure the frequency on the PAL20L8 : pin 23 of IC7272, CSCIAPN!
- 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, then check if everything is set and connected properly.
  (range : 511,96724 to 512,03276 Hz)
- 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 IC7241.
  The value of the frequency at pin 25 of IC7310 will not be changed or influenced.
- The calibration is done now.

ITEM 8 : Chip Select test

This step is only intended to be used with an oscilloscope. The software will generate a Chip Select pattern for All devices.It is not guaranteed that this test always runs. If one of the devices is defective (no DTACK) it will surely result in a hang-up of the testsoftware.
The devices are DRAM 1, DRAM 2, SYSTEM ROM, CIAP, IKAT and NVRAM.

ITEM 9 : VDSC test

1. Write continously $00 to the Display Decoder Registers of the master and slave.
2. Read continueously the contents of the Control Status Register (CSR).

5.1.2 Error Codes

When during a test an error occurs the user should be aware of followig conventions:

- 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 DASTA 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 Tes 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.

Following error codes are generated:

05	ROM checksum error
09	NVRAM error
10	NVRAM error (for inverted data)
11	DRAM error (bank0 & bank1)
12	DRAM error (bank0 & bank1, inverted data)
13	DRAM bank0 error
14	DRAM bank0 error (inverted data)
15	DRAM bank1 error
16	DRAM bank1 error (inverted data)
20	IKAT error (wrong echo from slave)

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5.2 THE SERVICE SHELL

Introduction.
For service purposes the CD-I set has built-in testsoftware 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 testpa tern
- CDM and servo circuitry. Testing the CDM and servo cicuitry in the service shell is only possible with a CD-DA disc.

5.2.1 Starting sequence of the service shell

1. Put the power off
2. Connect the RXD2 and TXD1 lines of the inputport at the front of the player (pin2 and pin3).
   Or insert testplug 4822 264 50263 into the inputport.
3. Put the power on and wait until the menu appears on the tv-screen.
4. Disconnect the shortcircuit of RXD2 and TXD1.
   Or remove the testplug.
5. Now connect a pointing device to the input port:
   Access of the menu can only be carried out by means of a "M"(ouse) pointing device like :

Tracker Ball	**4822 691 30298**
Mouse	**4822 691 30297**
Rollercontroller	**4822 691 30293**
or Remote Control	

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 pointing device 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 about errors in a box at the bottom of the screen. To remove such a message and continue a button must be clicked on the pointing device.

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.

5.2.2 Subject dependent information

Main menu
The main menu contains three item boxes.
1. TEST IMAGE
2. CD DRIVE
3. EXIT

Selecting TEST IMAGE will give immediate action.
Selecting CD DRIVE will start the CD DRIVE test submenu.
Selecting EXIT will return to the normal usershell.

Test image
A video (75%)colorbar with 750 mV level white bar is generated and send to the video output.

CD drive test
1. First of all the communication with the CD part is checked then after clicking on one of the buttons the IKAT version is displayed.
2. After clicking on one of the buttons the CD drive test menu will appear. The CD drive test will perform the service loop as implemented in the Philips CD audio players. A CDDA disc is needed for this test. Results of this test will be displayed on the tv-screen.
3. When the cd drive test is selected, the next items can be selected:
   - ARM OUT. Clicking on this item will result in a movement of the sledge with laser and the optical pickup to the outside area of the disc if the sledge is at the centre area of the disc.
   - ARM IN. Selecting this item will return the sledge to the centre area of the disc if it is at the outside.
   - NEXT MODE. Selecting this item will put the servo circuit into some modes (or steps). The modes are displayed in the red box on the right at the top of the screen, while messages are displayed in the red box on the left. The drive test consist of the following steps:

   MODE 0
   In mode 0, the ARM IN and ARM OUT buttons can be selected to move the sledge with the optical unit inwards and outwards.
   Selecting NEXT MODE will bring the player in mode 1.

   MODE 1
   In mode 1 the IKAT processor will try to focus. If it manages to do so (a disc must be present!), the message IN FOCUS will appear in the left box. Otherwise, the message NO FOCUS will appear after the processor has tried to focus 3 times. In that case (no focus found) the test will return to mode 0.
   Selecting NEXT STEP will bring the player in mode 2.

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MODE 2
The turntablemotor is rotating and controlled by the rough HF. The message MOTOR OK will appear. If an error occurs, the message MOTOR ERROR APEARS and the test will return to mode 0. Selecting NEXT STEP in mode 2 will bring the player in mode 3.

MODE 3
The radialservo is now activated and the message RADIAL TEST OK appears. The optical pick up will follow the tracks now and the sound is muted. If an error occurs, an error message will be displayed and the test will return to mode 0. NEXT STEP in mode 3 will bring the player in normal playing mode, but if something goes wrong at the bottom of the screen an error code ("CD error x")will be displayed.
The meaning of the "x" is in the next list :

0 = no error
1 = focus found
2 = focus error
3 = radial error
4 = turntable motor error
5 = search time error
6 = subcode error
7 = TOC error
8 = fatal sledge error

To exit the SERVICE SHELL the power must be switched off.

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6 DIAGNOSTICS AND SHORT DESCRIPTIONS

6.1 SHORT DESCRIPTION OF THE KEYCOMPNENTS

6.1.1 CPU SCC68070

- Microcontroller (UART, I/O-bus, I^2C-bus, 2 DMA-channels, memory management unit)
- 16 datalines (DATA0 .. DATA15) and 24 addresslines (LADD0 .. LADD23)
- 16 MByte addressrange:
  - 5 MByte on the mainboard
  - The rest on extension boards
- Clockfrequency : 30 MHz for PAL
  30.2 MHz for NTSC
  This **systemclock** (**SYSCLK**) is also a clock for the 'video chip' (VDSC)
- The UART works on 4.9 MHz and provides in the communication between processor and terminal.
  This UART is used for access of the Low Level test.

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6.1.2 VDSC
Video Decoder and System Controller

System Interface

- Direct interface for 680X0 bus compatible devices
- 1 MByte ROM control
- 1 kByte I/O control
- Reset sequencer, including ROM shadowing
- Watchdog timer
- Generates chip selects for the systemrom

DRAM Interface

- On chip DRAM controller
- 4 MByte direct drive
  For CDI470 this is 1 MByte spread over 2 DRAM banks of 512 kByte.

Video Interface

- Up to 768 x 560 screen resolution
- Capability to display run-length coded files
- Mosaic effects
- 256 Color Look Up Table (CLUT)
- Two Delta YUV decoders
- Cursor shape, color and blink control
- Overlaying of four planes (cursorplane, plane A, plane B and backdrop plane)
- Special effects via weight control, priority control, etc.
- Dynamic programmable registers and CLUT reload in retrace period
- Digital RGB output (8 bit per component)
- Synchro generator for 50 and 60 Hz scan
- Synchronization with external video

General

- CMOS technology
- 160-pin QFP package

The DRAM banks are constantly being read by the VDSC to generate video. The VDSC has the highest priority but the DRAM is also a kind of system-memory (which is asynchronously read by the CPU).

6.1.3 SYSTEMROM 27C400

- 4 Mbit (EP)ROM
- Contains boot, operating system, hardware drivers and the player shell.

6.1.4 IKAT MC68HC05I8

- Integration of servo- and slave processor
  - Generates chip select for CD7
  - Control of the pointing device port and the player control keys.
- Works on 4 MHz.
- CMOS technology, 64 pin QFP

6.1.5 CIAP 1.5-
CD-Interface and Audio Processor

- Establishes the link between the 'standard' CD- part and the CD-i part of the player.
- Decoding of the ADPCM-audio (base case audio).
- To perform audio mixing functions (as described in the Green Book).
- To be able to add external audio to the base case audio.
- At the CD-side the CIAP has to interface with the CD7 for both main channel and subchannel data.
- The CIAP does not control the servo but it can, via the Q-channel data, indicate which sector is currently read.
- it interfaces directly to the 68070.
- Works on 33 MHz; this clock is also fed to the CD7 decoder

6.1.6 NVRAM + CLOCK

- 8Kx8 SRAM
- Time keeper
- Contains CSD-files (Configuration Status Description: info about system set-up) and FTS-files (files for the player shell and applications).

6.1.7 CALVIN or HOBBES

- Digital RGB to video encoder
- Four DAC's on chip
- Two NTSC/PAL Composite outputs
- Y/C outputs
- Analog RGB outputs
- Digital RGB inputs
- Automatic detection and support of PAL and NTSC modes
- Automatic detection and support of interlaced/noninterlaced modes
- Internal voltage reference available
- 68-pin PLCC

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6.1.8 GAL's

- Glue logic
- GAL20V8-10. Generates chip selects for IKAT, VDSC, NVRAM and CIAP.
- GAL16V8-10. Generates DTACKN for the NVRAM and the SYSTEMROM

6.1.9 CD7 Digital Servo IC + CD-decoder

- Sophisticated digital servo controller which provides all servo functions needed in a two stage three spot CD-system.
  [two stage means fine control by the actuator and coarse control by the sledge]
- Provides in all servo functions
- Special functions to improve the playability, to perform reliable access and to realize a high degree of shock insensitivity.
- I^2C communication
- Complete CD decoder
- HF is being transformed into a I^2S-format and digital out.
- Errorcorrection
- Spindle motor control with programmable motorloop bandwidths.
- On chip AGC for the EFM input signal
- On chip front end 6 bits ADC
- Subcode data processing
- Audio data interpolation processing
- Digital audio interface (EBU)
- Works on 33 Mhz

6.2 TROUBLESHOOTING AND REPAIR

This section contains some guides to aid the technician in troubleshooting the CDI player. The CD servo section and Analog Audio section are similar to any CD player. Thus, the same techniques for troubles hooting 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 equivalent) to run and test the functioning of the µP section, CIAP section or digital video section.
The Service Shell provides tests for the Video and Servo and Decoder circuits. Section 5.3 covers all the Service Shell test procedures.
The analog video/audio and servo & CD decoder circuitry can be serviced to the component level, the CD Mechanism (CDM12) is also replaced as an assembly. Disassembly instructions are provided on the exploded views.
If the defective item is in the circuitry of the µP section, CIAP section or digital video section, then the complete main board must be replaced and sent back to a local central repairshop. See section 3.5 and 3.6.

Troubleshooting hints:

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

6.2.1 Troubleshooting and Service the µP section, CIAP section or digital video section

The mainboard is replaced as a module when parts of the µP section, CIAP section or digital video section are defective. The technician must know the functioning of those sections 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 test indicates a fault, replace the complete mainboard. If the test cannot be initiated, check the power sources and main clock signals on the µP section. If all supplies and clock signals are present, replace the mainpanel.

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7 ELECTRICAL DRAWINGS

7.1 BLOCKDIAGRAM with FUNCTIONAL SURVEY

The circuitry is build up on one double sided 4-layer main board and consists of the following functional parts and blocks:

Processor part
- CPU (SCC68070)
- IKAT (MC68HC05I8)
- System ROM (27C400)
- NVRAM/CLOCK

CD Interface and Audio Processor part
- CIAP 1.5 (-)

Digital Video part
- VDSC (Video Decoder and System Controller)
- CALVIN(Video Encoder)
- 1MB DRAM with two banks of 512 KB
- CVBS video out
- RGB video out [Only for 470/00, 470/05]
- Y/C video out [Only for 470/11, 470/17]

Chip Select and DTACKN generating glue logic
- GAL 20V8-10
- GAL 16V8-10

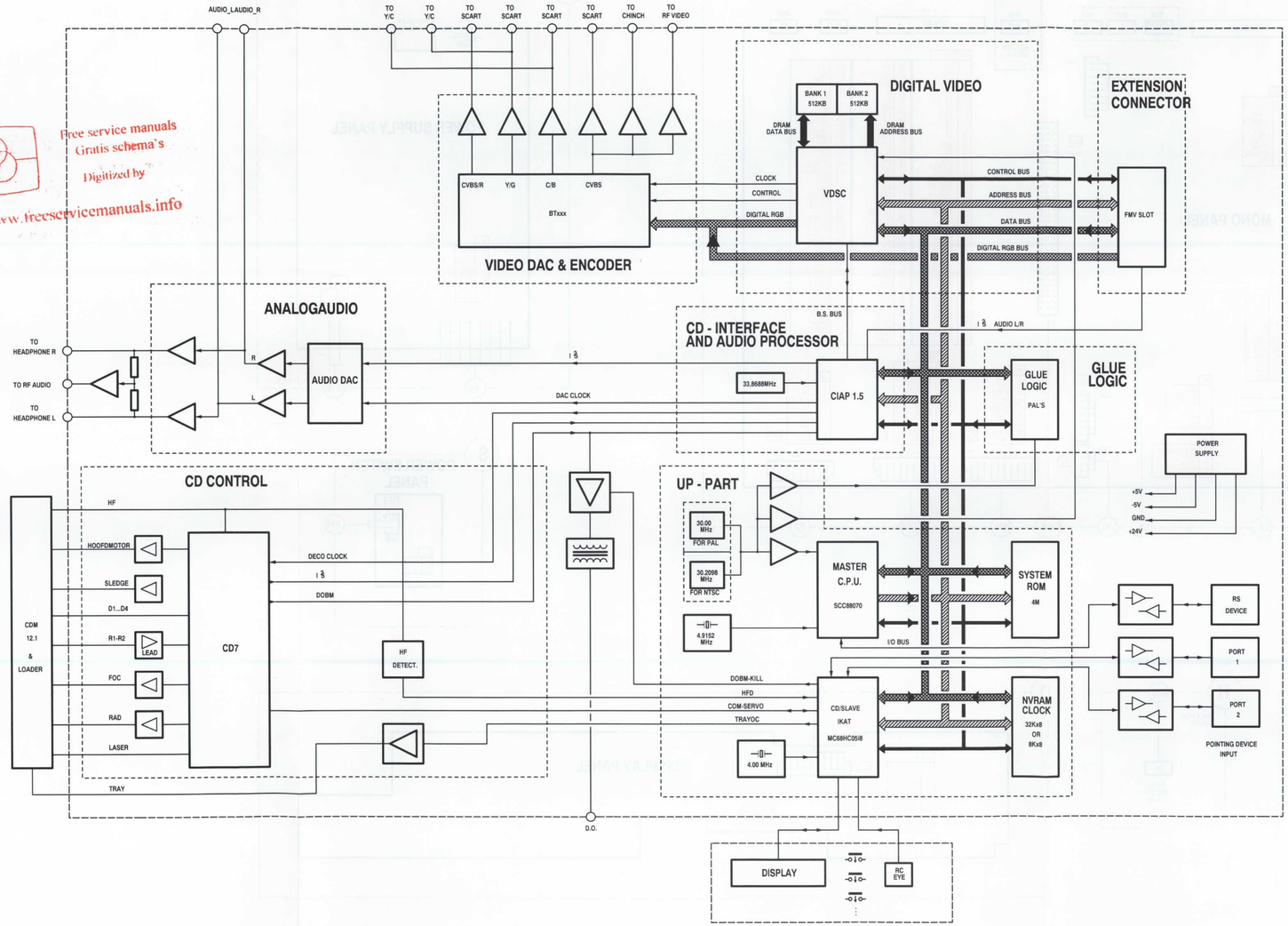
CD Control part
- CDM 12.1
- CD7 (Digital Servo IC for Controlling 2 stage 3 beam servo mechanisms + CD decoder)
- Additional discrete HFD and defect detector circuits

Audio part
- DAC TDA 1305ST
- Audio outputs L/R

Power Supply [+5V / -5V]

Interfaces
- CDM 12 interface (flex connector, pos. nr. 1008)
- Power supply inlet (pos. nr. 1001)
- Pointing device input/output front (pos. nr. 1022)
- Pointing device input/output rear (pos. nr. 1033)
- Extension connector (pos. nr. 1096)
- Audio headphone output L/R (pos. nr. 1030)
- Audio outputs L/R (pos. nr. 1015)
- Video CVBS output (pos. nr. 1015)
- Video RGB output (pos. nr. 1013) [Only for /40, /45]
- Video Y/C output (pos. nr. 1006) [Only for /51]
- Video modulator output (pos. nr. 1007)

BLOCKDIAGRAM



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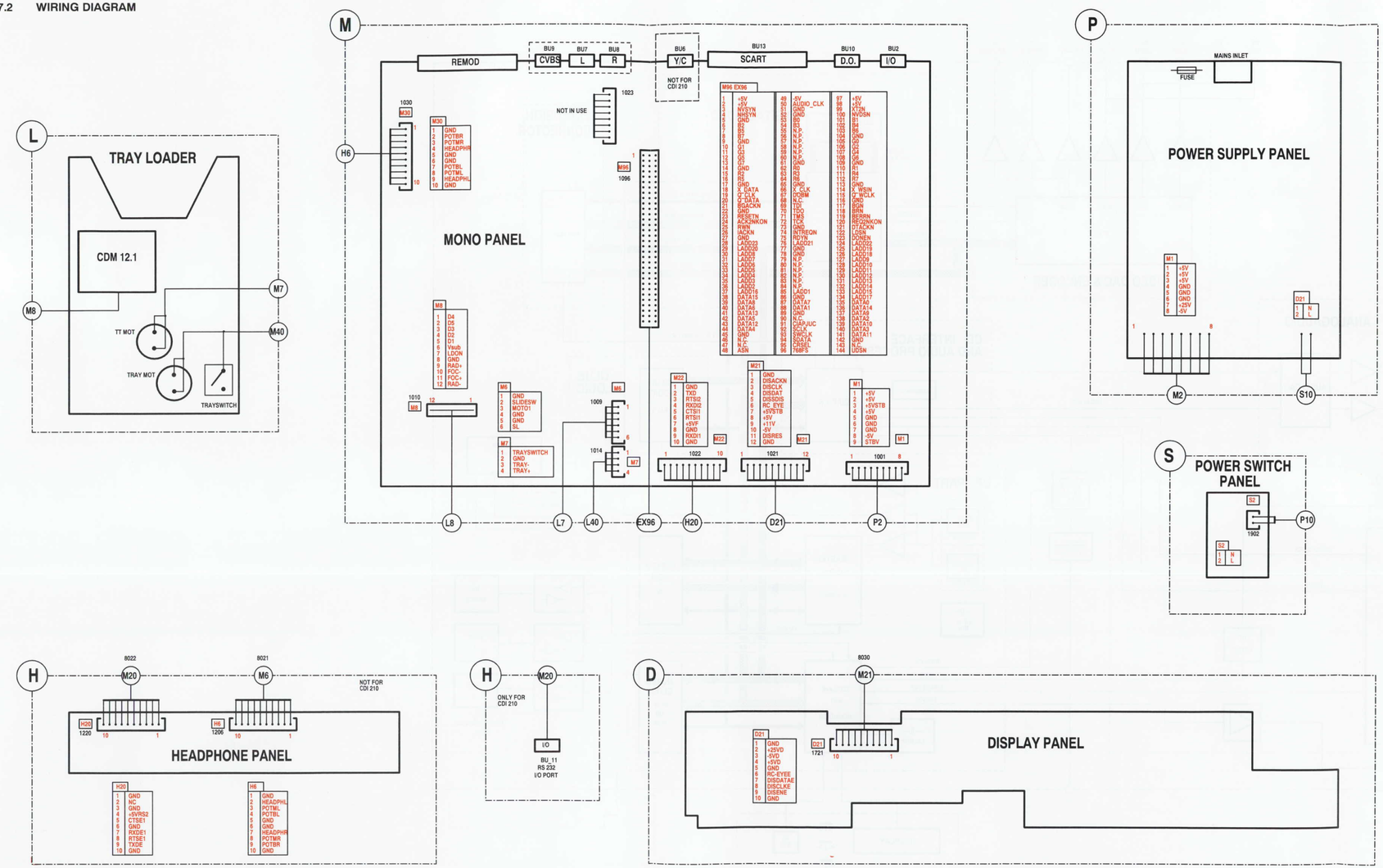
7.2 WIRING DIAGRAM



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7.3 Alphabetical list of abbreviations

Remark: The list contains all abbreviations, which are ever used in CDI electrical circuitry

A,B,C + : >>control signals for brushless DC-motor
A,B,C, - : >>
ACKNDSA : DSA communication bus for OEM costumers
ACK2N : DMA REQUEST ACKNOWLEDGE (active low)(of channel 2)
ACM : output AC-motor
ACK2NKON : DMA REQUEST ACKNOWLEDGE (96-pins connector, channel2 :FMV)
ADEN : (=ADENA)ADDRESS ENABLE NOT. When low,the address ADENA coming from the bus (68070)
ADOCLK : output clock from the ADOC (11.2896 MHz)
AM : ADDITIONAL MUTE
ASN : ADDRESS STROBE (active low,tristate) indicates whwn an address is valid on the bus for the system
ASNP : ADDRESS STROBE from processor (active low)
ASPRAT : Aspect ratio switch signal (16:9 or 4:3)
AUDGND : Audio ground (SCART)
AUDL : >>AUDIO LEFT
AUDIOL : >>
AUDIOLSC : >> (scart)
AUDIOREM : Audio signal to remodulator
AUDR : >>AUDIO RIGHT
AUDIOR : >>
AUDIORSC : >> (scart)
AUDIO_CLK : 16.93MHz clock (33.86MHz:2) from CIAP to CD60 and audio DAC
AVN : AUTOVECTORED INTERRUPTS (active low), can be used by an extension
A0..15 : Local addressbus of the audio DSP-processor
B0..7 : digital video (blue) from VDSC > DRAM
B0CD..B3CD : input control bits for off-,catch-,play status and DAC output current for radial motor
B,G,R : output colours of the VSD
BERRN : >>BUS ERROR (active low,open drain)
BFMV : blue color coming from the FMV-extension
BGACKN : Bus Grant Acknowledge (active low)
BGN : Bus Grant (active low) access from the cartridge to the base system via bus-mastership
BGND : Blue color ground (SCART)
BIN : blue color input for the CXA1145 encoder
BLANI : (=BLAN1M) BLANKING OUTPUT (active low,tristate) of the VSC
BRN : Bus Request (active low) access from the cartridge to the basecase system via bus-mastership
BSC : blue color (scart)
BSW : blue color coming from the switch CDI/external (FMV) video
BUGCD60 : CD60 anti - hangup line
BUSYLED : signal to control green busy LED - driver
C : Chrominance singnal (Y/C)
CADDYIN : high when reading data
CADDYSWITCH : control signal for position tray
CAS1N : column address strobe 1 (VDSC)
CAS2N : column address strobe 2 (VDSC)
CBA : 68070 bus tranceiver latch (rising edge)
CBSC : CHROMA for S-VHS (Y/C) or BLUE for SCART
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)
CD60_V2 : CD60 -status information line from CD60 to IKAT
CD7CLK : CD7 clock
CD7_V2 : V2 flag from CD7 to IKAT
CIAPACKN : DMA channel 1;CIAP acknowledge (active low)
CIAPJUC : CIAP Jump Complete
CIAPREQN : DMA channel 2;CIAP request (active low)
CIAP_INTN : CIAP interrupt request (active low)
CL : serial communication clock to DSIC2 and CD60
CLAB=CLAB2 : bitclock for the SAA 7220 chip
CLABCD : bitclock from the 7310 chip
CLK=2BLCK : CLOCK (11,2896 Mhz)
CLKDAC : CLOCK DAC,the clock used to send serial data to the volume adjustment
CLKF : 2B-clock (11,2896 MHz) for the FMV-extension
CLK1 : the clock on which the DSP operates (7,5264 MHz)
CLK11 : not used (connected to ground)
CLK3A : 11.2896 MHz clock for the SAA7310 decoder
CLOCK_27 : 27 MHz clock :used as system clock by the DSP and the LEMM
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
COXNDSP : clock DSP, the clock used to send serial data on the X-bus
COMIK12 : communication between IKAT1 and IKAT2
CSDMAKILL : generates killme :Dot killer enable signal (active for NTSC) and functions as DMA enable for the FMV extension
CSDSPN : signal used by LEMM to generate the DSP chip select signal (KIP) (active low)
CST : combined chipselect signal for NVRAM/system ROM
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
CRI-DODS : counter reset inhibit of the 7310 chip
CRSEL : CLOCK SELECT (intern or extern)
CS : CHIP SELECT
CSCDICN : CHIP SELECT CDIC (active low) bus information is intended for or coming from CDIC
CSCIAPN : CHIP SELECT CIAP NOT
CSIKAT1..2N : chip selekt for IKAT (active low)
CSIKAT1..2STB : STANDBY CHIP SELECT IKAT1..2 (after switch)
CSIKATP : modified chip select for IKAT for testing purposes
CSKILL-MEMM : chip select for kill and DMA circuit.
CSKILL-MEMMS : >> syncronized
CSDAC1N : (=CSDAC2N)(if selected,low)it means that data will be adjusted on that channel
CSNVRAMN : CHIP SELECT NVRAM (active low) information is intended for or coming from the NVRAM
CSROMN : >>
CSROM0N : CHIP SELECT ROM (active low) information is coming from the ROM'S
CSSLAVEN : CHIP SELECT SLAVES (active low)
CSON : CHIP SELECT (active low) for the 8Kx8 SRAM'S
CSVDSCN : CHIP SELECT for the VDSC (active low)
CSYN : COMPOSITE SYNCHRONIZATION input from the VSC'S (active low)
CTS1..4 : CLEAR TO SEND (active low) it indicates that the remote receiving device is ready
CTS1P : CLEAR TO SEND (to 68070 UP)
CRS#2 : >>
CTSE1..2 : CLEAR TO SEND input
CTSI1..2 : >>
CVBS : CVBS output
CVBS-OUT : >>
CVBS-GND : CVBS ground (SCART)
CVBS-REM : CVBS input signal for the remodulator
CVBS-SYNC : composite sync input for the SCART connector
C_BSC : output C or B (c=y/c) (b=rgb)
D0..D23 : Local data bus of the audio DSP-processor
D8NVR : data bit 8 (least significant bit) signal for the NVRAM
DA : serial communication data to DSIC2 and CD60
DAAB : (DAAB2,DAABCD) serial data output of the X-bus I^2S standard
DATA0..15 : DATA LINES
DATA1_TRANS : RS bus for OEM costumers (TRANS=TX)
DATA2_REC : >> (REC=RX)
DATADAC : data which will be send to the DAC('S) for volume adjustment
DDTACKN : DATA TRANSFER ACKNOWLEDGE (active low) from CDIC
DEEMP : DEEMPHASIS
DIG OUT : DIGITAL OUTPUT
DIRN : DIRECTION CONTROL. indicates the direction of data transfer through the transievers
DISAKN : Display Acknouledge
DISCL : DISPLAY CLOCK
DISCLK : (DISCLKE) DISPLAY CLOCK >>
DISDAT : (DISDATAE) DISPLAY DATA >>
DISEN : (DISENE) DISPLAY ENABLE >>
DISRES : Display reset
DISSDIS : Display disable
DISSEL : software selection signal (CDI210/220)
DIV4 : DIVIDE BY 4 signal
DMAEN : DMA enable for the FMV extension
DOBM : Digital Out from CD60
DOBM_KILL : DIGITAL OUT KILL signal
DS : Data memory select output of the DSP-processor (active low)
DSPACKN : DMA acknowledge (Channel 1) : 68070 --> LEMM (active low)
DSPREQN : DMA request (Channel 1) : LEMM --> 68070 (active low)
DSP-INTN : interrupt request DSP --> 68070 (active low)
DTACKN : data transfer acknowledge (68070) (active low)
DTCNC : data transfer completed corrected (CDIC)
DTRAM : DTACKN generation signal for NVRAM acces
DTROM : DTACKN generation signal for system ROM acces
DTCN : Data transfer completed (active low; 68070)
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 DSP
DSN2N : DATA STROBE (active low) of the DSP
DATACK ROM : DATA TRANSFER ACKNOWLEDGE of the ROM
DTACKSLAVEN : DATA TRANSFER ACKNOWLEDGE of the SLAVE processor
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
DZF : DATA ZERO FLAG
D1...5 : CDM photo diodes inputs
D8NVR : DATA 8 to NVRAM

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EFAB : ERROR FLAG
EFLAG : ERROR FLAG input to CIAP
EFLAGCD60 : ERROR FLAG output from CD60
FILTERN : filter select when high:levelC,when low:level A
FOC- : >>focus out to CDM
FOC+ : >>
FSB : Frame select line output of the LEMM --> DSP : this line is asserted for every WSAB (pin 66 of the LEMM) transition
GFMV : green color coming from from the FMV-extension
GGND : Green color ground (SCART)
GIN : green color input for the CXA1145 encoder
GN : when low:the outputs and inputs of the trancievers are enabled
GNDC : Ground for the color signal (Y/C)
GNDL : Ground for MPEG audio left (96-pins connector)
GNDR : Ground for MPEG audio right (96-pins connector)
GNDV : Ground for MPEG video (96-pins connector)
GNDY : Ground for the luminance
GSC : green color (SCART)
GSW : green color coming from the switch CDI/external (FMV) video
G0..7 : digital video (green) from VDSC > DRAM
HALTN : active low,open drain,biderectional. if low together whit the resetn it couses the 68070 to enter the reset state.
HEADPHL : (HPL)headphone audio left
HEADPHR : (HPR)headphone audio right
HFD : High Frequency Detect signal
HFDDEF : signal that indicates when the last session of a multisession-disc has ended
HFIN : HF current input
HMP : Spindle Motor Plus
HOBBES1..2 : HOBBES1 or HOBBES2 select
HSYN : (active low) horizontal synchronisation input from the VSC
HSYNCOUT : (active low) horizontal synchronisation output for monitor or tv
HVID0..7S : 8bit pixel bus for channel 1 VSD from VSC
IACK2 : Interrupt acknowledge from 68070 (active low) --> AVN line of the 68070 (auto-vector interrupt) --> the 68070 generates this signal (IACK2) when the slave proc. as- serts IN2
IACKN : interrupt acknowledge for the FMV-extension
IACKIN2N : >>
IACKIN4N : >>decoded interrupt acknowledge (active low).
IACKIN5N : >>asserted during an interrupt 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
IFDN2 : main channel word-flag to the DSP
IN2 : interrupt request from slave proc. --> 68070 (active low)
IN5 : interrupt request input 5 of the 68070 (not used)
INTENN1 : interrupt enable for the FMV-extension
INTENN : >>when low,no extensions use the interupts,when high interupt devices are daisy chained
INTENN2 : >>
INTENN3 : >>
INTENN4 : >>
INTIKATN : INTERRUPT from IKAT (from IKAT to UP)
INTREQN : interrupt request from the FMV-extension
IN2IN : (=IN2OUT)>>
IN4IN : (=IN4OUT)>> 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
IN4OUT2 : >>
IN5OUT2 : >>
IN2OUT3 : >>
IO1..IO4 : INPUT or OUTPUT (for OEM costumers)
IRQA : interrupt request from LEMM --> DSP (active low) and mode A pin of the DSP (after the DSP reset, the DSP reads the level on this pin to define the mode of operation)
IRQABN : logical AND of the IRQA and the IRQB line (lemm output pin --> DSP)
IRQB : interrupt request from LEMM --> DSP (active low) and mode B pin of the DSP (after the DSP reset, the DSP reads the level on this pin to define the mode of operation)
IRQIN : interrupt request for IKAT (not used)
ISELIN : pin of CIAP (always pulled up)
JUC : jump completed signal from servo proc. --> LEMM
KILL : to mute audio outputs by power on and off
KILLME : (KILL-ME)dot killer enable signal (active for NTSC)
KIP : host enable input pin of the DSP-processor : this signal enables a transfer on the DSP host bus DATA0..7 (active low)
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
LDON : switches laser on (5V) & off (0V) (LASER DRIVE ON)
LDSN : LOWER DATA STROBE of the bus
LIDSWITCH : Lid detection switch
LM : LASER MONITOR diode input
LO : laser amplifier current OUTPUT
LRDN : when low select,the ROM'S or NVRAM read the lower data byte
LS : switches between DOUBLE (0V) & SINGLE (5V) SPEED
LTAP : >>for HPL volume control
LTOP : >>
LVID0IN..7IN : >>8 bit pixel-bus for channel 2 (VSC-SLAVE)
LVID0OUT..7OUT : >>
LWN : read/write enable (for the lower part of the data: MD0..7) for the DRAM (VDSC)
LWRSN : R/W lower memory data to DRAM from VSC slave
LWRMN : R/W lower memory data to DRAM from VSC master
MA0..8 : VDSC DRAM address bus
MC : MOTOR CONTROL signal
MD0..15 : VDSC DRAM data bus
MISO : MASTER IN SLAVE OUT
MOSI : MASTER OUT SLAVE IN
MPEGL : left audio signal color coming from the FMV-extension > goes the adder CDI/FMV audio
MPEGR : right audio signal color coming from the FMV-extension > goes the adder CDI/FMV AUDIO
MSM : master slave selection input
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
NCSYNV : composite sync for the VDSC
NHSYN : active low horizontal sync input for the FMV-extension
NPORE : Power on Reset for CD60 (active low)
NRESET : when low the video synthesizer is in reset
NVDS : digital output to control an external switch for TV overlays (active low)
NVDSI : >>synchronized with NXT2
NVDSN : Digital video switch - line (active low)
NVSYN : (active low) vertical sync input for the FMV-extesion
OTD : Off Track Detection from DSIC2
PCLK1IN : PIXEL CLOCK for channel 1
PCLK2IN : PIXEL CLOCK for channel 2
PLAYSEL : SELECTION of PLAYER type
PLOIN1 : input clock for CDIC (22,5792 MHz)
PLOIN2 : input clock for CDIC (19,3536 MHz)
PLOIN : clock signals for emulator panel
PLOINE : >>
POTBL : headphone left volume control
POTBR : headphone right volume control
POTML : headphone left volume control
POTMR : headphone right volume control
PRTS11 : request to send from main processor
QCL : Q-channel CLOCK
QDA : Q-channel DATA
QRA : Q-channel REQUEST INPUT/ACKNOWLEDGE OUTPUT
Q22 : output to PLL (22,5792 MHz) devided by 14
Q21 : output to PLL (19,3536 MHz) devided by 12
Q_DATA : I^2S data from LEMM --> audio DAC
Q_CLK : I^2S bit clock from LEMM --> audio DAC
Q_WCLK : I^2S word clock from LEMM --> audio DAC
RAB : hand shake protocol signal for CD60
RAD+ : >>RADIAL OUT to CDM
RAD- : >>
RASN : row address valid (active low) for the VDSC DRAM'S
RBOT : for HPR volume control
RC5 : wired RC jnput (cinch)
RC-EYEDIS : RC-EYE DISABLE signal (not used)
RCEYE : (RCEYEE)REMOTE CONTROL EYE
RCLED : REMOTE CONTROL LED
RD : READ signal DSP :this signal is asserted to read external memory (three SRAM'S FCB61C65) on the data bus D0..23 (active low)
RDN : READY signal,starting up procedure finished
RDYN : READY (active low) of the DMA channel
REDIG : RADIAL ERROR DIGITAL
REFHCA : reference voltage pin of CD60
REFLCA : reference voltage pin of CD60
REM : power supply remodulator
RESETCD : when low resetsequence starts
RESETINN : when low VSC is in reset
RESETN : this is the rest for all other ic's on MMC
RESETSTB : RESET in STANDBY mode
RESETSYS : system reset (controlled by the slave-processor)
REQ2N : DMA-request of channel 2
REQ2NKON : DMA-request (96-pins connector, channel 2 : FMV
REQ2KON : DMA-request of channel 2 via DMA 2 on/off circuit

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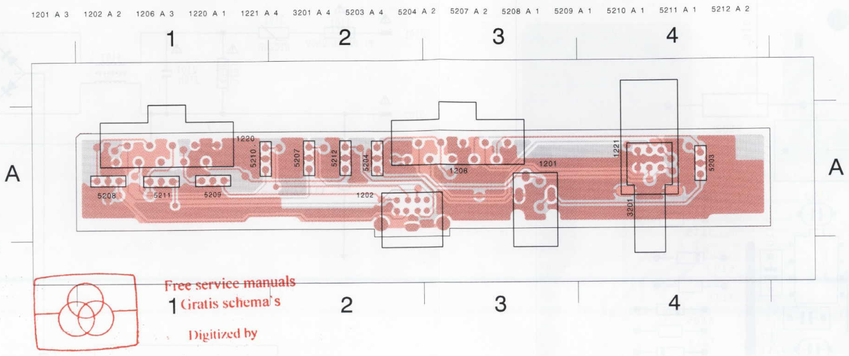
RFE : high-frequent signal coming from CDM (disc)
RFMV : red color coming from the FMV-extension
RGBS_GND : incoming video SCART (not used) ground
RGND : red color ground (SCART)
RIN : red color input for the CXA1145 encoder
RSC : red color (scart)
RSTOUT : RESET OUT of the slave processor when high resetsequence starts
RST2IK1 : REQUEST TO SEND pointing dev.2 (connect on IKAT1)
RSW : red color coming from the switch CDI/external (FMV) video
RTAP : >>for HPR volume control
RTOP : >>
RTS12 : REQUEST TO SEND 2 from IKAT
RTSE1..2 : REQUEST TO SEND
RTSI1..2 : REQUEST TO SEND
RTSUART : REQUEST TO SEND from the slave processor to the UART of the 68070 processor
RST1..4 : >>REQUEST TO SEND (active low)
RTS1IK1RTS1IK2 : >>
RTS1P : >>
RST#1..2 : >>
RWN : READ - WRITE (low is write) signal
RWN2 : READ - WRITE (low is write) signal from DIC to the DSP
RWRAM : READ - WRITE signal from the CDIC to the S RAM'S
RXDE1..2 : RECEIVE DATA
RXDI1..2 : RECEIVE DATA
R0..7 : digital video (red) from VDSC > DRAM
RXD1..4 : >>RECEIVE DATA RXD is data input
RX1IK1TX2IK2 : >>RECEIVE SIGNAL
RX1K2 : >>
RX1P : >>
RX2IK1 : >>
XD#1..2 : >>
SCAB : subcode data clock (2,8224 MHz) from the 7310
SCK : serial clock output from the LEMM --> DSP :the data and frame select for the DSP is clocked out on the rising edge of this clock
SCL : I^2C clock to HOBBES
SCLK : I^2S clock out from CD60
SDA : I^2C data to HOBBES
SDAB : subcode data from the 7310
SDATA : signal from CD60 data
SDAT : I^2S data out from CD60
SELPAR : CD7 in 16MHz or 33MHz mode
SERVORESETN : Reset for DSIC2 from IKAT
SI : on - off control for laser supply and focus circuit
SI-RD : on - off control for laser supply and focus circuit/ready signal,starting up procedure finished

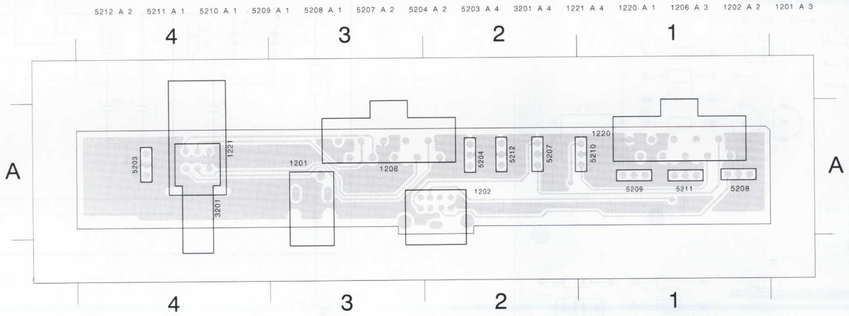
SILD : Serial communication Load to DSIC2
SLEDGE : sledge motor control
SLEDGE_OUT : power signal for activating the sledge motor
SLEEPAUDN : Audio kill line (active low)
SLEEPVID : Video kill line (active low)
SLIDESW : SLIDE SWITCH ;detection of sledge - endposition
SLMA0..8 : VSC-slave memory address bus to the DRAM'S
SLMD0..15 : VSC-slave memory data bus to the DRAM'S
SOCKGND : socket ground (SCART)
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 : (SPISSN) SERIAL PERIPHERAL INTERFACE SLAVE SELECT
SRD : serial data from LEMM --> DSP
SRTS1 : request to send 1 from IKAT
STAND : NTSC or PAL selection signal
STANDARDOUT : software choise between PAL and NTSC
STANDARDSW : hardware choise between PAL and NTSC
STANDEM : status from emulator,input for DUART
STANDEMEN : enable signal for switch signal on emulator
STANDIN : NTSC or PAL selection signal (input for slave)
STATUS : RF/external video selection signal
STATUSF : CVBS/RGB video selection signal
STBS : Standby signal
STBY : Standby signal to power supply
STD : serial data from DSP --> LEMM
STROBEDSA : DSA connection bus for OEM costumers
SSCLKIN : pin of CIAP (always pulled up)
SSM : START STOP MOTOR
SWAB : SUBCODING WORD CLOCK INPUT
SWAB-SSM : subcoding word clock output and start/stop input of the 7310
SWCLK : I^2S Word Select Clock out from CD60
SWEM : software dat to switch on the emulator
SYSCLK : >>SYSTEM CLOCK
SYSCLKA : >>
SYSCLK1 : >>
SYSCLK2 : >>
SYSCLK3 : 33.86MHz system clock to CIAP
TCAP : input capture feature for the on-chip timer
TCMP : output for the output compare feature of the on chip timer
TCK : scan clock boundary
TDI : boundary scan input
TDOCIAP : boundary scan output of CIAP

TDOVDSC : boundary scan output of VDSC
TL : TRACK LOSS of the TDA8808 combined with the radial error signal of the TDA8809
TMOUT : TRAY MOTOR OUT
TMS : boundary scan control line
TRAY : tray open/close signal
TRAYOC : TRAY open/close
TRAYSWITCH : tray open/close detection signal
TXCO : >>Transmit signal
TX1P : >>
TX2 : transmit data from IKAT
TX2IK1 :
TXDE1..2 : transmit data
TXDI1..2 : transmit data
TXD1..4 : >>TRANSMIT DATA TXD is data output
TXD#1..2 : >>
TXLC : Transmit signal
UDSN : UPPER DATA STROBE (active when low)
URDN : READ UPPER DATA BYTE (active when low)
UWN : read/write enable (for the upper part of the data: MD8..15) fir the DRAM (VDSC)
UWRN : Upper Write Read Not for NVRAM
UWRSN : read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-SLAVE
VC : output DC-motor (VOLTAGE CONTROL)
VDSC-INTN : interrupt request of the VDSC
V-FLAG : output to the DSP
VREFA : Reference Voltage on audio DAC
Vsub : substrate voltage
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
V1 : off track detection from DSIC2 to CD60
WIREDRC : see RC5
WR : write enable output of the DSP :this signal is asserted to write external memory (three SRAM'S FCB61C65) on the data bus D0..23 (active low)
WRMN : read/write (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-MASTER
WRN : WRITE UPPER DATA BYTE (active when low)
WRPN1M..S : control input for channel 1 or 2 (active low) of the VSD
WSAB : >>WORD SELECT from A to B CHIP
WSAB2 : >>
WSABCD : 11.2896 MHz bitclock (I^2S)
XINB : delayed clock XIN from CDIC > goes back to CDIC

7.4 HEADPHONE & POWER SUPPLY

7.4.1 Headphone panel





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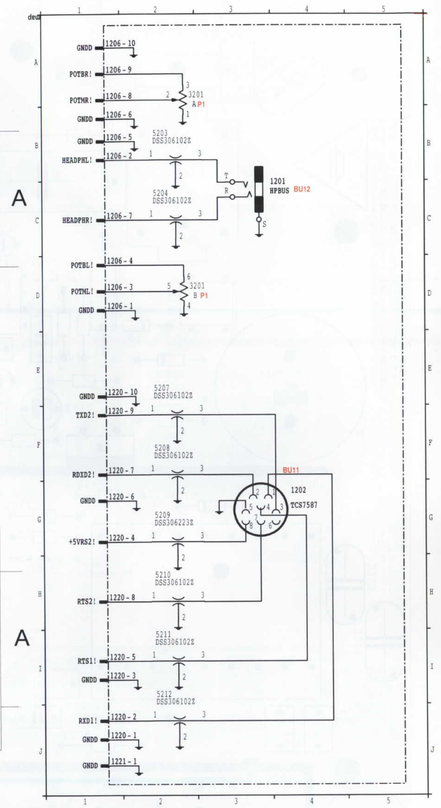
XIN : >>11,2896/9,6768/4,8384 symmetrical clock
XIN2 : >>
X-TAL2 : the same as the system clock,coming out of the VSC'S
XT2 : (XT2N) the system clock devided by two
XT4 : >>the system clock devided by four
XT41N : >>
XY : this DSP output signal selects which external memory space (X or Y) is selected
X_CLK : external audio I^2S -clock
X_DATA : external audio I^2S -data
X_WSIN : external audio I^2S -word select

Y : luminance signal (Y/C)
Y_GSC : Y (luminance) S-VHS (Y/C) or G for SCART
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 2 B-chip
12A..15A : ADDRESS BUS between CDIC and DSP

7.4.2 Headphone / Port 1 circuit



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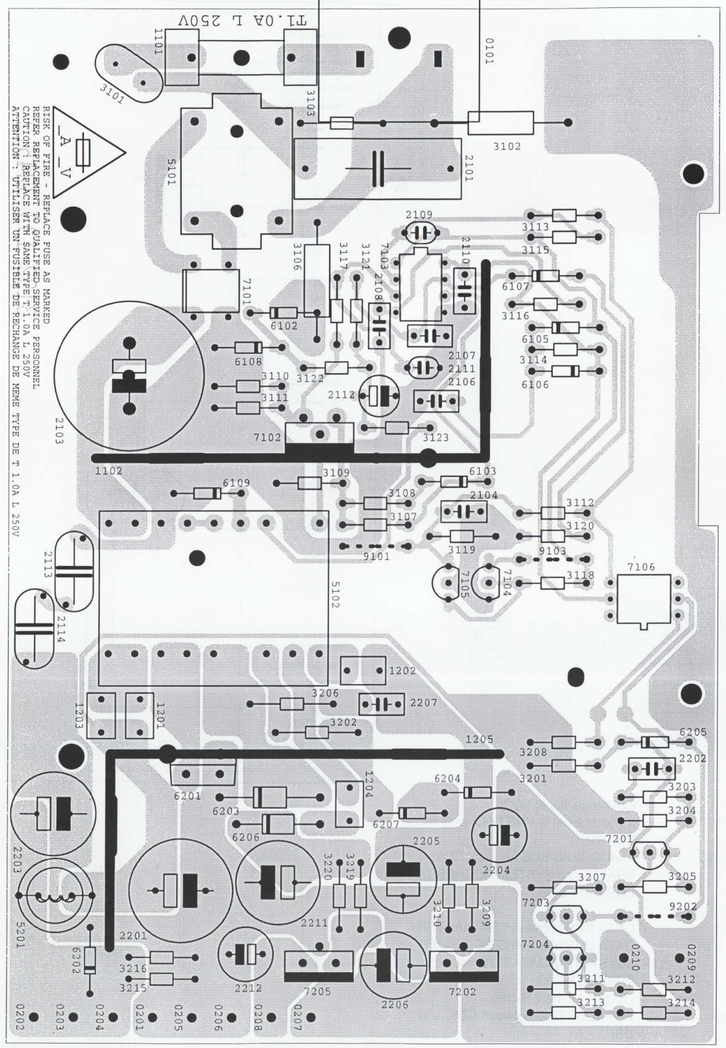
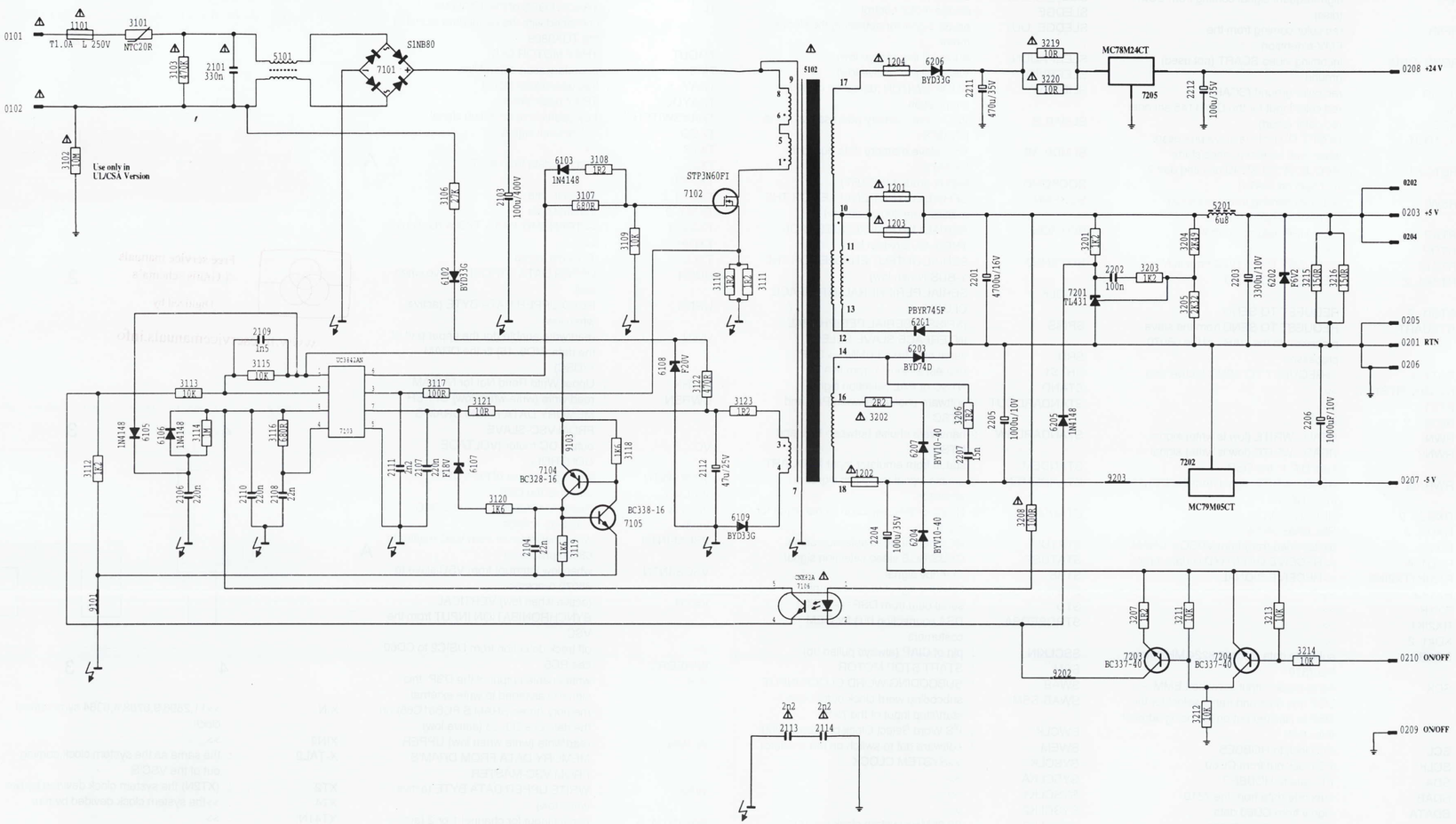
7.4.3 Power supply PCB layout



7.4.4 Power supply circuit diagram



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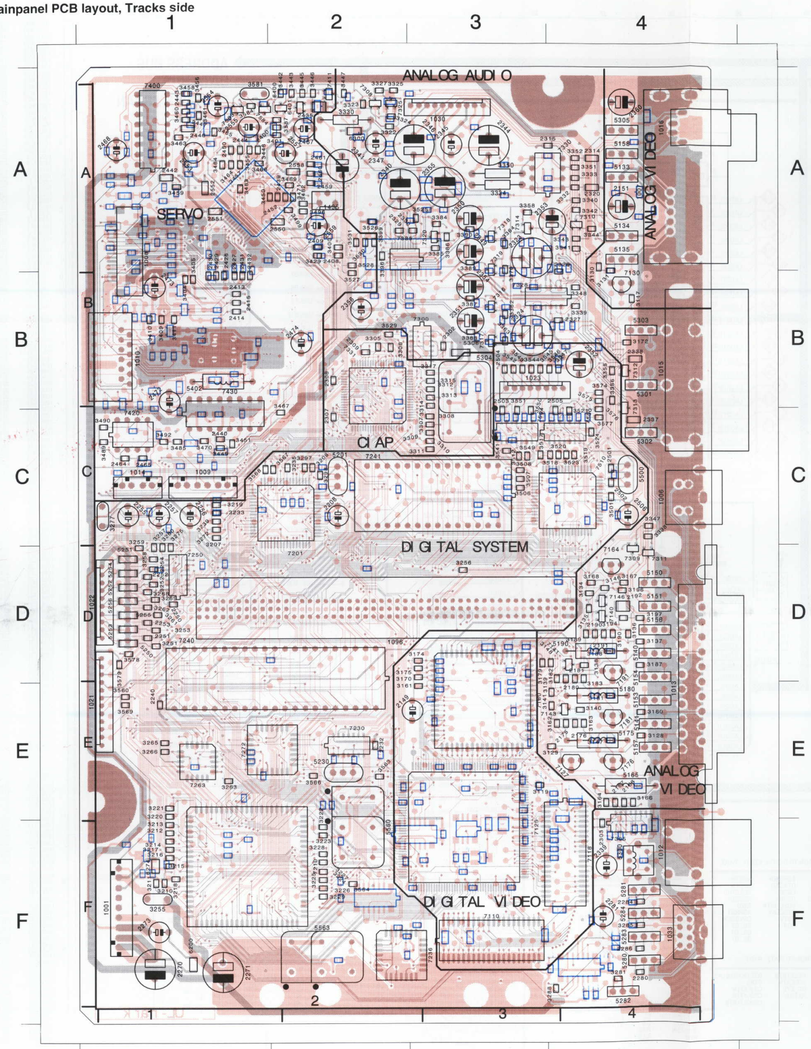
7.5 MAINPANEL

7.5.1 Mainpanel PCB layout, Tracks side



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1006 C 4	2501 C 4	3311 C 3	3549 C 3	7430 C 1			
1007 A 4	2502 C 4	3312 B 3	3550 C 3	7500 C 4			
1008 A 1	2503 C 3	3313 B 3	3551 C 3	7504 C 3			
1009 C 1	2504 B 3	3314 B 3	3560 E 1	7510 C 4			
1010 B 1	2505 C 4	3315 B 3	3563 E 2	7583 A 1			
1012 F 4	2506 C 4	3317 B 3	3564 F 2	7584 A 1			
1013 D 4	2550 A 2	3322 A 2	3566 E 2				
1014 C 1	2551 A 1	3323 A 2	3567 C 2				
1015 B 4	2552 A 1	3324 A 2	3568 C 1				
1016 A 4	2553 A 1	3325 A 2	3569 E 1				
1021 E 1	2554 A 1	3327 A 2	3574 B 4				
1022 D 1	2555 A 1	3330 A 2	3575 B 4				
1023 B 3	2557 A 2	3332 A 4	3576 C 4				
1030 A 3	2558 A 2	3333 A 4	3577 C 4				
1033 F 4	2559 A 2	3334 A 3	3578 D 1				
1096 D 2	3117 B 4	3338 C 4	3579 D 1				
1435 A 2	3119 E 3	3339 B 4	3581 A 1				
2149 E 3	3128 E 4	3340 A 4	3584 A 1				
2151 A 4	3129 E 4	3341 A 4	3587 A 2				
2167 E 4	3130 A 4	3342 A 4	5133 A 4				
2168 E 4	3131 B 4	3343 A 4	5134 A 4				
2175 E 4	3134 D 2	3344 A 4	5135 A 4				
2176 E 4	3135 D 4	3347 C 4	5140 D 4				
2180 D 4	3136 D 4	3348 B 4	5141 E 4				
2181 D 4	3137 D 4	3350 A 3	5150 D 4				
2190 D 4	3138 D 4	3351 A 4	5151 D 4				
2191 D 4	3139 E 4	3352 A 4	5153 E 4				
2192 D 4	3140 E 4	3355 B 4	5154 D 4				
2208 C 2	3141 E 4	3356 B 4	5156 D 4				
2232 E 2	3146 D 4	3358 A 3	5157 E 4				
2240 E 1	3147 E 4	3362 B 3	5158 A 4				
2250 D 1	3148 D 4	3363 B 3	5165 E 4				
2251 D 1	3161 E 3	3364 A 3	5175 E 4				
2252 D 1	3162 E 4	3370 A 3	5180 E 4				
2253 D 1	3163 E 4	3384 A 3	5190 D 4				
2254 D 1	3164 E 4	3385 A 3	5201 C 2				
2255 C 1	3166 E 4	3386 A 3	5230 E 2				
2256 C 1	3167 D 4	3387 B 3	5250 D 1				
2257 C 1	3168 D 4	3388 B 3	5251 D 1				
2270 F 1	3170 D 3	3389 A 3	5252 D 1				
2271 F 1	3172 B 4	3390 A 3	5253 D 1				
2273 F 1	3174 D 3	3396 A 2	5254 D 1				
2280 F 4	3175 D 3	3399 A 2	5255 D 1				
2281 F 4	3179 D 3	3400 A 2	5256 D 1				
2284 F 4	3180 E 4	3401 A 2	5280 F 4				
2286 F 4	3181 E 4	3404 A 1	5281 F 4				
2302 B 3	3182 D 4	3405 B 1	5282 F 4				
2303 F 4	3183 D 4	3409 B 1	5283 F 4				
2307 C 2	3187 D 4	3410 B 1	5284 F 4				
2308 B 2	3188 D 4	3411 B 1	5300 F 4				
2309 B 2	3189 D 4	3429 A 2	5301 B 4				
2314 A 4	3190 D 4	3442 A 2	5302 C 4				
2315 A 4	3194 D 4	3443 A 2	5303 B 4				
2320 A 4	3196 D 4	3445 A 2	5304 B 3				
2323 A 3	3197 D 4	3446 A 2	5305 A 4				
2324 B 3	3207 C 1	3447 A 2	5306 B 3				
2327 B 4	3208 C 2	3448 A 1	5402 B 1				
2328 B 4	3210 F 1	3449 C 1	5500 C 4				
2329 A 2	3211 F 1	3450 A 2	5560 F 2				
2330 A 3	3212 F 1	3451 C 1	5563 F 2				
2337 C 4	3213 F 1	3455 A 1	6200 F 1				
2338 B 4	3214 F 1	3456 A 1	6274 F 1				
2339 F 4	3215 F 1	3457 A 1	6300 A 2				
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2352 B 4	3225 F 2	3469 A 1	7143 E 4				
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2354 B 3	3227 F 2	3471 A 2	7160 E 3				
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2356 B 2	3229 F 2	3483 A 1	7176 E 4				
2360 A 4	3233 C 1	3484 A 1	7181 E 4				
2400 A 2	3235 C 2	3485 C 1	7191 D 4				
2408 A 2	3239 C 1	3489 C 1	7201 C 2				
2409 A 2	3251 D 1	3490 C 1	7210 F 1				
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2414 B 1	3253 D 1	3496 A 2	7236 B 2				
2415 B 1	3255 F 1	3499 A 2	7240 D 2				
2427 B 1	3256 D 3	3501 C 4	7241 C 3				
2428 B 1	3257 D 3	3506 C 3	7250 D 1				
2429 B 1	3258 D 1	3507 C 3	7263 E 1				
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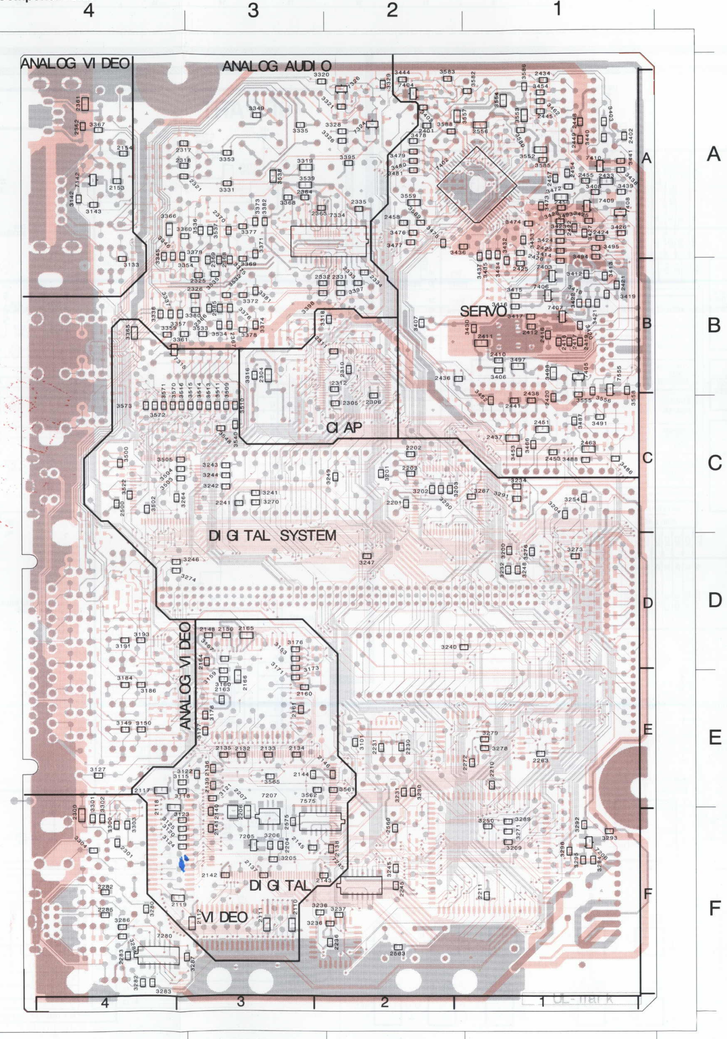
7.5.2 Mainpanel PCB layout, Component side



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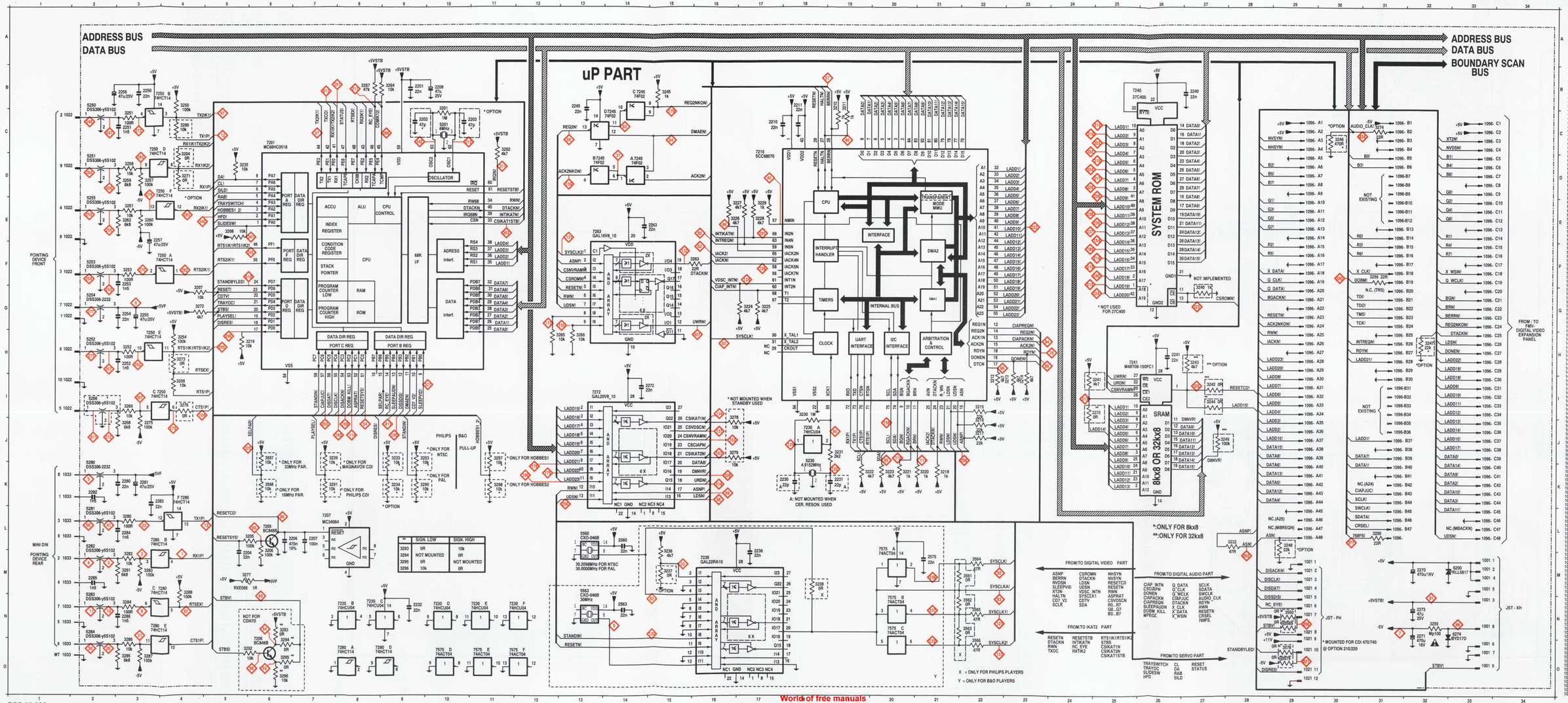
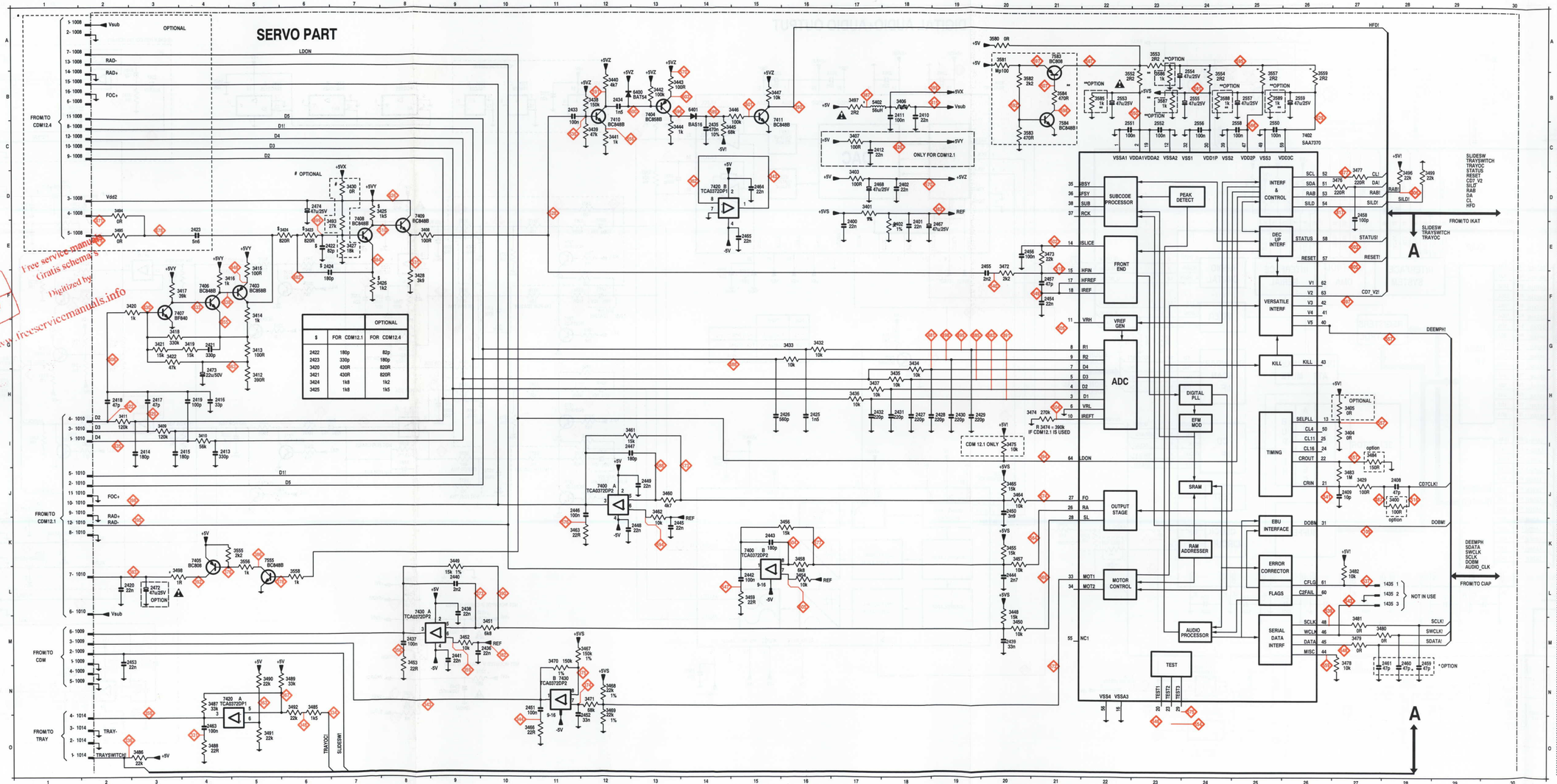
7.5.3 µP part circuit diagram



7.5.4 Servo & CD Decoder circuit diagram



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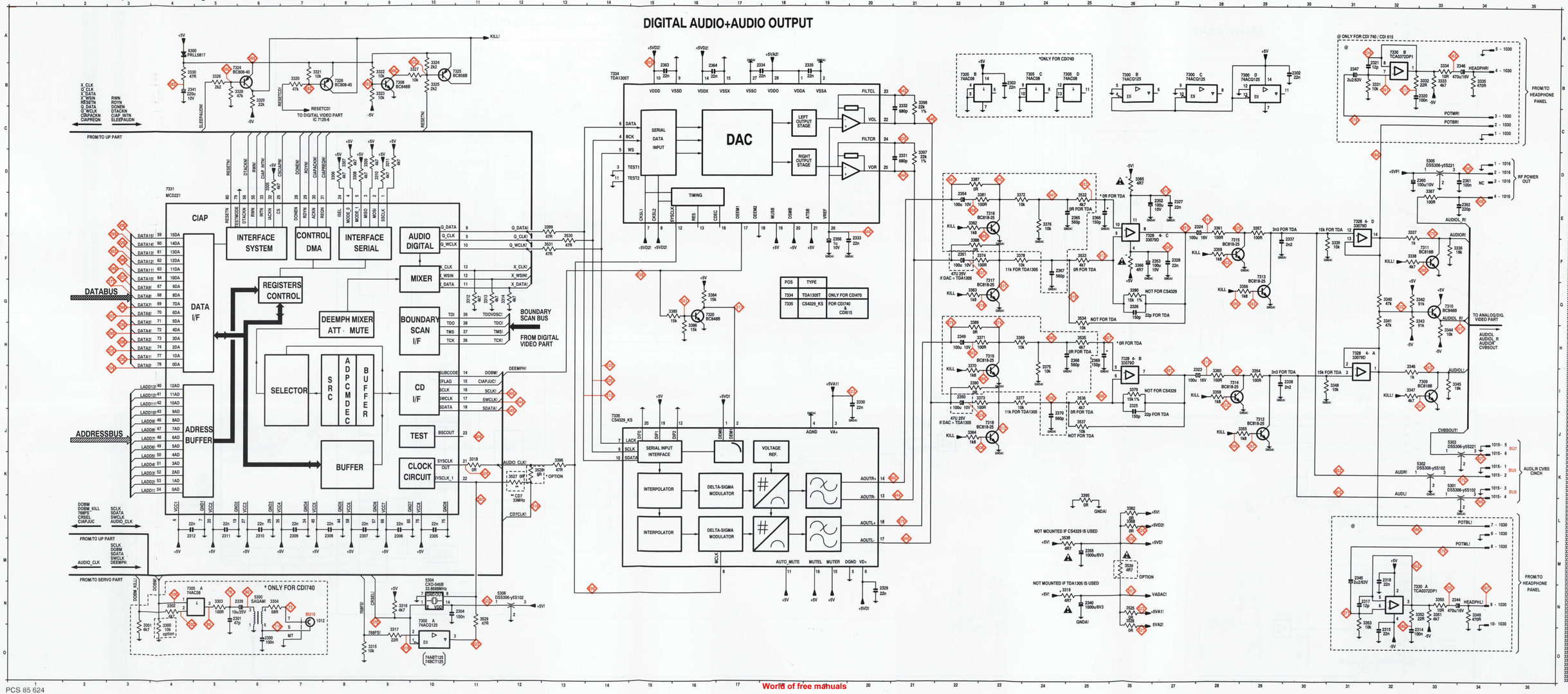
7.5.5 CD interface and Audioprocessor circuit diagram



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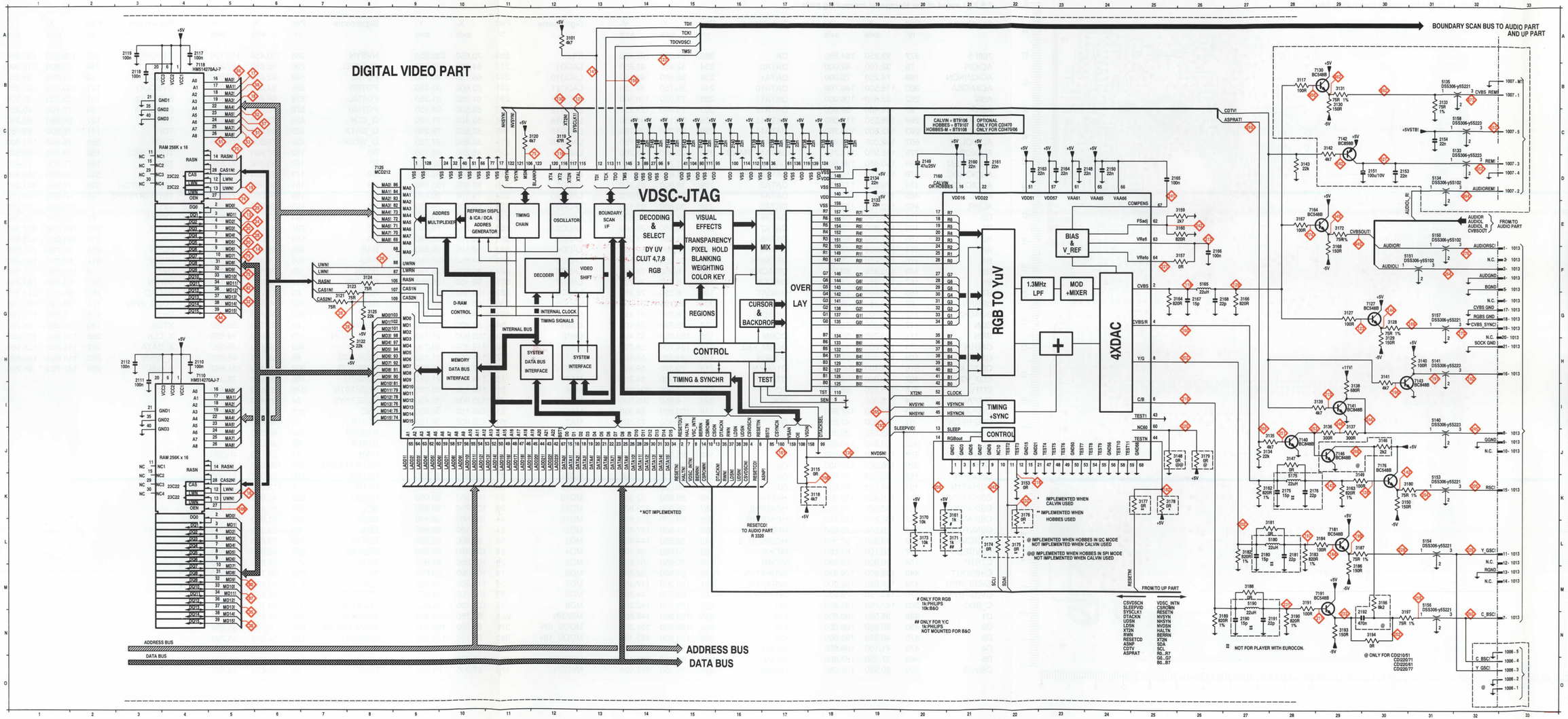
7.5.6 Digital Video and Video Encoder circuit diagram



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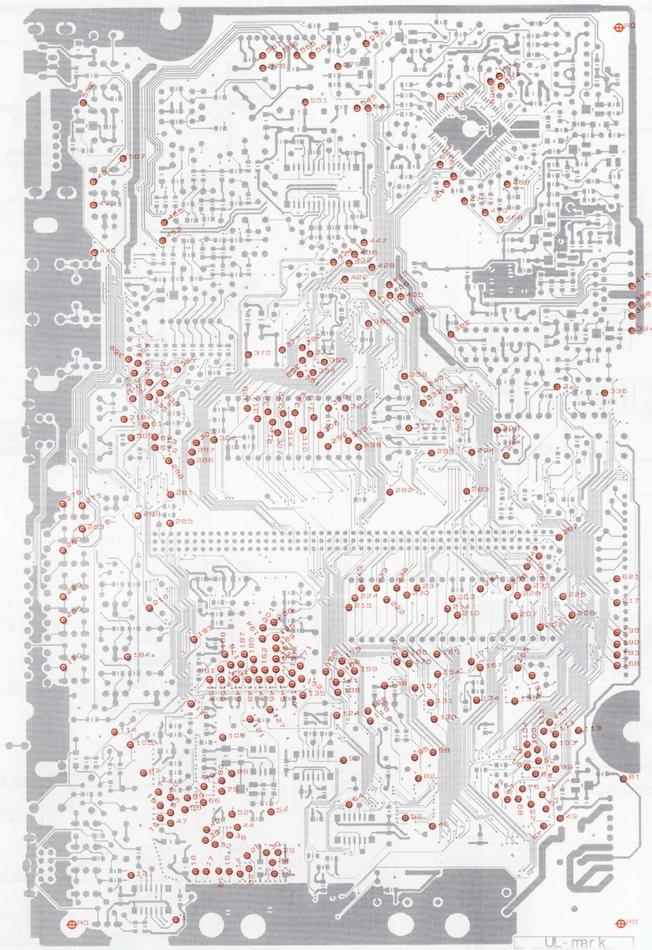
7.5.7 Layout of the Mainpanel measuring pads



PCS 86 018

7.5.7 Layout of the Mainpanel measuring pads

Signalname	Pad nr.	X-axis	Y-axis
768FS	377	92.250	154.650
ACK2N	76	32.100	42.000
ACK2NKON	159	74.250	72.000
ACKNDSA	360	118.500	149.700
ASN	262	22.650	106.050
ASNP	69	116.400	39.900
ASPRAT	269	128.550	112.050
AUDIOL	263	142.800	108.750
AUDIOL_R	507	132.000	203.850
AUDIOR	275	142.800	114.750
AUDIOREM	494	139.650	198.000
AUDIORSC	276	147.750	115.200
AUDIO_CLK	434	79.200	177.150
AUDL	465	121.650	187.500
AUDR	452	122.100	182.850
B0	151	110.700	69.900
B1	166	107.850	72.600
B2	150	107.700	69.900
B3	174	105.300	73.650
B4	176	102.750	73.800
B5	149	103.950	69.900
B6	187	101.850	76.350
B7	180	99.600	75.000
BERRN	57	26.250	36.900
BGACKN	112	26.700	56.550
BGN	117	25.200	58.800
BRN	111	23.700	55.800
CAS1N	74	123.600	41.400
CAS2N	109	107.400	55.200
CD7CLK	516	65.400	205.800
CD7_V2	497	49.050	198.900
CDTV	216	125.700	88.200
CIAPACKN	84	28.800	45.750
CIAPJUC	293	54.750	127.950
CIAPREQN	91	30.900	47.550
CIAP_INTN	67	35.850	39.300
CL	332	56.850	140.850
COMIK12	288	120.750	126.150
CRSEL	370	100.650	153.450
CSCIAPN	165	33.150	72.600
CSIKAT1N	134	43.500	64.500
CSIKAT1SB	614	126.450	135.300
CSIKAT2N	167	42.600	72.750
CSIKAT2STB	305	130.200	132.150
CSNVRAMN	153	29.550	70.650
CSROMN	223	49.650	90.300
CSVDSCN	137	59.100	67.650
CTS1P	104	30.900	53.250
CVBSOUT	440	139.500	179.850
CVBS_REM	473	139.650	192.000
CVBS_SYNC	170	147.750	73.200
C_BSC	260	147.750	103.200
D1	488	35.550	196.800
D2	490	50.850	196.950
D3	475	46.350	192.600
D4	470	41.100	189.600
D5	468	37.350	187.800
D8NVR	328	80.550	139.650

Signalname	Pad nr.	X-axis	Y-axis
DA	388	61.200	162.450
DATA0	234	42.450	92.850
DATA1	236	35.550	93.150
DATA10	249	30.750	98.550
DATA11	298	73.050	129.600
DATA12	303	75.600	131.250
DATA13	226	33.150	91.050
DATA14	299	80.700	129.750
DATA15	306	82.650	132.750
DATA1_TRANS	339	122.850	143.700
DATA2	225	21.750	90.750
DATA2_REC	345	121.650	146.100
DATA3	208	19.500	85.950
DATA4	200	27.450	82.950
DATA5	235	30.600	93.150
DATA6	207	33.900	85.800
DATA7	294	44.550	128.100
DATA8	177	44.850	74.250
DATA9	327	76.350	139.650
DEEMPH	558	52.200	219.150
DISACKN	168	8.250	73.050
DISCLK	183	8.250	75.750
DISDAT	190	8.250	78.450
DISRES	309	38.100	133.800
DISSDIS	199	8.250	81.450
DMAEN	64	75.750	38.100
DOBM	105	130.650	53.400
DOBM_KILL	114	134.700	56.700
DONEN	103	24.300	53.100
DTACKN	119	70.350	59.250
DTACKP	132	33.900	64.200
FO	574	37.500	224.250
FOC-	398	4.350	165.900
G0	148	100.950	69.900
G1	163	99.450	72.300
G2	147	98.250	69.900
G3	162	96.750	72.300
G4	146	95.550	69.900
G5	164	94.050	72.450
G6	145	92.850	69.900
G7	140	90.000	68.700
HALTN	45	26.850	32.550
HEADPHL	587	96.900	229.800
HEADPHR	585	88.350	229.800
HFD	350	61.500	147.750
HOBBES1_2	340	56.550	144.450
IACK2	62	30.000	38.100
IACKN	126	70.950	61.800
INTIKAT2N	46	54.900	32.550
INTIKATN	281	120.300	117.450
INTREQN	82	58.350	44.700
IO1	333	129.750	142.200
IO2	355	129.300	148.800
IO3	364	128.400	151.350
IO4	369	130.800	152.400
IRQ2N	318	132.000	136.950
IRQIN	311	60.450	134.400
ISELIN	420	76.350	172.800

Signalname	Pad nr.	X-axis	Y-axis
KILL	599	70.950	232.650
LADD1	319	84.300	137.250
LADD10	222	66.150	90.150
LADD11	238	63.600	93.150
LADD12	230	61.050	91.350
LADD13	237	58.500	93.150
LADD14	154	53.400	71.100
LADD15	185	53.550	76.200
LADD16	214	50.850	87.750
LADD17	210	48.300	86.100
LADD18	240	72.450	93.150
LADD19	215	75.600	88.200
LADD2	310	87.000	133.950
LADD20	224	74.100	90.600
LADD21	178	63.600	74.250
LADD22	175	60.600	73.800
LADD23	186	61.650	76.200
LADD3	323	89.100	138.450
LADD4	322	92.100	138.300
LADD5	316	94.650	136.050
LADD6	324	95.850	138.750
LADD7	317	98.400	136.950
LADD8	329	100.950	139.650
LADD9	239	68.700	93.150
LDON	394	4.350	159.300
LDSN	98	54.600	51.300
LWN	16	105.900	21.150
MA0	66	112.350	38.700
MA1	17	111.750	21.150
MA2	58	117.000	36.900
MA3	18	114.450	21.150
MA4	52	105.150	35.700
MA5	47	120.600	33.450
MA6	51	123.150	34.800
MA7	53	120.600	36.150
MA8	61	123.150	37.950
MD0	29	93.750	25.950
MD1	13	94.650	20.550
MD10	87	127.350	46.200
MD11	42	111.600	31.800
MD12	35	111.900	29.100
MD13	32	109.500	28.050
MD14	38	105.750	30.450
MD15	44	103.800	32.400
MD2	24	95.100	23.400
MD3	30	96.600	25.950
MD4	28	101.400	25.200
MD5	20	100.950	21.900
MD6	14	103.200	20.550
MD7	79	112.200	42.750
MD8	80	107.700	44.250
MD9	75	107.700	41.550
MISOIN	368	87.150	151.950
MODE_0IN	371	85.200	153.600
MODE_1IN	380	87.150	155.250
MOSIIN	354	84.450	148.800
NHSYN	193	114.600	80.100
NVDSN	135	87.300	65.850

Signalname	Pad nr.	X-axis	Y-axis
NVSYN	265	120.450	110.100
PLAYSEL	290	35.850	127.200
POTBL	586	92.850	229.800
POTBR	584	84.450	229.800
POTML	578	96.900	226.650
POTMR	579	78.000	226.950
Q_CLK	436	73.950	179.100
Q_DATA	428	69.600	175.800
Q_WCLK	432	75.300	176.850
R0	152	87.600	70.050
R1	157	90.000	71.550
R2	171	87.900	73.350
R3	181	94.050	75.150
R4	189	94.050	77.850
R5	195	94.050	80.550
R6	194	97.350	80.250
R7	201	97.200	83.100
RA	564	37.050	221.700
RAB	406	65.100	168.600
RAD-	395	4.350	163.050
RASN	70	120.600	40.050
RC_EYE	217	8.250	89.100
RDYN	89	23.700	46.950
REF	382	49.800	158.550
REM	552	142.200	218.100
REQ2N	68	33.150	39.450
REQ2NKON	179	77.400	74.550
RESET	405	62.400	168.300
RESETCD	86	105.150	46.050
RESETCD	304	109.400	131.562
RESETN	188	106.800	76.350
RESETSTB	346	125.550	146.400
RESETSYS	54	95.400	36.300
RSC	205	147.750	85.200
RTS1P	72	38.850	40.500
RTS2IK1	282	65.250	117.900
RTSEX	92	28.050	49.050
RWN	71	27.150	40.500
RX1IK1TX2IK2	291	130.650	127.200
RX1IK2	100	28.350	51.900
RX1P	1	119.400	8.850
RX2IK1	283	45.900	118.050
SCL	158	81.450	71.850
SCLK	365	81.600	151.500
SDA	95	59.250	49.950
SDATA	545	73.200	216.300
SELPAR	325	48.600	139.050
SILD	417	65.250	171.300
SL	569	39.750	222.900
SLEEPAUDN	411	69.450	169.200
SLEEPVID	321	52.650	138.000
SLIDESW	341	23.100	144.900
SSCLKIN	351	87.750	148.350
STANDBYLED	621	8.250	95.250
STANDIN	120	54.300	59.700
STATUS	503	52.500	201.900
STBS	113	18.000	56.700
STBV	49	22.650	34.500

Signalname	Pad nr.	X-axis	Y-axis
STROBEDSA	335	125.550	142.650
SWCLK	544	70.500	216.300
SYSCLK	50	61.650	34.650
SYSCLK1	121	100.500	59.850
SYSCLK2	131	55.200	63.900
SYSCLKA	93	77.100	49.350
TCK	127	95.550	62.250
TDI	141	78.900	69.150
TDO	385	70.500	161.400
TDOVDSC	136	78.450	66.600
TMS	156	77.700	71.400
TRAYOC	334	50.250	142.350
TRAYSWITCH	336	11.250	143.250
TS1IK1RTS1IK2	295	60.600	128.100
TX1P	12	130.650	20.250
TX2IK1	97	30.750	50.700
TXCO	613	124.200	132.300
TXLC	612	124.200	129.600
UDSN	256	27.750	101.250
URDN	314	90.750	135.450
UWN	19	108.600	21.300
UWRN	307	93.450	133.350
VADAC	551	86.250	217.950
VDSC_INTN	124	78.750	60.750
Vsub	415	4.350	170.700
XT2N	130	115.350	63.750
X_CLK	286	115.200	125.850
X_DATA	297	114.900	128.400
X_WSIN	302	113.850	130.800
Y_GSC	229	147.750	91.200

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7.6 CONTROL & DISPLAY PANEL

7.6.1 Control & Display PCB

1703 A 1 1706 A 1 1721 A 2 2703 A 2 3702 A 2 3706 A 4 3713 A 2 3717 A 2 3720 A 1 3723 A 5 3726 A 1 3729 A 1 3901 A 6 6702 A 2 6706 A 6 6709 A 1 7704 A 5 7707 A 1 7710 A 1
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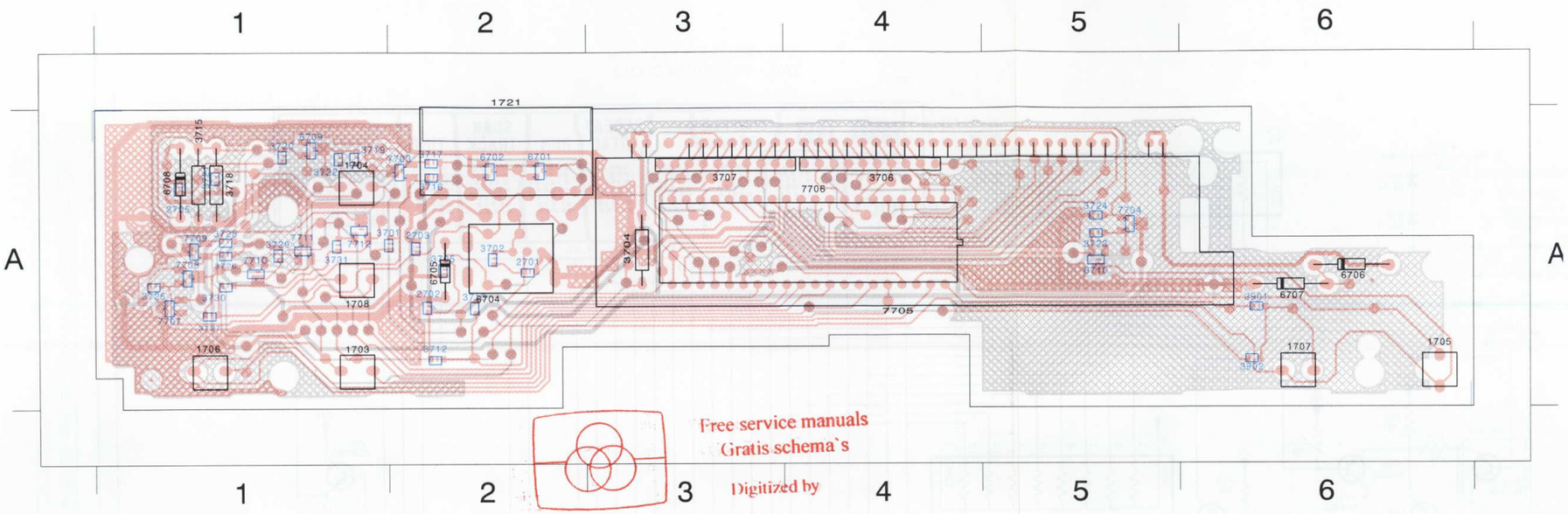

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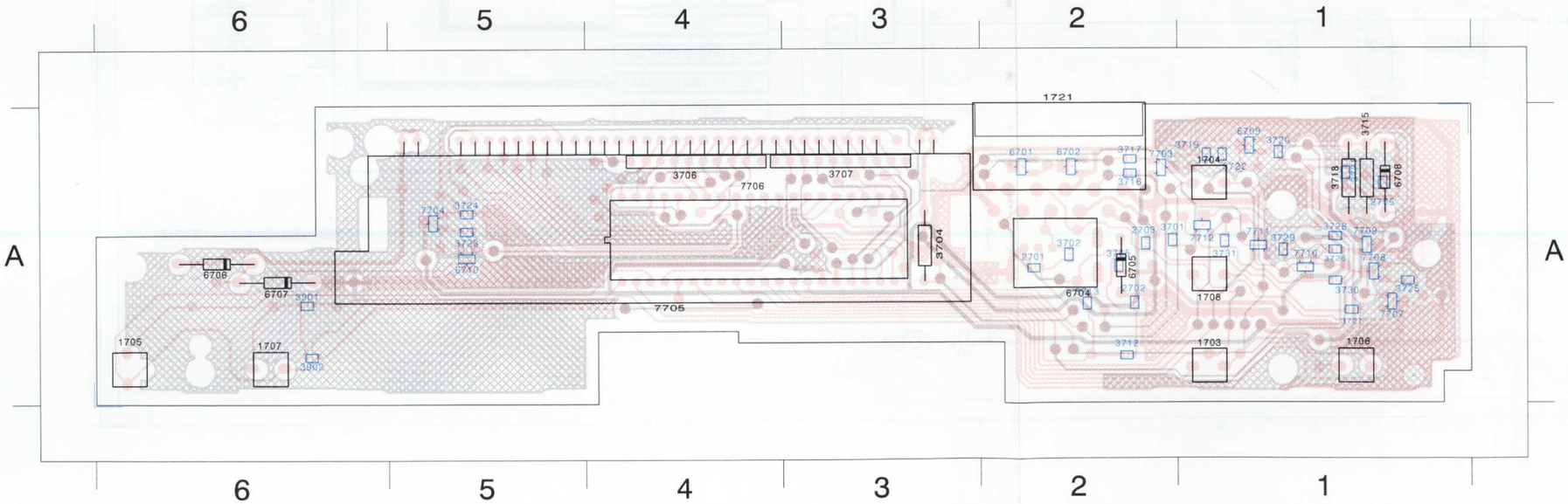

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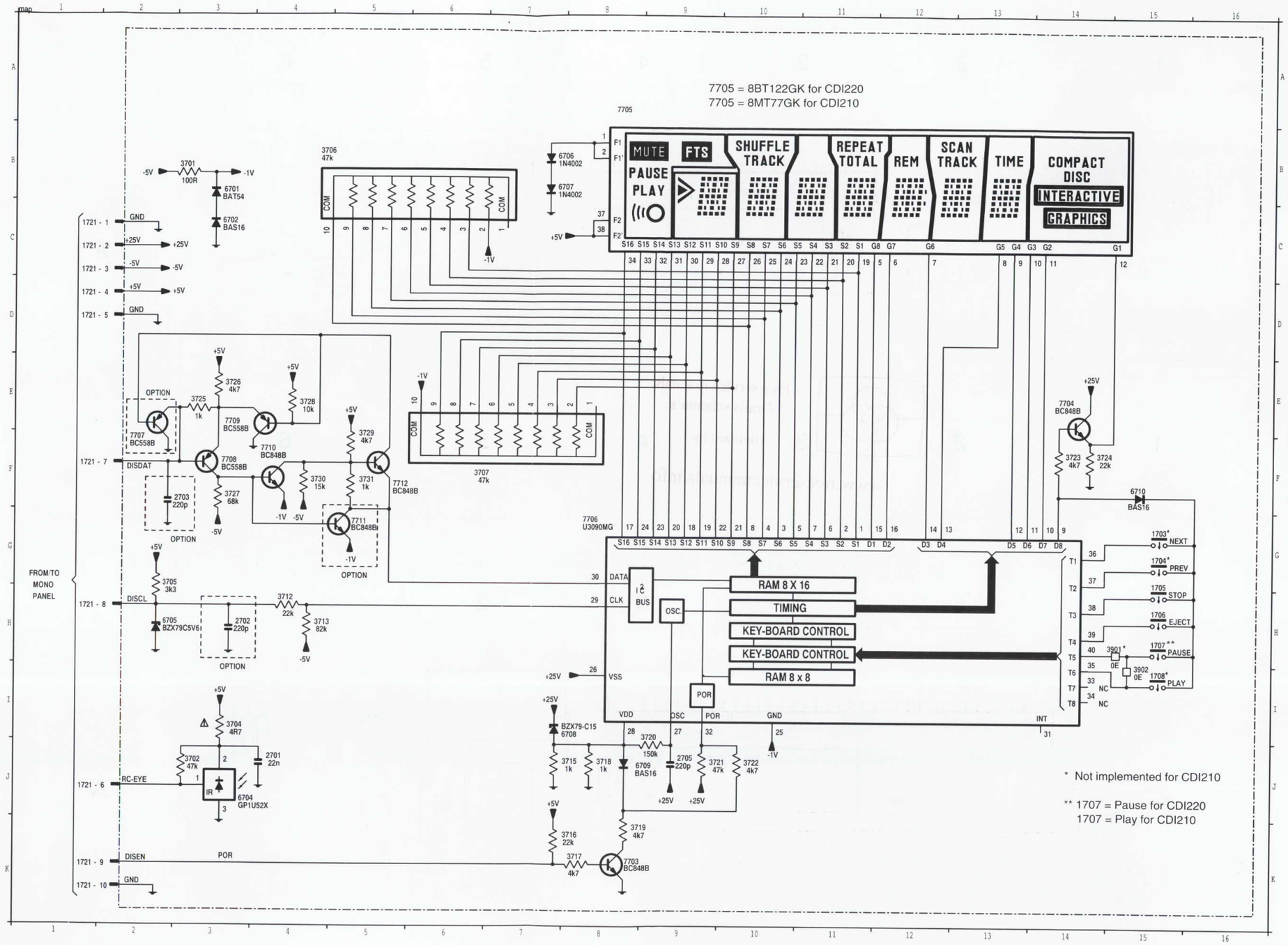
7.6.2 Control & Display circuit diagram



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8 PARTSLIST

8.1 Partslist of the cabinet

Item	Codenumber	Description
1	4822 444 40608	Front assy
1	4822 444 40638	Front assy /97
9	4822 410 62316	Powerknob assy
22	4822 502 30408	PL3X10PAN<STZNBK
23	4822 502 30408	PL3X10PAN<STZNBK
24	4822 502 30408	PL3X10PAN<STZNBK
25	4822 502 30408	PL3X10PAN<STZNBK
26	4822 502 30408	PL3X10PAN<STZNBK
27	4822 502 30408	PL3X10PAN<STZNBK
30	2511 076 50011	PL3X6PAN<STZNBK
31	2511 076 50011	PL3X6PAN<STZNBK
44	4822 413 51434	Volume knob
63		Bracket
65	4822 444 40802	Tray front
70	4822 502 12795	M2,5X5PAN<STZNBK
75	4822 502 12795	M2,5X5PAN<STZNBK
76	4822 502 12795	M2,5X5PAN<STZNBK
77	4822 502 12795	M2,5X5PAN<STZNBK
81	Tray loader	SEE SEPARATE LIST
100		Sticker
151	4822 444 60898	Cover
171	4822 502 12795	M2,5X5PAN<STZNBK
172	4822 502 12795	M2,5X5PAN<STZNBK
173	4822 502 12795	M2,5X5PAN<STZNBK
174	4822 502 12795	M2,5X5PAN<STZNBK
175	4822 502 12795	M2,5X5PAN<STZNBK
177	4822 502 12795	M2,5X5PAN<STZNBK
178	4822 502 12795	M2,5X5PAN<STZNBK
181		Frame assy
182		Loader support
183		Spacer locking
184		Spacer locking
185		Remod. bracket
186	4822 402 61422	Spacer
187	4822 402 61422	Spacer
188	4822 402 61422	Spacer
191		ZN 3X6 TORX
192		ZN 3X6 TORX
195		Gliding support
196	2511 077 00031	ZN M2,5X28 TORX
200	2511 077 00031	ZN M2,5X28 TORX
202	4822 502 12795	M2,5X5PAN<STZNBK
203	4822 502 12795	M2,5X5PAN<STZNBK
207		ZN 3X6 TORX
208		ZN 3X6 TORX
209	4822 502 12795	M2,5X5PAN<STZNBK
210	4822 502 12795	M2,5X5PAN<STZNBK
211	4822 502 30408	PL3X10PAN<STZNBK
212	4822 502 30408	PL3X10PAN<STZNBK
213	4822 502 30408	PL3X10PAN<STZNBK
214	4822 502 30408	PL3X10PAN<STZNBK
217	4822 502 12795	M2,5X5PAN<STZNBK
218	4822 502 12795	M2,5X5PAN<STZNBK
219	4822 502 12795	M2,5X5PAN<STZNBK
220	4822 502 12795	M2,5X5PAN<STZNBK
223	4822 502 30438	PL3X6PAN<STZNBK
224	4822 502 30438	PL3X6PAN<STZNBK
225		M3X4PAN<STZNBK
226		M3X4PAN<STZNBK

Item	Codenumber	Description
251	4822 462 41992	Foot
252	4822 462 41992	Foot
255	4822 462 40409	Plate for foot
256	4822 462 40409	Plate for foot
259	4822 502 12795	M2,5X5PAN<STZNBK
260	4822 502 12795	M2,5X5PAN<STZNBK
266		Textplate
268	4822 502 12795	M2,5X5PAN<STZNBK
269	4822 502 12795	M2,5X5PAN<STZNBK
270	4822 502 12795	M2,5X5PAN<STZNBK
274	4822 502 12795	M2,5X5PAN<STZNBK
275	4822 502 11667	M3X6PAN<STZNBK
276	4822 502 30408	PL3X10PAN<STZNBK
277	4822 502 30408	PL3X10PAN<STZNBK
278	4822 502 30408	PL3X10PAN<STZNBK
279	4822 502 30408	PL3X10PAN<STZNBK
280	4822 502 30408	PL3X10PAN<STZNBK
282		Earth plate
285		Cover plate assy
286	3104 128 91091	M2,5X6 TRX SLT
287	3104 128 91091	M2,5X6 TRX SLT
301	4822 321 10249	Mainscord /80
301	4822 321 11159	Mainscord /85
301	4822 321 10939	Mainscord /97
302	4822 321 20308	Audio cord set
309	4822 736 22247	Dir. for use mono 4/220
309	4822 736 22614	Dir. for use /97
313	4822 321 61452	Digital Out cable
315	4822 321 61579	Video cord set
316	4822 321 61849	TPX 3500 cord
317	4822 320 11096	Antenna cable /97
318	4822 218 10576	IR-remote Control
1005	4822 214 52306	Power supply unit
BU-11	4822 267 51216	MINIDINN socket
BU-12	4822 267 31572	Headphone socket
P-1	4822 101 21199	10 kΩ Log.

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8.2 Parts List Of The Tray Loader

Item	Codenumber	Description
1	4822 464 50896	Chassis assy
2	4822 444 50679	Slide assy
3	4822 464 50895	Subchassis
4		Cover plate
5	4822 402 61412	Clamper assy
6	4822 325 50215	Suspension
7	4822 325 50215	Suspension
8	4822 325 50215	Suspension
9	4822 325 50215	Suspension
10	4822 276 13222	Switch assy
11	4822 361 21492	Motor assy
12		Screw M2,2x4
13		Screw M2,2x4
14	4822 528 81465	Pulley gear
15	4822 528 81464	Drive pinion
16	see item 1	Spindle
17	see item 1	Spindle
18	4822 358 31168	Drive belt
20	4822 691 30278	CDM 12.1
21		Lead assy
24		Polylub. GLY801
25		Familysheet
35		Fondam FM3
36	see item 2	Ornamental tule
37	see item 2	Ornamental tule
38	see item 2	Ornamental tule
39	see item 2	Ornamental tule
40	4822 325 60379	Damping grommet
41	4822 325 60379	Damping grommet
42	4822 325 60379	Damping grommet
61		Lead assy

8.3 Partslist of the display and powersupply panel

Item	Codenumber	Description		
1703	4822 276 13114	TACT SWITCH		
1704	4822 276 13114	TACT SWITCH		
1705	4822 276 13114	TACT SWITCH		
1706	4822 276 13114	TACT SWITCH		
1707	4822 276 13114	TACT SWITCH		
1708	4822 276 13114	TACT SWITCH		
1721		CONN		
2701	5322 122 32654	22n	X7R	PM10
2705	4822 122 33575	220p	50V	
3701	4822 122 33575	100R		PM5
3702	4822 051 20473	47k		PM5
3704	4822 052 10478	4R7		PM5
3705	4822 051 20332	3k3		PM5
3706	4822 116 90857	8x 47k		PM5
3707	4822 116 90857	8x 47k		PM5
3712	4822 051 20223	22k		PM5
3713	4822 051 20823	82k		PM5
3715	4822 050 21002	1k0	1/8W	PM5
3716	4822 051 20223	22k		PM5
3717	4822 051 20472	4k7		PM5
3718	4822 050 21002	1k0	1/8W	PM5
3719	4822 051 20472	4k7		PM5
3720	4822 051 20154	150k		PM5
3721	4822 051 20473	47k		PM5
3722	4822 051 20472	4k7		PM5
3723	4822 051 20472	4k7		PM5
3724	4822 051 20223	22k		PM5
3725	4822 051 10102	1k		PM5
3726	4822 051 20472	4k7		PM5
3727	4822 051 20333	33k		PM5
3728	4822 051 20103	10k		PM5
3729	4822 051 20472	4k7		PM5
3730	4822 051 20153	15k		PM5
3731	4822 051 10102	1k		PM5
3902	4822 051 20008	0R05		
3999		PROCES SCHIP RP		
6701	4822 130 80622	BAT54		
6702	5322 130 31928	BAS16		
6704	4822 214 52009	GP1U58XP		
6705	4822 130 34173	BZX79-C5V6		
6706	5322 130 30684	1N4002GP		
6707	5322 130 30684	1N4002GP		
6708	4822 130 34281	BZX79-C15		
6709	5322 130 31928	BAS16		
6710	5322 130 31928	BAS16		
7703	5322 130 41982	BC848B		
7704	5322 130 41982	BC848B		
7705	4822 130 91194	DISPLAY FTD		
7706	4822 209 72226	U3090MG-40P		
7708	5322 130 41983	BC858B		
7709	5322 130 41983	BC858B		
7710	5322 130 41982	BC848B		
7712	5322 130 41982	BC848B		

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Item	Codenumber	Description		
1	4822 265 31015	SOC SUPP		
1011		HEATSINK		
1112	4822 492 70143	SPRING1		
1213		HEATSINK		
1314	4822 492 70143	SPRING1		
1101	4822 256 30517	FUSE HOLDER		
1201	4822 252 51179	PROT DEV 65V 4A		
1202	4822 252 51179	PROT DEV 65V 4A		
1203	4822 252 51179	PROT DEV 65V 4A		
1204	4822 252 51179	PROT DEV 65V 4A		
2101	5322 121 44222	330n	250V	PM20
2103	4822 124 42191	100µ	400V	PM20
2104	4822 121 41856	22n	100V	PM5
2106	4822 121 42408	220n	50V	PM10
2107	4822 121 42408	220n	50V	PM10
2108	4822 121 41856	22n	100V	PM5
2109		1n5	50V	PM10
2110	4822 121 42408	220n	50V	PM10
2111	5322 122 32818	2n2	63V	P80M20
2112		47µ	25V	PM20
2113	4822 122 32576	2n2	400V	PM20
2114	4822 122 32576	2n2	400V	PM20
2201	4822 124 23183	4700µ	16V	PM20
2202	5322 121 42386	100n	50V	PM10
2203		3300µ	10V	PM20
2205		1000µ	10V	PM20
2206		1000µ	10V	PM20
2207		15n	100V	P50M20
2211	4822 124 41334	470µ	35V	PM20
2212		100µ	35V	PM20
3101		20R	NTC	PM20
3103	4822 053 20474	470k		PM5
3106	4822 053 11273	27k		PM5
3107	4822 116 52228	680R		PM5
3108		1R2		PM5
3109	4822 116 52233	10k	1/6W	PM5
3110		1R2		PM5
3111		1R2		PM5
3112	4822 116 52207	1k2	1/6W	PM5
3113	4822 116 52233	10k	1/6W	PM5
3114	4822 116 52235	1M0	1/6W	PM5
3115	4822 116 52233	10k	1/6W	PM5
3116	4822 116 52228	680R	1/6W	PM5
3117	4822 116 52175	100R	1/6W	PM5
3118	4822 116 52246	1k6	1/6W	PM5
3119	4822 116 52246	1k6	1/6W	PM5
3120	4822 116 52246	1k6	1/6W	PM5
3121	4822 116 52176	10R	1/6W	PM5
3122	4822 116 83883	470R		PM5
3123		1R2		PM5
3201		1K2		PM5
3202	4822 052 10228	2R2		PM5
3203		1k2		PM5
3204		2k49		PM1
3205		2k32		PM1
3206		1R2		PM5

Item	Codenumber	Description		
3207		1R2		PM5
3208	4822 052 10101	100R		PM5
3211	4822 116 52233	10k	1/6W	PM5
3212	4822 116 52233	10k	1/6W	PM5
3213	4822 116 52233	10k	1/6W	PM5
3214	4822 116 52233	10k	1/6W	PM5
3215	4822 116 83868	150R		PM5
3216	4822 116 83868	150R		PM5
3219	4822 052 10229	22R		PM5
3220	4822 052 10229	22R		PM5
5101	4822 157 71268	FILTER CHOKE		
5102		TRANSFORMER		
5201		6µ8		PM20
6102	4822 130 42489	BYD33G		
6103	4822 130 30621	1N4148		
6105	4822 130 30621	1N4148		
6106	4822 130 30621	1N4148		
6107	4822 130 31024	BZX79-F18		
6108	4822 130 34499	BZX79-F20		
6109	4822 130 42489	BYD33G		
6201	4822 130 83073	PBYR745F		
6202	4822 130 34167	BZX79-F6V2		
6203	4822 130 82035	BYD74D		
6204	4822 130 32245	BYV10-40		
6205	4822 130 30621	1N4148		
6206	4822 130 42489	BYD33G		
6207	4822 130 32245	BYV10-40		
7101	4822 130 83707	S1NB80		
7102	4822 130 63689	STP3N60FI		
7103	4822 209 83909	UC3842AN		
7104	4822 130 41023	BC328-16		
7105	4822 130 40892	BC338-16		
7106	4822 130 10025	CNX82A		
7201	4822 209 81397	TL431CLPRM		
7202	4822 209 11079	MC79M05CT		
7203	4822 130 41344	BC337-40		
7204	4822 130 41344	BC337-40		
7205	5322 209 60027	MC78M24CT		

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8.4 Partslist of the Main panel

Item	Codenumber	Description		
1001		9P M 2.50		
1009		6P M 2.50		
1010		12P F 1.25		
1014		4P M 2.50		
1015		3P FDWHYE		
1016	4822 267 31772	1P F 2.5		
1021		12P M 2.00		
1022		10P M 2.00		
1033	4822 267 51216	8P Minidinn		
1096		120P M 2.00		
1470	5322 255 44217	40P DIPL		
2110	4822 122 33496	100n	63V	10%
2111	4822 122 33496	100n	63V	10%
2112	4822 122 33496	100n	63V	10%
2117	4822 122 33496	100n	63V	10%
2118	4822 122 33496	100n	63V	10%
2119	4822 122 33496	100n	63V	10%
2132	4822 122 32654	22n	63V	10%
2133	4822 122 32654	22n	63V	10%
2134	4822 122 32654	22n	63V	10%
2135	4822 122 32654	22n	63V	10%
2136	4822 122 32654	22n	63V	10%
2137	4822 122 32654	22n	63V	10%
2138	4822 122 32654	22n	63V	10%
2139	4822 122 32654	22n	63V	10%
2140	4822 122 32654	22n	63V	10%
2141	4822 122 32654	22n	63V	10%
2142	4822 122 32654	22n	63V	10%
2143	4822 122 32654	22n	63V	10%
2144	4822 122 32654	22n	63V	10%
2145	4822 122 32654	22n	63V	10%
2146	4822 122 32654	22n	63V	10%
2148	4822 122 32654	22n	63V	10%
2149	4822 124 80483	47µ	6V3	20%
2150	4822 122 32654	22n	63V	10%
2160	4822 122 32654	22n	63V	10%
2161	4822 122 32654	22n	63V	10%
2163	4822 122 32654	22n	63V	10%
2164	4822 122 32654	22n	63V	10%
2165	4822 122 33496	100n	63V	10%
2166	4822 122 33496	100n	63V	10%
2201	4822 122 32654	22n	63V	10%
2204	4822 122 32654	22n	63V	10%
2206	4822 126 12549	470n	25V	10%
2207	4822 122 33496	100n	63V	10%
2208	4822 124 41527	47µ	25V	20%
2210	4822 122 32654	22n	63V	10%
2211	4822 122 32654	22n	63V	10%
2232	4822 122 32654	22n	63V	10%
2240	4822 122 32654	22n	63V	10%
2241	4822 122 32654	22n	63V	10%
2245	4822 122 32654	22n	63V	10%
2250	4822 122 32654	22n	63V	10%
2251	5322 122 31865	1n5	63V	10%
2252	5322 122 31865	1n5	63V	10%
2253	5322 122 31865	1n5	63V	10%
2254	4822 122 32654	22n	63V	10%
2255	4822 124 41527	47µ	25V	20%
2256	4822 124 41527	47µ	25V	20%

Item	Codenumber	Description		
2257	4822 124 41527	47µ	25V	20%
2263	4822 122 32654	22n	63V	10%
2270	4822 124 41989	470µ	16V	20%
2271	4822 124 41989	470µ	16V	20%
2272	4822 122 32654	22n	63V	10%
2273	4822 124 80483	47µ	6V3	20%
2280	4822 122 32654	22n	63V	10%
2281	4822 124 80483	47µ	6V3	20%
2282	5322 122 31865	1n5	63V	10%
2283	4822 122 32654	22n	63V	10%
2284	5322 122 31865	1n5	63V	10%
2285	5322 122 31865	1n5	63V	10%
2286	5322 122 31865	1n5	63V	10%
2304	4822 122 33496	100n	63V	10%
2305	4822 122 32654	22n	63V	10%
2306	4822 122 32654	22n	63V	10%
2307	4822 122 32654	22n	63V	10%
2308	4822 122 32654	22n	63V	10%
2309	4822 122 32654	22n	63V	10%
2310	4822 122 32654	22n	63V	10%
2311	4822 122 32654	22n	63V	10%
2312	4822 122 32654	22n	63V	10%
2323	4822 124 22339	100µ	16V	
2324	4822 124 22339	100µ	16V	
2325	5322 122 32658	22p	63V	5%
2326	5322 122 32658	22p	63V	5%
2327	4822 122 32654	22n	63V	10%
2328	4822 122 32654	22n	63V	10%
2331		680p	63V	2%
2332		680p	63V	2%
2333	4822 122 32654	22n	63V	10%
2334	4822 122 32654	22n	63V	10%
2335	4822 122 32654	22n	63V	10%
2337	5322 122 33897	3n3	63V	5%
2338	5322 122 33897	3n3	63V	5%
2340	4822 124 80602	1000µ	6V3	
2341	4822 124 80144	220µ	25V	
2350	4822 124 41527	47µ	25V	
2351	4822 124 41527	47µ	25V	
2352	4822 124 41528	100µ	25V	
2353	4822 124 41528	100µ	25V	
2355	4822 124 80602	1000µ	6V3	20%
2356	4822 124 41969	1µ	50V	20%
2360	4822 124 41528	100µ	25V	20%
2361	4822 122 33496	100n	63V	10%
2362	4822 122 33575	220p	63V	5%
2363	4822 122 32654	22n	63V	10%
2364	4822 122 32654	22n	63V	10%
2366	4822 051 20008	0R05		
2369	4822 051 20008	0R05		
2400	4822 122 32654	22n	63V	10%
2401	4822 122 32654	22n	63V	10%
2402	4822 122 32654	22n	63V	10%
2408	5322 122 32452	47p	63V	5%
2410	4822 122 32654	22n	63V	10%
2411	4822 122 33496	100n	63V	10%
2412	4822 122 32654	22n	63V	10%
2413	5322 122 31863	330p	63V	5%
2414	4822 126 10326	180p	63V	5%

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Item	Codenumber	Description		
2415	4822 126 10326	180p	63V	5%
2416	5322 122 32659	33p	63V	5%
2417	5322 122 32452	47p	63V	5%
2418	5322 122 32452	47p	63V	5%
2419	5322 122 32531	100p	63V	5%
2420	4822 122 32654	22n	63V	10%
2421	5322 122 31863	330p	63V	5%
2422	4822 126 10326	180p	63V	5%
2424	5322 122 31863	330p	63V	5%
2425	5322 122 31865	1n5	63V	10%
2426	5322 116 80853	560p	63V	5%
2427	4822 122 33575	220p	63V	5%
2428	4822 122 33575	220p	63V	5%
2429	4822 122 33575	220p	63V	5%
2430	4822 122 33575	220p	63V	5%
2431	4822 122 33575	220p	63V	5%
2432	4822 122 33575	220p	63V	5%
2433	4822 122 33496	100n	63V	10%
2434	5322 122 31865	1n5	63V	10%
2435	4822 126 12549	470n	25V	10%
2436	4822 122 32654	22n	63V	10%
2437	4822 122 33496	100n	63V	10%
2438	4822 122 32654	22n	63V	10%
2439	4822 122 33342	33n	63V	10%
2440	4822 122 33127	2n2	63V	10%
2441	4822 122 32654	22n	63V	10%
2442	4822 122 33496	100n	63V	10%
2443	4822 126 10326	180p	63V	5%
2444	4822 122 32627	2n7	63V	10%
2445	4822 122 32654	22n	63V	10%
2446	4822 122 33496	100n	63V	10%
2447	4822 126 10326	180p	63V	5%
2448	4822 122 32654	22n	63V	10%
2449	4822 122 32654	22n	63V	10%
2450	5322 126 10465	3n9	63V	10%
2451	4822 122 33496	100n	63V	10%
2452	4822 122 33342	33n	63V	10%
2453	4822 122 32654	22n	63V	10%
2454	4822 122 32654	22n	63V	10%
2455	4822 122 33127	2n2	63V	10%
2456	4822 122 33496	100n	63V	10%
2457	5322 122 32452	47p	63V	5%
2463	4822 122 33496	100n	63V	10%
2464	4822 122 32654	22n	63V	10%
2465	4822 122 32654	22n	63V	10%
2467	4822 124 41527	47µ	25V	
2468	4822 124 41527	47µ	25V	20%
2473		22µ	50V	20%
2474	4822 124 41527	47µ	25V	20%
2550	4822 122 33496	100n	63V	10%
2551	4822 122 33496	100n	63V	10%
2552	4822 122 33496	100n	63V	10%
2553	4822 124 41527	47µ	25V	20%
2554	4822 124 41527	47µ	25V	20%
2555	4822 124 41527	47µ	25V	20%
2556	4822 122 33496	100n	63V	10%
2557	4822 124 41527	47µ	25V	20%
2558	4822 122 33496	100n	63V	10%
2559	4822 124 41527	47µ	25V	20%
2560	4822 122 32654	22n	63V	10%

Item	Codenumber	Description	
3101	4822 051 20472	4k7	5%
3115	4822 051 20008	0R05	
3119	4822 051 20399	47R	5%
3120	4822 051 20472	4k7	5%
3121		75R	1%
3122	4822 051 20223	22k	5%
3123		75R	1%
3124		75R	1%
3125	4822 051 20223	22k	5%
3153	4822 051 20008	0R05	
3157	4822 051 20008	0R05	
3159		4k42	1%
3160	4822 117 10361	680R	1%
3162	4822 051 20471	470R	5%
3164	4822 117 11454	820R	1%
3166	4822 117 11454	820R	1%
3167	4822 051 20101	100R	5%
3168	4822 051 20151	150R	5%
3171	4822 051 20102	1k	5%
3172		75R	1%
3173	4822 051 20103	10k	5%
3174	4822 051 20008	0R05	
3175	4822 051 20008	0R05	
3177	4822 051 20008	0R05	
3179	4822 051 20008	0R05	
3182	4822 051 20471	470R	5%
3189	4822 051 20471	470R	5%
3200	4822 051 20229	22R	5%
3201	4822 051 20105	1M	5%
3202	4822 051 20472	4k7	5%
3204	4822 051 20008	0R05	
3205	4822 051 20104	100k	5%
3206	4822 051 20104	100k	5%
3207	4822 051 20103	10k	5%
3208	4822 051 20103	10k	5%
3209	4822 051 20103	10k	5%
3210	4822 051 20102	1k	5%
3211	4822 051 20102	1k	5%
3212	4822 051 20472	4k7	5%
3213	4822 051 20472	4k7	5%
3214	4822 051 20472	4k7	5%
3215	4822 051 20223	22k	5%
3216	4822 051 20223	22k	5%
3217	4822 051 20223	22k	5%
3218	4822 051 20102	1k	5%
3219	4822 051 20103	10k	5%
3220	4822 051 20102	1k	5%
3221	4822 051 20102	1k	5%
3222	4822 051 20472	4k7	5%
3223	4822 051 20472	4k7	5%
3224	4822 051 20472	4k7	5%
3225	4822 051 20472	4k7	5%
3226	4822 051 20472	4k7	5%
3227	4822 051 20472	4k7	5%
3228	4822 051 20472	4k7	5%
3229	4822 051 20102	1k	5%
3230	4822 051 20105	1M	5%
3231	4822 051 20222	2k2	5%
3232	4822 051 20399	47R	5%
3234	4822 051 20103	10k	5%

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Item	Codenumber	Description		
3235	4822 051 20103	10k		5%
3238	4822 051 20008	0R05		
3241	4822 051 20472	4k7		5%
3245	4822 051 20102	1k		5%
3250	4822 051 20104	100k		5%
3251	4822 051 20101	100R		5%
3252	4822 051 20101	100R		5%
3253	4822 051 20101	100R		5%
3254	4822 051 20104	100k		5%
3255	4822 252 51173	65V	1.0A	
3256	4822 051 20229	22R		5%
3257	4822 051 20104	100k		5%
3258	4822 051 20103	10k		5%
3259	4822 051 20682	6k8		5%
3260	4822 051 20104	100k		5%
3261	4822 051 20103	10k		5%
3262	4822 051 20682	6k8		5%
3263	4822 051 20229	22R		5%
3264	4822 051 20103	10k		5%
3265	4822 051 20103	10k		5%
3266	4822 051 20103	10k		5%
3267	4822 117 10834	47k		5%
3268	4822 051 20682	6k8		5%
3269	4822 051 20103	10k		5%
3272	4822 051 20472	4k7		5%
3274	4822 051 20229	22R		5%
3275	4822 051 20104	100k		5%
3277	4822 116 40238	PTC	0R46	
3278	4822 051 20103	10k		5%
3279	4822 051 20103	10k		5%
3280	4822 051 20101	100R		5%
3281	4822 051 20682	6k8		5%
3282	4822 051 20103	10k		5%
3283	4822 051 20104	100k		5%
3284	4822 051 20101	100R		5%
3285	4822 051 20682	6k8		5%
3286	4822 051 20103	10k		5%
3287	4822 051 20104	100k		5%
3288	4822 051 20104	100k		5%
3290	4822 051 20103	10k		5%
3291	4822 051 20103	10k		5%
3297	4822 051 20103	10k		5%
3300	4822 051 20103	10k		5%
3305	4822 051 20472	4k7		5%
3306	4822 051 20472	4k7		5%
3307	4822 051 20472	4k7		5%
3308	4822 051 20472	4k7		5%
3309	4822 051 20472	4k7		5%
3310	4822 051 20472	4k7		5%
3311	4822 051 20472	4k7		5%
3312	4822 051 20472	4k7		5%
3313	4822 051 20472	4k7		5%
3314	4822 051 20472	4k7		5%
3316	4822 051 20472	4k7		5%
3318	4822 051 20008	0R05		
3320	4822 117 10834	47k		5%
3321	4822 051 20103	10k		5%
3322	4822 051 20103	10k		5%
3323	4822 051 20103	10k		5%
3324	4822 051 20222	2k2		5%

Item	Codenumber	Description		
3325	4822 051 20222	2k2		5%
3326	4822 051 20222	2k2		5%
3327	4822 051 20103	10k		5%
3328	4822 117 10834	47k		5%
3329	4822 051 20223	22k		5%
3330	4822 116 52195	47R		5%
3339	4822 116 83933	15k		1%
3340	4822 117 10834	47k		5%
3341	4822 117 10834	47k		5%
3342		91k		1%
3343		91k		1%
3344	4822 051 20103	10k		5%
3348	4822 116 83933	15k		1%
3354	4822 117 11373	100R		1%
3355	4822 051 20182	1k8		5%
3356	4822 051 20182	1k8		5%
3357	4822 117 11373	100R		1%
3358	4822 051 20182	1k8		5%
3359	4822 051 20182	1k8		5%
3360	4822 117 11373	100R		1%
3361	4822 117 11373	100R		1%
3363	4822 051 20182	1k8		5%
3364	4822 051 20182	1k8		5%
3365	4822 117 11152	4R7		5%
3366	4822 117 11152	4R7		5%
3367	4822 051 20101	100R		5%
3368	4822 051 20008	0R05		
3373	4822 117 11373	100R		1%
3374	4822 117 11373	100R		1%
3377	4822 117 10833	10k		1%
3378	4822 117 10833	10k		1%
3379	4822 116 83933	15k		1%
3380	4822 116 83933	15k		1%
3395	4822 051 20008	0R05		
3396	4822 051 20399	47R		5%
3397	4822 117 10354	22k		1%
3398	4822 117 10354	22k		1%
3399	4822 051 20399	47R		5%
3401	4822 117 11154	1k		1%
3402	4822 117 11154	1k		1%
3403	4822 051 20101	100R		5%
3404	4822 051 20008	0R05		
3406	4822 051 20101	100R		5%
3407	4822 051 20101	100R		5%
3408	4822 051 20101	100R		5%
3409	4822 051 20124	120k		5%
3410	4822 051 20563	56k		5%
3411	4822 051 20124	120k		5%
3412	4822 051 20391	390R		5%
3413	4822 051 20101	100R		5%
3414	4822 051 20102	1k		5%
3415	4822 051 20101	100R		5%
3416	4822 051 20102	1k		5%
3417	4822 051 20393	39k		5%
3418	4822 051 20334	330k		5%
3419	4822 051 20153	15k		5%
3420	4822 051 20102	1k		5%
3421	4822 051 20153	15k		5%
3422	4822 117 10834	47k		5%
3423	4822 117 11452	430R		1%

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Item	Codenumber	Description	
3424	4822 117 11452	430R	1%
3425	4822 051 20182	1k8	5%
3426	4822 051 20182	1k8	5%
3428	4822 051 20392	3k9	5%
3429	4822 051 20008	0R05	
3432	4822 051 20103	10k	5%
3433	4822 051 20103	10k	5%
3434	4822 051 20103	10k	5%
3435	4822 051 20103	10k	5%
3436	4822 051 20103	10k	5%
3437	4822 051 20103	10k	5%
3438	4822 051 20154	150k	5%
3439	4822 117 10834	47k	5%
3440	4822 051 20472	4k7	5%
3441	4822 051 20102	1k	5%
3442	4822 051 20104	100k	5%
3443	4822 051 20101	100R	5%
3444	4822 051 20102	1k	5%
3445	4822 051 20683	68k	5%
3446	4822 051 20104	100k	5%
3447	4822 051 20103	10k	5%
3448	4822 116 83933	15k	1%
3449	4822 116 83933	15k	1%
3450	4822 051 20103	10k	5%
3451	4822 051 20682	6k8	5%
3452	4822 051 20103	10k	5%
3453	4822 051 20229	22R	5%
3454	4822 051 20103	10k	5%
3455	4822 116 83933	15k	1%
3456	4822 116 83933	15k	1%
3457	4822 051 20103	10k	5%
3458	4822 051 20682	6k8	5%
3459	4822 051 20229	22R	5%
3460	4822 051 20472	4k7	5%
3461	4822 116 83933	15k	1%
3462	4822 051 20103	10k	5%
3463	4822 051 20229	22R	5%
3464	4822 051 20103	10k	5%
3465	4822 116 83933	15k	1%
3466	4822 051 20229	22R	5%
3467		150k	1%
3468	4822 117 10354	22k	1%
3469	4822 117 10354	22k	1%
3470		150k	1%
3471	4822 051 20683	68k	5%
3472	4822 051 20222	2k2	5%
3473	4822 051 20223	22k	5%
3474	4822 051 20394	390k	5%
3475	4822 051 20103	10k	5%
3476	4822 051 20221	220R	5%
3477	4822 051 20221	220R	5%
3478	4822 051 20103	10k	5%
3479	4822 051 20008	0R05	
3480	4822 051 20008	0R05	
3481	4822 051 20008	0R05	
3482	4822 051 20103	10k	5%
3483	4822 051 20105	1M	5%
3485	4822 117 11139	1k5	5%
3486	4822 051 20223	22k	5%
3487	4822 051 20333	33k	5%

Item	Codenumber	Description	
3488	4822 051 20229	22R	5%
3489	4822 051 20333	33k	5%
3490	4822 051 20223	22k	5%
3491	4822 051 20223	22k	5%
3492	4822 051 20223	22k	5%
3496	4822 051 20223	22k	5%
3497		2R2	5%
3498	4822 117 61008	1R	5%
3499	4822 051 20223	22k	5%
3517	4822 051 20008	0R05	
3518	4822 051 20103	10k	5%
3519	4822 051 20008	0R05	
3526	4822 051 20008	0R05	
3527	4822 051 20008	0R05	
3530	4822 051 20399	47R	5%
3531	4822 051 20399	47R	5%
3533	4822 051 20008	0R05	
3536	4822 051 20008	0R05	
3538	4822 117 11152	4R7	5%
3539	4822 117 11152	4R7	5%
3552		2R2	5%
3553		2R2	5%
3554		2R2	5%
3555	4822 051 20222	2k2	5%
3556	4822 051 20102	1k	5%
3557		2R2	5%
3558	4822 051 20102	1k	5%
3559		2R2	5%
3560	4822 051 20008	0R05	
3561	4822 051 20008	0R05	
3562	4822 051 20008	0R05	
3563	4822 051 20008	0R05	
3564	4822 051 20399	47R	5%
3565	4822 051 20399	47R	5%
3566	4822 051 20399	47R	5%
3567	4822 051 20103	10k	5%
3580	4822 051 20008	0R05	
5165	4822 157 52983	22µ	10%
5201	4822 242 72527	4MHz	
5230	4822 242 81739	4MHz915	
5250		LC-filter 1000p	
5251		LC-filter 1000p	
5252		LC-filter 1000p	
5253		LC-filter 1000p	
5254	4822 157 90252	LC-filter 22000p	
5255		LC-filter 1000p	
5280	4822 157 70378	LC-filter 22n	
5281		LC-filter 1n	
5282		LC-filter 1n	
5283		LC-filter 1n	
5284		LC-filter 1n	
5301		LC-filter 1n	
5302		LC-filter 1n	
5303		LC-filter 220p	
5304	4822 242 82078	x-tal 33M8688	
5305	4822 157 70378	LC-filter 22n	
5402	4822 157 63316	56µ	10%
5560	4822 242 82079	x-tal 30MHz	for /80/85
5560	4822 242 82081	x-tal 30MHz2098	for /97

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Item	Codenumber	Description
6200	4822 130 83918	PRLL5817
6274	4822 130 82212	BYD17D
6300	4822 130 83918	PRLL5817
6400	4822 130 80622	BAT54
6401	4822 130 31928	BAS16
7110	4822 209 52847	upd424270le-80
7118	4822 209 52847	upd424270le-80
7125	4822 209 52811	VDSC xcd212fu
7160	4822 209 52712	bt9106kpj for /97
7160	4822 209 52771	bt9108 for /80/85
7164	4822 130 40937	BC548B
7201	4822 209 90989	IKAT
7205	5322 130 41982	BC848B
7207	4822 209 31275	MC 34064D-5
7210	4822 209 31958	scc68070cca84
7230	5322 209 11517	PC74HCU04T
7240	4822 209 52848	Syst.rom
7241	4822 209 52464	NVRAM 32x8
7245	5322 209 61434	N74F02D
7250	5322 209 71568	74HCT14D
7263	4822 209 52731	dtack GAL16V8
7272	4822 209 52732	cspal GAL20V8
7280	5322 209 71568	74HCT14D
7308	5322 130 41982	BC848B
7310	5322 130 41982	BC848B
7312	4822 130 42696	BC818-25
7313	4822 130 42696	BC818-25
7314	4822 130 42696	BC818-25
7315	4822 130 42696	BC818-25
7317	4822 130 42696	BC818-25
7318	4822 130 42696	BC818-25
7324	4822 130 42655	BC808-40
7325	5322 130 41983	BC858B
7326	4822 130 42655	BC808-40
7328	4822 209 32071	MC33079D
7331	4822 209 52562	CIAP1.5
7334	4822 209 33403	TDA1305T/N2
7400	4822 209 72587	TCA0372DP2
7402	4822 209 90341	SAA7372GP/M1
7403	5322 130 41983	BC858B
7404	5322 130 41983	BC858B
7405	4822 130 42655	BC808-25
7406	5322 130 41982	BC848B
7407	4822 130 60887	BF840
7408	5322 130 41982	BC848B
7409	5322 130 41982	BC848B
7410	5322 130 41982	BC848B
7411	5322 130 41982	BC848B
7420	4822 209 62059	TCA0372DP1
7430	4822 209 72587	TCA0372DP2
7555	5322 130 41982	BC848B

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