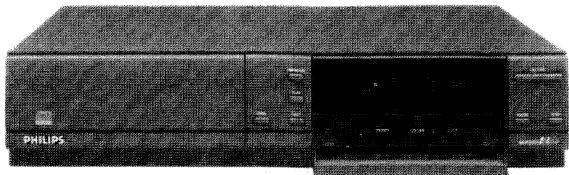


Service
Service
Service

Interactive
Media
Systems

CD-I



CDI 220

Service Manual

CONTENTS

- 1 Detailed 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 equipped 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

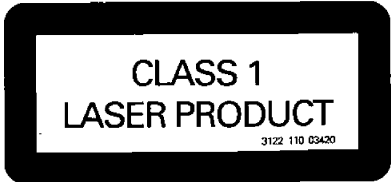
Osynlig laserstrålning när denna del är öppnad och spärren är urkopplad. Betakta ej strålen.

DK

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



PHILIPS

1 DETAILED TABLE OF CONTENTS

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2.1	Technical specification	5.1.1	Test sequence	7.1.2	Troubleshooting and Service the MMC parts
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3.5.1.1	Circuit diagram	6.4	Control & Display panel	7.2.4.3	Check of RGB input signals
3.5.1.2	Layout	6.4.1	PCB layouts	7.2.5	Multi media controller section
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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 utilisables • 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 • Alimentación • 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 • Leistungsaufnahme • Consumo di corrente • Consomo de Corriente
35 W with, 22 W without extension (22ER9141)
35 W avec, 22 W sans extension (22ER9141)

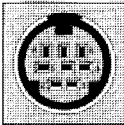
Operating temperature • Temperature de fonctionnement
Temperatura de operacion • Bedrijfstemperatuur
Betriebstemperatur • Temperatura di funzionamento • Temperatura de funcionamiento
41°F(5°C) to 95°F(35°C)
5°C à 35°C

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	rx	I / E
3	tx	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.

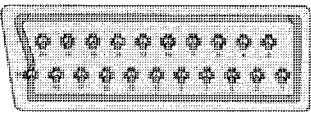
Output • Sortie • Salida • Uitgang • Ausgang • Uscita • Saídas • Salidas
video 1 V_{pp} (75 Ohm load, sync neg) RCA pin jack
1 V_{c-c} (charge 75 Ohm, sync. nég.) Prise cinch

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
Péri télévision A/V



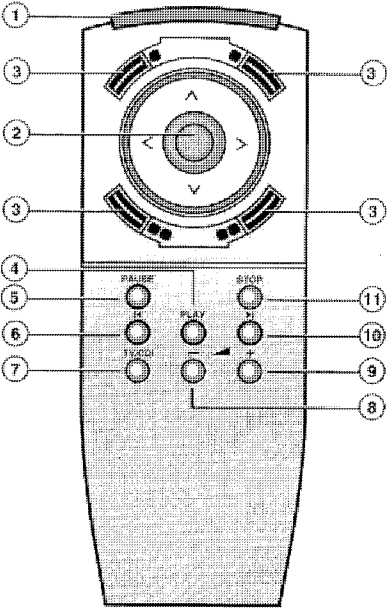
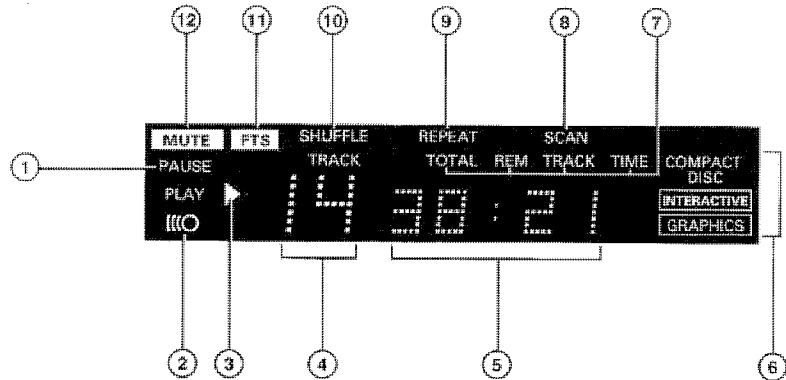
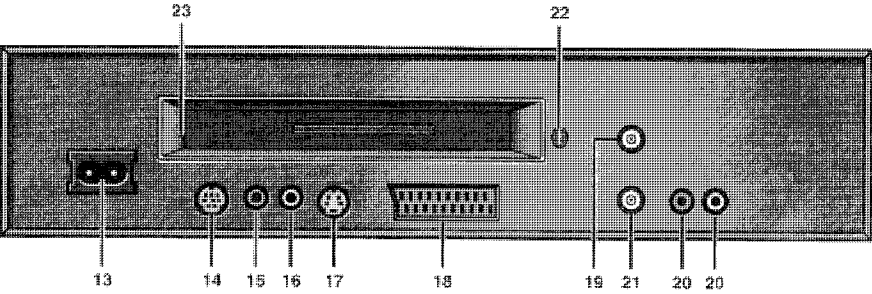
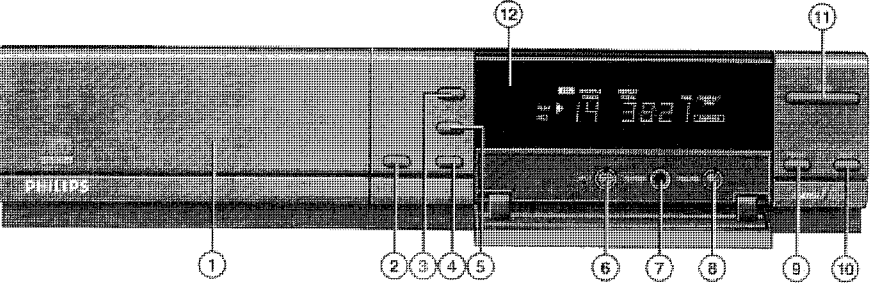
pin Broche	signal Signal
1	audio R / audio R (droite)
2	nc / non connecté
3	audio L / audio L (gauche)
4	audio ground / masse audio
5	blue ground / masse bleu
6	nc / non connecté
7	blue / bleu
8	slow switching (0=TV 1=AV/Euroconnector) commutation lente (0=TV 1=Péri télévision A/V)
9	green ground / masse 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.
Anderungen von Ausführung und technische Daten vorbehalten.
I disegni e le specifiche tecniche sono soggette a modifiche senza preavviso.
As especificações descritas estão sujeitas a alterações sem aviso prévio.
El diseño y las especificaciones están sujetos a cambios sin previo aviso.

2.2 CONNECTIONS AND CONTROLS



DESCRIPTION OF CONTROLS AND CONNECTIONS

- FRONT
- Disc loading tray
 - Open/close button
 - Previous track selection button
 - Next track selection button
 - Play button
 - Input port for CD-I pointing devices
 - Headphone jack
 - Headphone volume control
 - Pause button
 - Stop button
 - AC power on/off button
 - Soft tone multifunction display with infra red remote control receiver

- REAR
- Mains AC (alternating current) input jack
 - Input port for CD-I pointing devices, keyboard or RS232 connection
 - Remote control input
 - Video output (CVBS)
 - Y/C (S-video) output
 - AV Euroconnector
 - RF OUT*
 - Audio output L
 - Audio output R
 - TV Antenna input*
 - Channel selector*
 - Extension socket (for 22ER9141)* Full motion video

- DISPLAY PANEL
- CD pause active
 - Remote control active (flashing indicator)
 - Disc playing (stepping indicator)
 - Track number (CD-Audio)
 - Elapsed or remaining time (CD-Audio)
 - Type of disc indicator
 - Time indicators
 - CD scan active
 - CD repeat active
 - CD shuffle active
 - CD FTS active
 - Mute indicator

- REMOTE CONTROL
- Infra red remote control
 - Thumbstick
 - Action buttons (for left or right handed operation)
 - Play button
 - CD pause button
 - CD previous track selection button
 - Audio mute button - CD-I/TV button*
 - Volume down button
 - Volume up button
 - CD next track selection button
 - CD stop button

* Available on some player versions only.

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

- Oxidation on the SMDs terminals results in poor soldering. Do not handle SMDs with bare hand.
- 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.
- 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. Similarly, do not slide the circuit board across any surface.

3.2.2 Removal of SMDs

- 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
- While holding the SMD with a pair of tweezers take it off gently using the soldering iron's heat applied to each terminal (see Fig. 1b).
- 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:

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

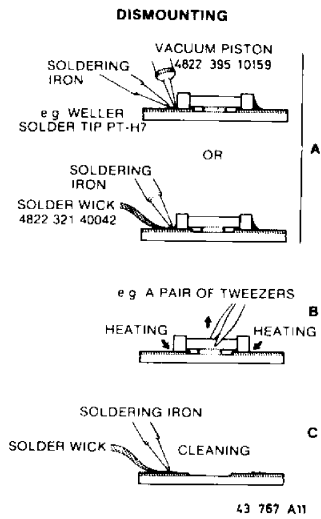


Fig. 1

3.2.3 Attachment of SMDs

- 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).
- Next complete the soldering of the terminals of the component (see Fig. 2b).

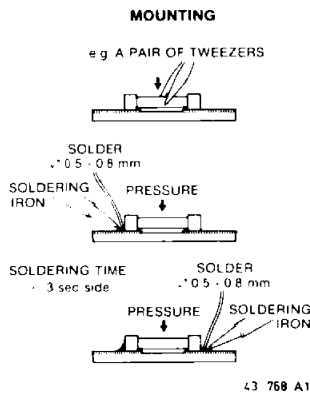


Fig. 2

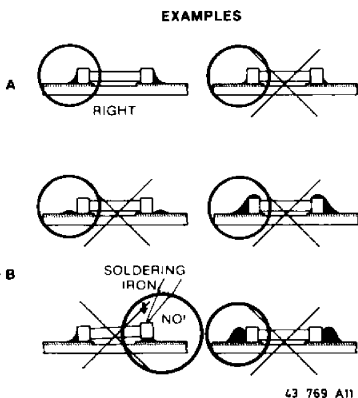


Fig. 3

3.2.3.1 Caution on attachment:

- 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.
- Keep the SMD's body in contact with the printed board when soldering.
- The soldering iron to be used (approx. 30 W) must preferably be provided with a thermal control (soldering temperature about 225 to 250°C).
- Soldering should not be done outside the solder land.
- Soldering flux (of rosin) may be used but should not be acidic.
- After soldering, let the SMD cool down gradually at room temperature.
- 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-sensitive 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

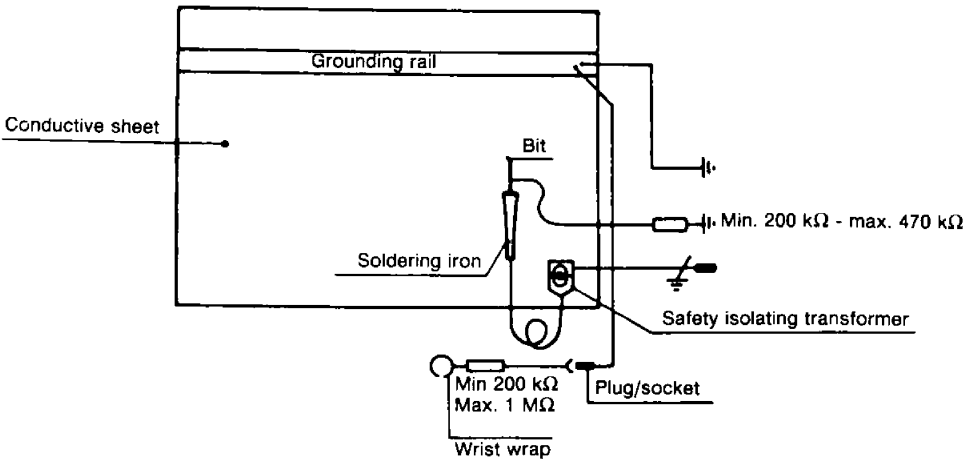
Transport and store the circuits and PCBs in their original packages. As an alternative to the original package one may use a conductive material or special IC package which short-circuits all the pins of the component with one another. Always discharge the package before opening it.

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 peaks 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.

ANTISTATIC MAT



MAGNIFYING GLASS



METAL BRUSH



HAIR DRYER

TOOLS TO BE USED

4822 390 50025
FLUX

BRUSH

FLUX

4822 321 40042
DESOLDER BRAID

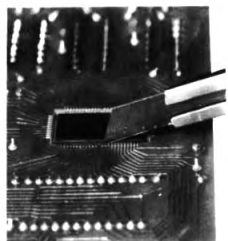
SOLDER
ø0,5-0,8 MM

SOLDERING IRON
WELLER TCP 50

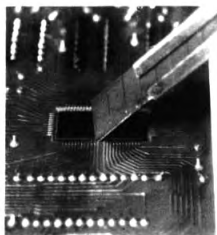
SOLDER TIP
WELLER PT-CC7
4822 310 50081

KNIFE

DISMOUNTING



CUTTING
THE LEADS



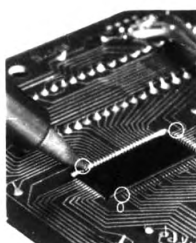
WRONG
TRACKS WILL
BE DAMAGED



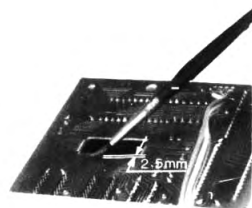
CLEANING
THE TRACKS



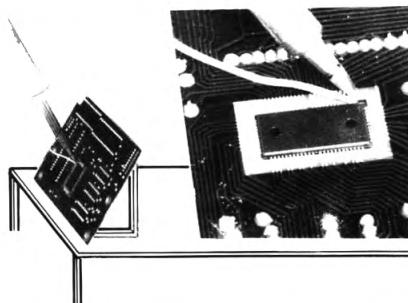
MOUNTING



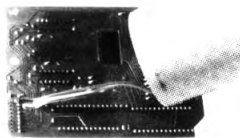
FIXING IC
AT THE CORNERS



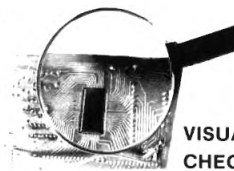
APPLYING FLUX



SOLDERING:
SPEED
1 CM IN 5 SEC.

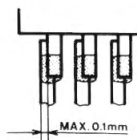


DRYING



VISUAL
CHECK

ALIGNING THE LEADS



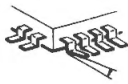
RIGHT



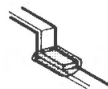
WRONG



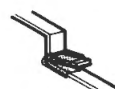
WRONG



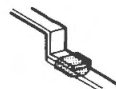
SOLDERING



RIGHT



WRONG

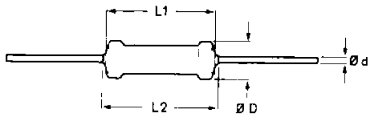


WRONG

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
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...

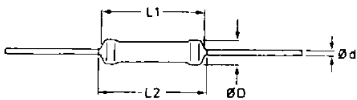
The codenumber above is completed by inserting the first two figures (resistance code) followed by the multiplier.

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

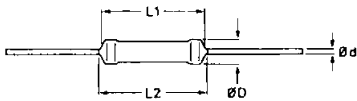
Example's:
The serv.nbr. for a VR25 resistor of 100 KΩ is 4822 053 20104
The serv.nbr. for a VR37 resistor of 33 MΩ is 4822 053 21336

PR01, PR02 and PR03 power metal film resistors

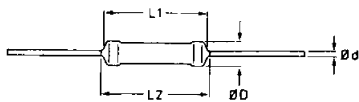
φD _{max}	L1	L2 _{max}	φd
2.5	6.5	8.0	0.6



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

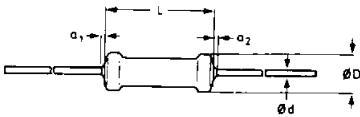
Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

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

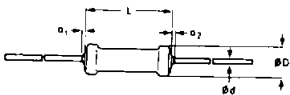
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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.

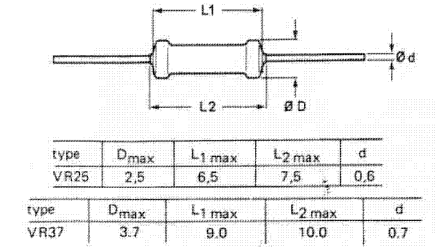
- 8 for R= 1 to 9,1 Ω
- 9 for R= 10 to 91 Ω
- 1 for R= 100 to 910 Ω
- 2 for R= 1 to 9,1 KΩ
- 3 for R= 10 to 91 KΩ

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

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



Range VR25 : 100 KΩ to 22 MΩ

Range VR37 : 100 KΩ to 33 MΩ

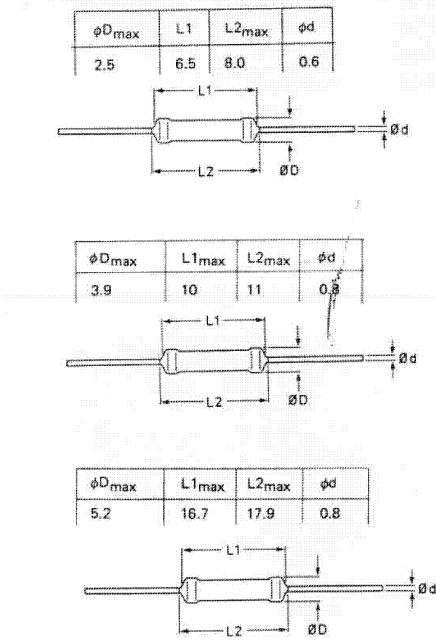
Composition of the service number for the VR25 and VR37
Main subgroup: 4822 053 20... and 4822 053 21...

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



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

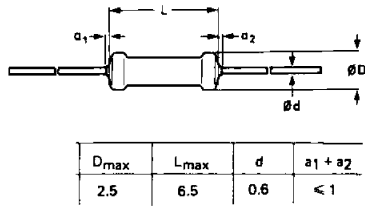
Composition of the service number for the PR01, PR02 and PR03
Main subgroup: 4822 053 10... ; 4822 053 11... and 4822 053 12...

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



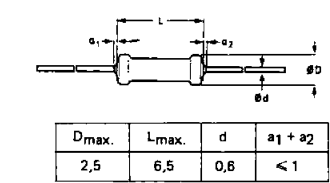
Composition of the service number for the NFR25
Main subgroup: 4822 052 10...

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



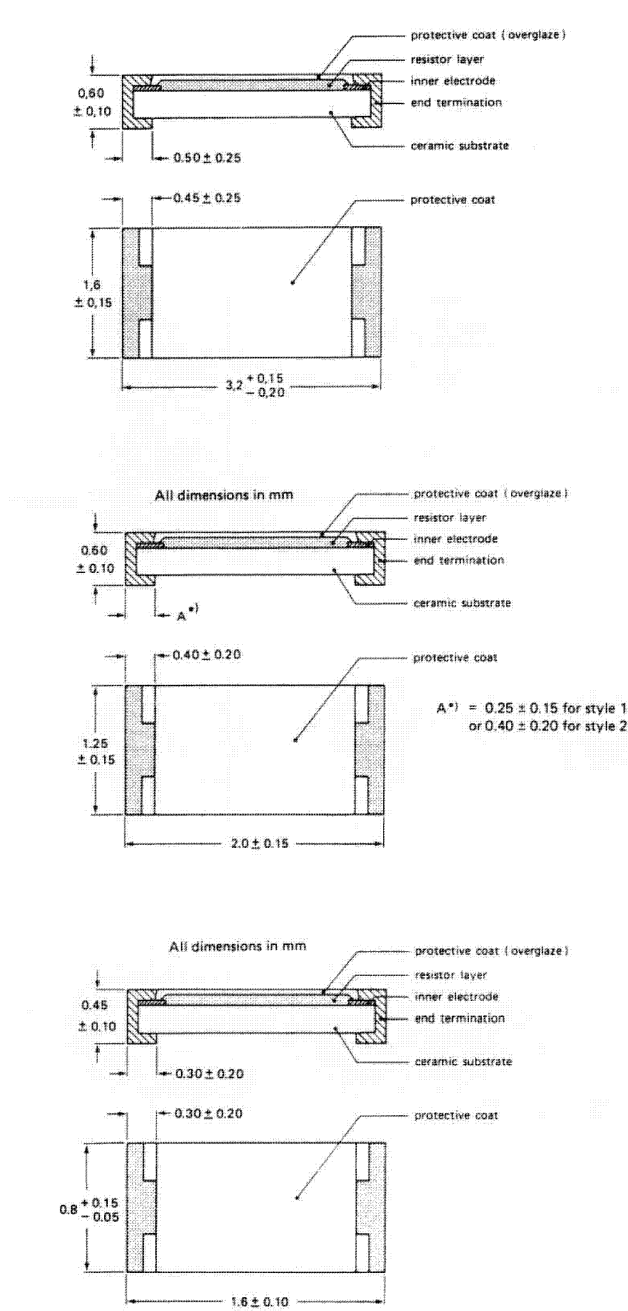
Composition of the service number for the NFR25H
Main subgroup: 4822 052 11...

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.

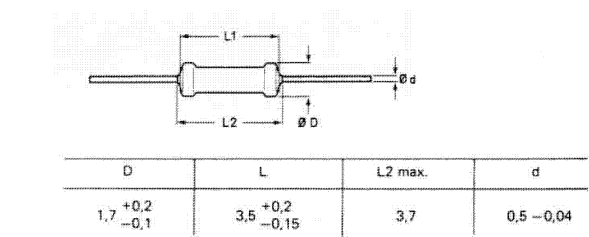
8 for R= 0 to 9.1 Ω
9 for R= 10 to 91 Ω
1 for R= 100 to 910 Ω
2 for R= 1 to 9.1 KΩ
3 for R= 10 to 91 KΩ
4 for R= 100 to 910 KΩ
5 for R= 1 to 9.1 MΩ
6 for R= or > 10 MΩ

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

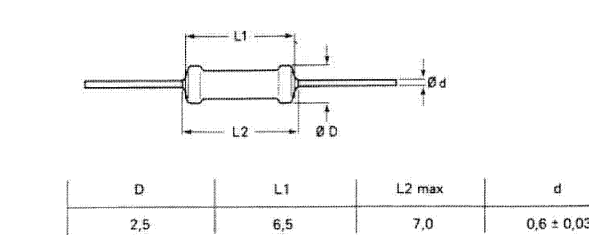


Composition of the service number for the MRS16T
Main subgroup: 4822 050 1....
The codenumber above is completed by inserting the first three figures (resistance code)followed by the multiplier.

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%)

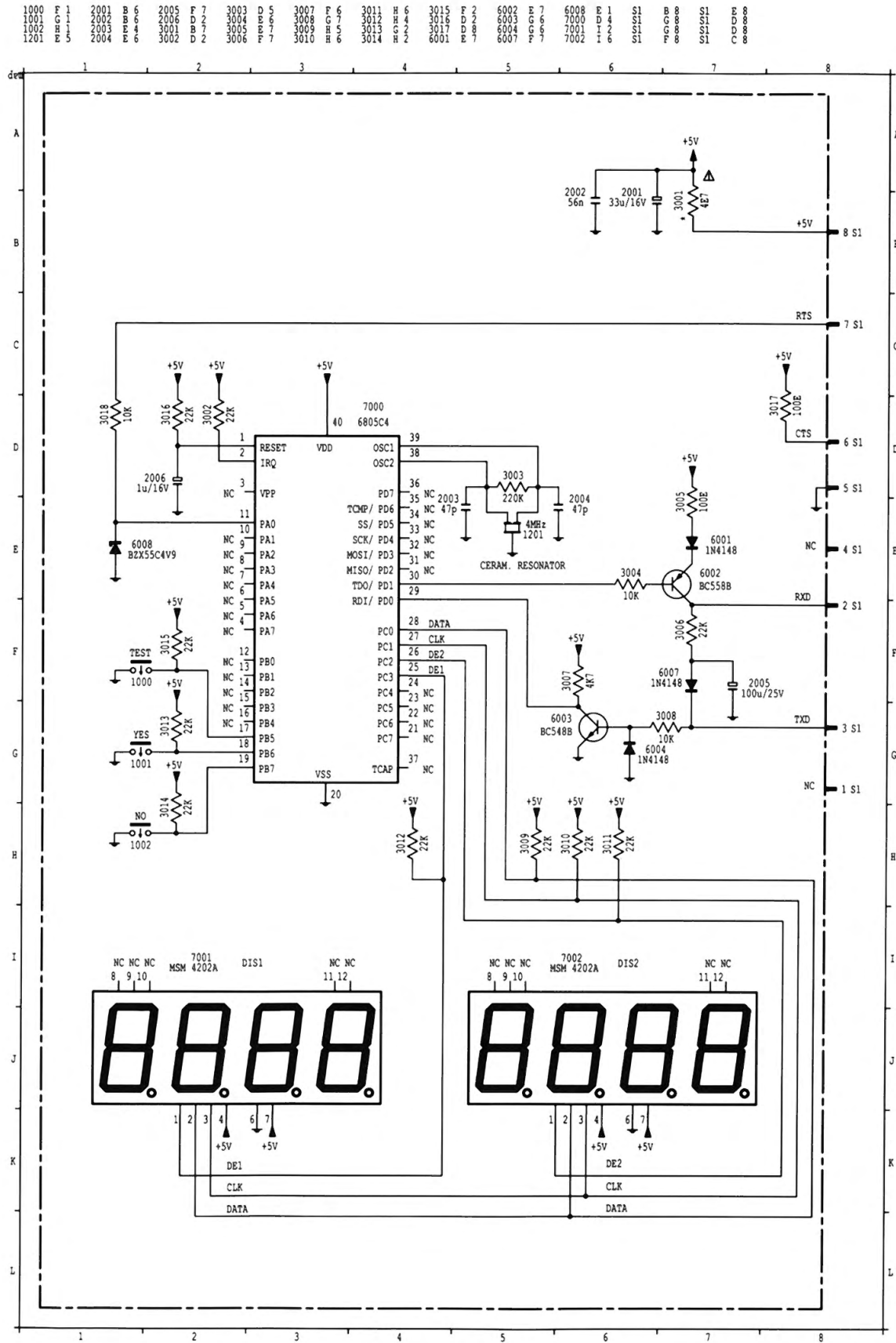


Composition of the service number for the MRS25
Main subgroup: 4822 050 2....

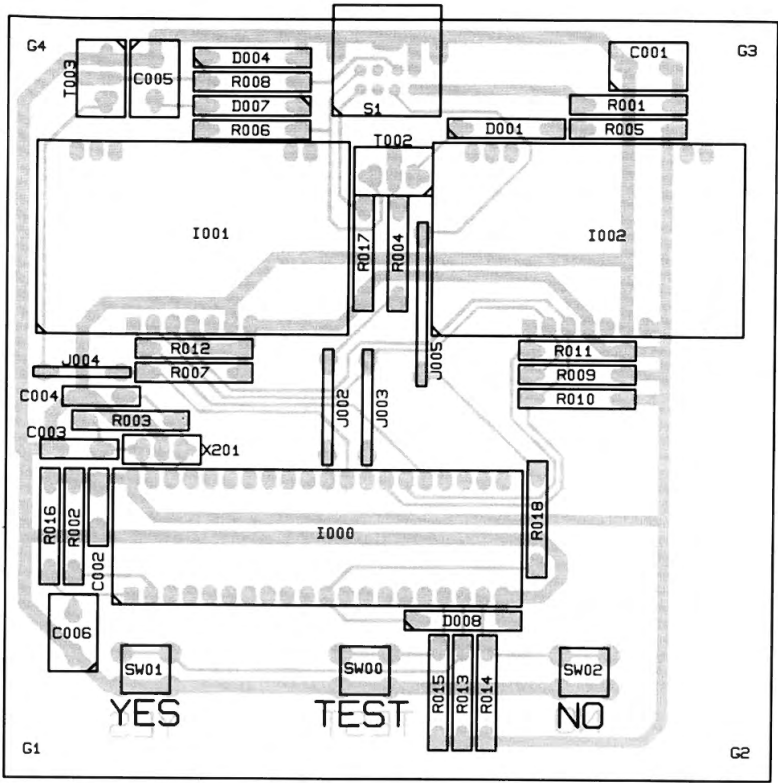
3.5 SERVICE TOOLS

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 μ F/16V	4822 124 20688
2002	56 nF	4822 121 41154
2003	47 pF	4822 122 31072
2004	47 pF	4822 122 31072
2005	100 μ F/25V	4822 124 20701
2006	1 μ F/63V	4822 124 20722
3001	4,7 Ω	4822 052 10478
3002	22 K Ω	4822 050 22203
3003	220 K Ω	4822 050 22204
3004	10 K Ω	4822 050 21003
3005	100 Ω	4822 050 21001
3006	22 K Ω	4822 050 22203
3007	4,7 K Ω	4822 050 24702
3008	10 K Ω	4822 050 21003
3009	22 K Ω	4822 050 22203
3010	22 K Ω	4822 050 22203
3011	22 K Ω	4822 050 22203
3012	22 K Ω	4822 050 22203
3013	22 K Ω	4822 050 22203
014	22 K Ω	4822 050 22203
3015	22 K Ω	4822 050 22203
3016	22 K Ω	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

3.5.2 LIST OF ACCESSORIES AND SERVICE TOOLS

Item	Codenummer	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 CONTINUOUS 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	Codenummer	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 Block-diagram) 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	Codenummer
/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/repared 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.

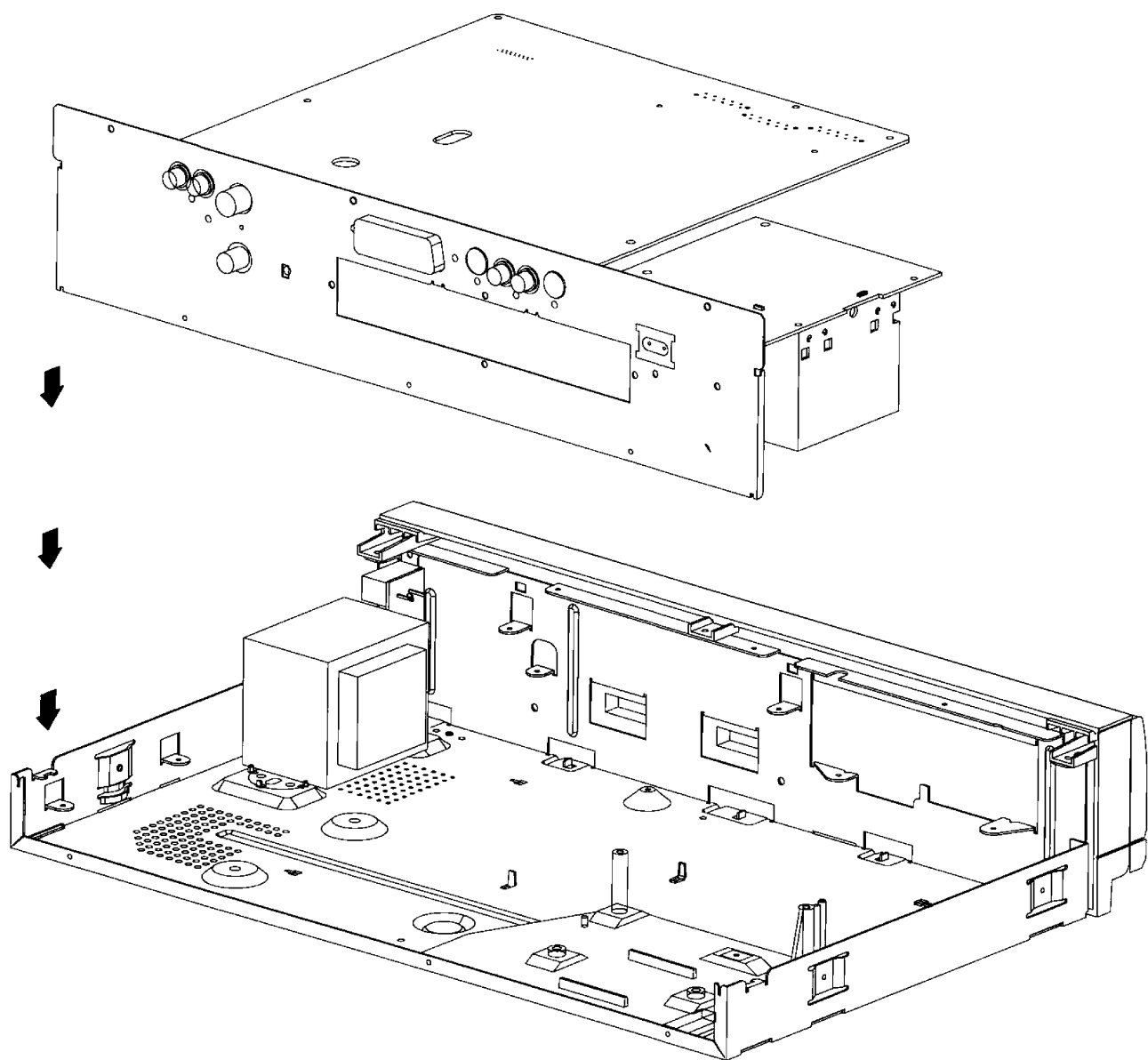
- Experience has learned that the status of the particular products and packaging needs your local attention. Products will be returned in case of unacceptable conditions.

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 codenummer on sticker must be equal to codenummer on repairable item.
- !!! If the above conditions are not fulfilled, then boards are not accepted and the return price will not be credited !!!

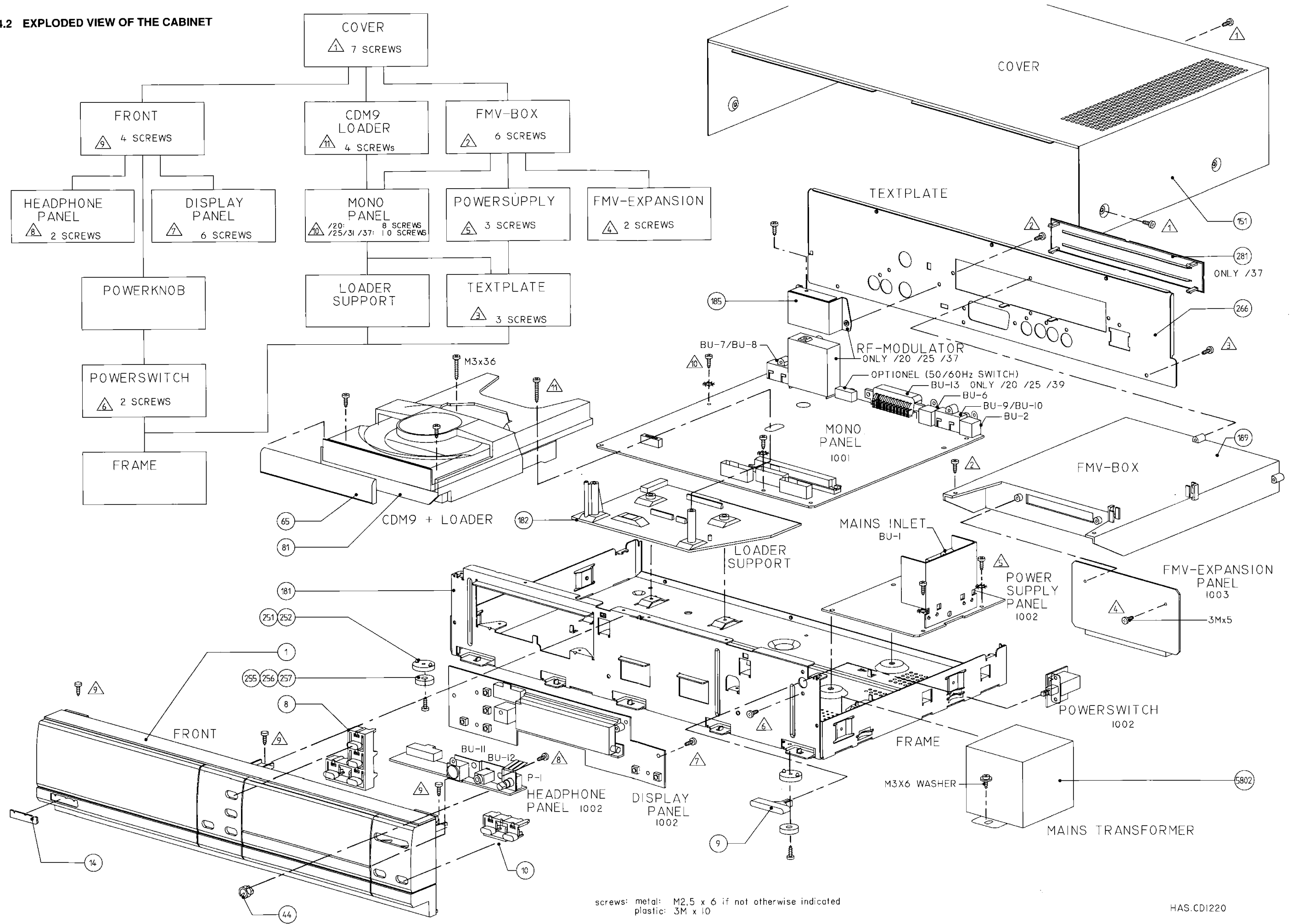
4 MECHANICAL DRAWINGS AND PARTS LIST

4.1 SERVICE POSITIONS



HAS.CDI220

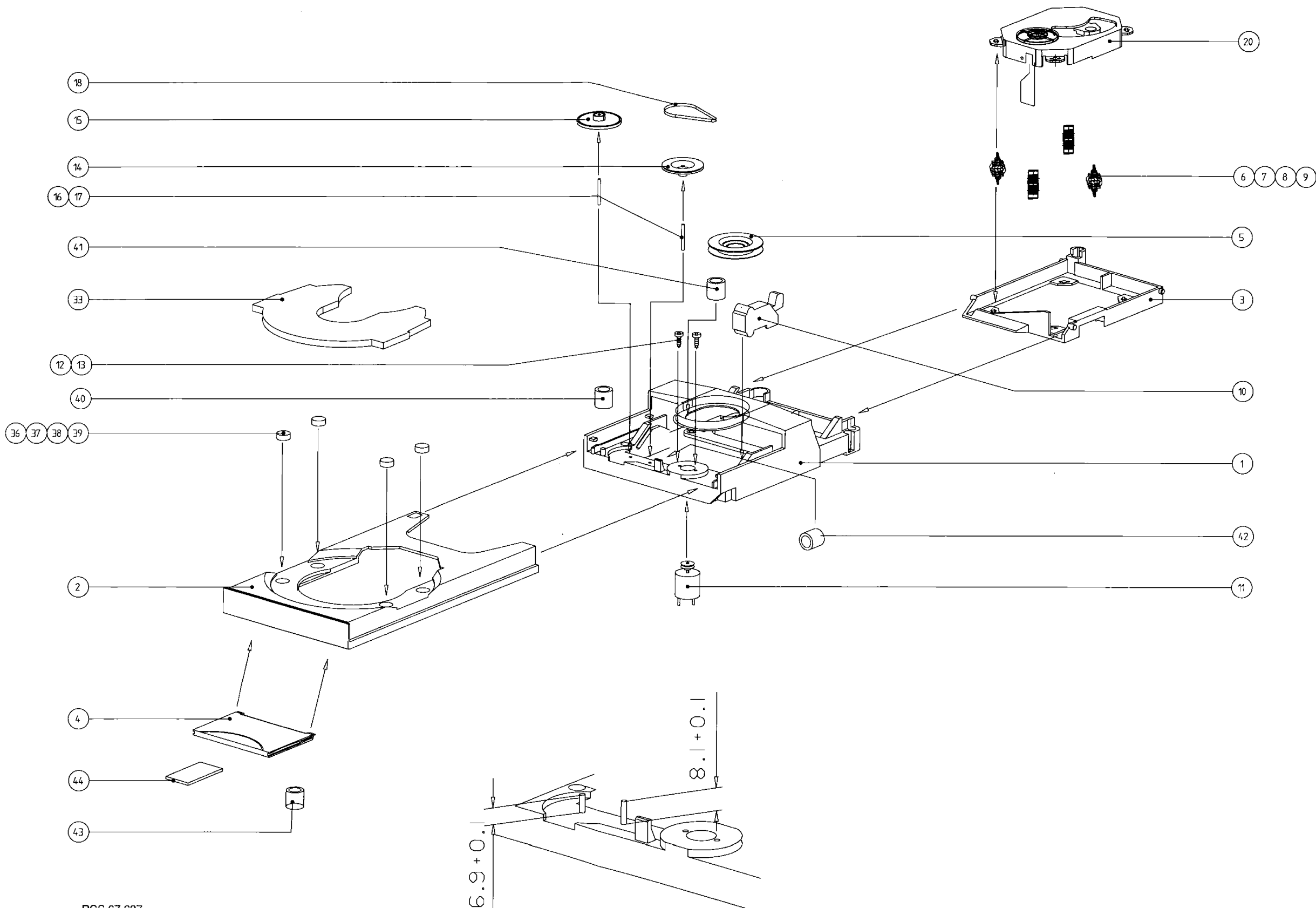
4.2 EXPLODED VIEW OF THE CABINET



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

HAS.CD1220

4.3 EXPLODED VIEW OF LOADER



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 dissappear 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

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 received 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

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

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 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

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 CDIC 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.

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 proces-
sor 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 ltest header and release number
In this step the VDSC is initialized in the same way as in the pcb ltest.

ITEM 0 : EXIT LOW LEVEL TEST

Selecting this item will end the ltest 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 addresses). 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 ltest.
See error table for more information.

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 ltest.
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 ltest 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 accidentally, just switch off the power and restart the ltest. 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 ltest 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)

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 ltest 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 ltest as well as the terminal ltest 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 \$47FFFFD
ROM checksum displayed in STEP 1 =
ROM checksum + (LSB + MSB) of this checksum.
This is also equal to the checksum of the complete ROM.

5.3 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 test pattern
- CDM and servo circuitry
- Input / Output ports
- Audio circuitry

Testing the CDM, servo and audio circuitry 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.

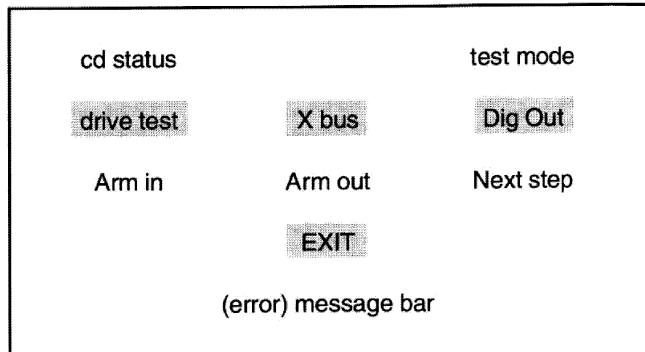


Fig 3.2 CD test menu

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. Its purpose is to check whether 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 turntable motor 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 : too 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 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 initialization.

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.

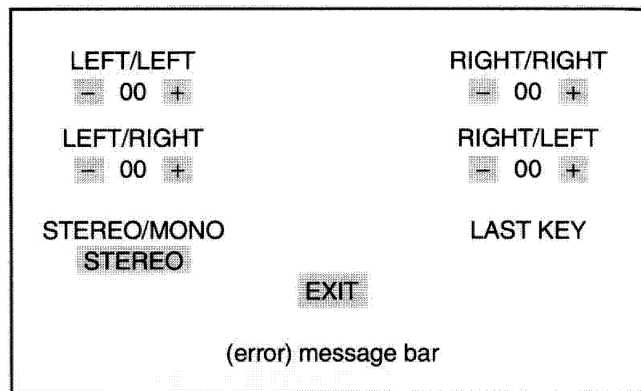


Fig 3.4 APU test menu

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.

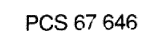
What could be wrong if...

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.

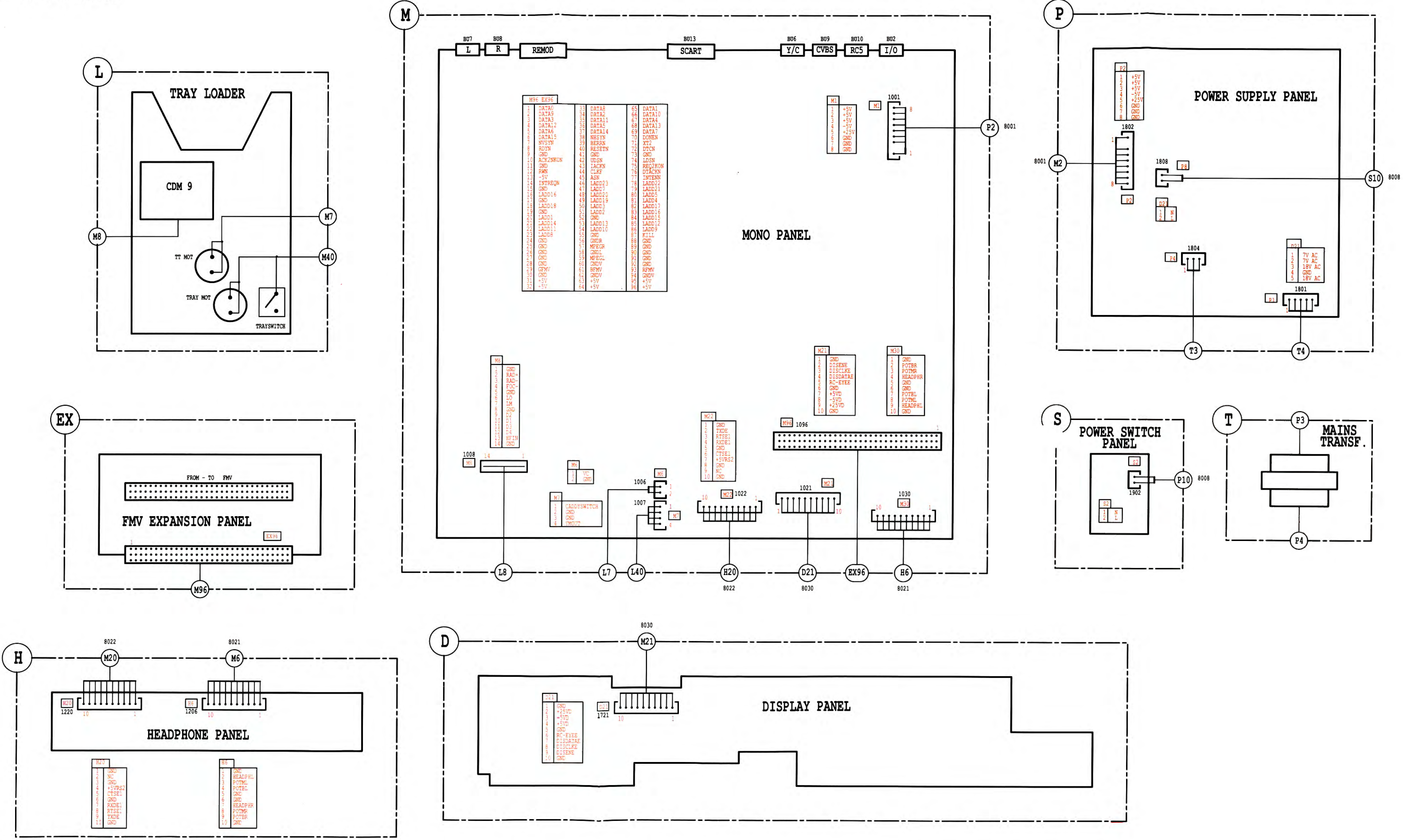
Service shell cannot be started with the testplug. Connections between port 1 and slave may be bad. Testplug could be wrong. Maybe the slave processor is defect. If the player-shell cannot be started either, try the low level test first.

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

6.1 BLOCK DIAGRAM



6.2 WIRING DIAGRAM



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 exction 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)	IACKOUT22	: >>	RBOT	: for HPR volume control	WRPN1IN..2	: >> control input for channel 1 or 2 (active low)
CTS1...4	: CLEAR TO SEND (active low) it indicates that the remote recieving device is ready	IACKOUT23	: >>	RCEYE	: REMOTE CONTROL EYE	WRPN1OUT.2	: >>
CTS 2	: >>	IACKOUT42	: >>	RCLED	: REMOTE CONTROL LED	WSAB	: >> WORD SELECT FOR AB CHIP
CVBS	: CVBS output	IACKOUT52	: >>	RD	: READY signal,starting up procedure finished	WSAB2	: >>
D1..4	: fotodiode currents	IDAC	: 1/2 bit DAC	RDYN	: READY (active low) of the DMA channel	XIN	: >> 11,2896/9,6768/4,8384 symmetrical clock
DAAB	: (DAAB2) serial data output of the X-bus I²S standard	IDTACKN	: data transfer acknowledge from 68070	REDIG	: RADIAL ERROR DIGITAL	XIN2	: >>
DATA 0..15	: DATA LINES	IFDN2	: main channel word-flag to the DSP	RESETC	: when low resetsequence starts	X-TAL2	: the same as the system clock,coming out of the VSC'S
DATADAC	: Data which will be send to the DAC('S) for volume adjustment	INTENN	: >> when low,no extensions use the interrupts,when high interrupt devices are daisy chained	RESETN	: this is the reset for all other ic's	XT2	: the system clock devided by two
DDTACK	: DATA TRANSFER ACKNOWLEDGE to the 68070 bus	INTENN2	: >>	REQ2N	: DMA-request of the second channel	XT4	: >> the system clock devided by four
DEEMP	: DEEMPHASIS	INTENN3	: >>	RSTOUT	: RESET OUT of the slave processor when high resetsequence starts	XT4IN	: >>
DIG OUT	: DIGITAL OUTPUT	INTENN4	: >>	RTAP	: >> for HPR volume control	0AD..12AD	: >> ADDRESS BUS,between CDIC-SRAM'S and SYSTEM ADDRESS BUS BUFFERS
DIRN	: DIRECTION CONTROL. Indecates the direction of data transfer through the transceivers	IN2IN	: (=IN2OUT) >>	RTOP	: >>	10ADA..	: >>
DISCLK	: DISPLAY CLOCK >>	IN4IN	: (=IN4UT) >> Decoder interrupt priority inputs	RTSUART	: REQUEST TO SEND from the slave processor to the UART of the 68070 processor	..12ADA	: >>
DISDAT	: DISPLAY DATA >> only for CDI 2XX	IN5IN	: (=IN5OUT) >> (active low) IN2IN has the lower	RTS1..4	: >> REQUEST TO SEND (active low)	0D..15D	: DATA BUS between CDIC and DSP
DISEN	: DISPLAY ENABE >>	IN2OUT	: >> and IN5IN has the higher priority	RTS 1..2	: >>	0DA..15DA	: DATA BUS between CDIC-SRAM'S and SYSTEM DATA BUS TRANCIEVERS
DIV4	: DIVIDE BY 4 signal	IN4OUT	: >> IN2IN = SLAVEPROCESSOR (6805),IN4IN =	RWN	: READ - WRITE (low is write) signal	2BCLK	: CLOCK for the 2B-chip
DO	: DIGITAL OUT	IN5OUT	: >> CDIC (IMS66490),IN5IN = DUART (68681)	RWN2	: READ - WRITE (low is write) signal from CDIC to the DSP	12A..15A	: ADDRESS BUS between CDIC and DSP
DODS	: DROP-OUT DETECTOR SUPPRESSION	IN4OUT2	: >>	RWRAM	: READ - WRITE signal from the CDIC to the S-RAM'S		
DONEN	: DONE (active low,open drain), operates in the DMA-mode	IN5OUT2	: >>	RXD1..4	: >> RECIEVE DATA RXD is data input		
DOXN	: serial data output of the X-bus	IN2OUT3	: >>	RXD 1..2	: >>		
DPSRWN	: Read (high) or write (low) from or to the Digital Signal Processor	KILL	: to mute audio outputs by power on and off	SI	: on - off control for laser supply and focus circuit		
DSN2N	: DATA STROBE (active low) of the DSP	LA1	: >> control signals for brushless DC-motor	SLMA0..8	: VSC-slave memory address bus to the DRAM'S		
DTACKN	: DATA TRANSFER ACKNOWLEDGE asserted by a peripheral	LB1	: >>	SLMD0..15	: VSC-slave memory data bus to the DRAM'S		
DTACKSLAVEN	: DATA TRANSFER ACKNOWLEDGE of the SLAVE processor (68HC05)	LC1	: >>	SOXENN	: SERIAL OUTPUT ENABLE FOR THE X-BUS (enabled when low)		
DTCN	: DATA TRANSFER COMPLETE (active low, open drain) operates in the DMA-mode	LADD1..23	: ADDRESS-BUS (active high,tristate) for direct addressing of 16 Mbyte of memory	SOXRQN	: SERIAL OUTPUT REQUEST FOR THE X-BUS (when low)		
DUARTCSN	: DUART CHIP SELECT,when low businfo is coming from or going to the DUART	LBOT	: for HPL volume control	SOYENN2	: SERIAL OUTPUT ENABLE FOR THE Y-BUS (when low)		
EFAB	: ERROR FLAG	LDSN	: LOWER DATA STROBE of the bus	SPICLK	: SERIAL PERIPHERAL INTERFACE CLOCK		
FILTERN	: filter select when high:level C, when low:level A	LM	: LASER MONITOR diode input	SPISS	: SERIAL PERIPHERAL INTERFACE SLAVE SELECT		
FOC-	: >> focus out to CDM 9	LO	: LASER amplifier current OUTPUT	STANDARD	: software choise between PAL and NTSC		
FOC+	: >>	LRDN	: when low select,the ROM'S or NVRAM read the lower data byte	STANDARD	: hardware choise between PAL and NTSC		
GN	: >>	LTAP	: >> for HPL volume control	SSM	: START/STOP MOTOR		
GNA	: >> When low:the outputs and inputs of the trancievers (646) are enabled	LTOP	: >>	SWAB	: SUBCODING WORD CLOCK INPUT		
GNB	: >>	LVID0IN..	: >> 8 bit pixel-bus for channel 2 (VSC-SLAVE)	SYSCLK	: >> SYSTEM CLOCK		
HALTN	: active low,open drain,bidirectional. If low together withh the resetn it causes the 68070 to enter the reset state.	..LVID7IN	: >> 8 bit pixel-bus for channel 2 (VSC-SLAVE)	SYSCLK1	: >>		
HFin	: HF current input	..LVID7OUT..	: >>	TCAP	: input capture feature for the on-chip timer		
HPL	: HEADPHONE LEFT	MC	: MOTOR CONTROL signal	TCMP	: output for the output compare feature of the on chip timer		
HPR	: HEADPHONE RIGHT	MISO	: MASTER IN SLAVE OUT	TMOUT	: TRAY MOTOR OUT		
HSYN	: (active low) horizontal synchronisation input from the VSC	MOSI	: MASTER OUT SLAVE IN	TXD1..4	: >> TRANSMIT DATA TXD is data output		
HSYNCO	: (active low) horizontal synchronisation output for monitor or tv	MSMA0..8	: ADDRESS BUS between the DRAM'S of the VSC' MASTER and the VSC MASTER	TXD 1..2	: >>		
..HVID 7 IN	: >> 8 bit pixel bus for channel 1	MSMD0..15	: DATA BUS between the DRAM'S of the VSC' MASTER and the VSC MASTER	UDSN	: UPPER DATA STROBE (active when low)		
HVID 0 OUT..	: >> (VSC-master)	NRESET	: when low the video synthesizer (VSR) is in reset	URDN	: READ UPPER DATA BYTE (active when low)		
..HVID 7 OUT	: >>	NVDS	: digital output to control an external switch for TV overlays (active low)	UWRMN	: READ - WRITE (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-MASTER		
IACKIN2N	: >>	PCLK1IN	: >> PIXEL CLOCK for channel 1	UWRN	: WRITE UPPER DATA BYTE (active when low)		
IACKIN4N	: >> Decoded interupt acknowledge (active low).	PCLK1OUT	: >>	UWRSN	: READ - WRITE (write when low) UPPER MEMORY DATA FROM DRAM'S FROM VSC-SLAVE		
IACKIN5N	: >> Asserted during an interupt acknowledge	PCLK2IN	: >> PIXEL CLOCK for channel 2	VC	: output DC-motor (VOLTAGE CONTROL)		
IACKOUT2N	: >> sequence to indicate to a peripheral that	PCLK2OUT	: >>	V-FLAG	: output to the DSP		
IACKOUT4N	: >> this interupt request is being serviced	PLOIN1	: input clock for CDIC (22,5792 Mc)	VSCM-INTN	: when low,interrupt from VSC master to 68070 processor		
IACKOUT5N	: >>	PLOIN2	: input clock for CDIC (19,3536 Mc)	VSCS-INTN	: when low,interrupt from VSC slave to 68070 processor		
IACKOUT2	: >>	QCL	: Q-channel CLOCK	VSYN	: (active when low) VERTICAL SYNCHRONISATION INPUT from the VSC		
IACKOUT4	: >>	QDA	: Q-channel DATA				
IACKOUT5	: >>	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)				

6.3 POWER SUPPLY PANEL

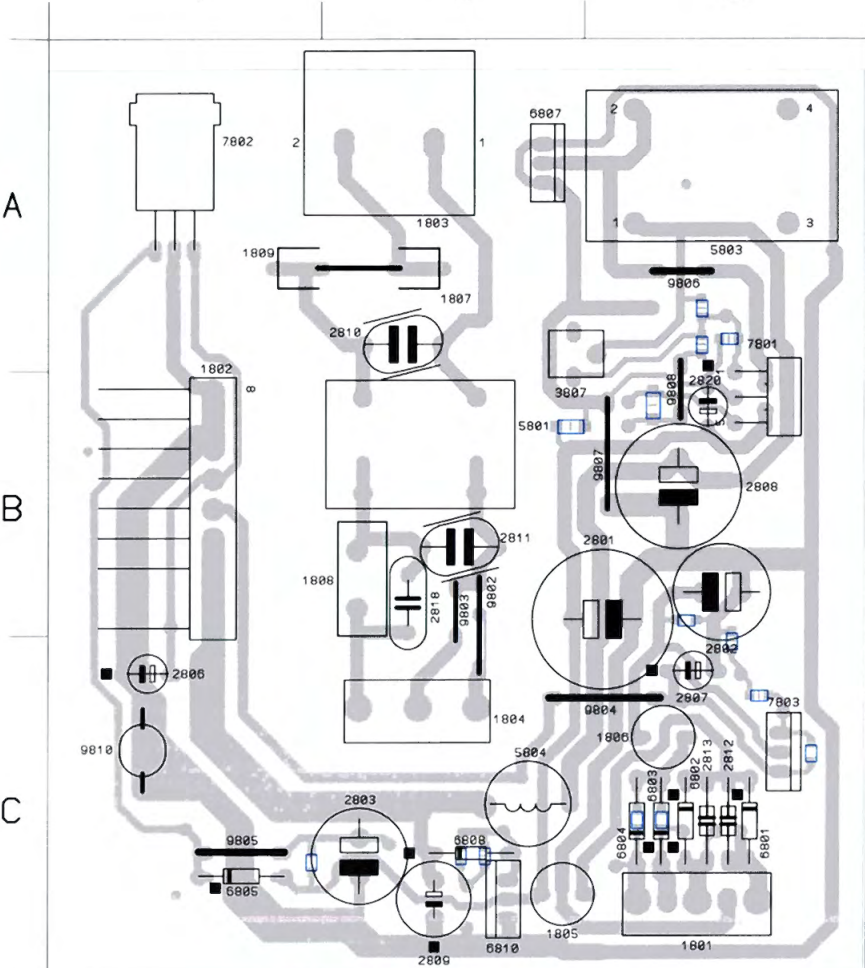
6.3.1 Power supply PCB
Component side view

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1802 B 1	1810 B 2	2807 C 3	2814 C 1	3801 C 3	3808 C 2	5804 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	5805 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	5807 A 2	9803 B 2	
1805 C 2	2803 C 2	2810 A 2	2817 C 3	3804 A 3	5804 C 2	5808 C 2	9804 C 2	
1806 C 3	2804 B 3	2811 B 2	2818 B 2	3805 A 3	5801 C 3	5810 C 2	9805 C 1	
1807 A 2	2805 B 3	2812 C 3	2819 B 2	3806 A 3	5802 C 3	7801 A 3	9806 A 3	

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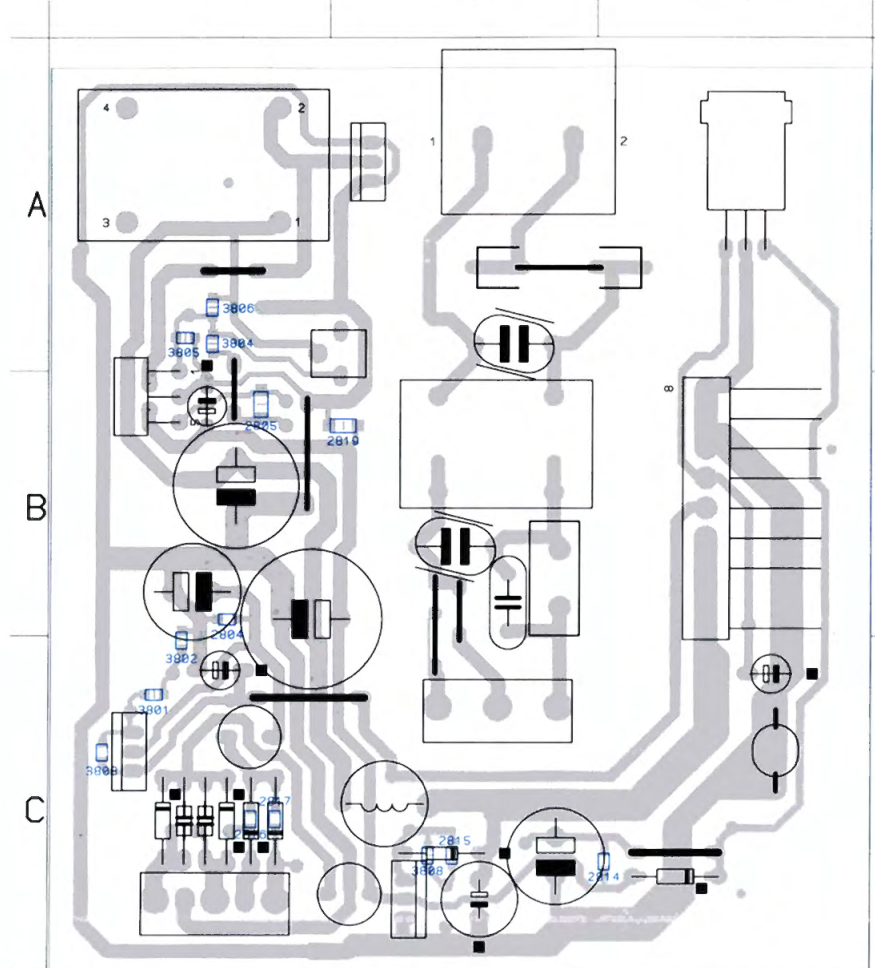
Power supply PCB
Coppertrack side view

9807 B 3	7802 A 1	5803 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	5804 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	5805 C 1	5801 B 2	3802 C 3	2815 C 2	2808 B 3	2801 B 2	1803 A 2
	9803 B 2	5807 A 2	5803 A 3	3803 C 3	2816 C 3	2809 C 2	2802 B 3	1804 C 2
	9804 C 2	5808 C 2	5804 C 2	3804 A 3	2817 C 3	2810 A 2	2803 C 2	1805 C 2
	9805 C 1	5810 C 2	6801 C 3	3805 A 3	2818 B 2	2811 B 2	2804 B 3	1806 C 3
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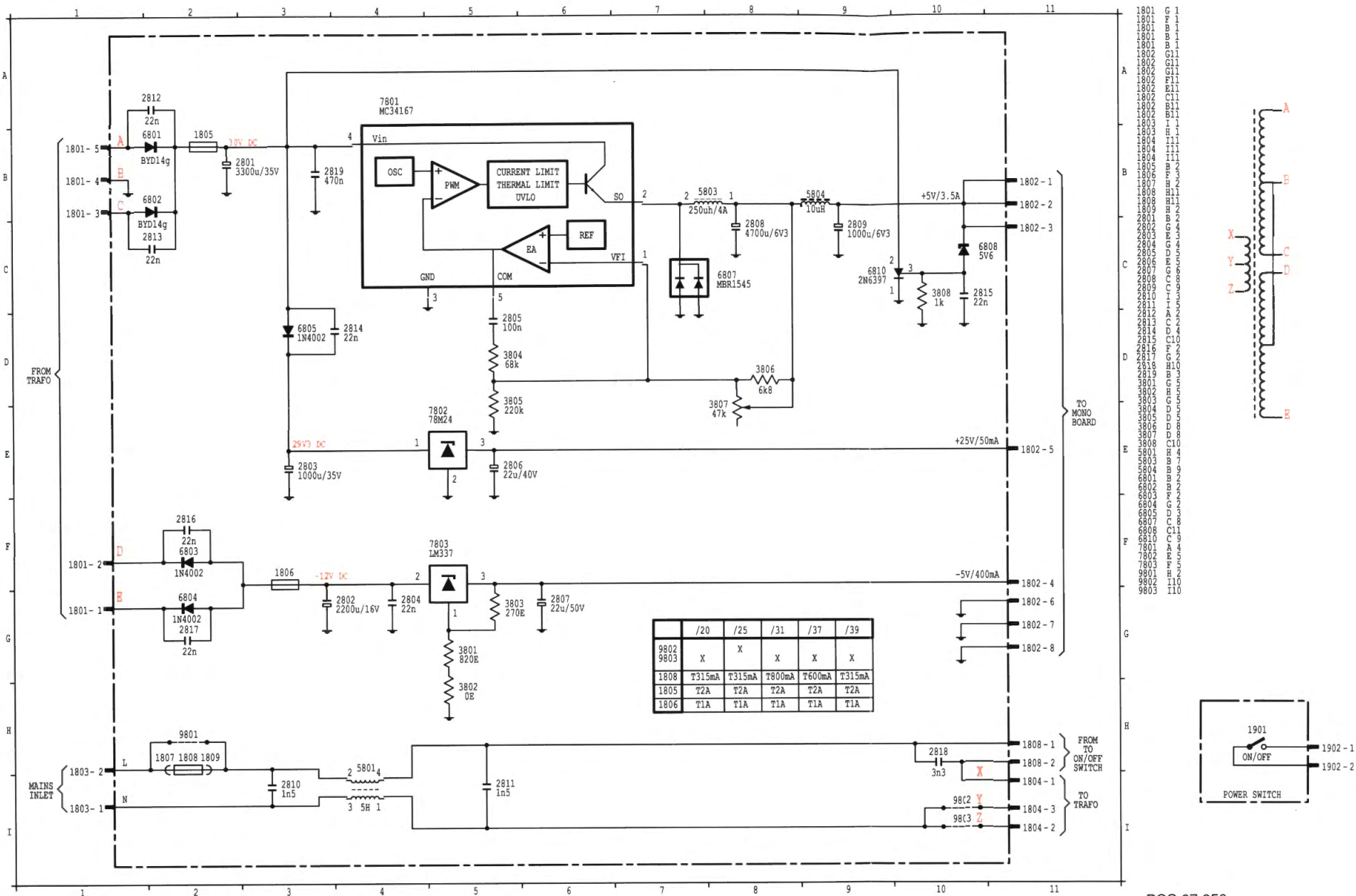


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6.3.2 Power supply Circuit diagram



6.4 CONTROL & DISPLAY PANEL

6.4.1 Control & Display PCB

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1704 A 1 1707 A 6 2701 A 2 2705 A 1 3704 A 3 3707 A 4 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 5 7708 A 1 7711 A 1

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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 4 3704 A 3 2705 A 1 2701 A 2 1707 A 6 1704 A 1
7711 A 1 7708 A 1 7705 A 5 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

6

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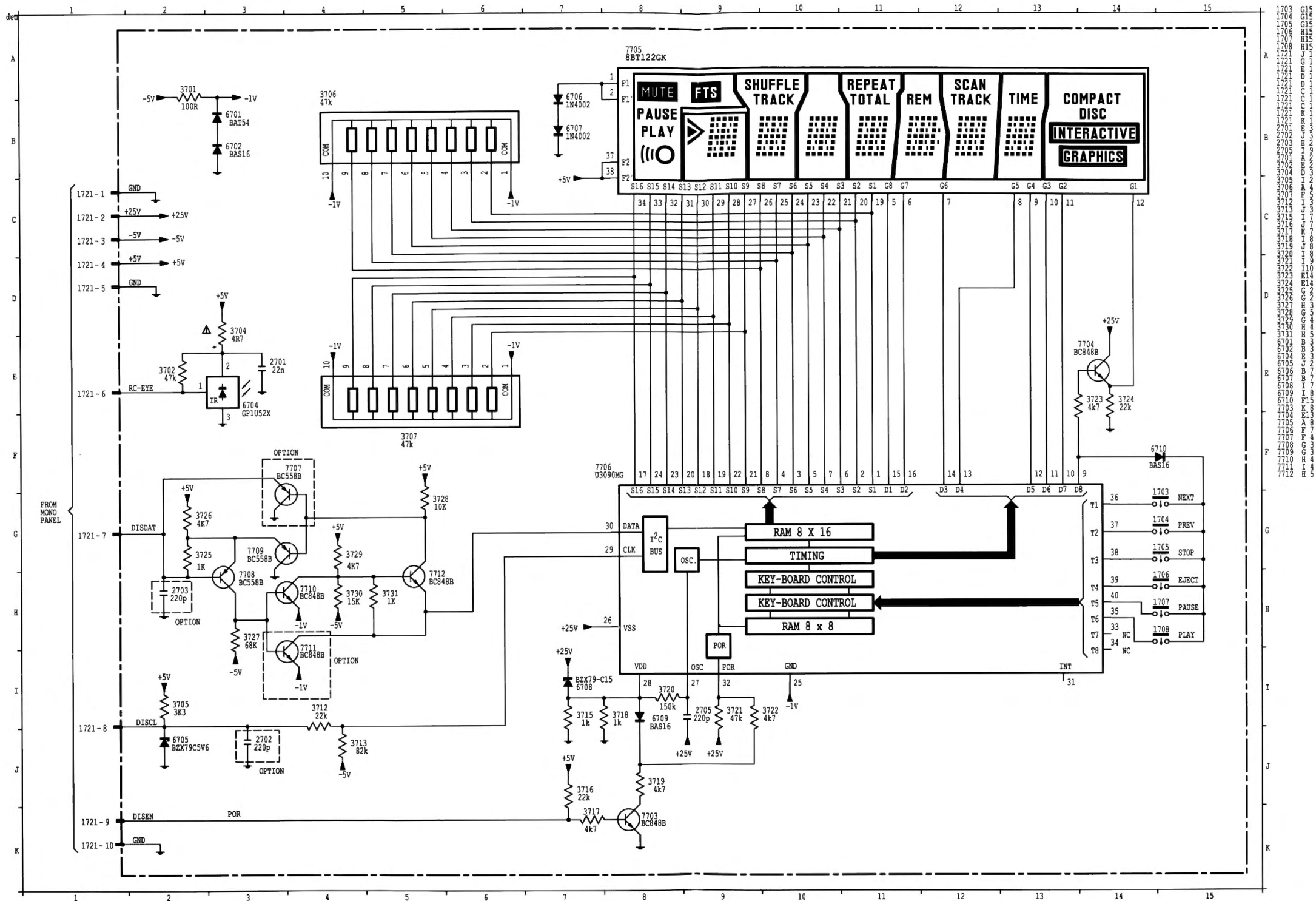
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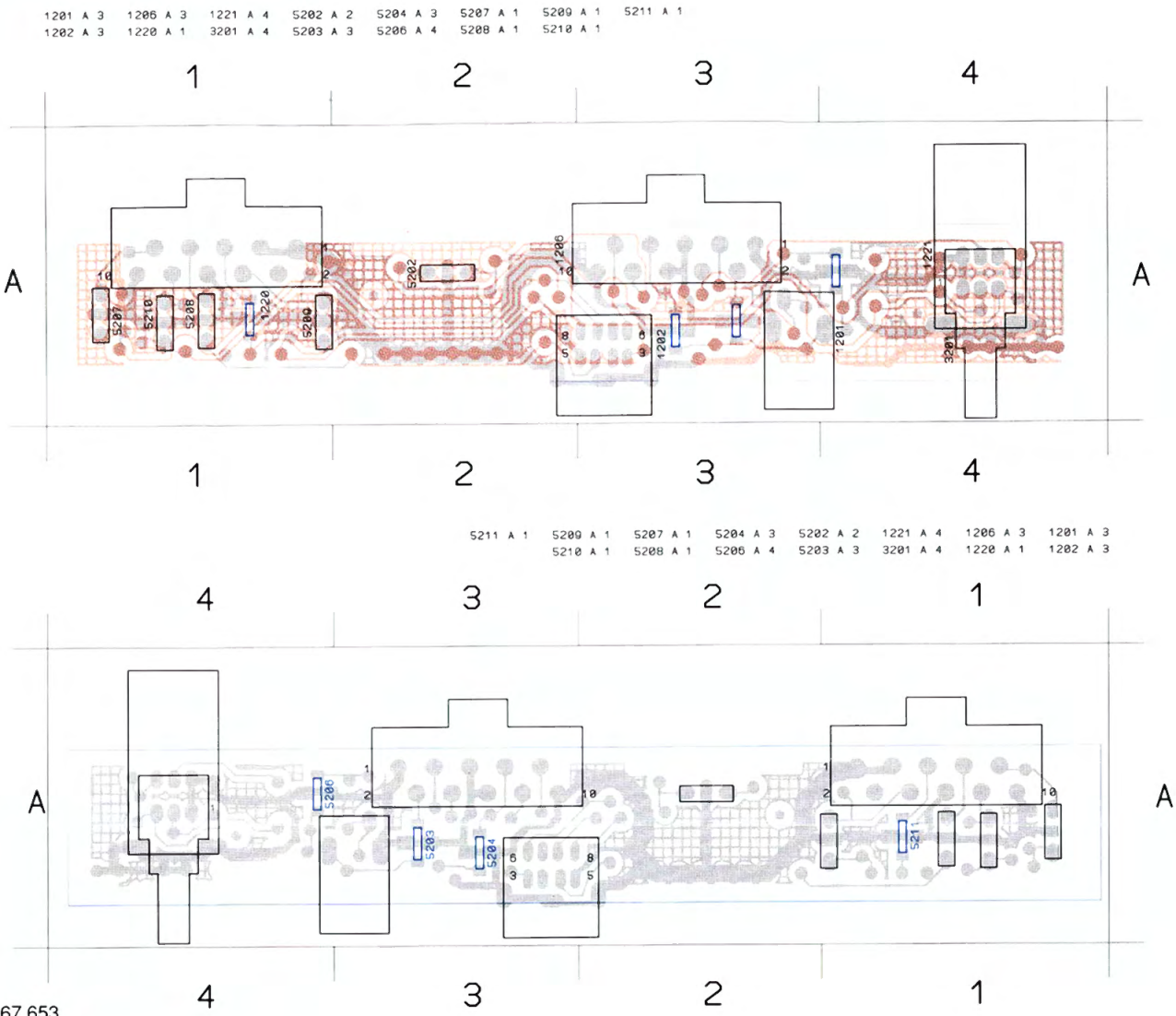
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6.4.2 Control & Display Circuit diagram

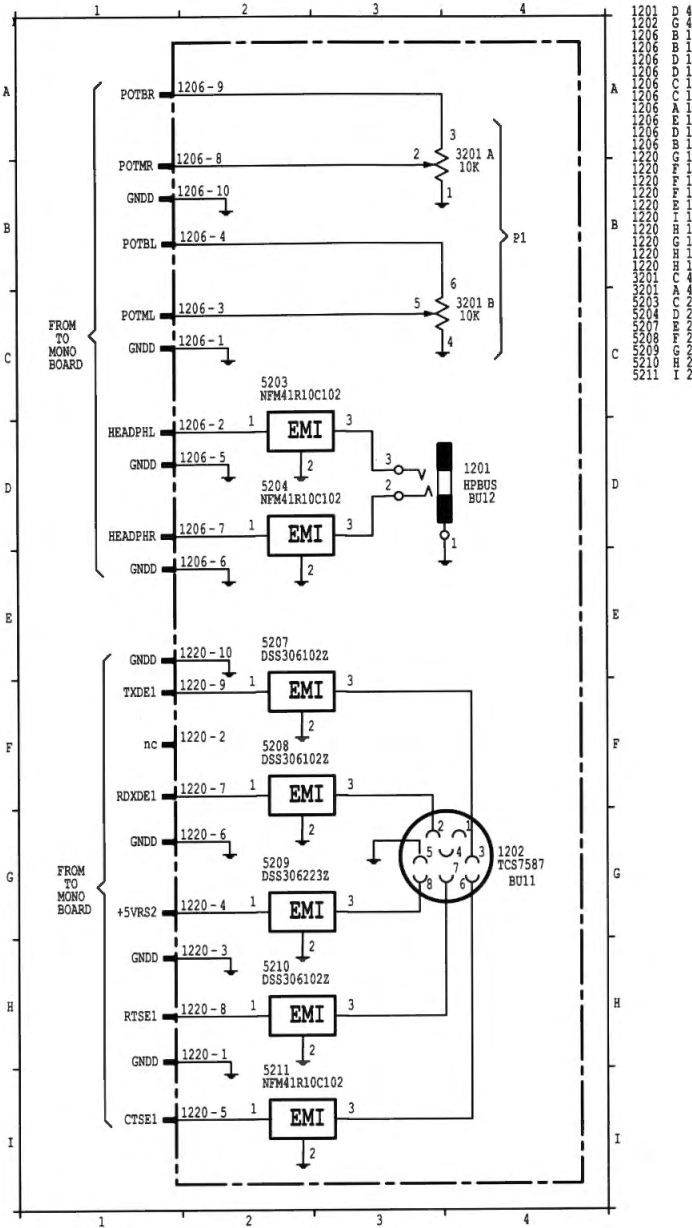


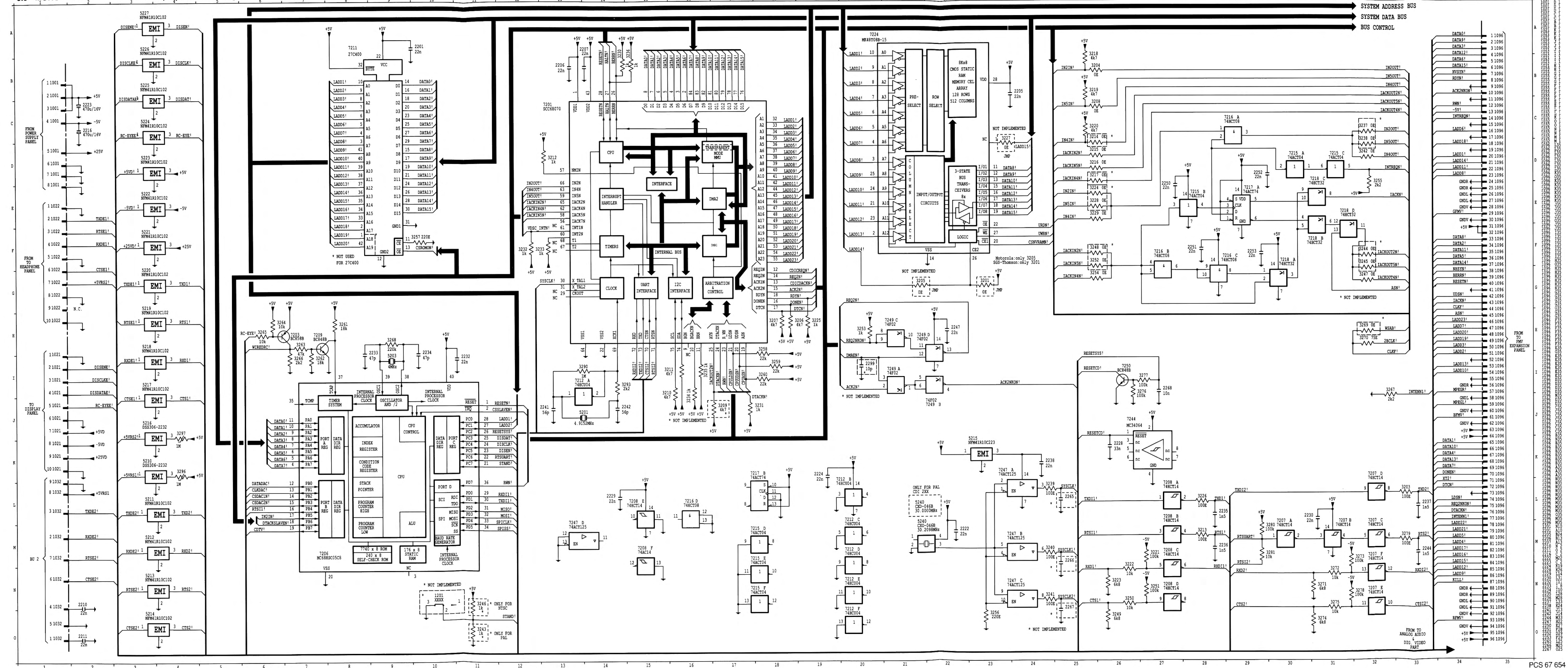
6.5 HEADPHONE PANEL

6.5.1 Headphone PCB

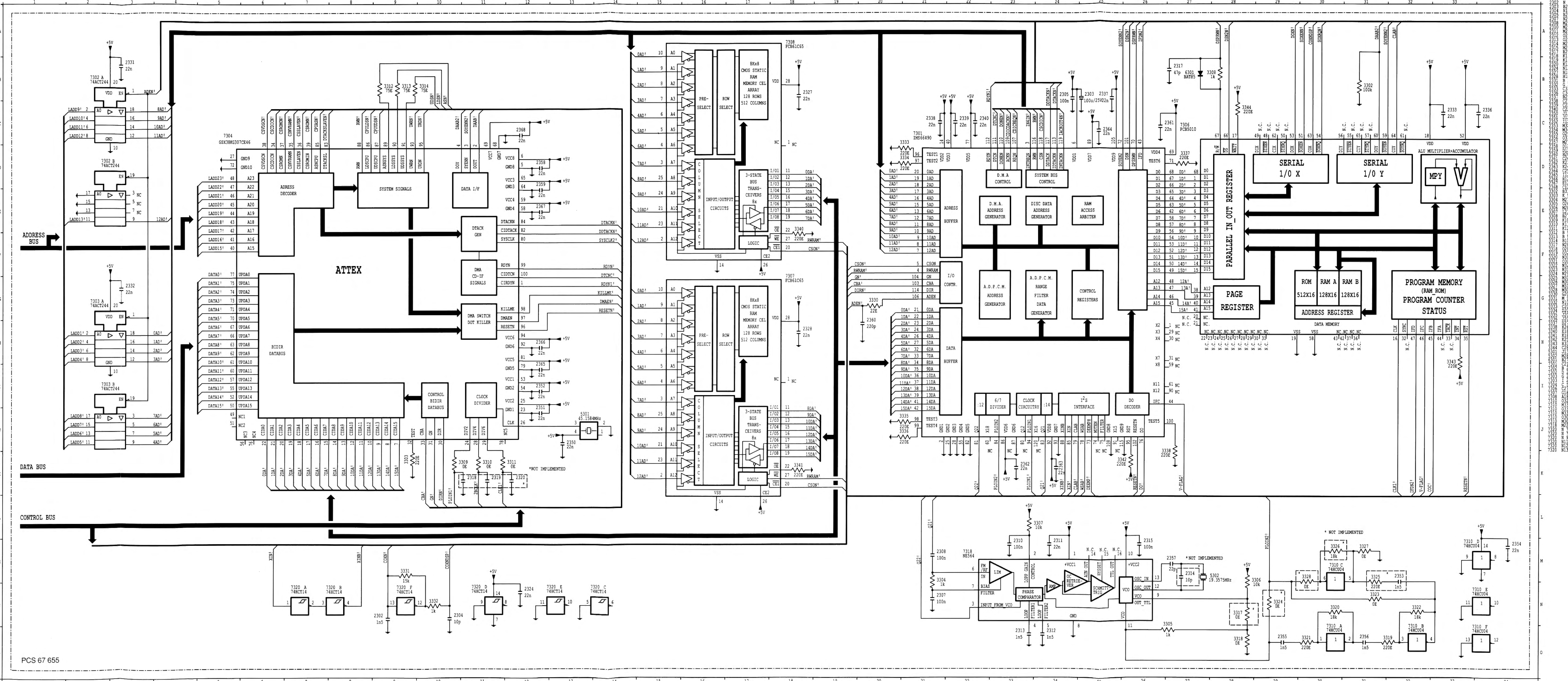


6.5.2 Headphone Circuit diagram

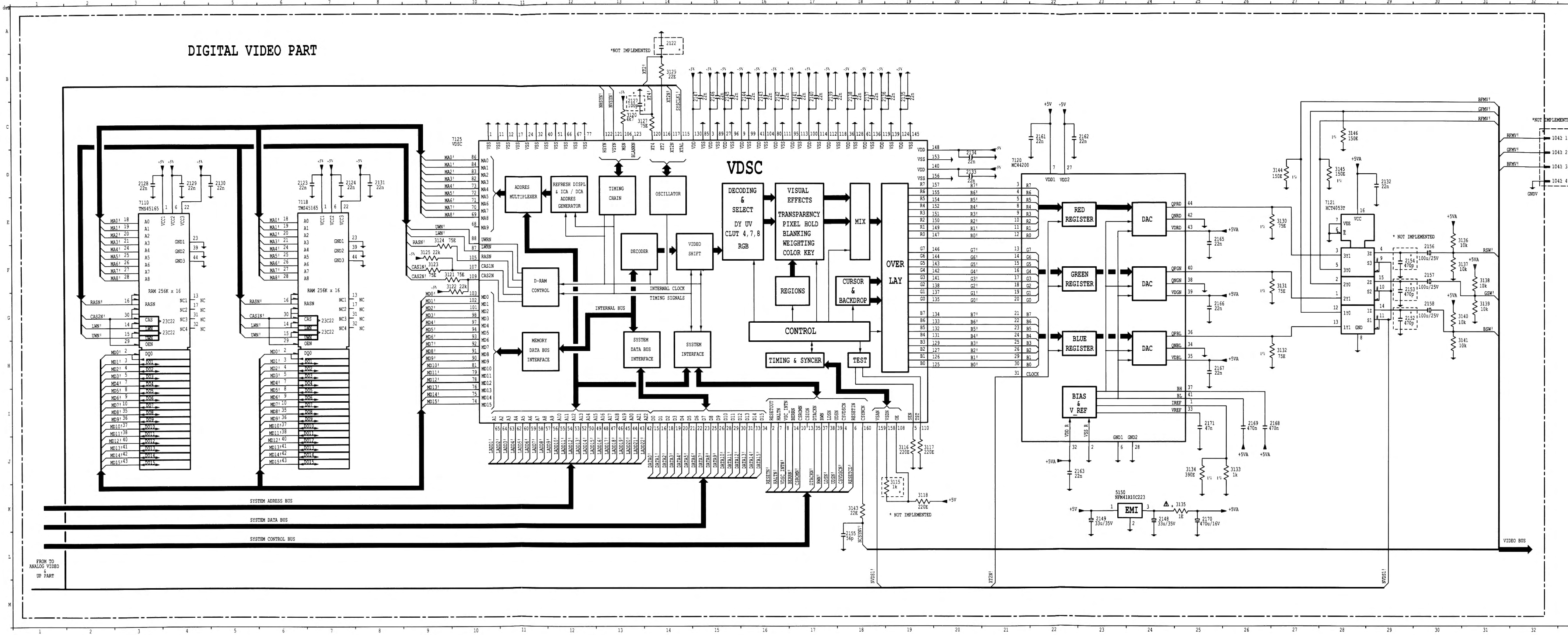




6.6.2 GlueLogic, CDIC, DSP part Circuit diagram



6.6.3 Digital video part Circuit diagram



A

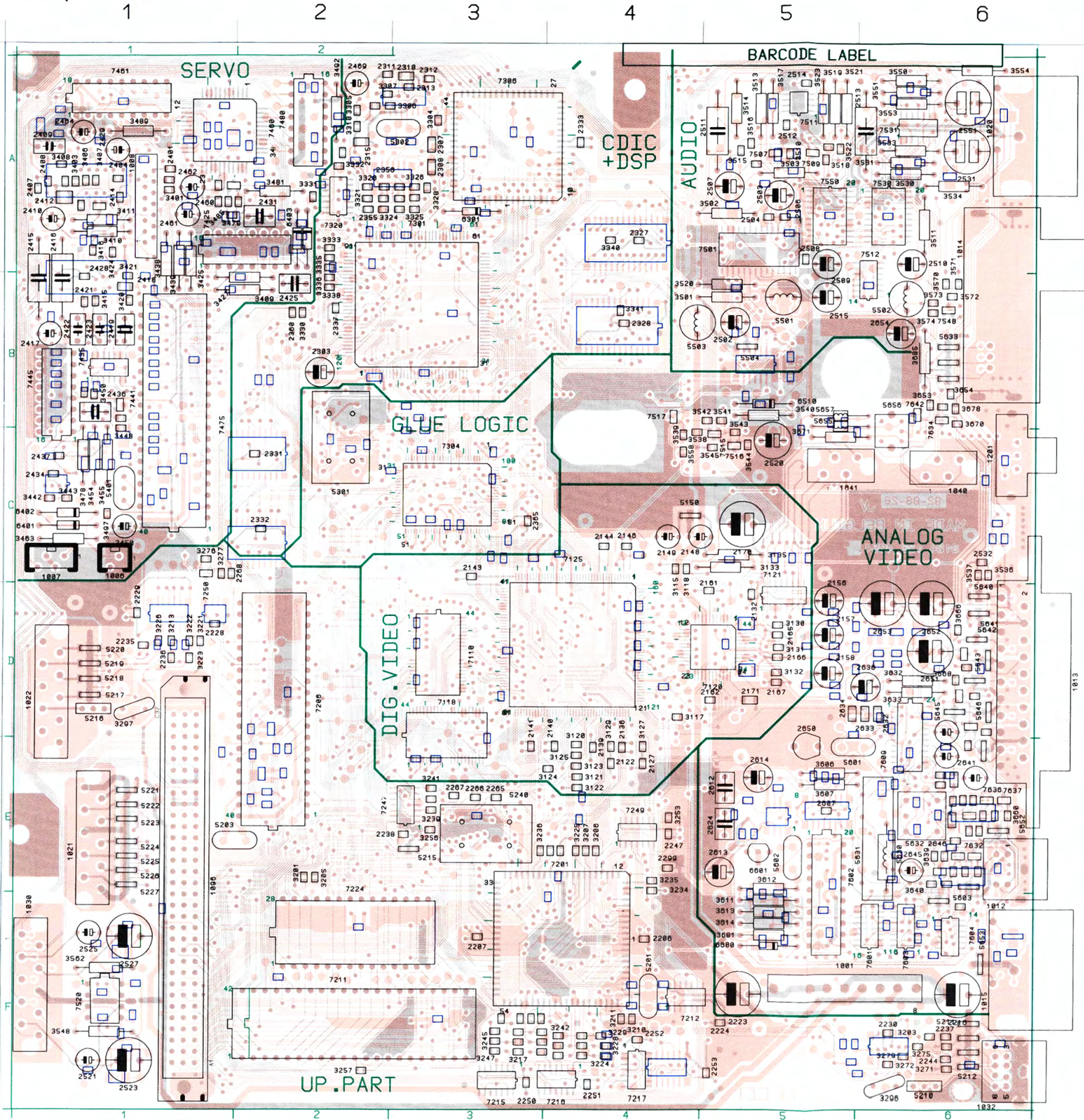
B

C

D

E

F



A

B

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D

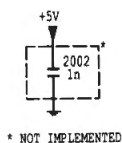
E

F

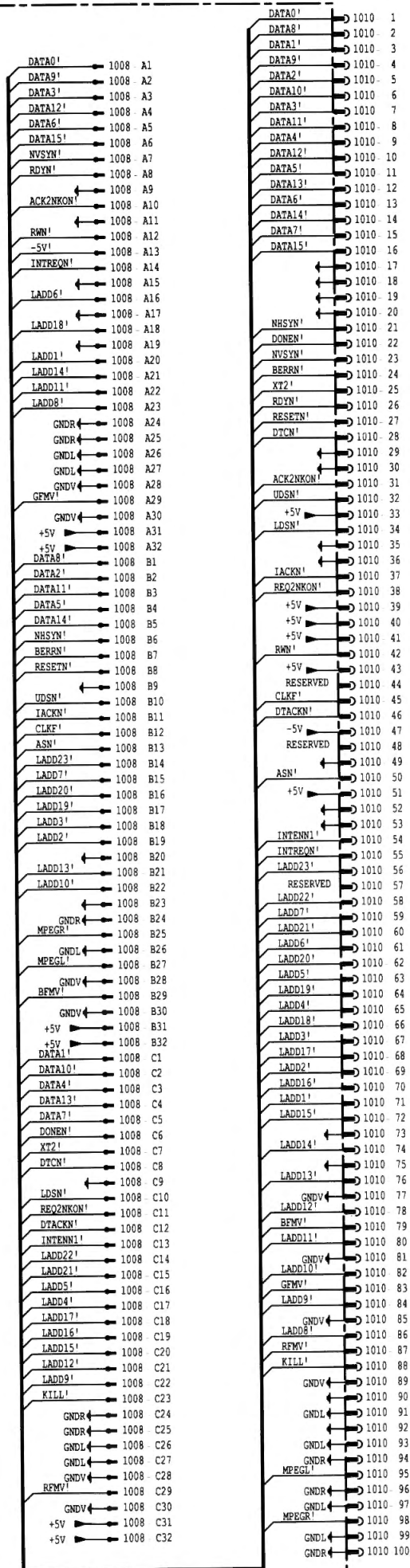
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1006	C 1	2313	A 3	2505	B 5	3135	C 5	3308	A 3	3471	B 1	3612	E 5	5042	D 6	7021	D 6
1007	C 1	2314	A 3	2506	A 5	3136	D 5	3309	B 3	3472	B 1	3613	F 5	5043	D 6	7022	D 6
1008	A 1	2315	A 2	2507	A 5	3137	D 5	3310	C 2	3473	B 1	3614	F 5	5044	D 6	7030	E 6
1012	E 6	2317	A 3	2508	A 5	3138	D 5	3311	C 3	3474	B 1	3615	E 5	5045	D 6	7031	E 6
1013	D 6	2318	B 3	2509	A 5	3139	D 5	3312	C 3	3475	B 1	3616	E 5	5046	D 6	7032	E 6
1014	B 6	2319	C 2	2510	A 6	3140	D 5	3313	C 3	3476	B 1	3620	D 8	5047	E 6	7033	F 6
1015	F 6	2320	C 3	2511	A 5	3141	D 5	3314	C 3	3478	C 1	3621	D 8	5048	B 6	7034	B 6
1020	A 6	2324	A 2	2512	A 5	3143	D 4	3317	A 2	3479	A 1	3622	D 8	5049	B 6	7035	E 6
1021	E 1	2327	A 4	2513	A 6	3144	C 5	3318	A 2	3480	A 2	3623	D 8	5050	F 6	7036	E 6
1022	D 1	2328	B 4	2514	A 5	3145	C 5	3319	A 2	3481	A 2	3624	D 6	5051	E 6	7037	E 6
1030	F 1	2331	C 2	2515	B 5	3146	C 5	3320	A 2	3482	A 2	3625	D 6	5052	E 6	7040	D 6
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1040	C 6	2333	A 4	2517	A 6	3203	F 6	3322	A 3	3484	A 1	3627	D 6	5055	B 6	7042	B 6
1041	C 5	2336	A 3	2518	B 6	3204	F 4	3323	A 3	3485	A 1	3628	D 6	5056	C 6	7043	D 6
1006	F 1	2337	B 2	2520	C 5	3205	E 2	3324	A 2	3486	A 2	3630	F 6	5057	B 5	7080	F 5
1201	C 6	2338	B 3	2521	F 1	3206	E 4	3325	A 3	3487	A 2	3631	D 8	6301	A 3		
2122	E 4	2339	B 3	2522	F 1	3207	E 4	3326	A 3	3488	A 2	3632	D 8	6401	C 1		
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6.6.5 F.M.V. interface panel

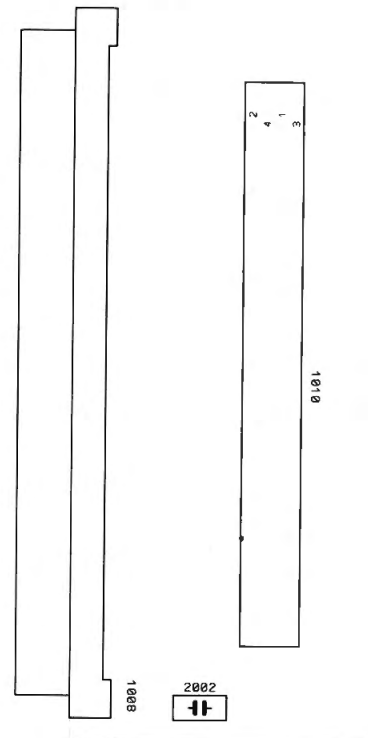
FMV CONNECTOR



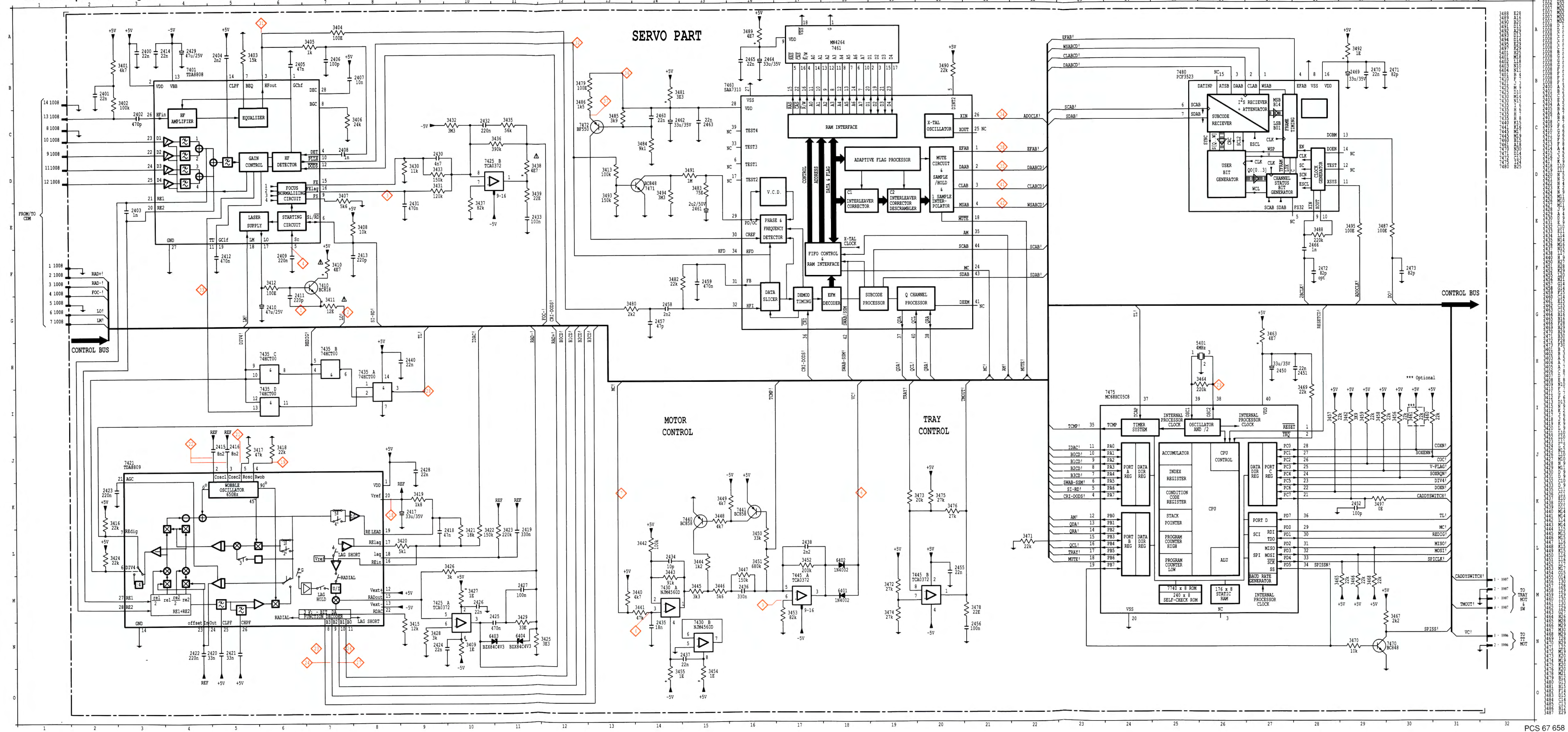
* NOT IMPLEMENTED



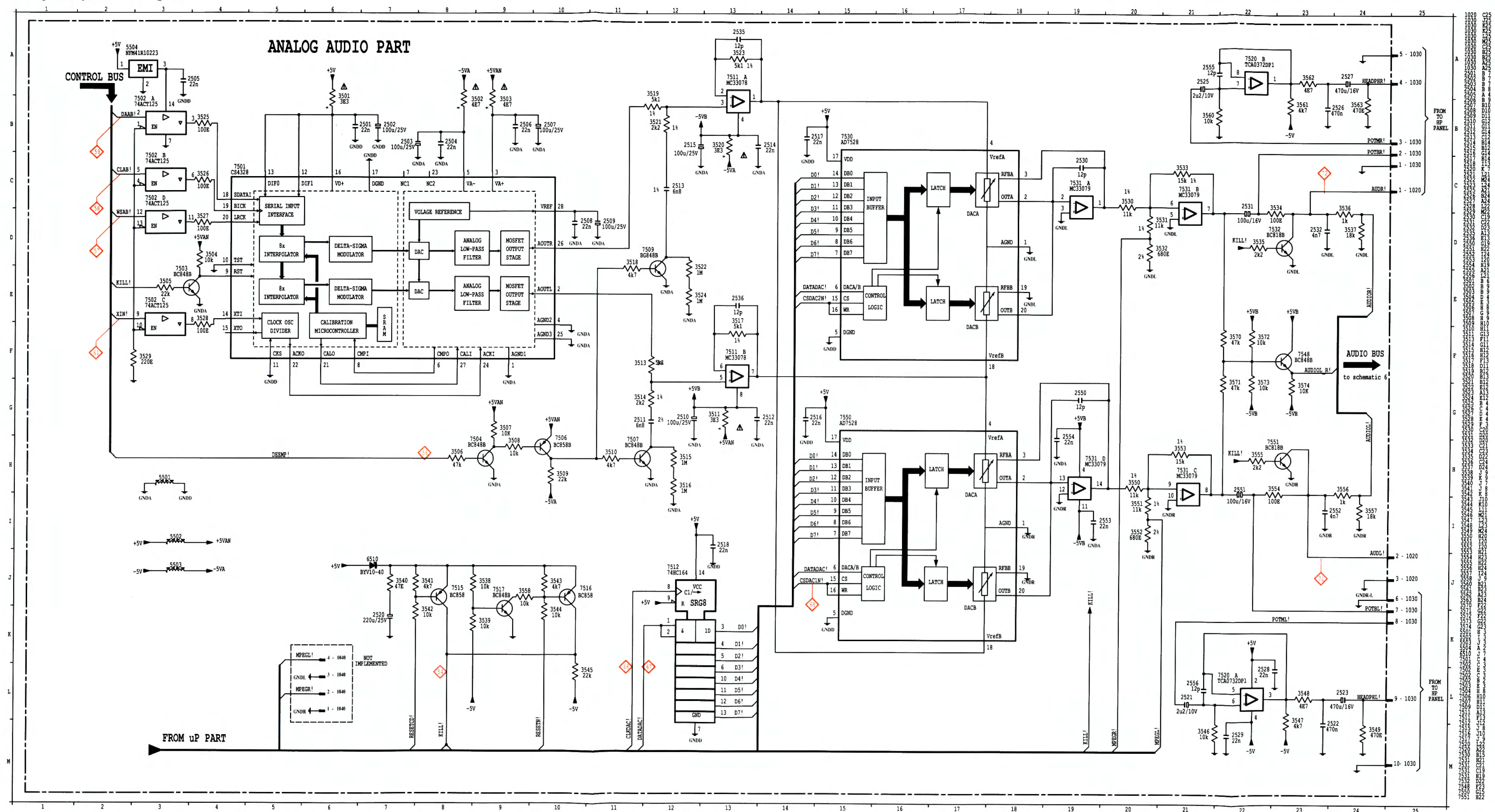
F.M.V. expansion



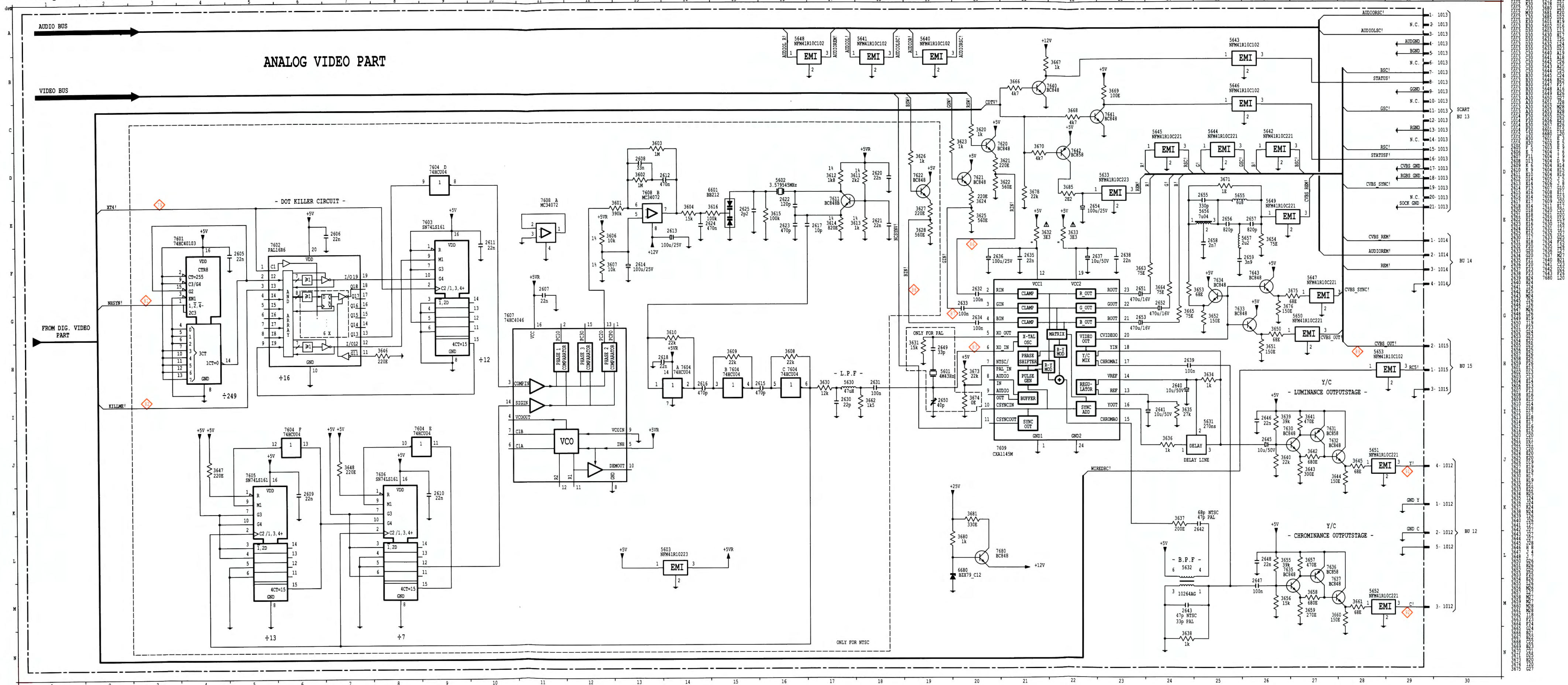
6.6.6 Servo part Circuit diagram



PCS 67 659

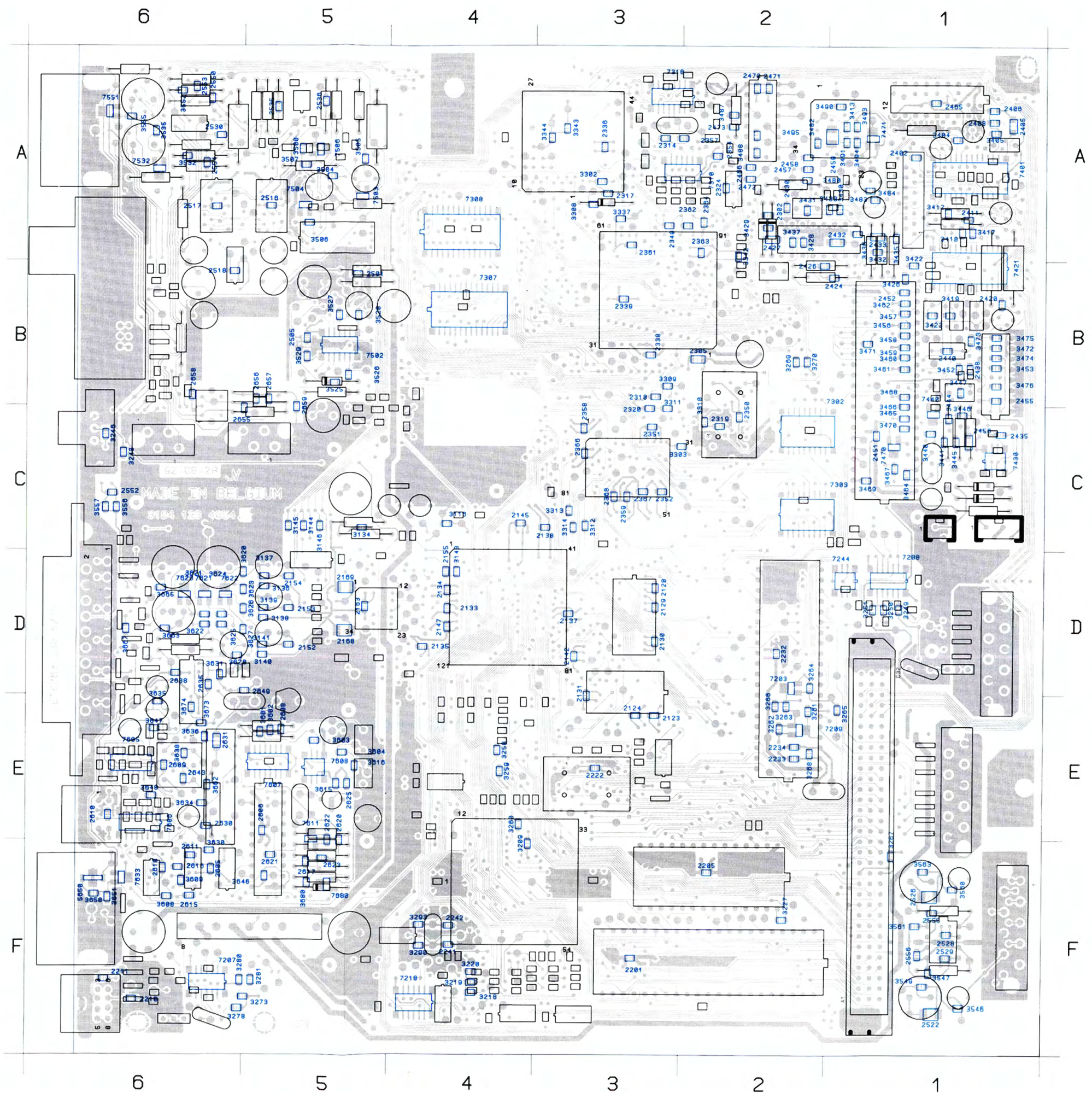


6.6.8 Analog video part Circuit diagram



6.6.9 Mono panel PCB SMD side view

7020	D	0	5041	D	0	3011	F	5	3470	C	1	3307	A	2	3134	C	5	2504	A	5	2312	A	3
7021	D	0	5042	D	0	3012	E	5	3471	B	1	3308	A	3	3135	C	5	2505	B	5	2313	A	3
7022	D	0	5043	D	0	3013	F	5	3472	B	1	3309	B	3	3136	D	5	2506	A	5	2314	A	3
7030	E	0	5044	D	0	3014	F	5	3473	B	1	3310	C	2	3137	D	5	2507	A	5	2315	A	3
7031	E	0	5045	D	0	3015	E	5	3474	B	1	3311	C	3	3138	D	5	2508	A	5	2317	A	3
7032	E	0	5046	D	0	3016	E	5	3475	B	1	3312	C	3	3139	D	5	2509	A	5	2318	B	3
7033	F	0	5047	E	0	3020	D	0	3476	B	1	3313	C	3	3140	D	5	2510	A	6	2319	C	2
7034	B	0	5048	B	0	3021	D	0	3478	C	1	3314	C	3	3141	D	5	2511	A	5	2320	C	2
7035	E	0	5049	B	0	3022	D	0	3479	A	1	3317	A	2	3143	D	4	2512	A	5	2324	A	2
7036	E	0	5050	F	0	3023	D	0	3480	A	2	3318	A	2	3144	C	5	2513	A	6	2327	A	4
7037	E	0	5051	E	0	3024	D	0	3481	A	2	3319	A	2	3145	C	5	2514	A	5	2328	B	4
7040	D	0	5052	E	0	3025	D	0	3482	A	2	3320	A	2	3146	C	5	2515	B	5	2331	C	2
7041	D	0	5053	F	0	3026	D	0	3483	A	1	3321	A	2	3201	E	2	2516	A	5	2332	C	2
7042	B	0	5055	B	0	3027	D	0	3484	A	1	3322	A	3	3203	F	0	2517	A	6	2333	A	4
7043	D	0	5056	C	0	3028	D	0	3485	A	1	3323	A	3	3204	F	4	2518	B	6	2336	A	3
7080	F	5	5057	B	5	3030	F	0	3486	A	2	3324	A	2	3205	E	2	2520	C	5	2337	B	2
7080	F	5	6301	A	3	3031	D	0	3487	A	2	3325	A	3	3206	E	4	2521	F	1	2338	B	3
			6401	C	1	3032	D	0	3488	A	2	3326	A	3	3207	E	4	2522	F	1	2339	B	3
			5402	C	1	3033	D	0	3489	A	1	3327	A	3	3208	F	4	2523	F	1	2340	A	3
			0403	A	2	3034	E	0	3490	A	1	3328	A	3	3209	F	4	2525	F	1	2350	C	2
			8404	A	2	3035	E	0	3491	A	1	3330	B	2	3210	F	4	2526	F	1	2351	C	3
			0518	B	5	3036	E	0	3492	A	2	3331	A	2	3211	F	4	2527	F	1	2352	C	3
			0601	E	5	3037	E	0	3493	A	1	3332	A	2	3212	F	3	2528	F	1	2353	A	3
			0608	F	5	3039	E	0	3494	A	1	3339	A	2	3213	D	1	2529	F	1	2354	A	2
			7118	D	3	3039	E	0	3495	A	2	3334	A	2	3214	F	4	2530	A	6	2355	A	2
7118	D	3	3040	E	0	3497	C	1	3335	A	2	3215	F	3	2531	A	6	2356	A	2			
7120	D	5	3041	E	0	3501	B	5	3336	B	2	3216	F	3	2532	C	6	2357	A	2			
7121	D	5	3042	E	0	3502	A	5	3337	A	3	3217	F	3	2535	A	5	2358	C	3			
7125	D	4	3043	E	0	3503	A	5	3338	B	2	3218	F	4	2536	A	5	2359	C	3			
7201	F	4	3044	E	0	3504	A	5	3340	A	4	3219	F	4	2550	A	6	2360	B	2			
7203	D	2	3045	E	0	3505	A	5	3341	B	4	3220	F	4	2551	A	6	2361	A	3			
7206	E	2	3046	F	5	3506	A	5	3342	A	2	3221	D	1	2552	C	6	2362	A	2			
7207	F	6	3047	E	0	3507	A	5	3343	A	3	3222	D	1	2553	A	6	2363	A	2			
7208	D	1	3048	E	0	3508	A	5	3344	C	3	3223	D	1	2554	A	6	2364	A	2			
7209	E	2	3050	F	0	3509	A	5	3401	A	1	3224	F	4	2555	F	1	2365	C	3			
7211	F	2	3051	F	0	3510	A	5	3402	A	1	3225	E	4	2556	F	1	2366	C	3			
7212	F	4	3052	B	0	3511	A	6	3403	A	1	3226	D	1	2605	F	6	2367	C	3			
7215	F	3	3053	B	0	3513	A	5	3404	A	1	3227	F	2	2606	E	5	2368	C	3			
7216	F	4	3054	B	0	3514	A	5	3405	A	1	3228	F	4	2607	E	5	2369	C	3			
7217	F	4	3055	E	0	3515	A	5	3406	A	1	3229	F	4	2608	E	5	2401	A	1			
7218	F	4	3056	E	0	3516	A	5	3407	A	1	3230	E	4	2600	E	6	2402	A	1			
7224	F	2	3057	E	0	3517	A	5	3408	A	1	3231	E	4	2610	E	6	2403	A	1			
7244	D	1	3058	E	0	3518	A	5	3409	B	1	3232	F	3	2611	F	6	2404	A	1			
7247	E	3	3059	E	0	3519	A	5	3410	A	1	3233	F	3	2612	E	5	2405	A	1			
7249	E	4	3060	E	0	3520	B	4	3411	A	1	3234	E	4	2613	E	5	2406	A	1			
7250	C	1	3061	E	0	3521	A	5	3412	A	1	3235	E	4	2614	E	5	2407	A	1			
7301	B	3	3062	E	0	3522	A	5	3413	A	1	3236	E	3	2615	F	6	2408	A	1			
7302	C	2	3063	D	0	3523	A	5	3415	B	1	3237	F	4	2618	F	6	2409	A	1			
7303	C	2	3064	D	0	3524	A	5	3416	A	1	3238	F	4	2617	F	5	2410	A	1			
7304	C	3	3065	D	0	3525	B	5	3417	A	1	3239	E	3	2618	F	6	2411	A	1			
7306	A	3	3066	D	0	3526	B	5	3418	A	1	3240	E	3	2620	F	5	2412	A	1			
7307	B	4	3067	D	0	3527	B	5	3419	B	1	3241	E	3	2621	F	5	2413	A	1			
7308	A	4	3068	D	0	3528	B	5	3420	B	1	3242	F	4	2622	F	5	2414	A	1			
7310	A	2	3069	D	0	3529	B	5	3421	B	1	3243	C	6	2623	F	5	2415	A	1			
7318	A	2	3070	B	0	3530	A	6	3422	B	1	3244	F	3	2624	E	5	2416	A	1			
7320	A	2	3071	C	0	3531	A	6	3423	B	1	3245	F	3	2625	E	5	2417	B	1			
7401	A	1	3073	E	0	3532	A	6	3424	A	1	3246	C	6	2630	E	6	2418	B	1			
7418	A	1	3074	E	0	3533	A	6	3425	A	1	3247	F	3	2631	E	6	2419	B	1			
7421	A	1	3075	E	0	3534	A	6	3426	B	1	3248	F	4	2632	D	6	2420	B	1			
7425	A	1	3076	D	0	3535	A	6	3427	B	2	3249	D	1	2633	D	6	2421	B	1			
7430	C	1	3078	B	0	3536	C	0	3428	A	2	3250	D	1	2634	D	5	2422	B	1			
7435	B	1	3080	F	5	3537	C	0	3429	A	2	3251	D	1	2635	D	6	2423	B	1			
7440	C	1	3081	F	5	3538	C	4	3430	A	1	3252	F	4	2636	D	6	2424	B	1			
7441	B	1	3085	B	0	3539	C	4	3431	A	2	3253	E	4	2637	D	6	2425	B	2			
7445	C	1	3150	C	4	3540	B	5	3432	A	1	3254	F	4	2638	D	6	2426	B	2			
7468	A	1	5201	F	4	3541	B	5	3433	A	2	3255	F	3	2639	E	6	2427	A	2			
7461	A	1	5203	E	2	3542	B	5	3435	A	1	3256	E	3	2640	E	6	2428	B	1			
7470	C	1	5210	F	8	3543	C	5	3436	A	1	3257	F	2	2641	E	6	2429	A	1			
7471	A	1	5211	F	8	3544	C	5	3437	A	2	3258	E	4	2642	E	6	2430	A	1			
7472	A	1	5212	F	8	3545	C	5	3438	B	1	3259	E	4	2643	E	6	2431	A	2			
7475	C	1	5213	F	8	3546	F	1	3439	A	1	3260	E	4	2645	E	6	2432	A	1			
7480	A	2	5214	F	6	3547	F	1	3440	C	1	3261	E	2	2646	E	6	2433	A	1			
7501	A	5	5215	E	3	3548	F	1	3441	C	1	3262	E	2	2647	E	6	2434	C	1			
7502	B	5	5216	D	1	3549	F	1	3442	C	1	3263	E	2	2648	E	6	2435	C	1			
7503	A	5	5217	D	1	3550	A	6	3443	C	1	3264	D	2	2649	D	5	2436	B	1			
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7509	A	5	5221	E	1	3554	A	6	3447	B	1	3268	E	2	2653	D	6	2450	C	1			
7511	A	5	5222	E	1	3555	A	6	3448	C	1	3269	B	2	2654	B	6	2451	C	1			
7512	B	6	5223	E	1	3556	C	6	3449	B	1	3270	B	2	2655	C	6	2452	B	1			
7515	C	5	5224	E	1	3557	C	6	3450	B	1	3271	F	0	2650	B	5	2455	B	1			
7510	C	5	5225	E	1	3558	C	4	3451	B	1	3272	F	0	2657	B	5	2456	C	1			
7517	B	4	5228	E	1	3560	F	1	3452	B	1</												



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 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 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 I²S (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 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).

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 oscilloscope

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 $\pm$ 10 %.

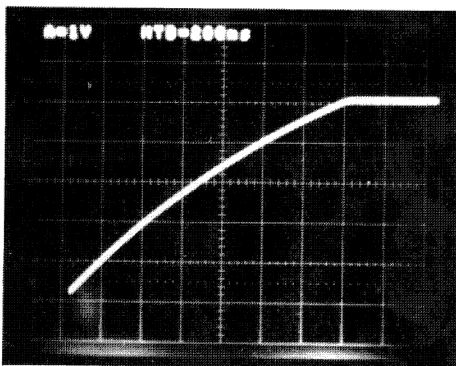
7.2.2.2 Focus signal.

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 $\pm$ 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 oscilloscope :

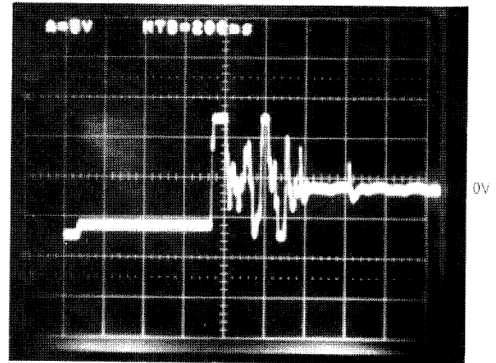


The signal is triggered by the Si/RD signal on IC7401pin6.

7.2.2.4 Motorcontrol signals.

Insert testdisc 5.

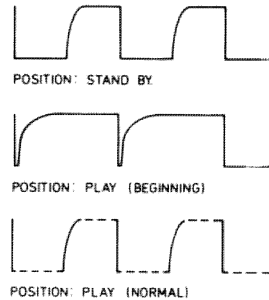
Measure accross IC7445A pin3 and GND, after pushing the play button the next picture should appear on the oscilloscope.



After a while, when playing track 1, the voltage should be: - 1.7 V DC $\pm$ 10%

Play track 1 of testdisc 5, the voltage accross measuring point 6 and ground should be: 3.2 Volt DC $\pm$ 10%

Signal accross measuring point 7 and GND should be :



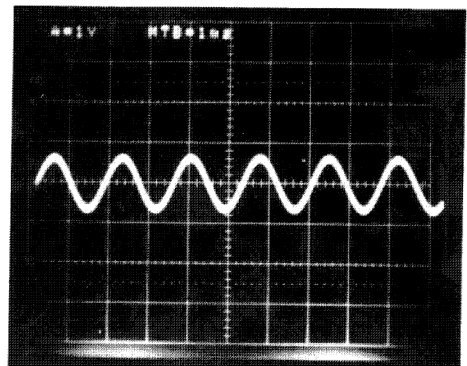
7.2.2.5 Radial error circuit signals.

Voltage accross measuring point 18 and GND : 2,6 V / DC $\pm$ 10%.

Voltage accross measuring point 19 and GND : 110 mV / DC $\pm$ 10% in PLAY mode.

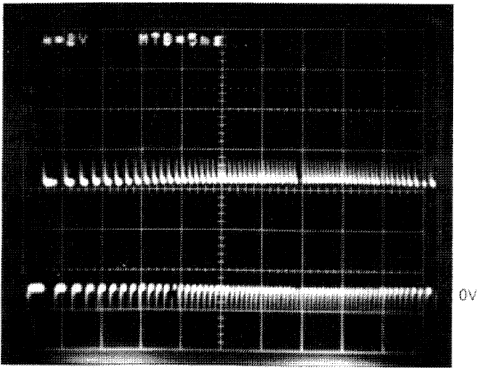
Voltage accross measuring point 21 and GND : 1,2 V / DC $\pm$ 10% in PLAY mode.

Voltage accross measuring point 22 and GND :



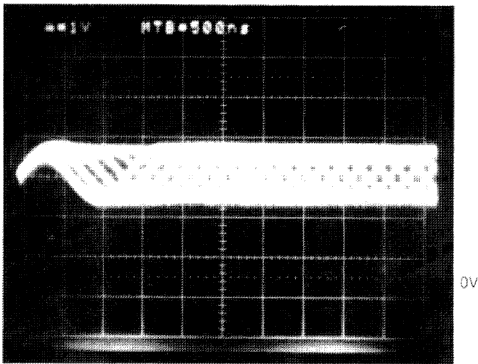
Voltage accross measuring points 23, 24, 26 and 27 depending on playing mode, 0V if LOW or 5V if HIGH

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 :

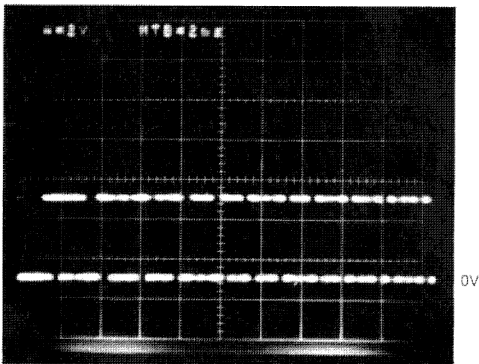


7.2.2.6 Clock signal μ P IC7475
Measuring point 29 : clock signal $f = 4\text{MHz}$.

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



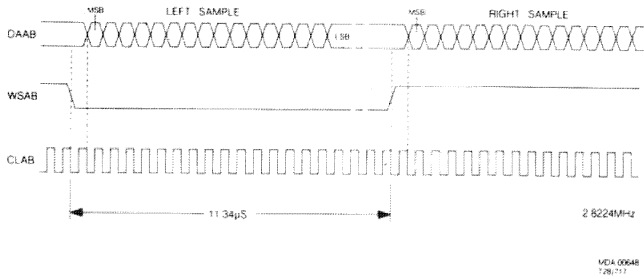
Insert testdisc 5 and put the player in the service shell on CD drive test mode 2.
The signal accross measuring point 32 should be :



Measuring point 34 : clock signal $f = 11.289.600\text{ Hz}$.
Voltage accross measuring point 36 and 37 :
 $775\text{ mV /DC} \pm 10\%$

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 :



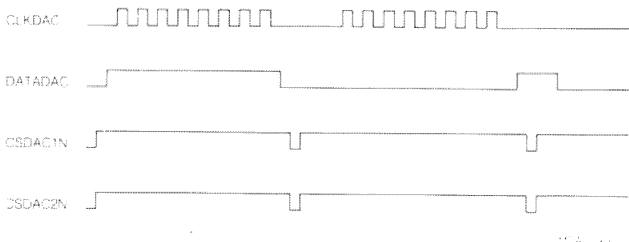
7.2.3 Audio section

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 ($2 \div 8$).

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

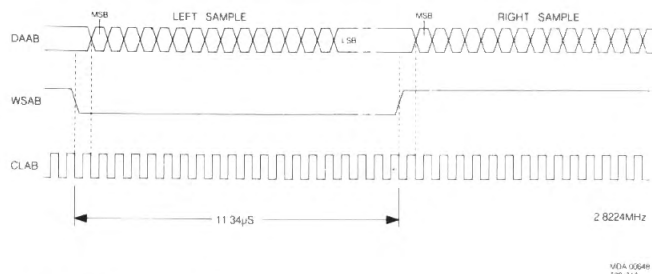


These signals are very hard to recognize on an oscilloscope during the normal application. Only in the **service shell** and controlling the attenuators you can observe activity .
If there is any activity on one of the lines 66 ÷ 69 one can suppose that the information of this signals are oke.
This is also to be considered for the data lines D0 ÷ D7. If no disturbances, check the data outputs D0 ÷ D7 of IC7512.

7.2.3.2 I²S 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 (recorded 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 $\pm$ 2dB
- The level on testpoint 71 and 72 should be: 2 Vrms $\pm$ 3dB.

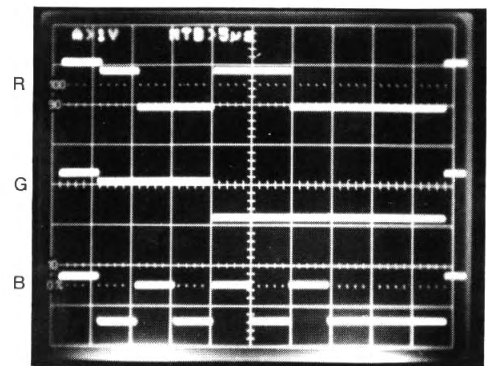
7.2.4 Video section

Required test equipment.

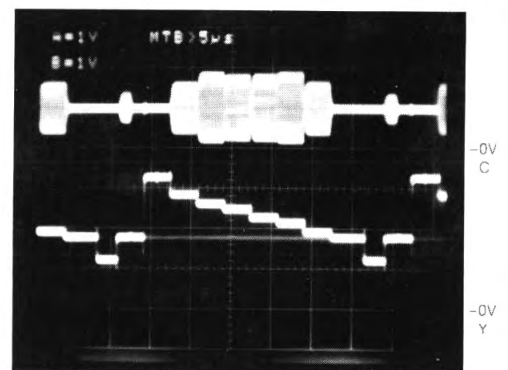
- Electronic voltmeter
- Oscilloscope
- Frequency counter

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

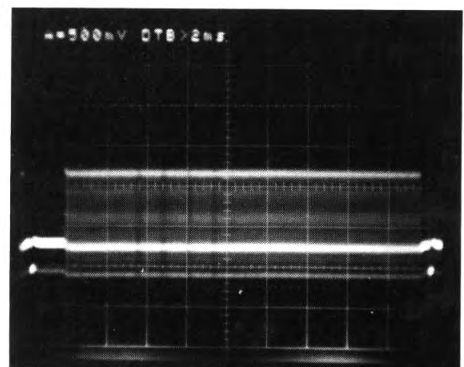
Measuring point 86, 87 and 88:



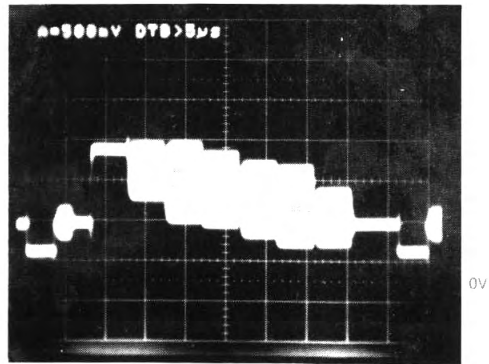
Measuring point 91:



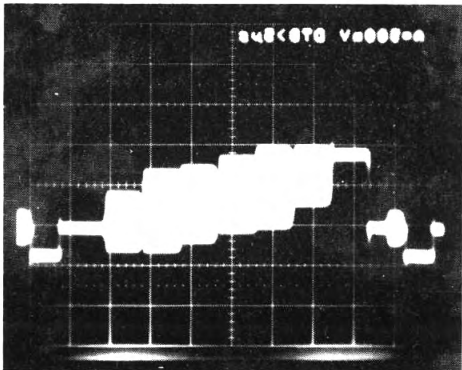
Measuring point 92:



Measuring point 89:



Check of Output signals for CVBS - Y / C.



7.2.4.1 Check of subcarrier .

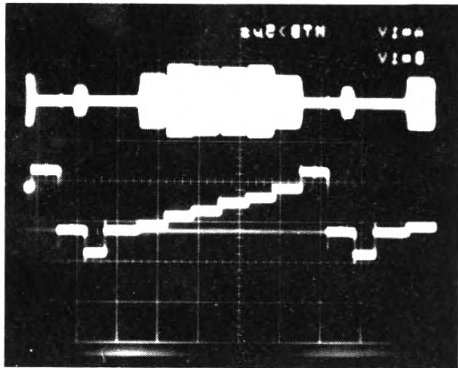
- Player switched off.
- Connect frequency counter to testpoint 83 ,(Pin 6 IC 7609) and turn on the player.
- The frequency on testpoint 83 should be;
PAL = 4 433 618 Hz. $\pm$ 50 Hz.
NTSC = 3 579 545 Hz. $\pm$ 7 Hz.
- The amplitude on testpoint 83 should be in between;
400 mV and 1000 mV_{pp}
- If for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

CVBS signals Testpoint 89

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

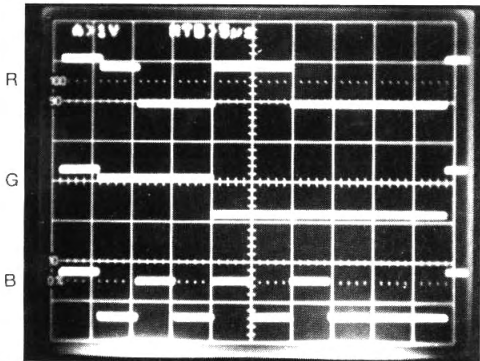
7.2.4.2 Check of standard control signal SW

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.



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 $\pm$ 5%
pin4 : -5 V $\pm$ 5%
pin5 : +25 V $\pm$ 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 $\pm$ 1500 Hz (PAL)
30.2098 MHz $\pm$ 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 $\pm$ 250 Hz

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

Frequency 4.000 MHz $\pm$ 100 Hz

At IC7301 pin 94 the clock of the CDIC must be present :

Frequency 22.5792 MHz $\pm$ 1100 Hz.

At IC7306 pin 16 the DSP clock must be present :

Frequency 7.5264MHz $\pm$ 380 Hz

7.2.5.3 I²S 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 $\pm$ 20 ms. Also measure the RESETCD time(low!) if the button is released. The signal RESETCD must be low for 140 ms $\pm$ 20 ms.

IC7201 pin 28 RESETN; low time = 250 ms $\pm$ 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 micro-processor 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 bits : 8

stop bits : 0

no parity/ no handshake

8 PARTSLIST

8.1 PARTSLIST OF THE CABINET

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

8.2 PARTS LIST OF THE TRAY LOADER					
Item	Codenumber	Description	Item	Codenumber	Description
ASSY	4822 691 30294	COMPLETE LOADER WITHOUT CDM	1803	4822 265 31015	AC socket /20/25/31/39
1	4822 464 50934	CHASSIS	1803	4822 265 31016	AC socket /37
2	4822 444 30457	TRAY	1804		Conn. 3p top entry
3	4822 464 50908	SUB CHASSIS	1805	4822 253 10128	Fuse T2A Rad
4	4822 444 60861	COVER	1806	4822 253 10138	Fuse T1A Rad
5	4822 402 61412	CLAMPER ASSY	1807	4822 256 30495	Fuseholder
6	4822 466 93065	SUSPENSION	1809	4822 256 30495	Fuseholder
7	4822 466 93065	SUSPENSION	1810	4822 265 40596	Conn. 2p male
8	4822 466 93065	SUSPENSION	1901	4822 276 11309	Powerswitch
9	4822 466 93065	SUSPENSION	1902	4822 265 40596	Conn. 2p male
10	4822 271 30707	MICROSWITCH	2701	5322 122 32654	22NF10%X7R 63V
11	4822 361 21492	MOTOR ASSY	2705	4822 122 33575	220PF5%NPO 50V
12	4822 502 12001	M2X4 STZN	2802	4822 124 80148	220UF20% 16V
13	4822 502 12001	M2X4 STZN	2803	4822 124 80047	1000UF20% 35V
14	4822 528 81465	PULLEY	2804	5322 122 32654	22NF10%X7R 63V
15	4822 528 81464	DRIVE PINION	2805	4822 122 33496	100NF10%X7R 63V
16	4822 535 93319	SPINDLE	2806	4822 124 41596	22UF20% 50V
17	4822 535 93319	SPINDLE	2807	4822 124 41596	22UF20% 50V
18	4822 358 31168	BELT	2808		4700UF20% 6V3
20	4822 691 30275	CDM9 UNIT	2809		1000UF20% 6V3
20	4822 691 30277	CDM9 UNIT + SUB CHASSIS + SUSPENSIONS !	2810	4822 126 12522	1,5NF20% 400V
33	4822 466 62109	TRANSPORT PROTECTION	2811	4822 126 12522	1,5NF20% 400V
40	4822 325 60379	DAMPING TULE	2812	4822 122 10289	22NF 100V
41	4822 325 60379	DAMPING TULE	2813	4822 122 10289	22NF 100V
42	4822 325 60379	DAMPING TULE	2814	5322 122 32654	22NF10%X7R 63V
43	4822 325 60379	DAMPING TULE	2815	5322 122 32654	22NF10%X7R 63V
44	4822 466 93163	DAMPING PLATE	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
8.3 PARTSLIST OF THE DISPLAY AND POWERSUPPLY PANEL					
Item	Codenumber	Description	Item	Codenumber	Description
2		Heat sink	3201	4822 101 21199	2X10KPOTM.CARBON
4		Bracket for conn.	3701	4822 051 20101	100R00 5% 0,1W
6		FTD-holder	3702	4822 051 20473	47K00 5% 0,1W
7		Insulating plate	3704	4822 052 10478	4R70 5% 0,33W
8		Factory plate	3705	4822 051 20332	3K30 5% 0,1W
10		Shielding cap	3706	4822 116 90857	4R7X8
101	4822 492 63076	Spring clip	3707	4822 116 90857	4R7X8
103	4822 492 63076	Spring clip	3712	4822 051 20223	22K00 5% 0,1W
107	4822 492 63076	Spring clip	3713	4822 051 20823	82K00 5% 0,1W
201	4822 325 20188	Mica isulator	3715	4822 050 21002	1K00 1% 0,6W
202	4822 325 20188	Mica isulator	3716	4822 051 20223	22K00 5% 0,1W
1201	4822 267 31572	socket 3p hor. fem.	3717	4822 051 20472	4K70 5% 0,1W
1202	4822 267 51216	minidin socket 8p FEM TCS	3718	4822 050 21002	1K00 1% 0,6W
1206	4822 267 50994	Conn. 10p grey	3719	4822 051 20472	4K70 5% 0,1W
1220	4822 267 50994	Conn. 10p grey	3720	4822 051 20154	150K00 5% 0,1W
1221		Earth spring	3721	4822 051 20473	47K00 5% 0,1W
1703	4822 276 13114	Switch tact H=4,3	3722	4822 051 20472	4K70 5% 0,1W
1704	4822 276 13114	Switch tact H=4,3	3723	4822 051 20472	4K70 5% 0,1W
1705	4822 276 13114	Switch tact H=4,3	3724	4822 051 20223	22K00 5% 0,1W
1706	4822 276 13114	Switch tact H=4,3	3725	4822 050 21002	1K00 1% 0,6W
1707	4822 276 13114	Switch tact H=4,3	3726	4822 051 20472	4K70 5% 0,1W
1708	4822 276 13114	Switch tact H=4,3	3727	4822 051 20683	68K00 5% 0,1W
1721		Conn. 10p hor male	3728	4822 051 20103	10K00 5% 0,1W
1801		Conn. 5p ver male	3729	4822 051 20472	4K70 5% 0,1W
1802		Conn. 8p ver male	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

Item	Codenummer	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	Codenummer	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

Item	Codenumber	Description	Item	Codenumber	Description
2201	5322 122 32654	22nF 10% 63V	2362	5322 122 32654	22nF 10% 63V
2205	5322 122 32654	22nF 10% 63V	2363	5322 122 32654	22nF 10% 63V
2206	5322 122 32654	22nF 10% 63V	2364	5322 122 32654	22nF 10% 63V
2207	5322 122 32654	22nF 10% 63V	2365	5322 122 32654	22nF 10% 63V
2210	5322 122 32654	22nF 10% 63V	2366	5322 122 32654	22nF 10% 63V
2211	5322 122 32654	22nF 10% 63V	2367	5322 122 32654	22nF 10% 63V
2216	4822 124 41989	470uF 20% 16V	2368	5322 122 32654	22nF 10% 63V
2222	5322 122 32654	22nF 10% 63V	2400	5322 122 32654	22nF 10% 63V
2223	4822 124 41989	470uF 20% 16V	2401	5322 122 32654	22nF 10% 63V
2224	5322 122 32654	22nF 10% 63V	2402	5322 122 32268	470pF 10% 50V
2228	4822 122 03330	33nF 10% 63V	2403	5322 122 34123	1nF 10% 50V
2229	5322 122 32654	22nF 10% 63V	2404	4822 122 33175	2,2nF 20% 50V
2230	5322 122 32654	22nF 10% 63V	2405	4822 122 32542	47nF 10% 63V
2232	5322 122 32654	22nF 10% 63V	2406	5322 122 32531	100pF 5% 50V
2233	5322 122 32452	47pF 5% NPO 63V	2407	4822 122 33177	10nF 20% 50V
2234	5322 122 32452	47pF 5% NPO 63V	2408	5322 122 34123	1nF 10% 50V
2235	5322 122 31865	1,5nF 10% 63V	2409	4822 121 42408	220nF 5% 63V
2236	5322 122 31865	1,5nF 10% 63V	2410	4822 124 41527	47uF 25V
2237	5322 122 31865	1,5nF 10% 63V	2411	4822 122 32575	220pF 10% 500V
2238	5322 122 32654	22nF 10% 63V	2412		470nF 10%
2241	5322 122 32661	56pF 5% 50V	2413	4822 122 32575	220pF 10% 500V
2242	5322 122 32661	56pF 5% 50V	2414	5322 122 32654	22nF 10% 63V
2244	5322 122 31865	1,5nF 10% 63V	2415	4822 121 51321	8,2nF 1% 63V
2247	5322 122 32654	22nF 10% 63V	2416	4822 121 51321	8,2nF 1% 63V
2250	5322 122 32654	22nF 10% 63V	2417	4822 124 41598	33uF 20% 35V
2251	5322 122 32654	22nF 10% 63V	2418	4822 122 32542	47nF 10% 63V
2252	5322 122 32654	22nF 10% 63V	2419	5322 121 42661	330nF 5% 63V
2253	5322 122 32654	22nF 10% 63V	2420	4822 122 33342	33nF 10% 63V
2268	4822 122 33177	10nF 20% 50V	2421	4822 122 33342	33nF 10% 63V
2302	5322 122 31865	1,5nF 10% 63V	2422	4822 121 42408	220nF 5% 63V
2303	4822 124 41528	100uF 25V	2423	4822 121 42408	220nF 5% 63V
2304	5322 122 32448	10pF 5% 50V	2424	5322 122 32654	22nF 10% 63V
2305	4822 122 33496	100nF 10% 63V	2425	4822 121 51252	470nF 5% 63V
2307	4822 122 33496	100nF 10% 63V	2426	5322 122 32654	22nF 10% 63V
2308	4822 122 33496	100nF 10% 63V	2427	4822 122 33496	100nF 10% 63V
2310	4822 122 33496	100nF 10% 63V	2428	5322 122 32654	22nF 10% 63V
2311	5322 122 32654	22nF 10% 63V	2429	4822 124 41527	47uF 25V
2312	5322 122 31865	1,5nF 10% 63V	2430	5322 126 10223	4,7nF 10% 63V
2313	5322 122 31865	1,5nF 10% 63V	2431	4822 121 51252	470nF 5% 63V
2315	4822 122 33496	100nF 10% 63V	2432	4822 122 32927	220nF Y5V 50V
2317	5322 122 32452	47pF 5% NPO 63V	2433	4822 122 33496	100nF 10% 63V
2324	5322 122 32654	22nF 10% 63V	2434	5322 122 32448	10pF 5% 50V
2327	5322 122 32654	22nF 10% 63V	2435	4822 122 33893	18nF 10% 63V
2328	5322 122 32654	22nF 10% 63V	2436	5322 121 42661	330nF 5% 63V
2331	5322 122 32654	22nF 10% 63V	2437	5322 122 32654	22nF 10% 63V
2332	5322 122 32654	22nF 10% 63V	2438	4822 122 33175	2,2nF 20% 50V
2333	5322 122 32654	22nF 10% 63V	2440	5322 122 32654	22nF 10% 63V
2336	5322 122 32654	22nF 10% 63V	2450	4822 124 41598	33uF 20% 35V
2337	5322 122 32654	22nF 10% 63V	2451	5322 122 32654	22nF 10% 63V
2338	5322 122 32654	22nF 10% 63V	2452	5322 122 32531	100pF 5% 50V
2339	5322 122 32654	22nF 10% 63V	2455	5322 122 32654	22nF 10% 63V
2340	5322 122 32654	22nF 10% 63V	2456	4822 122 33496	100nF 10% 63V
2350	5322 122 32654	22nF 10% 63V	2457	5322 122 32452	47pF 5% 63V
2351	5322 122 32654	22nF 10% 63V	2458	4822 122 33175	2,2nF 20% 50V
2351	5322 122 32654	22nF 10% 63V	2459		470nF 10% 50V
2354	5322 122 32654	22nF 10% 63V	2460	5322 122 32654	22nF 10% 63V
2355	5322 122 31865	1,5nF 10% 63V	2461	4822 124 41576	2,2uF 20% 50V
2356	5322 122 31865	1,5nF 10% 63V	2462	4822 124 41598	33uF 20% 35V
2357	5322 122 32658	22pF 5% 50V	2463	5322 122 32654	22nF 10% 63V
2358	5322 122 32654	22nF 10% 63V	2464	4822 124 41598	33uF 20% 35V
2359	5322 122 32654	22nF 10% 63V	2465	5322 122 32654	22nF 10% 63V
2360	4822 122 32575	220pF 10% 500V	2466	5322 122 34123	1nF 10% 50V
2361	5322 122 32654	22nF 10% 63V	2469	4822 124 41598	33uF 20% 35V

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

Item	Codenumber	Description	Item	Codenumber	Description
3229	4822 051 20008	0R00 5% 0,1W	3318	4822 051 20008	0R00 5% 0,1W
3230	4822 050 21002	1K00 1% 0,1W	3319	4822 051 20221	220R00 5% 0,1W
3231	4822 050 21002	1K00 1% 0,1W	3320	4822 051 20183	18K00 5% 0,1W
3232	4822 050 21002	1K00 1% 0,1W	3321	4822 051 20221	220R00 5% 0,1W
3233	4822 050 21002	1K00 1% 0,1W	3322	4822 051 20183	18K00 5% 0,1W
3234	4822 050 21002	1K00 1% 0,1W	3323	4822 051 20008	0R00 5% 0,1W
3235	4822 050 21002	1K00 1% 0,1W	3327	4822 051 20008	0R00 5% 0,1W
3236	4822 050 21002	1K00 1% 0,1W	3330	4822 051 20229	22R00 5% 0,1W
3239	4822 051 20101	100R00 5% 0,1W	3331	4822 051 20153	15K00 5% 0,1W
3240	4822 051 20101	100R00 5% 0,1W	3332	4822 050 21002	1K00 1% 0,1W
3241	4822 051 20101	100R00 5% 0,1W	3333	4822 051 20221	220R00 5% 0,1W
3242	4822 051 20008	0R00 5% 0,1W	3334	4822 051 20221	220R00 5% 0,1W
3246	4822 050 21002	1K00 1% 0,1W	3335	4822 051 20221	220R00 5% 0,1W
3247	4822 051 20008	0R00 5% 0,1W	3336	4822 051 20221	220R00 5% 0,1W
3249	4822 051 20682	6K80 5% 0,1W	3337	4822 051 20221	220R00 5% 0,1W
3250	4822 051 20103	10K00 5% 0,1W	3338	4822 051 20221	220R00 5% 0,1W
3251	4822 051 20104	100K00 5% 0,1W	3340	4822 051 20221	220R00 5% 0,1W
3253	4822 050 21002	1K00 1% 0,1W	3341	4822 051 20221	220R00 5% 0,1W
3254	4822 051 20008	0R00 5% 0,1W	3342	4822 051 20221	220R00 5% 0,1W
3255	4822 051 20222	2K20 5% 0,1W	3343	4822 051 20221	220R00 5% 0,1W
3256	4822 051 20221	220R00 5% 0,1W	3344	4822 051 20221	220R00 5% 0,1W
3257	4822 051 20221	220R00 5% 0,1W	3401	4822 051 20472	4K70 5% 0,1W
3258	4822 051 20223	22K00 5% 0,1W	3402	4822 051 20104	100K00 5% 0,1W
3259	4822 051 20223	22K00 5% 0,1W	3403	4822 051 20123	12K00 5% 0,1W
3260	4822 051 20223	22K00 5% 0,1W	3404	4822 051 20101	100R00 5% 0,1W
3260	4822 051 20223	22K00 5% 0,1W	3405	4822 050 21002	1K00 1% 0,1W
3261	4822 051 20183	18K00 5% 0,1W	3406	4822 116 83705	24K 2% 0,2W
3262	4822 051 20183	18K00 5% 0,1W	3407	4822 051 20562	5K60 5% 0,1W
3263	4822 051 20473	47K00 5% 0,1W	3408	4822 051 20103	10K00 5% 0,1W
3264	4822 051 20103	10K00 5% 0,1W	3409	4822 052 10108	1R00 5% 0,33W
3265	4822 051 20103	10K00 5% 0,1W	3410	4822 052 10478	4R70 5% 0,33W
3266	4822 051 20222	2K20 5% 0,1W	3411	4822 052 10129	12R00 5% 0,33W
3267	4822 051 20222	2K20 5% 0,1W	3412	4822 051 20101	100R00 5% 0,1W
3268	4822 051 20224	220K00 5% 0,1W	3413	4822 051 20104	100K00 5% 0,1W
3270		75R00 1%	3415	4822 051 20123	12K00 5% 0,1W
3271	4822 051 20682	6K80 5% 0,1W	3416	4822 051 20223	22K00 5% 0,1W
3272	4822 051 20103	10K00 5% 0,1W	3417	4822 051 20473	47K00 5% 0,1W
3273	4822 051 20104	100K00 5% 0,1W	3418	4822 051 20223	22K00 5% 0,1W
3274	4822 051 20682	6K80 5% 0,1W	3419	4822 051 20182	1K80 5% 0,1W
3275	4822 051 20103	10K00 5% 0,1W	3420	4822 116 83706	5K1 2% 0,2W
3276	4822 051 20104	100K00 5% 0,1W	3421	4822 051 20183	18K00 5% 0,1W
3277	4822 051 20104	100K00 5% 0,1W	3422	4822 051 20154	150K00 5% 0,1W
3278	4822 051 20104	100K00 5% 0,1W	3422	4822 051 20224	220K00 5% 0,1W
3279	4822 051 20101	100R00 5% 0,1W	3424	4822 051 20223	22K00 5% 0,1W
3280	4822 051 20104	100K00 5% 0,1W	3425	4822 050 23308	3R30 1% 0,6W
3281	4822 051 20103	10K00 5% 0,1W	3426	4822 051 20302	3K00 5% 0,1W
3290	4822 051 20105	1M00 5% 0,1W	3427	4822 052 10108	1R00 5% 0,33W
3293	4822 051 20222	2K20 5% 0,1W	3428	4822 051 20302	3K00 5% 0,1W
3296	4822 116 40238	0R46 - 60V	3429	4822 051 20339	33R00 5% 0,1W
3297	4822 116 40238	0R46 - 60V	3430	4822 051 20113	11K00 5% 0,1W
3302	4822 051 20104	100K00 5% 0,1W	3431	4822 051 20124	120K00 5% 0,1W
3303	4822 051 20221	220R00 5% 0,1W	3432		3M3 5% 0,1W
3304	4822 050 21002	1K00 1% 0,1W	3433	4822 051 20154	150K00 5% 0,1W
3305	4822 050 21002	1K00 1% 0,1W	3435	4822 051 20563	56K00 5% 0,1W
3306	4822 051 20103	10K00 5% 0,1W	3436	4822 051 20394	390K00 5% 0,1W
3307	4822 051 20103	10K00 5% 0,1W	3437	4822 051 20823	82K00 5% 0,1W
3308	4822 050 21002	1K00 1% 0,1W	3438	4822 052 10478	4R70 5% 0,33W
3309	4822 051 20008	0R00 5% 0,1W	3439	4822 116 52186	22E 5% 0,5W
3310	4822 051 20008	0R00 5% 0,1W	3440	4822 051 20472	4K70 5% 0,1W
3311	4822 051 20008	0R00 5% 0,1W	3441	4822 051 20473	47K00 5% 0,1W
3312		75R00 1%	3442	4822 051 20104	100K00 5% 0,1W
3313		75R00 1%	3443	4822 051 20913	91K00 5% 0,1W
3314		75R00 1%	3444	4822 051 20122	1K20 5% 0,1W

Item	Codenummer	Description	Item	Codenummer	Description
3445	4822 051 20332	3K30 5% 0,1W	3516	4822 051 20105	1M00 5% 0,1W
3446	4822 051 20562	5K60 5% 0,1W	3517	4822 050 25102	5K10 1% 0,6W
3447	4822 051 20154	150K00 5% 0,1W	3518	4822 051 20472	4K70 5% 0,1W
3448	4822 051 20472	4K70 5% 0,1W	3519	4822 050 25102	5K10 1% 0,6W
3449	4822 051 20472	4K70 5% 0,1W	3520	4822 052 10338	3R3 5% 0,33W
3450	4822 051 20333	33K00 5% 0,1W	3521	4822 050 22202	2K20 1% 0,6W
3451	4822 051 20684	680K00 5% 0,1W	3522	4822 051 20105	1M00 5% 0,1W
3452	4822 051 20204	200K00 5% 0,1W	3523	4822 050 25102	5K10 1% 0,6W
3454	4822 052 10108	1R00 5% 0,33W	3524	4822 051 20105	1M00 5% 0,1W
3455	4822 052 10108	1R00 5% 0,33W	3525	4822 051 20101	100R00 5% 0,1W
3456	4822 051 20223	22K00 5% 0,1W	3526	4822 051 20101	100R00 5% 0,1W
3457	4822 051 20223	22K00 5% 0,1W	3527	4822 051 20101	100R00 5% 0,1W
3458	4822 051 20223	22K00 5% 0,1W	3528	4822 051 20101	100R00 5% 0,1W
3459	4822 051 20223	22K00 5% 0,1W	3529	4822 051 20221	220R00 5% 0,1W
3460	4822 051 20223	22K00 5% 0,1W	3530	4822 050 21103	11K00 1% 0,6W
3462	4822 051 20223	22K00 5% 0,1W	3531	4822 050 21103	11K00 1% 0,6W
3463	4822 052 10478	4R70 5% 0,33W	3532	4822 051 20681	680R00 5% 0,1W
3464	4822 051 20224	220K00 5% 0,1W	3533	4822 050 21503	15K00 1% 0,6W
3465	4822 051 20223	22K00 5% 0,1W	3534	4822 051 20101	100R00 5% 0,1W
3466	4822 051 20223	22K00 5% 0,1W	3535	4822 050 22202	2K20 1% 0,6W
3467	4822 051 20222	2K20 5% 0,1W	3538	4822 051 20103	10K00 5% 0,1W
3468	4822 051 20223	22K00 5% 0,1W	3539	4822 051 20103	10K00 5% 0,1W
3469	4822 051 20223	22K00 5% 0,1W	3540	4822 050 14709	47R00 1% 0,4W
3470	4822 051 20103	10K00 5% 0,1W	3541	4822 051 20472	4K70 5% 0,1W
3471	4822 051 20223	22K00 5% 0,1W	3542	4822 051 20103	10K00 5% 0,1W
3472	4822 116 83084	27K 2% 0,2W	3543	4822 051 20472	4K70 5% 0,1W
3473	4822 051 20203	20K00 5% 0,1W	3544	4822 051 20103	10K00 5% 0,1W
3474	4822 116 83084	27K 2% 0,2W	3545	4822 051 20223	22K00 5% 0,1W
3475	4822 116 83084	27K 2% 0,2W	3546	4822 051 20103	10K00 5% 0,1W
3476	4822 116 83084	27K 2% 0,2W	3547	4822 051 20472	4K70 5% 0,1W
3478	4822 116 52186	22E 5% 0,5W	3548	4822 050 24708	4R70 1% 0,6W
3479	4822 051 20104	100K00 5% 0,1W	3549	4822 051 20471	470R00 5% 0,1W
3480	4822 051 20222	2K20 5% 0,1W	3550	4822 050 21103	11K00 1% 0,6W
3481	4822 052 10338	3R3 5% 0,33W	3551	4822 050 21103	11K00 1% 0,6W
3482	4822 051 20223	22K00 5% 0,1W	3552	4822 051 20681	680R00 5% 0,1W
3483		75R00 1%	3553	4822 050 21503	15K00 1% 0,6W
3484	4822 051 20912	9K10 5% 0,1W	3554	4822 050 21001	100R00 1% 0,6W
3485	4822 051 20392	3K90 5% 0,1W	3555	4822 050 22202	2K20 1% 0,6W
3486	4822 051 20152	1K50 5% 0,1W	3558	4822 051 20103	10K00 5% 0,1W
3487	4822 051 20101	100R00 5% 0,1W	3560	4822 051 20103	10K00 5% 0,1W
3488	4822 051 20224	220K00 5% 0,1W	3561	4822 051 20472	4K70 5% 0,1W
3489	4822 052 10478	4R70 5% 0,33W	3562	4822 050 24708	4R7 1% 0,6W
3490	4822 051 20223	22K00 5% 0,1W	3563	4822 051 20471	470R00 5% 0,1W
3491	4822 051 20105	1M00 5% 0,1W	3570	4822 051 20473	47K00 5% 0,1W
3492	4822 052 10108	1R00 5% 0,33W	3571	4822 051 20473	47K00 5% 0,1W
3493	4822 051 20154	150K00 5% 0,1W	3572	4822 051 20103	10K00 5% 0,1W
3494		3M3 5% 0,1W	3573	4822 051 20103	10K00 5% 0,1W
3495	4822 051 20101	100R00 5% 0,1W	3574	4822 051 20103	10K00 5% 0,1W
3497	4822 051 20008	0R00 5% 0,1W	3601	4822 051 20394	390K00 5% 0,1W
3501	4822 052 10338	3R3 5% 0,33W	3602	4822 051 20105	1M00 5% 0,1W
3502	4822 052 10478	4R70 5% 0,33W	3603	4822 051 20105	1M00 5% 0,1W
3503	4822 052 10478	4R70 5% 0,33W	3604	4822 051 20153	15K00 5% 0,1W
3504	4822 051 20103	10K00 5% 0,1W	3606	4822 050 21003	10K00 1% 0,6W
3505	4822 051 20223	22K00 5% 0,1W	3607	4822 050 21003	10K00 1% 0,6W
3506	4822 051 20473	47K00 5% 0,1W	3608	4822 051 20223	22K00 5% 0,1W
3507	4822 051 20103	10K00 5% 0,1W	3609	4822 051 20223	22K00 5% 0,1W
3508	4822 051 20103	10K00 5% 0,1W	3610	4822 051 20223	22K00 5% 0,1W
3509	4822 051 20223	22K00 5% 0,1W	3611	4822 050 22202	2K20 1% 0,6W
3510	4822 051 20472	4K70 5% 0,1W	3612	4822 050 21802	1K80 1% 0,6W
3511	4822 052 10338	3R3 5% 0,33W	3613	4822 050 21002	1K00 1% 0,6W
3513	4822 050 25102	5K10 1% 0,6W	3614	4822 050 28201	820R00 1% 0,6W
3514	4822 050 22202	2K20 1% 0,6W	3615	4822 051 20104	100K00 5% 0,1W
3515	4822 051 20105	1M00 5% 0,1W	3616	4822 051 20104	100K00 5% 0,1W

Item	Codenumber	Description	Item	Codenumber	Description
3620	4822 051 10102	1K00 2% 0,25W	5222		EMI FILTER 1nF/100V
3621	4822 051 20221	220R00 5% 0,1W	5223		EMI FILTER 1nF/100V
3622	4822 051 20561	560R00 5% 0,1W	5224		EMI FILTER 1nF/100V
3623	4822 051 10102	1K00 2% 0,25W	5225		EMI FILTER 220pF/100V
3624	4822 051 20221	220R00 5% 0,1W	5226		EMI FILTER 220pF/100V
3625	4822 051 20561	560R00 5% 0,1W	5227		EMI FILTER 1nF/100V
3626	4822 051 10102	1K00 2% 0,25W	5240	4822 242 81394	30.209 800 MC
3627	4822 051 20221	220R00 5% 0,1W	5240	4822 242 81419	30.0000 MC
3628	4822 051 20561	560R00 5% 0,1W	5301	4822 242 81395	45.158 400 MC
3630	4822 051 20123	12K00 5% 0,1W	5302	4822 242 81393	19.357 000 MC
3632	4822 052 10338	3R3 5% 0,33W	5401	4822 242 72527	CST 4,00MGW-TF01
3633	4822 052 10338	3R3 5% 0,33W	5501		CHOKE
3634	4822 051 10102	1K00 2% 0,25W	5502		CHOKE
3635	4822 051 20273	27K00 5% 0,1W	5503		CHOKE
3636	4822 051 10102	1K00 2% 0,25W	5504		EMI FILTER 22nF/100V
3537		200R00 5% 0,1W	5602	4822 242 81397	3.579 000 MC
3638	4822 051 10102	1K00 2% 0,25W	5603		EMI FILTER 22nF/100V
3639	4822 051 20393	39K00 5% 0,1W	5630	4822 157 53906	47uH
3640	4822 051 20223	22K00 5% 0,1W	5631	4822 320 40247	DELAY LINE 275 nSEC
3641	4822 051 20471	470R00 5% 0,1W	5632	4822 157 53259	COIL 166NNF10264AG
3642	4822 051 20681	680R00 5% 0,1W	5633		EMI FILTER 22nF/100V
3643		300R00 5% 0,1W	5648		EMI FILTER 1nF/100V
3644	4822 051 20151	150R00 5% 0,1W	5649		EMI FILTER 220pF/100V
3645	4822 051 20689	68R00 5% 0,1W	5650		EMI FILTER 220pF/100V
3646	4822 051 20221	220R00 5% 0,1W	5651		EMI FILTER 220pF/100V
3647	4822 051 20221	220R00 5% 0,1W	5652		EMI FILTER 220pF/100V
3648	4822 051 20221	220R00 5% 0,1W	5653		EMI FILTER 1nF/100V
3650	4822 051 20689	68R00 5% 0,1W			
3651	4822 051 20151	150R00 5% 0,1W	6301	4822 130 31983	BAT85
3652	4822 051 20151	150R00 5% 0,1W	6401	5322 130 30684	1N4002
3653	4822 051 20689	68R00 5% 0,1W	6402	5322 130 30684	1N4002
3654		75R00 1%	6403	4822 130 31981	BZX79-B3V9
3655	4822 051 20393	39K00 5% 0,1W	6404	4822 130 31981	BZX79-B3V9
3656	4822 051 20153	15K00 5% 0,1W	6510	5322 130 34885	1N5817
3657	4822 051 20471	470R00 5% 0,1W	6601	4822 130 31129	BB212
3658	4822 051 20681	680R00 5% 0,1W	6680	4822 130 34197	BZX79-C12
3659	4822 051 20271	270R00 5% 0,1W			
3660	4822 051 20151	150R00 5% 0,1W	7110	4822 209 32148	TMS45165-70-DGE
3661	4822 051 20689	68R00 5% 0,1W	7118	4822 209 32148	TMS45165-70-DGE
3662	4822 051 20152	1K50 5% 0,1W	7120	4822 209 31292	MC44200
3670	4822 051 20472	4K70 5% 0,1W	7121	5322 209 60189	PC74HCT4053T
3671	4822 052 10108	1R00 5% 0,33W	7125		MCDI460-VDSC
3673	4822 051 20223	22K00 5% 0,1W	7201		SCC68070CCA84
3678	4822 051 20223	22K00 5% 0,1W	7203	5322 130 41983	BC858B
3680	4822 051 10102	1K00 2% 0,25W	7206	4822 209 32101	MC68H05/ZC405170R3.2
3681	4822 050 23301	330R00 1% 0,6W	7207	5322 209 71568	PC74HCT14T
3685	4822 052 10228	2R20 5% 0,33W	7208	5322 209 71568	PC74HCT14T
			7209	5322 130 41982	BC848B
5150		EMI FILTER 22nF/100V	7211	4822 209 32098	SYST.SOFTW. 3.0R1.2
5201	4822 242 81398	4.915 000 MC	7212	4822 209 30704	MC74HCU04D
5203	4822 242 81396	4.000 000 MC	7215	4822 209 32147	MC74ACT04DC
5210	4822 157 70378	EMI FILTER 22nF/16V	7216	5322 209 11596	PC74HCT08T
5211		EMI FILTER 1nF/100V	7217	4822 209 30696	MC74ACT74DR2
5212		EMI FILTER 1nF/100V	7218	5322 209 11599	PC74HCT32T
5213		EMI FILTER 1nF/100V	7224	4822 209 30554	MK48T08B15
5214		EMI FILTER 1nF/100V	7225	4822 209 72587	TCA0372D2
5215		EMI FILTER 22nF/100V	7244	4822 209 61547	MC34064D
5216	4822 157 70378	EMI FILTER 22nF/16V	7245	4822 209 72587	TCA0372D2
5217		EMI FILTER 1nF/100V	7247	4822 209 32068	MC74ACT125D
5218		EMI FILTER 1nF/100V	7249	5322 209 61434	N74F02D
5219		EMI FILTER 1nF/100V	7250	4822 130 41982	BC848B
5220		EMI FILTER 1nF/100V	7301		IMS66490/1 CDIC'
5221		EMI FILTER 1nF/100V	7302	4822 209 32146	MC74ACT244DWR2

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